

PART ONE IN A SHORT SERIES FOR BEGINNING OBSERVERS – if you’re already an experienced observer, this probably isn’t for you.

WAIT! DON’T BUY THAT TELESCOPE UNTIL YOU’VE READ THIS!

You’ve decided that you need a telescope but aren’t sure which one to go for. Someone wants to buy you a telescope, for Christmas perhaps, but doesn’t know where to buy one or what to choose.

The telescope landscape is a bewildering one and you need to know your way around. It’s easy to fall into the trap of buying a scope that’s complicated or awkward to use, specialised or unsuitable for a beginning observer or just plain bad value for money.

The purpose of this short advice sheet is to help you avoid the pitfalls and make an informed purchase to start with. The idea is to cut through the complexity, steer clear of all but the essential ifs and buts and offer straightforward, practical advice to beginning observers on choosing a first scope.

Tip 1: Set a budget and, within reason, stick to it. Don’t go over the top. There are probably more telescopes gathering dust in garages and serving as homes for hedgehogs and owls than ever get to be pointed at the night sky. Until you’ve tried it, you don’t know whether observational astronomy is for you. I guarantee that if you do discover that you really love it, there’ll be no shortage of spending opportunities further down the line. The suggestions here offer the best available value in terms of performance, cost, short learning curve and ease of use.

Fortunately and perhaps surprisingly, when it comes to choosing a first scope, there is more or less definite and unequivocal advice to offer. Here it is.

Tip 2: For most people, the best first scope is an 8 inch Dobsonian. Now, it could be a 6 inch or a 10 inch but an 8 inch is not too big, not too small and is super easy to set up and super convenient to use. At the same time, it is excitingly powerful. A 10 inch might be a bit awkward for some people to lug around and a 12 inch certainly would be. A 12 inch is also quite bulky and might be inconvenient for you to store.



A typical Dobsonian reflector, the Skywatcher 8 inch (200mm).

The popularity of this design is due to its ease of use, versatility and, above all, its unmatched capacity to provide significant light gathering power and resolution for a relatively low price - in other words, performance for money.

Why a Dobsonian? Quite simply, of all telescope designs, the Dobsonian provides the best performance for the money, by a very big distance. The numbers in the previous paragraph refer to the diameter of the main optic. In the case of a Dobsonian - which is a 'reflecting' telescope, a variant of the Newtonian design - the main optic, or 'primary', is a parabolic mirror sitting at the bottom of the tube. There are other important numbers but this diameter – the 'aperture' of the scope – is the key optical determinant of any telescope's capabilities.

That's assuming an instrument that's properly made and in decent condition, of course – a safe assumption if you purchase new from a reputable brand such as Skywatcher. A telescope's 'light gathering power' and capacity to resolve fine detail depend on the size of its main optic. What this means for you is that, with the proviso that a scope needs to be safe for you to move and convenient for you to store, you should go for something reasonably big. How big? Well, I've suggested a range. Within that it's for you to choose by budget and preference. Remember that if a scope is awkward or taxing to move around, you're likely to use it less. You're not going to know the answers to these essential questions without getting your hands on one. So, here's my next piece of advice:

Tip 3: Don't buy a telescope without seeing it and getting a feel for what it would be like to own, move and store.

It follows that you should not buy unseen through sites like ebay or Amazon. And don't buy from non-specialist dealers like Currys, PCWorld, etc. The staff in these stores are not well placed to advise on astronomical matters and the scopes for sale at such outlets, at least the ones I've seen, are poor choices in terms of performance and value for money.

If buying new, buy from a recognised astronomy equipment dealer. GAS doesn't endorse or recommend particular dealers. Going solely on personal experience, I've used and found Telescope House, 365 Astronomy and First Light Optics to be helpful and well informed, but this is not an exclusive list and there are, of course, other reputable dealers. The first two are perhaps close enough for you to visit to get a hands-on sense of what different scopes look and feel like. The Skywatcher brand is well respected and can be recommended. It offers a range of good value equipment much of which is designed with the beginning observer in mind.

The Dobsonian design is a complete package of optical tube and mount. If you buy new, you can expect to get a couple of eyepieces and a finder-scope inside the box - pretty much all you need to get started with visual observing. A small or mid-size Dobsonian is easily packed in the car for trips to dark sites and is quick and easy to set up in the field. If you keep it in a shed, you can be observing from your lawn or patio in 5 minutes. If you keep it in the house, it'll need some time to adjust to outside temperature before it performs at its best.

Tip 4: Buy a scope that's quick and easy to set up and you're likely to use it. Buy a scope that's fiddly to set up and uncomfortable to use and you'll opt for the armchair and more pizza instead.

