Badlands Observatory

Quinn, SD

"A privately owned facility dedicated to Astronomical Research & Education"

www.sdsmt.edu/space/bo.htm

<u>Day #1</u> -- 100 degrees in the shade...and no shade!!

Almost ready to lay the floor.

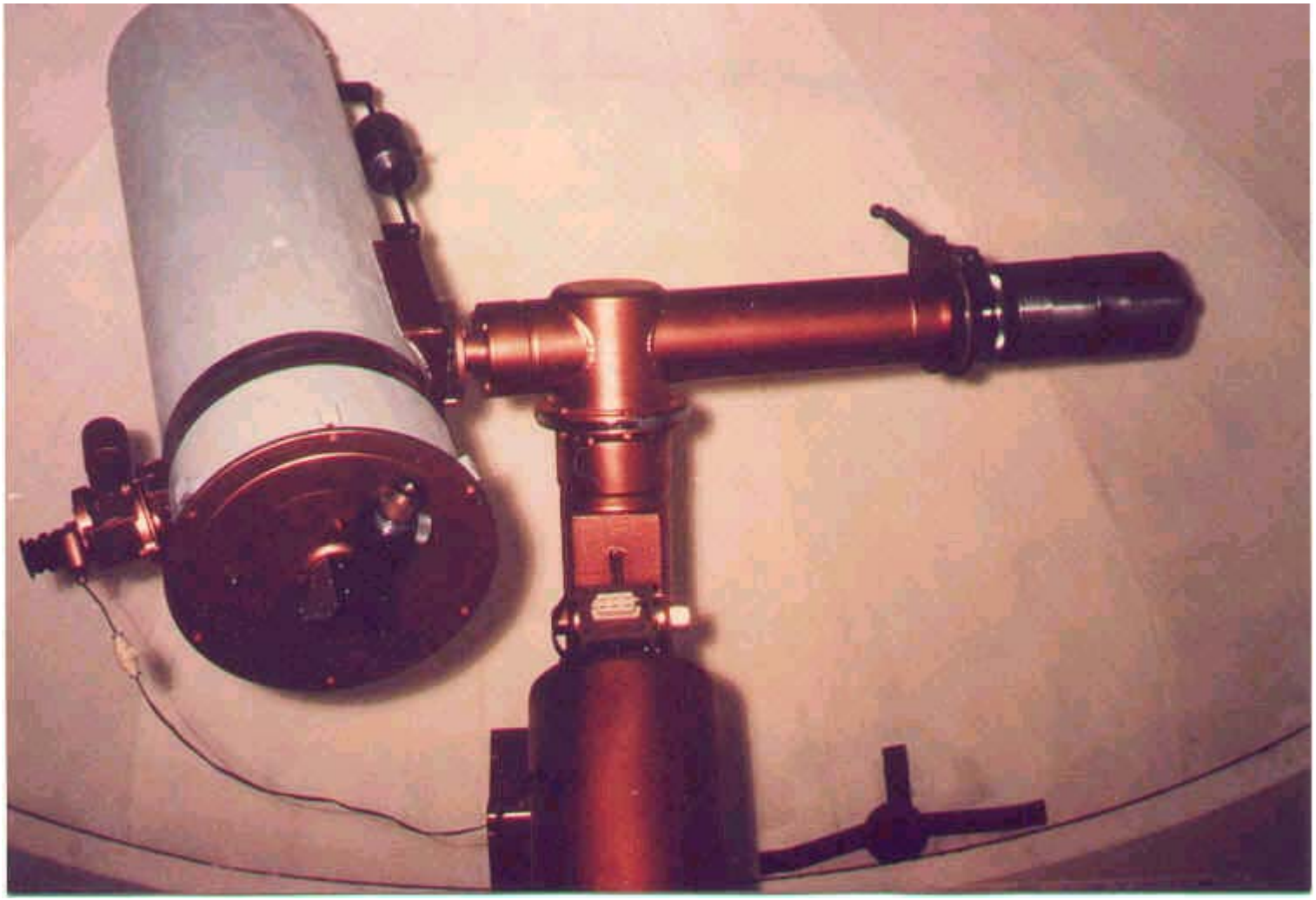
The walls are nearly finished.

Setting the base ring for the dome

Dome panels had been constructed ahead of time, and then assembled on site.

