Amateur Astronomy

Magazine

The Essential Journal for Engaged Amateur Astronomers

Surprise Me Sky
766 Observations in Canis Major

Star People
An Interview with Rob Teeter of Teeter's Telescopes

Return to Chiefland

Observing
Deep Sky Hunting
Variable Stars
Solar Activity

Normalize Gradients with PixInsight

Sketching At the Eyepiece
Vintage Optics
Amateur Weather Station Review
Whispers From the Past

Issue 114
Spring 2022 $8.95 US

Star People

Real People in Astronomy

Article by Charlie Warren

All Images Courtesy of Rob Teeter

Name: Rob Teeter

Occupation: Telescope Makers and Environmental Engineer

Residence: Newfoundland, New Jersey

Astronomer since: 1996

Website: https://www.teeterstelescopes.com/

An Interview with Rob Teeter professional telescope maker and astronomy enthusiast.

How long have you been active in astronomy?

Since the Summer of 1996, at the age of 15, when my parents purchased for me an 8" F/6 Orion Deep Space Explorer (DSE) Dobsonian telescope. This was actually my second telescope, the first having been a "Natural Wonders" (made by Meade) 60mm refractor also purchased by my parents for me as a Christmas gift in 1994. I used it sparingly, never really getting super involved. It wasn't until I went to a Star Party (Princeton Astronomy Club's "Jersey StarQuest") for the first time in the Summer of 1996 that I saw what real telescopes could do I'll never forget that first view of Jupiter through a quality 10" Dobsonian at that event! Just a couple months after that Star Party I had that 8" Orion DSE and was hooked!

Do you have any formal education in astronomy and what is your background and how did that lead to an interest in astronomy?

I have no formal education in this great field. Granted, I did take an astronomy course in college and was a Teacher's Aid in another astronomy course, and my original track in college was Geology with an anticipated capstone course in Planetary Geology. But any hopes of following that path were dashed when Calculus II happened. It took two tries to pass the class and even then, I did not have a great handle on it. Fortunately, at the same time I was taking an environmental policy course and found an avenue that appeared much less daunting. From there I went on to acquire my bachelor's degree in Environmental Policy and my master's degree in Environmental Management.

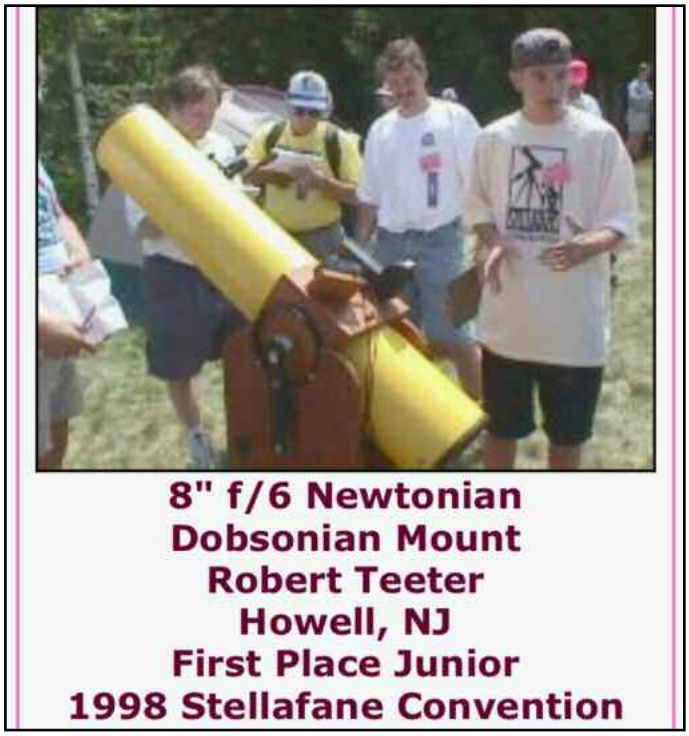
How long have you been making telescopes?

It took my father and I about a year to realize, after purchasing that 8" Orion DSE telescope, that we could greatly improve it. It was 1997 when we started to take that telescope apart and tinker with it. So, we can say I have been building since 1997. I then officially started my business, Teeter's Telescopes, in 2002 to make telescopes for others.

What started or led you into telescope making and how did you learn the art and science of it? Who, if any were your influencers/mentors in this regard?

The fact that some "regular Joe" could build a telescope in his garage with modest tools amazed me back then in 1997. My father worked with his hands for a living. Dad worked for Mobil and then went out on his own starting a business repairing equipment at gas stations, from pumps, to piping to storage tanks. Through his ability and knowledge to use various tools and identify various hardware available, I was able to design how I wanted the updated version of that 8" telescope to work and he was able to show me how to make it a reality. If we are talking mentors, he would definitely be my first. But when it came to building a functional telescope that worked to a high degree, then I can't fail to mention the late Gene Russo from the ASTRA (Astronomical Society of the Toms River Area) club in Ocean County, NJ.

