Caster and Track System for Roll-Off-Roof Observatories

By: Jeff Beish

During a trip to Flagstaff, Arizona in the early 1980's this author and a friend visited well-known variable star observer Bob Fried and was delighted with a tour of his backyard observatory. His observatory had a dome made from a 14-foot silo roof that housed a computer controlled 16-inch Classical Cassegrain. A Personal Computer (PC) automated the operation of both the telescope and dome -- including a rain detection to shut down operation in bad weather.

An interesting feature to Bob's observatory was the method he used to support and to rotate the dome. Rolling on casters the dome rolled on a chain-link fence top rail and casters. The rail was shaped into a circle and connected at the ends; therefore the casters would roll and guide the dome around in a complete rotation. One caster was connected to a motor and gearbox. The casters are the type used for automatic chain-link fence gates often found at industrial parks or military installations that are surrounded by high fences. Casters and fence rails can be found at a local store that installs and sells parts for various types of fences. The particular casters he used are 5-inch inside diameter with a half-inch outer rim. They will fit onto 1.5-inch or 1.625-inch diameter rails or water pipes. This method operated Bob's dome simply and smoothly.

After returning home this author decided to replace the worn out roll-off-roof observatory roller assembly (conventional "channel" system) and install fence rails and casters ("track" system). The older method applied several small hard-rubber casters that rolled onto a strip of metal angle. This method worked fairly well; however, quite often dirt, leaves and other debris would collect onto the top rail/guide and interfere with its operation. Also, the roof would occasionally jam against rail or hop over the guide and make if difficult to quickly open or close the roof. Obviously this design could have been improved upon. The cost of the rails and casters was about the same as the old system. The cost in 1982 was approximately $60 for the casters and top rails.

Using the chain-link fence rails and casters seemed to be a much simpler and more efficient way to go. Since the observatory roof weighed 300 pounds only four 5-inch casters were used at each corner. These particular casters are capable of supporting much more weight; therefore, a heavier roof could have been used quite easily.

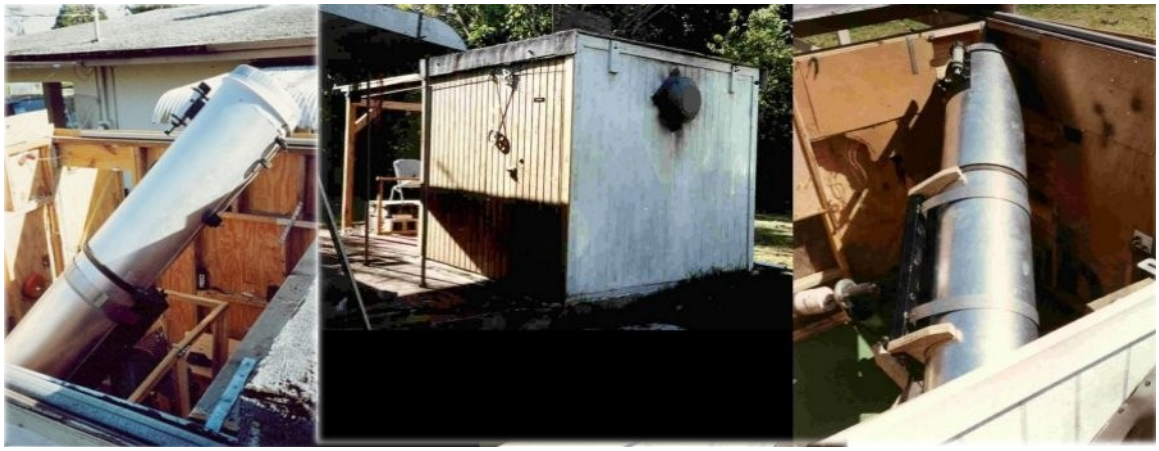

Figure 1. Pre-hurricane Andrew photos of roll-off roof observatory and 12.5″ f/7 Newtonian telescope. A bit cramped, but this was a cozy and productive setup for many years. 1-5/8th inch Chain-link fence rail system for the roll-off-roof observatory shown in left and right images.