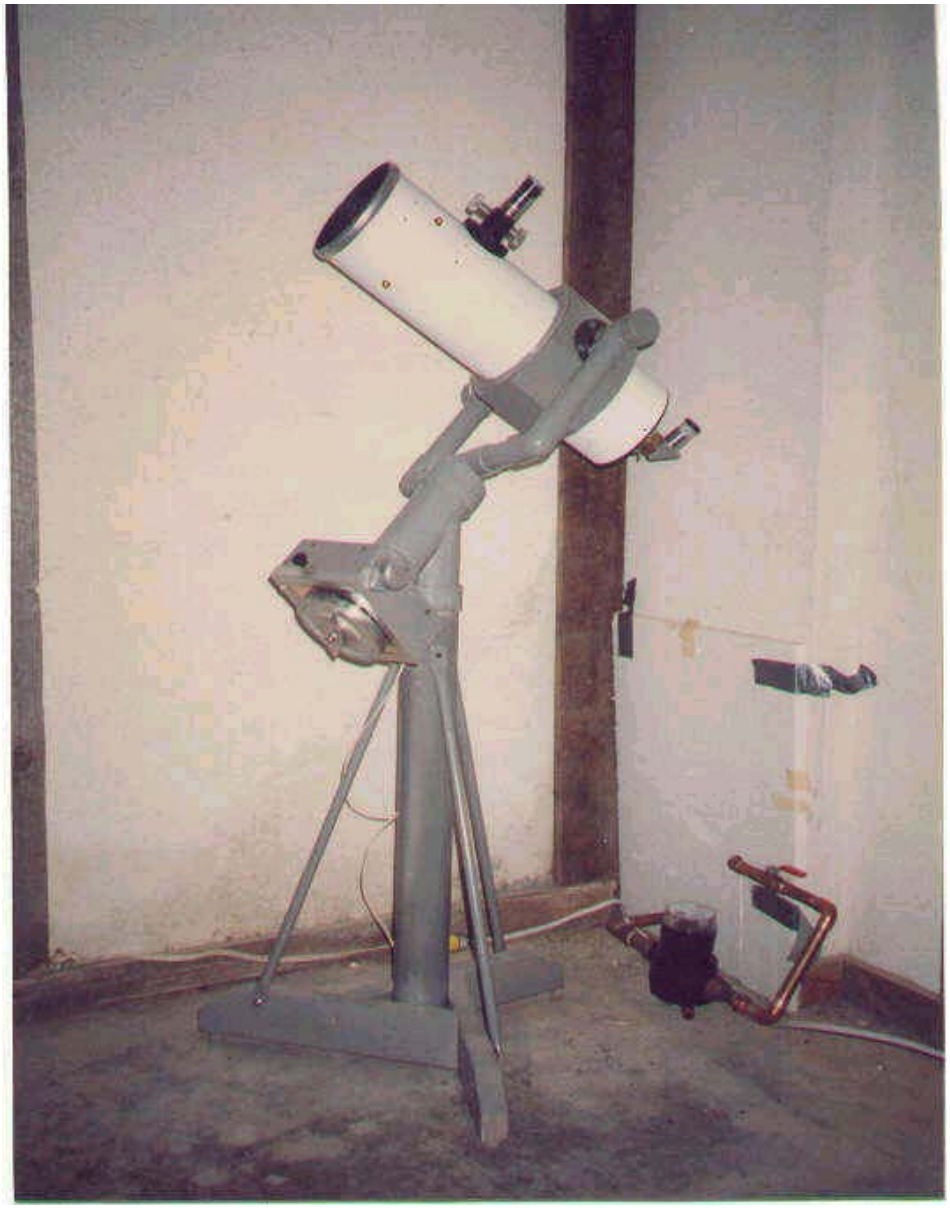
View from the inside

Weep your heart out, Darth Vader!! The black coating is a special rubber undercoat used before the final white coats.



1963 --This 12.5" Dall-Kirkham reflector was built for Hidden Valley Observatory in Rapid City, SD.

1975--This is a replica of the first reflecting telescope invented by Sir Isaac Newton in 1668.