After joining this club, Gene took me under his wing and passed along an amazing amount of telescope making knowledge. He was also the one who taught me collimation and to be undaunted by the process, confusing as it was for a newbie. He was a great teacher in those regards. Around this time I was active on an internet chat service called IRC (Internet Relay), specifically the sci.astro.amateur channel. Through there I gleaned much information from two very prolific telescope builders; the late Ed Turco from Rhode Island and the late Rick Singmaster of StarMaster telescope fame. Both were incredibly giving of their time and expertise, answering a plethora of questions from an extremely excited young telescope builder. Fortunately, I was able to meet both of these great men in person at various times in my astronomy travels to thank them for their help. Lastly, I cannot forget to mention Don Odegard from STAR (Society of Telescopy, Astronomy, and Radio) Astronomy Club in Monmouth County, NJ. Don helped hone my weak (and that's being generous!) woodworking skills to such a degree that I could build something that didn't look like it came



8" f/6 Newtonian
Dobsonian Mount
Robert Teeter
Howell, NJ
First Place Junior
1998 Stellafane Convention

from the scrap heap. Each of these mentors helped create in my mind a complete picture of how to take a telescope design from paper and turn it into something tangible of which I could be proud.

These were people who helped me get off the ground in telescope making, but I would be remiss if I didn't thank some very influential people who helped while the business was active. The first being the late Tom Trusock of Michigan who recognized early on in my career that I had something to offer the marketplace. His order for a 10" F/7.5 Truss-Dobsonian structure and subsequent CloudyNights review gave Teeter's Telescopes a much needed catapult to go from a few orders here and there to perpetually having work in the queue. Next, Phyllis Lang from North Carolina widened the exposure to our products by reviewing her 14.5" F/4.5 Truss-Dobsonian in-depth for an issue of Astronomy Technology Today. These two glowing reviews plus a multitude of others over the years in various forums and publications were critical to the growth of my business.

This is a two-way street, you only get those kinds of reviews if you strive hard to make a quality product AND take care of your client base. You have to be responsive, you have to be flexible, you have to be friendly and you have to be willing to help. You also have to put yourself in your customer's shoes. What would you want if you were spending thousands of dollars on a piece of equipment? What would make you feel most comfortable about the purchase? Communication is the one thing I found to be most important to our customers. No one really likes handing over thousands of dollars and then being ignored for several months. To me, the unwritten contract is your customer pays the product plus the customer service, especially if the product is highly custom and not simply in a box on a shelf. Being willing to answer questions and provide progress updates is part of the deal. Not every customer is the same. Some didn't really seem to care about being updated while others craved it, essentially wanting to be part of the whole build process. That's where being flexible comes in. Maybe you are more communicative with one customer than another, but you never completely go dark on them. The same goes for after the sale and delivery, you need to stay in touch and let them know you're here in the event they need assistance.

The more you can immerse yourself in the business, and put your heart into your product, the more likely it is you'll have people like Tom and Phyllis who go out of their way and take the time to document their experiences in word and photo. Yes, you'll still have the occasional customer who simply can't be pleased - that happens with everyone, myself included - but the idea is to have THAT client and/or review be the outlier. If you treat your customers well and make a fine product then everything will take care of itself. Simple, right? :-)

What instruments did you start out with in the beginning, have you owned or used in the past, and use today? I've already explained how I started with a 60mm refractor (doesn't everyone?) and then went to the 8" Orion DSE, then a fully rebuilt and enhanced version of that. From there I jumped to a 12.5" F/5.5 homebuilt Truss-Dobsonian with a Steve Swayze primary mirror, then all the way up to a 20" F/5 Truss-Dobsonian with another Swayze primary mirror. The 12.5" was my first attempt at building a Truss-Dobsonian and the 20", a few years later, was my appeal to the telescope making and amateur astronomy worlds that I knew what I was doing. The 20" would become the flagship Teeter's Telescope for several years. It came with me to every major Star Party in NJ, PA, NY, CT, and MD. Then something magical was happening in the industry, mirror makers had begun making optically superb F/3.X primary

mirrors. I jumped on board that trend, selling the 20" F/5 and building a 20" F/3.5 Truss-Dobsonian in 2011. For the last 10 years that shorty-20" has been my primary instrument, we have been joined at the hip. Because that was the new flagship for the business, and was more than just my personal observing instrument, I outfitted it with most every upgrade available including ServoCat GoTo/Tracking, NexusDSC, Markless Astronomics' DSC Stalk and iPad Stalk, Feathertouch focuser with oversized fine-focus knob, heated Filter Slide from AstroCrumb, Denkmeier binoviewer with 3D eyepieces, variable speed cooling fans, Howie Glatter Cable Sling for the primary mirror, etc.

