

Astronomical Adventures

An Occasional Series on Building, Outfitting and Operating a Remote Observatory

By Manny Leinz

The first two parts of this series detailed the initial steps to realizing my dream of building a remotely operable astronomical observatory, from planning through building, and first light. Episodes 1 and 2 were featured in this year's March and June editions of Prime Focus, respectively.

Episode 3 – From Usable to Functional

Where Do I Put My Stuff?

Even before the observatory achieved first light back in January of 2018, I knew that there was work required in order to really make it functional – from within the building, much less remotely. A place was needed to put eyepieces and other tools; AC and DC power would need to be routed to the telescope and other subsystems on the pier; and a computer would be needed to control the observatory systems, including roof, telescope, and imaging equipment.

The Pier

The first order of business was to install eyepiece shelves on the pier. After considering various approaches, I settled on a two tiered design, with the top shelf remaining clear to provide essentially a small table. The bottom shelf provides room for 2" and 1 1/4" eyepieces and is suspended from the top shelf via carriage bolts and locknuts. The bolts I covered with aluminum sleeves which act as spacers to firmly hold the shelf assembly together. I decided on an octagonal shape for the shelves – to facilitate moving around the pier – sized to just clear the telescope counterweight bar. Each shelf is made of 3/8" plywood and surrounded by a molding "fence" to minimize the potential for expensive hardware to roll onto the floor. Clearance holes for cables were cut into the top shelf, with the unused ones later covered with cap plugs. Finally I painted the entire structure black to match the pier.

I placed red LED adhesive strip lights under the CGEM mount adapter and the top pier shelf to provide illumination. Strips of aluminum provide a secure mounting surface and heat sink for the LEDs.

The lights, power supply and dimmer were available online at a very reasonable price.



Top and Bottom Bottom Pier Shelf Illumination
(Note Dimmer in Bottom Photo)



Pier North Side With Power Strip (Top) and
Adhesive-Mounted Power Bricks

Of course various subsystems on the pier require DC power supplies: the aforementioned LED strips, USB hub, telescope mount and – later – the imaging camera and electronic focuser. The power supplies require an AC input, and thus a power strip on the pier is another needed accessory. I mounted the power strip under the bottom shelf, and used strong double-sided tape – XFasten Acrylic – to mount the DC supplies to the pier.

The Computer

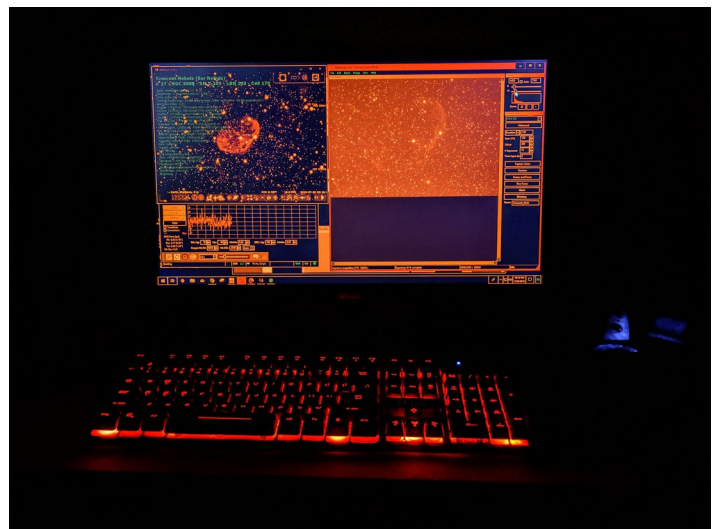
These days every amateur observatory – certainly one that is intended for imaging – requires a computer; and a computer requires a desk. Given the tight confines of my observatory – 8' x 15' with two piers – I decided on a corner desk. Two sheets of ½ inch plywood, arranged with grains crossing, and anchored to the walls with 2 x 4's provided a mounting surface strong enough to stand on with no legs or braces required. A black melamine surface is planned later as the observatory interior is finished.



Pier Shelves and Computer Desk (Note Temporary Mount Power Supply and conduit to PC Desk)

An old windows PC outfitted with an upgraded CPU and motherboard provides a more than adequate observatory control center. A wireless mouse, 22 inch monitor and a keyboard with red backlight completed the configuration.

Of course a red display is essential to maintain dark adaptation and the traditional method is to apply “Rubylith” or similar film to the monitor. However, seeking a software solution I stumbled on this free method: <https://www.atm-workshop.com/win10-red-mode.html>. Switching to Windows “Night Light” mode and turning the monitor brightness down all the way are required to complete the transition from Day to Night display configurations. It’s not perfect, but it works fine for me alone in the observatory. (A word of caution: this approach may yet be too bright for your neighbors at a star party!)



The Observatory PC Showing Off Its Red Display Mode and Backlit Keyboard (NGC6888 imaging in progress)

With these initial steps, the observatory is now functional to the point where observing and imaging from within the building are reasonably efficient and comfortable. Of course, at this stage the observatory is still a far cry from being operable remotely. Many more steps will be required to make it operational over distances of hundreds of yards, to hundreds of miles. Those initial steps in autonomy will be the topic of the next installment of this series.

Next Episode: Autonomy by Baby Steps