

# Chapter 5 - Astronomy

## Turning Points ; Telescope building in Marin

### **Also Sprach Zarathustra... cool, man**

2001 was brought in with style. The Haight Ashbury Free Band played at Caffè Proust for the new years party! The year didn't have PanAm flights to Moon bases, but we could play the widely recognized movie theme composed originally by Strauss-- but we did it with jazz band instruments! I initiated the thundering drumroll on the floor tom around a minute before the stroke of midnight, with the saxophones and piano entering the theme for it to peak by 12am — a thunderous wonky rendition — Spirited, its timely significance lost on none in the full house as champagne corks joined the sound! By 12:01 we simmered the midnight Kubrick frenzy down to a cool Coltrane blues into All Blues by Miles. Outer space for Midnight arriving at 2001 — back down to earth immediately afterwards, which is where we still are.

I'm totally glad we took advantage of the timing to play that! I think it was my idea, being the big *2001 : A Space Odyssey* fanatic. It was a perfect way to bring in that particular new years eve date!

*[A note about the personnel : Nick on piano and leadership. David on sax, flute, and an original Free band authority. Paul on bass and guitar. Syd on guitar. Doc on baritone sax. plus guests. I was the*

*main drummer in the Free Band for the past ten years, and by that year we were playing jazz standards every Saturday evening at Caffè Proust - owned by esteemed hostess and writer P Segal, who made her restaurant into a community nerve center for crossroads of friends from Burning Man and San Francisco Cacophony Society. Those were good years!]*

## **Meanwhile back in space**

For the past few years around the new millennium, Alisa and I spent most weekends enjoying the wilderness of Marin County. This often had good long hikes on the many glorious trails, around Mt Tamalpais, the headlands, beyond Fairfax around Pine mountain, and back under the stars. Loving the charm of the perfect small town of Fairfax, we decided to move there! We love San Francisco, but apartment living had too many annoyances.

At the end of the year 2001, we scored a most auspicious rental house in San Anselmo just a few hundred yards from the Fairfax border! This marked the beginning of the most charmed years of my life. 57 Oak Knoll avenue, a funky labyrinth of an old cottage with added rooms, curved brick patios, gardens, driveway, with a towering redwood tree in the front! *We Loved this!* Close to favorite trailheads, and downtown Fairfax.

Space for *finally* building a telescope! Ready for Dobson's class, but the Academy of Sciences was not offering the course anymore, and I didn't (yet) find it elsewhere, so I found a good instructional book by Kenneth Berry, determined to make a leap to deeper sky viewing. Especially

before Mars is slated to be at its nearest proximity to Earth for a while.

### **Finding parts for a 6-inch Dobsonian**

The inches refer to the mirror size, not the length of the 'scope itself. I pored the book for the most suitable size and how manageable are its plans. I didn't want to bite off more than I could chew; I just wanted to scan the deliciously dark skies outside of our new doors!

I almost went for a 10-inch, using sonotube, but decided on a 6-inch box 'scope. For a few reasons, one of them financial. I aimed to buy the mirror and not spend the energy grinding one with only book instructions. I smelled potential frustration with that process. Alisa helped to track an affordable 6-inch mirror source online from a seller in Sonoma County, who has a few for \$60 each. A great deal if the optics are good. The seller had a good reputation, so this looked good and not risky. The priciest part of the project, otherwise I had wood panels already for the tube structure, and plenty of scraps from miscellaneous projects, and Fairfax Hardware was just a few minutes away. *Let's do this!*

Alisa made much of this more possible, not just for her positive encouragement, but also for helping track down parts that were not available in hardware stores. Some important components were found through her exquisite workplace — I'm talking about The Exploratorium!

A most fortunate source for unique contraption building materials. She worked in the graphics department, but was able to post a call to the rest of staff who deals with

making the exhibits, who were interested and very helpful in supplying with extra essential parts! A large 15" disk of Teflon that I used for the smooth spinning bottom base bearing, two empty old film canisters for the side bearings, the small Teflon pieces for the bearings to roll upon with little friction - *and* - they cut the side panels of wood with their table saws (since I didn't have a good one) cut to my specs! They certainly sped up my process!