Do you have any other hobby besides astronomy and telescope making?
Other interests of mine include building websites, reading, being outdoors, watching baseball and tennis. Astronomy is my only real hobby now, but prior to getting immersed in this hobby I did collect baseball cards, stamps, and comic books. Each was a bit of a phase I went through, only astronomy has stuck for the long term.

If not astronomy, what other hobby would you pursue?
There is a piece of me that really likes the idea of working on vintage cars and trucks. In my limited free time, you can find me watching the Motor Trend channel on TV, drooling over the rebuild processes of various 60's muscle cars. I am just handy enough with tools to actually think I could take on such a project myself, but then I remember I already have an outlet for my addiction to building things and that's telescope building. For now, that's the lane I stay in.

What excites you the most about your engagement in astronomy?
It is two-fold; the act of creating a telescope from a pile of parts and then the views such a telescope will yield on a clear, Moonless, night. Starting new projects makes me giddy which is then reinforced by picturing in my head what objects like NGC 891, NGC 4565, M3, M5, M22, etc., will look like when that project is done.

What has been your most challenging TM project so far and what are you most proud of?
I've completed over 300 telescope builds to date and because each one is custom built to what that customer wants, they all end up having their difficulties. Yes, some have been more troublesome than others. Some have been challenging because of technical issues, others have been challenging because of component availability and delay issues, while others have been challenging because of customer-demanded deadlines. Keeping all of that in mind, these are a few examples.

The builds that give me the most headaches, and ones I dread doing, are those with the ServoCat GoTo/Tracking system. Whether it is the system, me or both of us together, I simply do not know. Maybe I have a mental block about installing the system. But often when a customer calls or Emails us for technical support it is to do with the ServoCat system. When it is working and fully dialed in, it's amazing.

Rob with some of his Truss Dobs - top left and counter clockwise; 16", 18", 24" and 20"

But when something is amiss it can range from a simple fix to a "I feel like I'm banging my head against the wall" fix. But in the end, it always gets fixed. But it can be a time-suck to get to that point and a real aggravation because we ensure the system tests and works to a satisfactory level before the telescope on leaves our workshop.

Over the years we have also fought component availability, delays, and quality. My supply chain is quite long, and I find myself working with dozens of subcontractors and supply houses for all of the parts that go into our telescopes. Routinely parts are discontinued or get changed and I will have to find replacements and change my design to adapt to new parts. Subcontractors of mine have closed shop unexpectedly in the past, leaving me to scramble to find someone new to supply a certain component. Others have not met time frames that they had set forth, causing lengthy delays. Some have had inadequate quality control. Others have outright lied and deceived. You name it, I have experienced it with regard to obtaining all of the parts necessary to build a high quality Dobsonian telescope.

Projects have also been challenging when customers have been at the root of the problem. I would have to say, with 300+ customers in our database, the vast majority have been great to work with. I do my best to stay in touch with all of them, as best I can. Sometimes it is just an Email once per year to ask how the telescope is performing, while with others it is lengthy conversations about observing, equipment