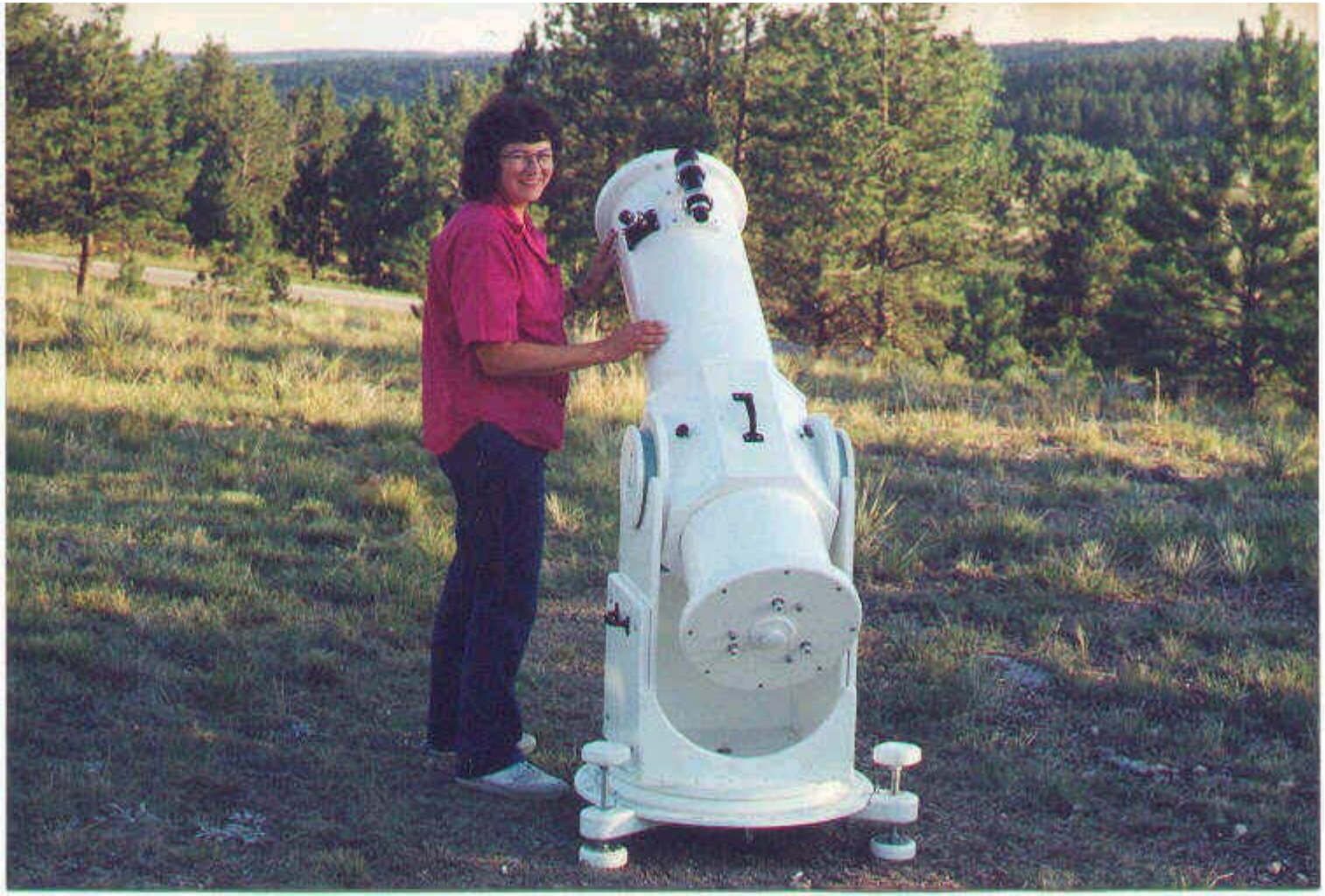
1984 -- 6" Newtonian/Cassegrain combination telescope was built for less than $100.

1986--This vintage-style brass refractor used an objective lens manufactured by the A. Jaegers Co. It was featured in the December 1986 issue of Sky & Telescope magazine. This was not a replica of a particular antique instrument, rather an original design employing the methods and materials prevalent in the 19th century.

1986--The vintage refractor was made to disassemble for transport via these mahogany cases.

1992 -- 6" f/8 Dobsonian was made for use at Hidden Valley Observatory. Optics by Michael O'Connor, and telescope by Ron Dyvig.

1993--8" f/8 Dobsonian made for use at Hidden Valley Observatory.