It was still a process of tooling and retooling to get everything perfectly aligned into functional place, with jaunts back and forth to the hardware stores. A few custom choices were made beyond the instructions. The single arm handmade secondary mirror seemed flimsy and prone to be easily jostled out of place, so I sought a four-partite factory made spider vane instead, with adjustable screws. I wanted durable reliability — a good bit of foresight, since this 'scope got shlepped around for years afterwards without much shifting out of place! I also ended up buying a simple eyepiece holder with adjustable knobs instead of a sliding tube. Not much was spent on the whole project; maybe around \$120 including the Plossl lenses I ordered from Orion Telescopes, the paint, various hardware, all that I mentioned including the primary and secondary mirrors, taking me around two months of my spare time to complete.

The primary mirror is the most important and costly part, and I made sure to make the mirror plate that it rests upon exact to specifications. A sensitive procedure was applying a perfect amount of silicone glue on the mirror bed, then carefully lowering the primary onto it without oozing

silicone, and set true to the center. I took my time and held my breath for that operation. Let set to dry in place overnight, and the primary mirror is ready to install! Same with the secondary mirror, attach with silicone glue, in my case to a factory made secondary holder, angled with adjustable screws and attached to the spider vane. Those were the most precarious passages to construct this. I don't recall the exact focal length of the primary, but it must be around 42" or so. I built the box shaped tube to have a few extra inches, to add a bit more light baffling, and some more protective distance for the secondary mirror from the top open end.

Base and tube complete and painted — dark blue-purple enamel for its exterior to be moisture resistant. Flat black for the interior to minimize light reflectivity. Before this I performed a weight balance test with all pieces placed roughly in their positions, to calculate placement of the side bearings (circular film canisters, around 8 inches in diameter.)

Everything dry after a few days of setting, it's time to place the mirrors inside and close the open side panel. The moment of truth is finally moments away, after collimating the two facing mirrors by the collimation bolts at the bottom of the 'scope, and the hand adjustable screws above the secondary mirror. I look through the empty eyepiece holder to see my own eye reflected back. Centering my eye reflection to as dead center as possible is my way to achieve maximum collimation (before getting a laser collimator), and it is a less tricky advantage to collimate a smaller telescope such as this one, allowing

easier accuracy than a large 'scope with wider primary mirrors and longer focal lengths.

I time this to be ready before twilight with the waxing Moon already high, and with Alisa there. I carried this brand new telescope up to the attic room with a wide window facing south where the Moon was rising into clear view. I lower the scope onto the sturdy base, load in a 20mm eyepiece, rock the scope gently on its bearings up and down, side by side, Teflon on Teflon riding smooth and steady, until I find the white near circle shape fill the eyepiece view. Fuzzy at first, then focusing with the eyepiece adjustment knobs...

***Zap Pow Wowie!!!!!!!!!!!!***

*Crystal clear craters, terminator, and Mare!*

Alisa hears my excitement and joins to be equally blown away by the success of this vision!!

Such a relatively simple mechanism, yet giving such valuable results. I felt like "The Time Traveller" (known as George in the 1960 movie I grew up with and was /is a favorite) in H.G. Wells' *The Time Machine*! Even though I didn't invent anything here, and it's only a light gathering box with mirrors and lenses, this felt absolutely fantastic to achieve. Now, to get on with my own space exploration!

**The cosmos within better reach**

Wasting no time with my new long dreamed of apparatus, scanning the night sky into the wee hours until my eyes couldn't stay open. Often up until around 4am. Addicted to

viewing star fields, slowly nudging the alt-azimuth mount with butter smooth motion — yet its position never slipped. The sensation was of traveling the stars while coming across very interesting deep sky objects, when I would research what they are in my trusty old Petersens Field Guide to the Stars.

What I'd see would be dozens to hundreds of stars through the 20mm wide field eyepiece, especially dense when scanning the Milky Way span, rich for exploring and letting yourself get lost in! Eventually, random arrangements of stars become familiar patterns after passing over the same regions a few times. Geometric "compositions", like miniature sub-constellations are found ; I learned that these are called *Asterisms*. The sky map is compared with the view, helping to know where I am within the familiar constellation. Eventually brighter and denser visions are crossed within the view!

As an example of many discoveries:

Okay, I see a cluster of stars above the Sagittarius region... In the book that must be M11, an open cluster known as the Wild Duck — and looking fantastic!

But I need to move the telescope out in the front of the house to see the many highlights in Sag, below the house and treeline, towards the center of our galaxy. And wow, this section of the sky is *loaded* with telescope sights! My new scope is manageable to lug around by myself. I attached handles; one to the heavy base, the other on the 'scope. [handles made for drawers that I picked up at the local hardware store.] Suitable, and looks and works okay. Lifting them is like carrying two suitcases, with one being

twice as heavy as the other. I got used to moving it around, navigating the way around the trees around the house, blocking views of the slow, constant rotating sky. Also, I used my height adjustable drumkit throne to comfortably sit at the eyepiece level.