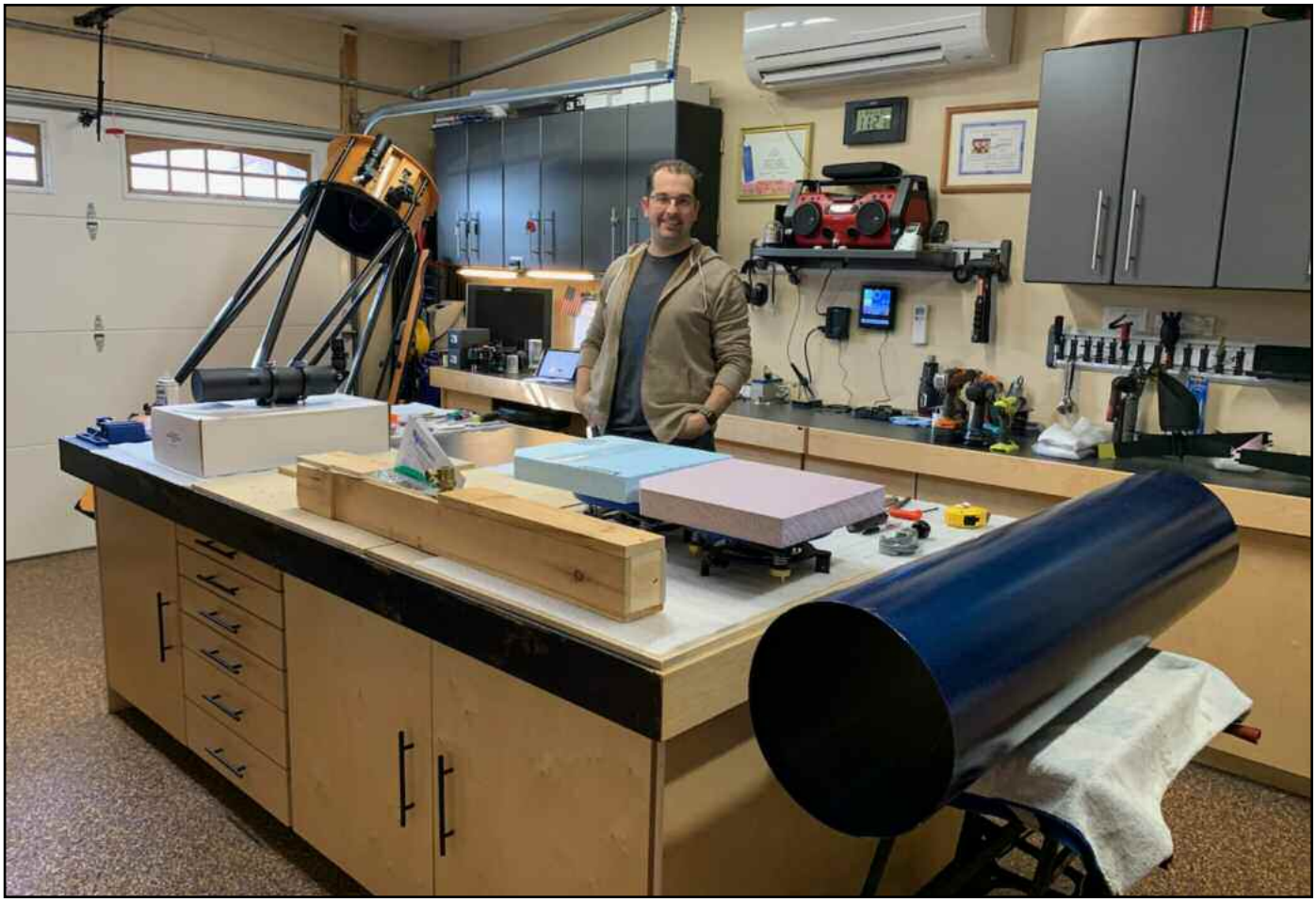
and our families. Those are the good ones. The troublesome ones have kept me up at night, they have made me cringe when their number shows up on my phone or their Email hits my Inbox. Some are worse than others. Others have simply been challenging because every week they would want to change the order in some way, causing me to have to modify or remake certain parts which slows down my whole production process for not just their telescope but everyone else's in production too. Some have been challenging because they micro-manage and felt I am here to do exactly as they say, almost as if I'm a puppet of which they're pulling the strings. Others have been meticulous nit-pickers and finally others would rush me from the very beginning to the very end. Each situation was challenging in its own way.

One thing that I am immensely proud of since having started this business is the stellar reputation and name recognition we have built and maintained, despite the challenges we faced from some customers. Some people in this hobby/industry craft great products but have no "bedside manner" when it comes to customer service. I strive to build a quality instrument and to be there for my customer base. I do not air my dirty laundry in public and I always do my best and everything I can to make a tough situation right. I am proud that when I see my name show up in the forums or I get mentioned at Star Parties that it is always in a very. positive light. Over 20 years we have been able to put out a consistent product that most everyone has been ecstatic to own and use in the field.

What advice do you have for those starting in ATM?
Be willing to accept criticism and advice! We are a community of people who build and use telescopes. We are here to support each other. I have answered many Emails and phone calls from people just looking for advice, which is exactly what people did for me when I was building my first telescope 25 years ago. I would also say do not be afraid to experiment and to fail. Telescope making is an exercise in trial and error. For me, early on, it was a lot of error. It sounds cliche, but that is how you learn. That, and by asking others for help. No one in this hobby should "suffer in silence." Remember, this is supposed to be fun and rewarding!

What has been your greatest discovery and what failures/learning experiences did you have to work through that may help others endeavoring in ATM as a hobby or possibly considering building professionally?
Many ATM's are jacks of all trades and the general Standard Operating Procedure (SOP), if you will, for building a telescope is that you make all the components yourself. I think that outlook has softened over the years, as fewer people make their own focusers, spiders, secondary mirror holders, primary mirror cells and/or optics nowadays. Some builders will build some of that, but few build everything from scratch.

