

Observing Tips

Setting Up a Sky-Watcher SynScan Dobsonian Telescope

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(As of July 2017, I am Chair of the RASC Observing Committee [thanks to Alan Whitman, previous Chair, for his years of service]. I would like to inaugurate this new column, Observing Tips, by writing the first article; however, it is not my intention to write ALL the articles, only to solicit them from active observers and to offer editorial help. Please send your ideas to me at the email above.)

The main telescope at the RASC Halifax Centre's Saint Croix Observatory is a 400-mm (16") Sky-Watcher SynScan alt-azimuth collapsible Dobsonian. I have its 300-mm baby brother and Keji Dark Sky Preserve has the 250-mm version. I have become familiar with the operation of these telescopes, so I am writing down some tips for setting up beyond what the basic manual provides. I have spoken to a few members and others who have experienced problems, and usually the fix is something quite elementary. This may be for you! However, I am assuming that the reader is already familiar with the basic telescope operation procedure through training and/or reading the manual. I'm not trying to rewrite the manual here! The manual for these telescopes can be downloaded from the Service & Support menu at ca.skywatcher.com, but be aware that manufacturers often make small changes to things. Even if you do not operate this telescope brand, some of the following tips may still be helpful.

I have no experience with the Sky-Watcher EQ (equatorial) versions and I do not recommend EQ mounts for beginners—an alt-azimuth mount is much more intuitive and the SynScan technology that drives these models is perfectly adequate for visual observing. I also prefer the Dobsonian design because optically it is a classic Newtonian with an inverted image, which is the same as a 180° rotation. This means the observer can use standard star charts and lunar maps with a minimum of confusion. Most refractors and many other telescope designs employ star diagonals for ease of observing, but this introduces another reflection that results in a left-right mirror-reversed image, which can confuse the beginner.

Preparing to Observe

Before initializing the telescope and beginning to observe, there are several things you should take care of, perhaps in daytime: make sure your battery is charged (if rechargeable)



Figure 1 — The author with the 400-mm Sky-Watcher SynScan Dobsonian at Saint Croix Observatory, Nova Scotia.



Figure 2 — The larger Sky-Watcher dobs have adjustable bearings on both axes.

or sufficiently fresh (if not). Have backup power handy. Make an observing plan (even in your head) and go through the checklist of all the things you need to take to the observing site. Review the initialization and alignment procedures and pick out some bright alignment stars appropriate to the season.

At the observing site, place the telescope base on a level spot, with an eye out for trees or buildings that might interfere with your plans. Level the mount as best you can—things just work out better, believe me! I bought a bubble level for my telescope and glued it to the base, or you can use a smart phone app. (It's a pity the manufacturer did not provide a built-in level and a means of levelling the base.) Place the telescope on the base (if it's not already there), install and firmly tighten the locking screw, then check the level again.

This is a good time to check optical collimation, particularly if the telescope has been moved (if collimation is important to you and if you know how to adjust it). Typically, the secondary mirror holds its alignment, but the primary mirror might have shifted, particularly if you have taken the telescope for a ride down a bumpy road. In daytime or twilight, a quick peek down the focusing tube will identify any obvious problems. You should see a series of concentric circular reflections of the various components of the optical train, including a centre



Figure 3 — The altitude axis has a scale for leveling the tube before initialization.



Figure 4 — Consider replacing the secondary mirror adjustment hex-screws with knobs to eliminate the need for a tool.

bullseye on the primary mirror. If things look off-kilter, take action or seek help. Better now than later in the session! If you are new to the concept of collimation, start with garyseronik.com/a-beginners-guide-to-collimation.

Now align the finder telescope to the main telescope, using a distant terrestrial target or bright star. Again, better now than later (you can always tweak it later). If you are not using the GPS dongle, have ready your observing longitude and latitude in degrees/minutes/seconds (not decimal degrees), the date, and the accurate local time. For simple Auto-Tracking mode (what I call No-Star Alignment), you also need to know the direction of True North. Use a magnetic compass, correcting for the magnetic declination of your location (roughly 17° W in Nova Scotia), or a smart phone app.

I need to say a few words about data entry: be mindful of the US mm/dd/yyyy date format; enter your STANDARD time zone (Daylight Saving Time is handled independently); use NEGATIVE hours for time zones west of Greenwich.

By using the optional GPS dongle, you can skip a lot of manual entry below, thereby avoiding manual entry errors. The GPS needs to be plugged in to the hand control before powering up. When you do power up and initialize, don't be

fooled by the message "GPS FOUND!" You must proceed and enter the time zone and DST info, then wait for "GPS FIXED". Sometimes the GPS takes a while, but not too long if the telescope hasn't been relocated. After GPS fix is achieved, you can unplug the dongle.

Are you ready?

Aligning the Telescope

There are three basic approaches to alignment (which I think should really be called sky orientation), with variations:

1. Manual or Push-To Operation. Without electricity, you can manually push the telescope to point in any direction, using the finder to place a target in the telescope's low-power field of view. The larger Sky-Watcher telescopes have hand-adjustable clutches on both axes for adjusting the bearing friction to your liking. With electrical power, you could use the hand control to move the telescope at a variety of speeds to follow a target or to slew to a new target; however, you should turn OFF tracking in the Setup menu, because the telescope will have a mind of its own if you don't orient it to the sky. Honestly, if you are going to use the electronics, consider...