1994-- 10" f/5.0 Dobsonian made for use at Hidden Valley Observatory. The telescope was constructed by Steve Parker and the optics fabricated by Ron Dyvig

1995 -- 26” Dobsonian Test Telescope

Machine shop layout of basic components

Badlands Observatory after fire of Dec. 30, 1998

Badlands Observatory Fire Damage - Inside

Hoisting the fork

Setting the fork

Lowering the tube assembly

Badlands Observatory

Systems Control Room

Badlands Observatory 26" f/4.8 Newtonian Telescope

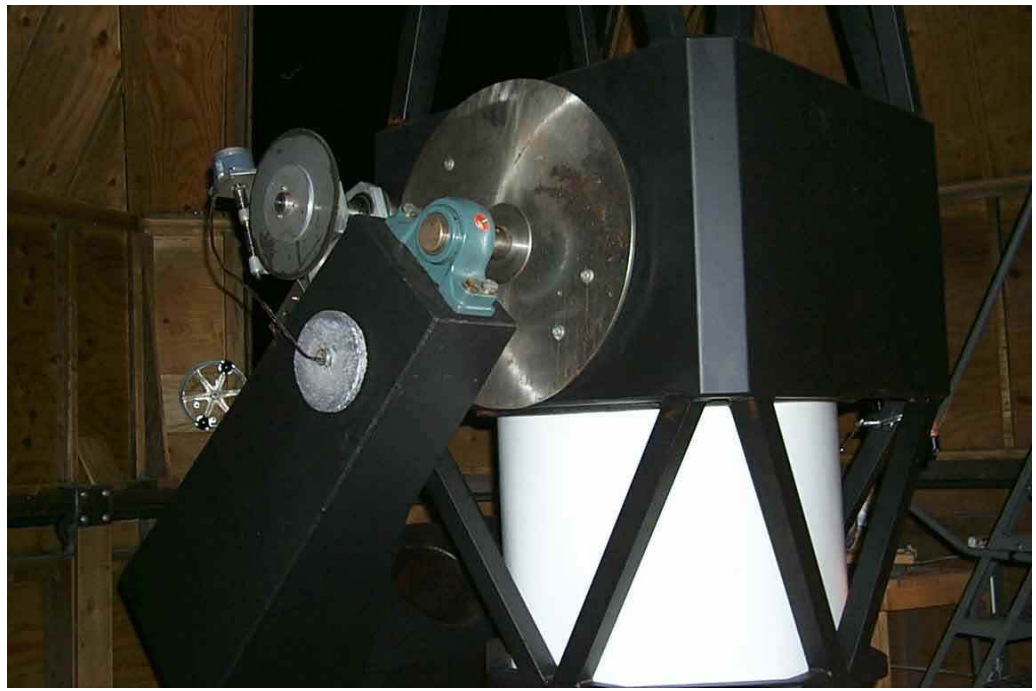
Badlands Observatory

Telescope's "Polar Axis"

Badlands Observatory

Right Ascension friction-disk drive system

Declination friction-disk drive system



Since these images were taken, the telescope has been upgraded to steel belt drive.

Badlands Observatory - Image shows viewing port on upper end of the tube assembly. Ron Dyvig is on top of the stair platform adjusting the ST-8 CCD camera.

Asteroid Research at Badlands Observatory

MPC Site Code 918

Asteroid observations from around the world are submitted to the Minor Planet Center (MPC). The MPC operates at the Smithsonian Astrophysical Observatory, which is part of the Harvard-Smithsonian Center for Astrophysics. It falls under the auspices of the International Astronomical Union (IAU). In order for observations to be accepted into MPC's database, an observatory must first satisfy requirements that include taking several images of a low numbered, well known asteroid, and performing the astrometry (positional measurements) on them. If MPC is satisfied with the results, an official observatory site code number is issued which allows future observations to be accepted.

Observation Summary

August, 2000 - Current

- **Reports sent to MPC..... 138**
- **Main belt asteroid positions..... 1,935**
- **NEO positions..... 593**
- **NEO confirmations..... 126 (including 6 comets)**
- **Main belt asteroids discovered..... 28**