For Teeter's Telescopes, I've chosen to really deviate from that old SOP and outsource most of the components to people/companies inside (and outside) the hobby who do the best work. Granted, some ATM's subscribe to the thinking



that "it doesn't matter what it looks like at night, it just matters how it performs." While others, like myself, are very much concerned with fit/finish AND performance at the eyepiece. This is a long-winded way of saying that buying readymade components, such as focusers, spiders, primary mirror cells, etc., does not make you less of an ATM if it allows you to focus on other parts of the construction process to make a beautiful looking and beautiful functioning telescope. I used to think, early on in my telescope making days, that I was somehow "cheating" if I didn't do most of the work myself on a telescope that "I" built. I know now that I can build a telescope using commercial components and because I have devised some novel innovations to the Dobsonian design that I can very much feel like I have built a telescope that is distinctly mine. We need not be a jack of all trades if we do not want to be. As an ATM you can build as much or as little of the telescope as you like if you enjoy the process.

In your opinion, what are the most significant recent developments in ATM and what do you see as possible developments in the future?
The availability of thin primary mirrors (less than what used to be customary practice of 6:1 diameter:thickness ratio) made from Quartz substrate have been a massive development in the hobby. For those of us who observe in areas where temperatures fall all night long, having a thin mirror on a more thermally stable substrate is key to sharp images at the eyepiece for your whole observing session. Hand in hand with that are primary mirror cells up to the task of supporting such thin mirrors. Whether it is Howie Glatter's cable sling or Aurora Precision's "wiffle tree" edge supports, being able to put the edge support for a primary mirror at the exact center of gravity (the physical point, measured from back to front on a primary mirror, where it would it would balance, thus putting the same amount of mass behind and ahead of the edge support) is super critical for optimal performance of the optic. For smaller mirrors (12.5" aperture and smaller) a major development has been the advent of silicone adhesive attachment of the mirror to the primary mirror cell at 6 extremely specific flotation point locations on the backside of the mirror, which negates the need for edge support entirely.

Any additional advice to give newcomers or novices who might want to venture into telescope making professionally and tell us a little about the evolution of your shop where you make telescopes from its genesis to now.
I will caution anyone who wants to get into the professional side of ATM and astronomy to think long and hard about doing so. While it can be extremely rewarding, it can also be a major burden. That of course depends upon how much you value your products, your reputation, your customer base and how willing you are to go above and beyond to provide outstanding products with outstanding customer service and technical support. If you produce a novel product that the market likes then your life could easily devolve into: Eat, sleep, telescopes. All day, every day.

Teeter's Telescopes has, at times, been all consuming. The number of all-nighters I've pulled, along with weekends worked, sleep lost, trying to meet deadlines and make everyone happy has taken its toll on me mentally. I have likened wrapping up the business and completing our last several orders as being able to see "light at the end of the tunnel." I have been buried in work since 2011, and specifically severely behind schedule for 3+ years. Fatigue from fighting that backlog has set in.

Here in early 2022, I can see the end of our queue of work as being early 2023. After which I will not be building telescopes for customers again, I will have "done my time" as I have been saying of late. That makes it sound like I did a 20-year stint in prison, while it has only been since mid-2019 that the business ceased to be fun. It has been a slog to get from mid-2019 to early 2022. Many telescopes have been delayed, parts have been difficult to get, I have had changes at home (most notably the addition of our twin boys, Nolan and Vaughn which has been great, but also super tiring) and my other work venture has been growing and demanding more of my time.

I would recommend others who are interested in this industry to think how they can best fit into their work-life balance. That is something I wish I had initially planned, instead of just letting the business grow unchecked. For someone new getting into this business I would recommend setting a production schedule and sticking to it. The temptation to take "just one more order" might feel good as you on-board that customer, but then when it comes time to fit completion of that order into your work schedule you may wish you hadn't taken that order. As I have experienced over and over, "there's never enough time in the day."

This requires the ability as a business owner to say "No" to

Rob finishing and getting ready to field test a 22"

some work. The allure of having people throwing money at you to do what you love to do is a hard proposition to quell. It is even tougher when you've grown a business from the point of nearly begging for work and experienced days of having nothing on the agenda. You fear going back to that, so you say "Yes" to everyone until you get to a point where you are completely behind the eight-ball. That's when your reputation in the industry can suffer, unless you are willing to really fight through it.

What equipment, processes or gadgets that have helped you in the production of your telescopes over the years?