Figure 2. Photos the casters on a chain-link fence rail system in my roll-off-roof observatory. Rail is 1.625 inch diameter chain-link top rail.

This particular observatory was only 8′ x 8′ square; so, two standard-sized 8-foot top-rail sections were connected together using a connection-insert and screwed down to the top of observatory wall header. Holes were drilled in the end of each 8-foot section and ¼-inch lag bolts were used to tighten the rails down. It was quite easy to screw the lag bolts in through the open ends of the rails and the

connection-insert was installed easily. A small hole was drilled in the inaccessible end (at the connection-insert) and center of each 8-foot section for a #10 screw to add stability the rail system. Each of the screwdriver sized hole was drilled in the top of the rail, used to secure the screw in the inside bottom of the rail, was too small to interfere with the casters nut (see Figure 3).

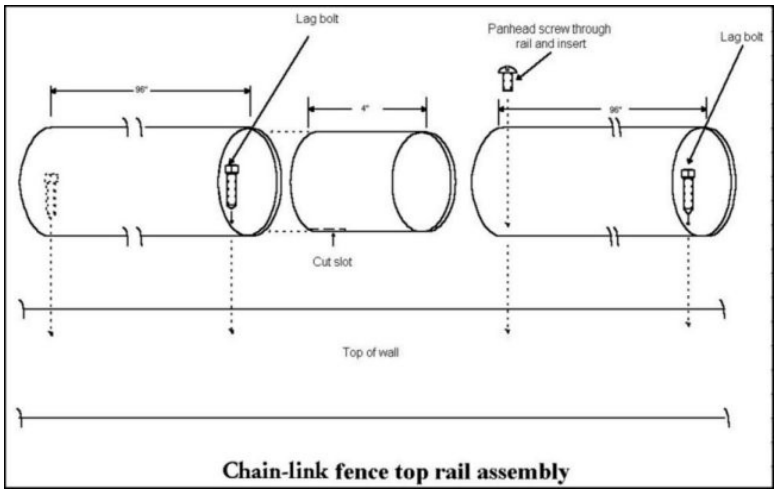

Figure 3. A cross section drawing of the chain-link fence rail system for the roll-off-roof observatory described in the text. Each 8-foot rail is connected together with tube connection-insert and either bolted or screwed down to the top of the observatory wallboard. Shown is a 1.625" top rail. A water pipe can be substituted the top rail.

The casters have roller bearings and are attached to the outside beams using a $5/8^{th}$ inch carriage bolt, washers, and locking nut. Three washers insure the caster does not drag against the roof beam. (See Figure 4).

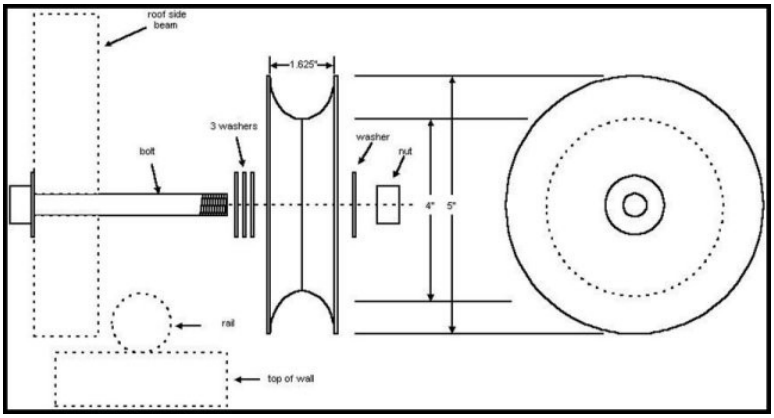

Figure 4. A cross section drawing of the chain-link fence caster and rail system for the roll-off-roof observatory described in the text. The caster is bolted to the roof side beam using several

washers to keep the caster away from the wooden structure. A 1.5" or 1.625" top rail or water pipe is bolted to the top of each wall as support and guides for the caster system

This observatory was torn down right before hurricane Andrew hit and I am sure glad of that. The winds would have blown this structure over onto my house and damage would have been more extensive. Then a job transfer forced me to move to another state for a 4.5 years period and now I am back in Florida where a new observatory is being planned. A roll-off roof will be in order.