2. No-Star Alignment or Auto-Tracking. This is an under-appreciated mode of operation that does not use stars to orient the telescope to the sky, but provides sufficient orientation to track celestial objects once found. With care, this method can situate a bright planet within the finder's field of view in twilight (possibly daylight). Accordingly, it is especially suited for solar observation, and lunar or planetary observing in twilight, but obviously works just as well at night. The trick is to place the telescope in HOME position before turning on the power—to do this, manually level the telescope tube using the scale on the altitude axis (assuming the base itself is level) and manually rotate the telescope to point True North. After you turn on the electronics, follow the Initialization procedure on the hand control—this includes entering Longitude and Latitude (in that order), Date, Standard Time Zone, Local



Figure 5 — Take the time to align the finder with the telescope before initializing the electronics.

Time, and Daylight Saving Time: Yes/No. The hand control will ask Begin Alignment? which you decline and bypass. The telescope will now track a target pretty well, once you find and centre it in the eyepiece. The Go-To function will actually work in a crude way, but you will normally need to use the finder and hand control to centre the target. The tracking will be decent, but you will need to correct it from time to time. It is worth pointing out that, with the SynScan telescopes, at any time you can push the telescope to point where you want without interfering with its automatic positioning. Also, at any time, without shutting down, you can opt to perform a Star Alignment. I successfully used the Auto-Tracking mode to setup my telescope in daylight to observe the Transit of Mercury in May 2016—the telescope tracked the Sun almost perfectly all day.

3. Star Alignment or Go-To Mode. This is the typical mode of operation of these telescopes, which assumes the observer has some familiarity with the bright stars in the sky. You can start up with the telescope pointing in any direction; however, there still is a case to be made for levelling the telescope and pointing roughly north—then the telescope will track while you centre the alignment stars. Either way, first Initialize the telescope as described in section 2. At this stage, the telescope knows where it is and what date and time it is, but may not know where it's pointing. This time, when the telescope offers asks Begin Alignment? you accept. There are two flavours: classic Two-Star Alignment and an assisted version called Brightest Star. In both cases, the first star orients the telescope to the sky with the assumption that the base is perfectly level; the second star corrects for any small deviation from levelness. All true in principle; however, I have found that the more care taken to level the base at the very start, the better everything turns out after that. The telescope's tracking performance and especially Go-To performance will just be better.

Let's begin with Two-Star Alignment. As far as choosing stars goes, the telescope makes fairly smart suggestions, but is unaware of any obstructions to viewing the sky (in my yard, there are plenty!). You can choose alternate stars, but be sure you know where they are and that you can see them! Use the hand control and finder to place the first star in the telescope field (it's important to centre the star in the telescope, not the finder—if you discover the finder “off,” then readjust it). To make centring easier, start with a low-power eyepiece, but switch to a higher power and re-centre for the most accurate alignment. Some observers like to use an eyepiece with crosshairs for centring. Also, you might want to centre in the (aligned) finder first, using a moderate slew rate (5–6) and then switch to the eyepiece and centre with a slower slew rate (3–4). For precise positioning, the last motions should be UP and RIGHT on the hand control. Once the first star is centred and accepted, the telescope will suggest a second star. If it is not obstructed, choose it, otherwise choose another with the hand controller. It is good practice to choose a second star that

is roughly 90° different in azimuth from the first star. Once the second star is centred and accepted, you are good to go! Happy Observing!

Brightest Star Alignment is similar to the Two-Star Alignment, but you don't have to know the names of the stars. You DO need to know your cardinal directions NEWS, and their in-between directions. Look up in the sky, find a bright star, face it, and figure out in which of the eight sectors it lies: north, northeast, east, etc. Also confirm that it is the brightest star in that direction. Then scroll through the hand control menu until the appropriate sector is displayed, and enter it. The hand control will (with luck) identify the star. There may be a list of star candidates, which you can often discriminate by their altitude above the horizon. If you are happy with the star, accept the choice. After that, the alignment proceeds as with Two-Star.

Here's the best-kept secret about the Brightest Star option: it recognizes bright planets as “brightest stars”; however, when you centre and accept the planet, the telescope proceeds to find two actual stars to complete the alignment. In this way, when it's dark enough to pick out planets with the unaided eye, but too bright to pick out stars with the unaided eye, you can still proceed with star alignment because the stars might be visible in the finder and telescope, owing to their greater aperture. Cool, eh?

Parking. If you would like to shut down your telescope briefly and restart later without having to go through the entire initialization procedure, there is a hand-control menu item for that, including options for the park direction of the telescope. For example, you might want to replace a weak battery (note that there is a hand control-menu item for monitoring the battery voltage). When restarting, you only have to enter the date (if changed) and time. For best positional accuracy, use as accurate a time as possible: every minute out is equivalent to a minute of image drift in the eyepiece. Actually, it's best to use the same time source as before, for consistency. On one occasion, I aligned my telescope for night-time observing at the observatory, parked it for the night, and returned in daytime to start from park and find Venus in the daytime sky. That was fun!

I hope this first article has been useful to the reader. I'd love to hear your thoughts, and ideas for future articles. ★

Dave Chapman is a Life member of the RASC and Emeritus Editor of the RASC Observer's Handbook (2012–2016 editions). He has been observing with telescopes for over half a century. He received the Simon Newcomb Award for astronomical writing in 1986 and a Service Award in 2015. Currently, he is Chair of the RASC Observing Committee.