Nothing is very automated within my workshop where we do wood finishing and final assembly and testing of each telescope. Because each one is unique and custom made, I cannot set up any kind of assembly line or process that would allow me to "stamp out" certain components. The closest we have come to utilizing gadgets is through the use of a CNC router for cutting our wooden components from the sheets of Baltic Birch plywood we use. Ten years ago, that was cutting edge, but now in 2022 you can find facilities using CNC machines everywhere. But it is a neat gadget that while running allows for me to do other work at the same time.

Apart from you ATM activities, how often do you observe?

I had a major life change in 2020 with the birth of our twin boys, Nolan and Vaughn. Prior to their arrival I had an active observing schedule where I would attend one major star party from April through October every year. I would also then attend local, smaller, telescope nights held by the astronomy clubs in which I was involved. I did that from 2003 until 2018. Now that the boys are here, the only observing I do are short telescope nights for public outreach purposes and while evaluating every Teeter's Telescope we build here at the workshop. That's fine because once the boys are old enough to join me at a full-fledged Star Party I'll be that much more excited to get out again and share it with them.

Heather enjoying some telescope time and rigging out a 60" telescope with one of her shrouds

Apart from your telescope production, what do you do for a living and what has been your career path?
As noted previously, I studied Environmental Policy and Management in undergraduate and graduate school. While pursuing my master's degree I took a job with a private environmental consulting/engineering company with municipal, county and State contracts in 2006. I still work - albeit part time now - on one of the same projects today that I did 15 years ago. That would be the Environmental Joint Insurance Fund (EJIF) where we operate as environmental inspectors for municipalities who have insurance policies for their underground and aboveground fuel storage tanks. Visual inspections of the tanks and looking over required record keeping are some of what I do while on site. I advise municipalities on what they need to improve upon as far as maintenance and records go, all before the State Department of Environmental Protection comes in for their inspection.

Does your family participate in your astronomical activities and in what ways? How did you and Heather meet and how did she get started making shrouds?
My wife, Heather, has been a huge supporter of mine, both personally and professionally, since we met in early 2003. We both enjoyed bowling at the time and met through the Rutgers University intramural bowling league. We both showed up to the informational meeting without teams, thus we were treated as "free agents" and put on the same team with a few other people who also did come with their own team of people. While bowling with Heather she saw a copy of Sky & Telescope magazine in my backpack and commented that she used to subscribe and read that all the time. That got us taking a lot about astronomy and telescopes. Heather was more of an arm-chair astronomer, having never looked through a "real" telescope up until that point. Enter the 20" F/5 Teeter's Telescope and the amazing views such a beast can put up! Whether Heather ended up marrying me for me, or for unfettered access to a 20" telescope, we may never know. I joke of course, or at least I hope so.

Heather has been running a side business for several years called "Shrouds by Heather" where she sews telescope light shrouds, end caps and truss pole carry cases not just for my telescopes but for about any telescope under the Sun. She got involved in sewing telescope components when early on in our relationship I casually asked, "Hey Heather, can you sew?" Because, of course, the telescope business was always on my mind, and I needed a better solution than using my local tailor. Heather borrowed her aunt's sewing

machine and now a couple Bernette (by Bernina) sewing machines later, Heather has crafted hundreds of shrouds, end caps and cases. She was even contracted to fabricate the light shroud for the 50" Dobsonian located at the Northwest Jersey Astronomy Club. We loaded up her sewing machine, tables and a bolt of material, drove to the telescope, set up in the surrounding field and did most of the custom work right there next to the observatory.

Where do you observe locally, and do you travel to any local or regional star parties?
When I was observing on a more regular basis, I would travel all over New Jersey, Pennsylvania, New York, Connecticut, Massachusetts and even down to Maryland for various large Star Parties. More locally for observing sessions of a few hours, I would visit a site in the NJ Pinelands called Coyle Field used by my two former clubs, ASTRA and STAR. Nowadays I use a Rockland Astronomy Club site within Wawayanda State Park in NJ and for going a little darker we will use a site in the Pocono Mountains in Pennsylvania called Shohola Falls.

One of my most enjoyable trips was the 2017 "Great American Solar Eclipse." My wife, Heather, and I traveled to Idaho Falls, ID. By random chance we found out the owners of the South Menan Butte (a dormant volcano!) would be opening their property to eclipse chasers. We booked a spot and spent that day camped on the rim of the volcanic crater with thousands of other people, some who knew what to expect and others who were obviously newbies to the experience. We met people from all over, and not just from the US, but worldwide too. The scenery was amazing, the conditions were crystal clear, and the experience of totality was in a word…moving. We spent a few days before and a few afterward exploring the region and seeing various sights/sites. It is a beautiful part of this country that I think without the excuse of having totality pass right over it we would never have had a reason to visit.