### **Without a net**

A difference of this telescope is my choice to not include a finder. Usually as a small, low power monocular attached along the length of the tube, or a Telrad tracking mechanism, to help with targeting the view on specific spots in the sky. I opted out, deciding to track by sighting along the length of the tube with the naked eye.

Challenging, however it was to advance my natural navigating ability by far, rather than if technological aid was purely relied upon. I already knew the constellations from nearly twenty years of learning them — now I get to learn what myriad cosmic gems exist within their geometric frames!

Time, determination and repeated exposure combined with studying the charts, did what it takes to know one's way around the visible universe!

### **The sky's the limit**

I didn't stop as long as there were clear, cloudless skies, being often the case of central Marin County summers (Mt Tamalpais blocks the San Francisco fog.) I was out there nearly every late night, obsessively and patiently loving my mode of visual space travel!



Without wanting to turn this page into an inventory list of objects, the summer highlights were many that I pored over and learned. The brighter Messier objects such as M13 in Hercules — a fantastic Globular star cluster! Looking like an explosion of abundant stars from a dense center. M17 — the Swan nebula — a swan shaped cloud of stardust and gasses, seeming to float gracefully amidst the galactic center of our Milky Way. The galaxies in Ursa Major — M81 and M82, easy to find! To M57 — the Ring Nebula — a "planetary nebula", distinctive for being a gas shell remaining from a once upon a time supernova. This one looks like a tight, little smoke ring in the constellation Lyre. I could go on about the amazing sights — and haven't even covered NGC objects yet — or Mars!

### **The red planet**

Mars is predicted to be closer to us in optimum viewing proximity, and I made this telescope in time! It was summer 2003, personally a great year, and upon finding Mars — easily — was thrilled to see actual features such as its white polar caps and shaded surface highlights! I tracked it for months, noticing different sides when rotated. When after the planet receded away, I never saw it as clearly again — even through telescopes over three times more powerful. This modest sized scope has terrific optics, and I lucked out with that mirror purchase!

### **More planets!**

When Jupiter and Saturn were in view, my brain almost couldn't believe my eyes. They looked almost too *perfect*!

Particularly crisp when cooler autumn days set in. I learned something about viewing skywards from in a valley when after warm/hot days — *inversion*. Cool evening air rolls high over warm air trapped in the valley below, resulting in layers of distortion where the opposing temperatures meet, as winds high up. The central Marin location where we live had dark skies, but wasn't as clear as when away from an inversion prone zone. It could still be excellent after temperatures had a chance to even out. I was learning about how to watch the weather patterns for optimal viewing conditions. The "no smoke" air quality warnings meant still windless skies = best for seeing conditions. I started driving the telescope nearer to the ocean and up along the western side of the mountain for less inversion. Good clarity! For shorter outings with less driving time hassle, I'd take it up a local hill in a dark patch slightly to the north. Alisa would join me there, and I started getting friends to check this out. Kim (nephew, and good friend) and Hitesh joined me up there for quality telescope times.

Mainly I was at our house in the front and back yards. At times I had to bring the 'scope on the sidewalk and up the street in order to view something that was too low in the sky to see where the house or trees block it. If a neighbor passed by, I would call them over to look. I found myself doing Sidewalk Astronomy, enjoying the instant unselfconscious bond that forms by the shared awe when they see something like Saturn's rings for the first time, or the Moon crackling with visual punch. Hearing "*Wow!*" as when I looked through Dobson's 'scope in the city. I realized that Astronomy is for everybody!

## **Research and Development**

More resources were found, online information such as the Clear Sky Clock, calculating seeing conditions around the country. Astronomy Picture of the Day (APOD) featuring the best astrophotography with professional Astronomers descriptions, giving insights into what I might be viewing as a dim, fuzzy oval, now better visualized — and conceptualized — as to what exactly it is I'm seeing. Sky & Telescope magazines were a great font of knowledge and experience with current sky maps; many a copy of those publications were wrinkled out in the dark. I was digging up in the deep skies, insatiably.

## **Really dark skies**

Alisa and I brought the telescope to Yosemite for our annual visit, and the Astronomy was better than ever up high near Glacier Point! This was the last trip this 6-inch scope would make to Yosemite — but we definitely returned for much more involved Astronomy, with a different telescope...

~ Dean Gustafson, April 2021