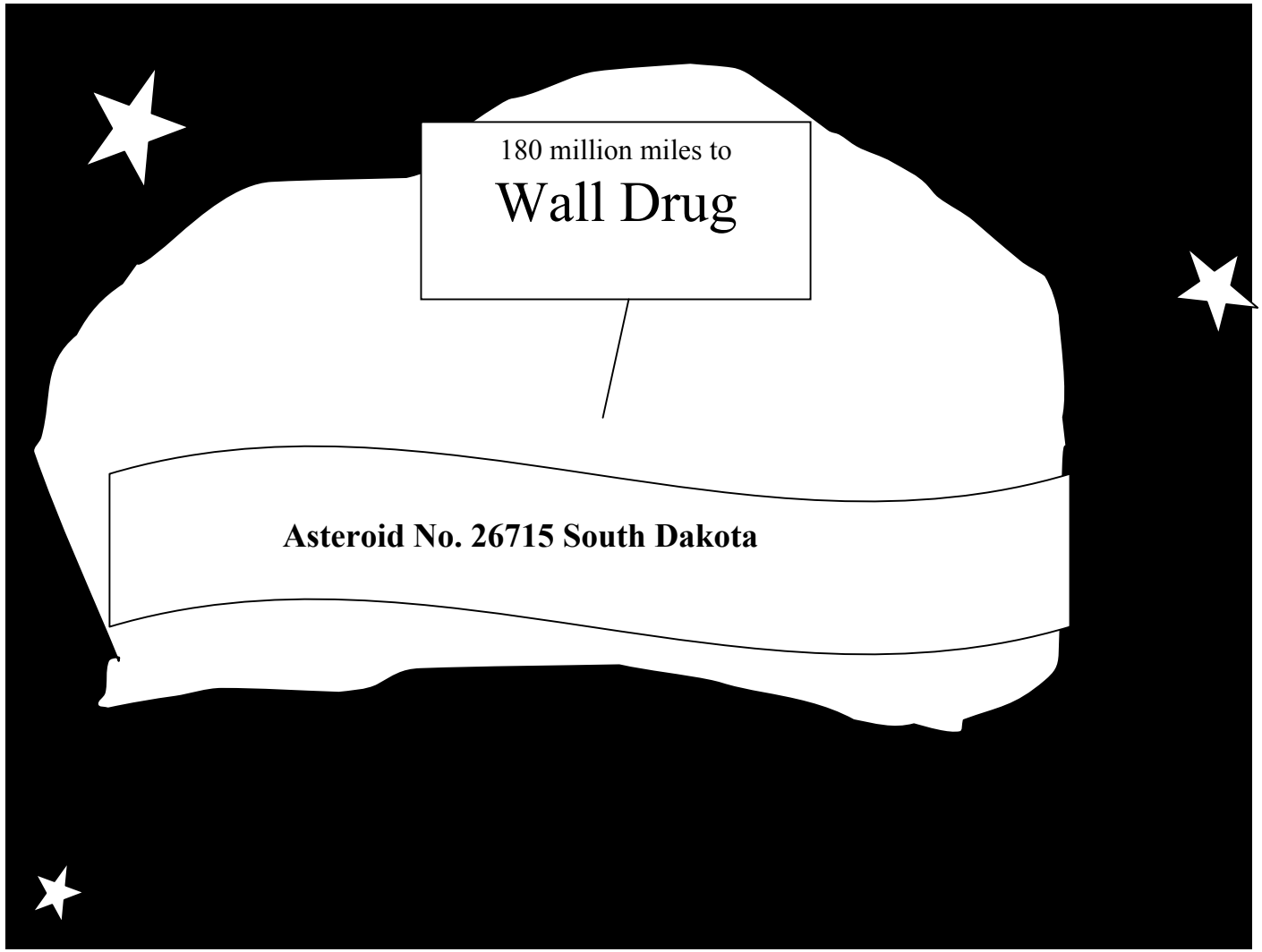
Asteroid No. 26715 South Dakota
Discovered at Badlands Observatory by Ron Dyvig

Presentation of plaque to Governor William J. Janklow commemorating the naming
of asteroid No. "26715 South Dakota". April 29, 2002.

l to r: Ron Dyvig of Badlands Observatory, Governor Janklow, and Dr. Sherry Farwell
and Tom Durkin of the SD Space Grant Consortium.

Plaque Inscription:

"Presented to the state of South Dakota in commemoration of the official naming of asteroid No. 26715 SOUTH DAKOTA by the International Astronomical Union (IAU) on March 28, 2002. No. 26715 SOUTH DAKOTA is a main-belt asteroid located between the orbits of Mars and Jupiter, and has a diameter of approximately 3 miles. It was discovered by Ron Dyvig using the 26-inch telescope located at Badlands Observatory, Quinn, SD on April 16, 2001."