What is your favorite object class for observing?
I am not sure I can limit my favorite object type to just one since I love globular clusters, edge on galaxies and Jupiter. I have spent hours observing such objects visually, just staring and being amazed as the atmosphere becomes steady and then turbulence sets back in and then steady seeing comes back, always hoping for that next amazing glance. That of course plays in more with Jupiter as far as steady seeing goes, but for globular clusters seeing the stars crystalize and really become diamonds on black velvet is thrilling. The same can be said about the edge on galaxies I love so much too. I love seeing the surround stars come into sharp focus, as a contrast against the ghostly white and grey mottled outline of the galaxy and dust lane. Drool.

What size scope(s) do you currently keep for your personal use?
This is something else that is in flux in my life currently. Since 2011 I've used a 20" F/4.0 Truss-Dobsonian as my primary visual instrument. I have spent more eyepiece time with that telescope than any other in my life. We have traveled to many places and see many objects. Many people have also looked through what some have called the "Teeter Half Meter." I decided in late 2021 it was time to let this telescope go. I had a very eager buyer who I could tell would give it a good home and I made the realization that for the

next 4-5 years I would not be in a position to use the 20" anywhere near its full potential. I hate to blame our twin boys, but my ability to attend Star Parties is going to be completely stalled until they are old enough to join with me on such camping trips. Combined with not being able to observe from home (we are surrounded by trees) I knew I wouldn't use the 20". Rather than sitting here unused, it will now go to someone who will use it like I used to use the first 8 years I owned it.

For my public outreach activities that I still do, I have access to a couple of our Solid Tube Series (STS) telescopes from 8" to 11" in aperture. But who is Rob Teeter without a large aperture instrument? My long-term plan has a 24" F/3.5 Truss-Dobsonian in it to be used when I get back into the Star Party scene with our twin boys. I've been squirreling away parts and once time allows, I will start construction on it.

What has been the funniest (odd/quirky) thing that has happened to you in your ATM career (or practice of astronomy in general)?

After building more than 300 telescopes and having just as many customers, you'll accumulate a multitude of stories. One that comes to mind is my customer Paul from California. He was self-admittedly not mechanically inclined, at all. He was truly clear about that. He ordered a 22" F/3.5 Truss-Dobsonian and a new structure for an existing 18" F/4.2 primary mirror he had acquired. However, he was not interested in assembling these telescopes after having them shipped to him. He was a man who truly knew his limitations and assembling telescopes was not something he was comfortable doing. Fortunately, his financial situation allowed him to fly me and my wife, Heather, from Newark Airport to San Diego airport and then host us for a couple days at his home in a remote section of California. He paid for us to be on site to unpack and assemble these two telescopes that we had previously shipped to him. The 22" with its ServoCat GoTo/Tracking system went inside of a dome structure for visual use and the 18" would be situated in another structure and planned to be used for astrophotography. After both telescopes were up and running, we were invited to stay for a party Paul was hosting for his neighbors (limited as they may be in remote California) where wine and cheese was served with classical and jazz music played in the background and everyone got several turns to look through the 22" under a high elevation dark sky. It was an incredible experience to design those two telescopes for Paul, build them, test them, pack them and ship them cross country and then fly cross country at no cost to set them up and then spend the evening at a house party while sharing views through the eyepiece of a big scope. Experiences like that are what I call the perks of this business because you are designing and building a product someone REALLY wants.

The most frightening experience?

Early on as a teenage telescope builder I found out that electronics were not my strong suit. This was most clear when at a Star Party where I was set up about 12 feet away from one of my first customers with his 18" telescope I built, he started screaming "FIRE, FIRE, FIRE!" I turned around to see his upper tube assembly on fire. It was the power cable bringing 12-volt power up to the dew heater on his Telrad that had melted and the counter top laminate material used for the baffle in the UTA had caught fire, fortunately just momentarily. I only recall for a brief second seeing a small flame, but fire is fire. I am not too proud to admit how stupid I was in my formative telescope building days. This situation was a result of my faulty soldering of the power cable combined with a cardinal sin in electronics, not having fuse protection! Something most likely pinched in the cable, the positive and negative crossed and without a fuse to blow the cable melted and the heat caused the fiber-based laminate for the UTA baffle to ignite momentarily.

Has any astronomical event or outing ever resulted in a calamity of sorts which in retrospect is humorous or a good tale?