180 million miles to
Wall Drug
Asteroid No. 26715 South Dakota

Science Fair Projects
Completed Using the Facilities at Badlands Observatory

2002 The Size and Distance to the Andromeda Galaxy

High Plains Regional Science Fair
South Dakota School of Mines and Technology

Intel International Science and Engineering Fair
Louisville, Kentucky

Congratulations Ashley Nord

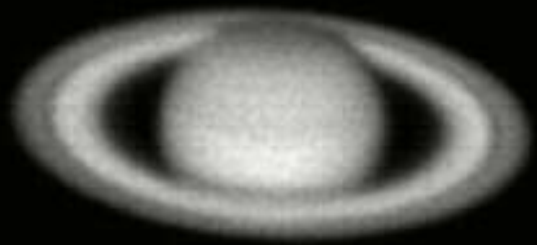
Stevens High School, Rapid City, South Dakota

Minor Planet (12,501) Nord was named in honor of Ashley by the Ceres Connection, a joint effort between Lincoln Laboratory and Intel Science Service.

Moon - 12/25/01, 0.11 second exposure, revealing the southern lunar hemisphere containing the famous crater Clavius; location of the well-known lunar base from Arthur C. Clark's ***2001 Space Odyssey***.

Images from Badlands Observatory

Saturn



Taken at Badlands Observatory on 12/25/01; exposure 0.11 seconds.

NGC 7635 The Bubble Nebula in Cassiopeia: 8/29/00, Exposure 60 seconds --This interesting object is thought to be a rather rare example of a very massive star, with an extremely strong stellar wind, located within a gas cloud. It can be seen that this outward wind results in an expanding shock-wave which forms this "bubble" in space. The "bubble" itself is estimated to be about 10 light years across.

M-13 Great Globular Star Cluster in Hercules: 8/12/01, Exposure 60 seconds --Brightest globular star cluster visible from the northern latitudes. Contains 100,000 to 500,000 stars, and is located about 22,000 light years away. There are approximately 150 of these clusters within our Milky Way galaxy, and they are among the oldest objects known.

M-42 Great Nebula in Orion - 03/29/03. This unguided, 11 minute cumulative exposure of M-42 (the Great Nebula in Orion) was taken by Ron Dyvig at Badlands Observatory, demonstrating the wide-field capability of the new 114mm Vixen refractor with the SBIG ST-8 CCD camera. This new telescope is riding piggyback on the 26" telescope.

Images from Badlands Observatory

<u>M-16 The Eagle Nebula in Serpens:</u> 7/19/01, Exposure 180 seconds --The Eagle Nebula is a star forming region where new stars are currently being condensed from interstellar gas and dust. This is the material left over from previous supernova explosions. The dark columns visible here, are also known as the "Pillars of Creation" and were made famous in an image taken with the Hubble Space Telescope.

Announcing

You can have remote access to Badlands Observatory via the Internet

YOU CAN...

On-line capabilities by remote client:

- ***Use your computer and internet access to link to the navigation and control systems on the Badlands Observatory server***
- ***Select targets for imaging from a database of 19 million catalogued objects and view in simulated mode using "The Sky" planetarium-style software.***
- ***Control the movement of the dome and telescope by slewing to the targets of your choice in real-time.***
- ***Control the on-board CCD camera to image stars, galaxies, nebulae and solar system objects and download them to your computer.***

Research grade instrumentation available to scientists, educators, classrooms, students and the public

M-51 "Whirlpool Galaxy" (a Spiral Galaxy in Canes Venatici):acquired 04/09/03 by Teresa Hofer.

Images from Badlands Observatory

She was operating the telescope and camera system remotely from her home in Rapid City, South Dakota, (about 60 miles away) demonstrating the new Internet access capability for Badlands Observatory.

In addition, the new Apogee AP-8 CCD camera was being used. It has nearly 5 times the field of view (FOV), and twice the sensitivity of the SBIG ST-8 camera. Exposure: Four 30 second images combined to a 2 minute image.

Images from Badlands Observatory

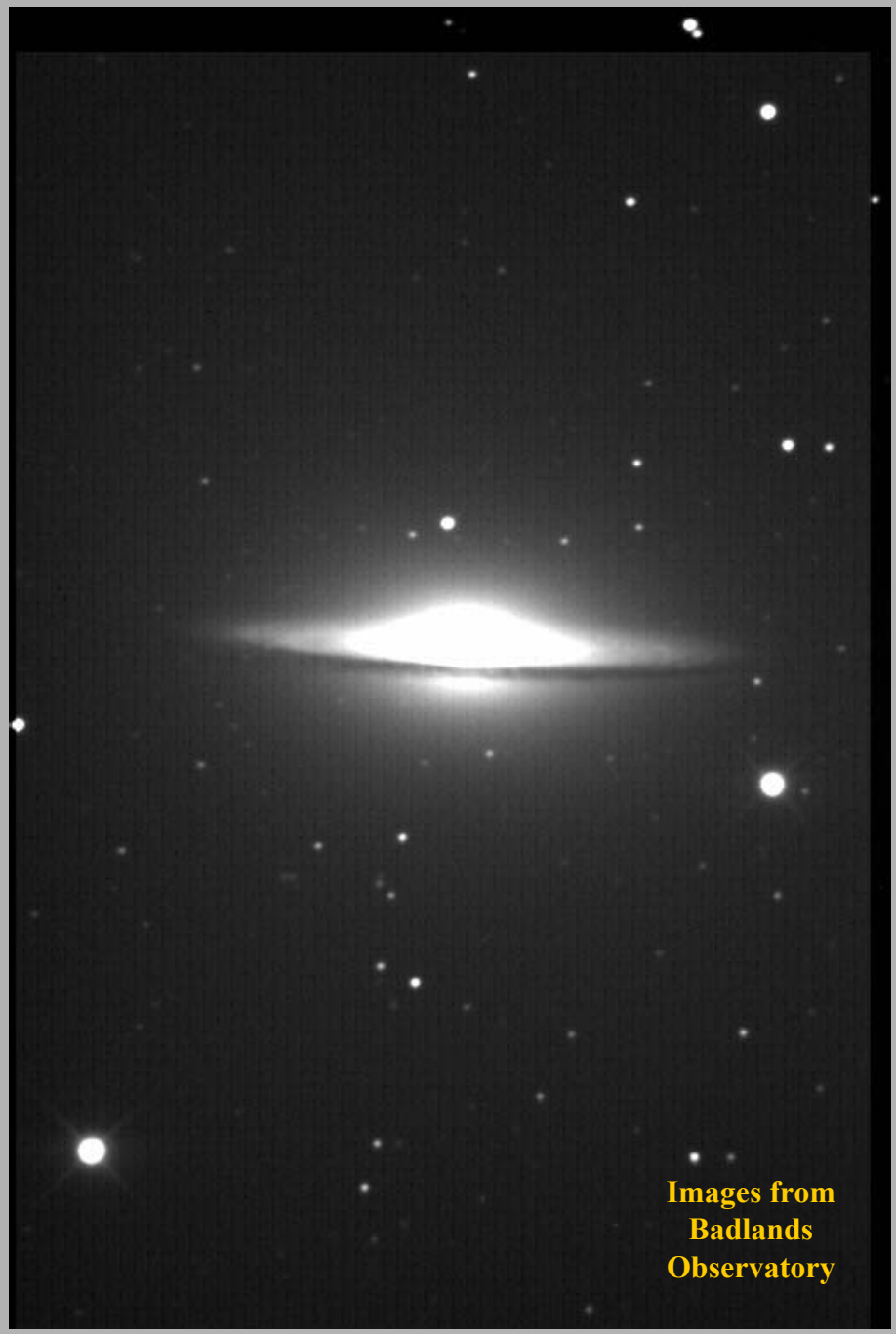
<u>NGC 891 Spiral Galaxy in Andromeda:</u> 9/7/00, Exposure 100 seconds --This galaxy, also similar to our own Milky Way, is seen almost exactly edge on. The dust lanes in its spiral arms are clearly visible in this view. Galaxies, such as this, contain upwards of 100 billion stars each. It is estimated to be about 31 million light years away.

Images from Badlands Observatory

NCG 4565 the "Spindle Galaxy" in *Coma Bernices*

4/18/01; 120 second exposure.

Arguably the most beautiful and most famous of all the edge on spiral galaxies. It is estimated to be located about 31 million light years away. As with our own Milky Way galaxy, NGC 4565 has a prominent obscuring band of dust around its equatorial region.



M-104 The Sombrero Galaxy in Virgo: 4/20/01, This is a composite made by adding together individual 120, 60, 60, and 60 second exposures. -- This famous spiral galaxy is seen nearly edge on, and is located about 50 million light years away.

Badlands Observatory

is an Educational Affiliate of the

South Dakota Space Grant Consortium