One that comes to mind is also a good customer story. It started with a phone call from a customer who purchased a 16" F/5 telescope from us, asking "Why when I guide the telescope by hand by grabbing the top ring of the upper tube assembly (UTA) does my hand get black residue on it?" Turns out after some back and forth and the customer taking a closer look at the underside of the top UTA ring he discovered six distinct places where the wood UTA ring was charred, which triggered his memory that the telescope had been brought outside for a family gathering during the day. The primary mirror cover had been removed so everyone could see the beautiful primary mirror. He recalled getting distracted and the telescope was left uncovered and with Murphy's Law being what it is, the telescope happened to be left pointed at nearly the exact spot the Sun crossed in the sky. We all know what happens when unfiltered Sunlight enters a telescope! It appears the 4-vane spider diffracted the sunlight after it reflected off the primary mirror and came back up the telescope assembly creating three areas, separated by 90 degrees where sunlight made direct contact with the wood UTA ring (a fourth spot never materialized possibly due to imperfect alignment of the Sun and the telescope). The customer recalled the telescope smoking but not catching on fire. He shipped the UTA back to us for us to repair and we kept the original UTA with its scorch marks as a reminder as to why you never point an unfiltered telescope at the Sun.

What kind of equipment (within your probable future reach) do you dream of using or making someday for more advanced astronomy?

I've been lucky enough that during my 25 years of building telescope, specifically 20 building for customers, that I have built almost every possible aperture and focal ratio combination from 8" to 24" and from F/3 to F/8. There are not many apertures and focal ratios I have not built and tested here in the workshop. I have also had the opportunity to use, try and/or test almost every eyepiece, binoviewer, filter, finderscope, digital setting circle unit and goto/tracking system. I have admittedly been spoiled over the years to have had access to such an array of equipment. I most look for-

ward - in general - to completing all of our customer telescopes and then moving onto several projects for myself which have perpetually been on the backburner. These include a 10" F/6 Solid Tube Series with an RF Royce conical primary mirror (to be used for public outreach), a 12.5" F/4.8 Journey-AIR Truss-Dobsonian (made to be taken as checked and carry-on airline luggage), and lastly a 24" F/4.0 Truss-Dobsonian which will be my Star Party instrument.

How has your association with astronomy improved your life or has it created more problems?
There's one thing I learned about myself once I got interested in astronomy and that's that I love to travel. I love road trips, I will tolerate getting on an airplane, but either way I love planning trips. I love maps, I love looking over the light pollution maps, I love looking at topography and seeing where other astronomers go for dark sky observing. I like to hike and visit scenic overlooks; I love to camp and be outside. Astronomy has given me the opportunity to do all of that. While the telescope business has been trying at times, overall, my experience as an amateur astronomer and as a professional telescope maker have been incredibly positive and very formative. My involvement in attending Star Parties and going camping while in middle school and high school opened my mind to pursuing environmental science, and then ultimately policy and management, in college.

Do you conduct or participate in astronomy outreach, and if so, tell us a little about what you do and enjoy about it? What equipment do you use for outreach.
I do as much public outreach as I can fit into my schedule and currently such events are the main way, I get my "fix" of observing nowadays. As explained above, it is difficult for me to get away from the house at night considering we have our twin 17-month-old boys now. The public outreach I do is coordinated through a private company called Pearl Observatory, owned by my good friend John Miller here in New Jersey. We do telescope nights for libraries, schools, scout troops and other organizations. For those events I have used my former 20" F/3.5 Truss-Dobsonian, which really amazes kids, but more often I will take a smaller (usually something between 10" and 15" of aperture) in stock telescope that needs final testing. I will use/test the telescope before the event formally starts and then I'll stay after the event has ended, all to do some observing by myself.

I also own an inflatable planetarium which fits upwards of 35 people inside of it. I will do planetarium shows at those same venues, sometimes the same nights that we bring the telescopes out.

Do you correspond with other astronomers or telescope builders in different parts of the world?
We have been fortunate to have customers all over the world. We have sent our telescopes to Canada, China, India, Israel, Italy, Malaysia, Mexico, Norway, South Korea, and Spain. Through Heather's company, "Shrouds by Heather," we have made light shrouds for astronomers on every continent (minus Antarctica, of course!) and to too many countries to count. I never let the opportunity go by to ask our telescope customers and Heather's light shroud customers, what observing is like in their country. I love hearing how it compares and contrasts to what we do in the US.

Being a recognized expert in telescope making, you get asked a lot of questions. What are some of the goofiest questions that you remember being asked?
One that sticks out in my mind is when I was contacted by a general contractor building a luxury home in Florida for a client he would not name. The client wanted, for the enjoyment of his grandchildren, a telescope built and installed in an observatory dome that would be 100% automated with astrophotographs live streamed to a big screen television on the main living level. The idea is that the client could control the telescope via remote control and NEVER have to step foot inside of the dome or run any software to process the data/images. The telescope would just stream beautiful images on demand. Obviously, anything is possible, but we declined the project and instead suggested the general contractor have his client run a slide show of Hubble images on the TV for his grandchildren. They would probably be more impressed with that!