Suppose you go and see some 'Dobs' and decide that they're all too bulky and awkward? The best starter scope alternative is a small refractor (lens telescope) with an aperture between about 80 and 100mm, or maybe a bit bigger if you can afford it. Unlike a Dobsonian, a refractor of this kind requires a separate mount. Again, Skywatcher supplies some soundly made and performing

packages that include both scope and mount. These packages, like the Skywatcher Dobsonians, come with everything you need to get started already in the box. At this stage, there should be no need to fork out for anything else, other than perhaps a Moon filter, so you don't dazzle yourself looking at the Moon.

A decent, small refractor is easy and enjoyable to use. It is also a viable 'travel scope' - up to a point. You can fit one in your hold luggage but you'll also have to find room for some sort of mount. Most refractor- mount packages include what's known as an equatorial mount that goes on a tripod and typically requires counterweights to balance the scope. Taking a small refractor away is not quite the breeze it might at first appear to be. To perform properly, a good telescope needs a stable, wobble-free mount. You might be better off taking some decent binoculars instead. Furthermore, you're likely to do most of your observing at or near your home, so choosing your telescope on the basis of the occasional exotic trip makes little sense.



A small refractor on an equatorial mount

Counterweights balance the scope. The polar axis runs at right angles to the shaft bearing the weights and must be aimed at the North pole of the sky for the mount to work properly.

An excellent design popular for imaging in its powered versions but somewhat less convenient than an alt-az for visual observing.

If size concerns send you in the direction of a small refractor, I'd recommend buying a separate 'optical tube assembly' (OTA) and getting an alt-az (altitude-azimuth) mount, such as the one shown in the picture, rather than an equatorial. Each design has its pros and cons – there is nothing more or less 'serious' about either one or the other. For visual observing with a small refractor, the balance of advantage points to an alt-az. Such mounts work extremely well, are fuss-free, uncomplicated and intuitive to use. Many advanced observers prefer them for their visual observing.

The alt-az mount (of which, incidentally, the Dobsonian mount is a version) allows you to swivel the scope up and down (alt) and side to side (az), so you can point it around the sky. An equatorial mount differs only in the respect that one of its axes is tilted to align with the rotational axis of the Earth. This enables an equatorial to follow an object in the sky by moving in one plane only, as long

as it is carefully set up. An equatorial mount is, specifically a powered one, is more or less essential for imaging and has conveniences for some other types of observing, but for visual observing with a smallish refractor it is unnecessary and can be inconvenient. With the most commonly found 'German' equatorial design – as illustrated - the eyepiece gets into some very awkward, neck-wrenching positions. An equatorial also takes longer to set up in the field because you have to align its polar axis before you can use it properly. With a bit of practice, this isn't too difficult, but it can exact costs in terms of time and patience and, for small scope, visual observing, it's just another barrier between you, the eyepiece and the sky.



A small refractor on an alt-azimuth mount.

Functional and intuitive, an ideal pairing for visual use.

The manual 'slow motion' knobs allow the observer to follow objects in the sky and make fine adjustments to centre the image.

The main reason to favour the Dob over the smaller refractor, though, is this. The small refractor will be crushingly outperformed visually by any of the Dobsonians I've mentioned. 'Ye cannae beat the Laws of Physics, Cap'n ...' Assuming comparable optical and mechanical quality, there is no way that a small telescope can be 'magicked' to outperform a much bigger one. Aperture wins. A mid-size Dobsonian is the least expensive way to access sizeable, manageable aperture.

Tip 5: Second best choice only if size is a problem: a small/mid-sized refractor on an alt-az mount – enjoyable wide-field viewing, but it won't keep up with the mid-range Dob.

A small refractor would be the better choice if you were absolutely sure that your main interest lay in imaging. This is not the place to go into the ins and outs of imaging; please just be aware that the imaging route has a learning curve and entails extra expense. The length and steepness of the curve vary with the type of imaging you want to do, as does the expense. If you want to do it properly, you could toss the price of an 8 inch Dob into the imaging money-pit that you'll need to excavate. Experience tells us that of the many people who believe they want to do imaging and spend a small fortune up front on the necessary kit, only a small fraction stay the course. I am both a visual observer and an imager and tend to view them as complementary. My advice to beginning observers is to start by exploring the visual option. Find out first if observational astronomy is really for you. You can decide later whether or not you want to make the considerable commitment of time and money that successful imaging entails.

Tip 6: Experience some visual astronomy before committing to imaging

What about binoculars? For beginners and advanced observers alike, binoculars are a wonderful, accompaniment to a sizeable telescope. They're superb in their own right for low-power, wide field views of, say, the Milky Way from a dark site and star clusters like the Pleiades, the Hyades and the Beehive. They're perfect for scanning the skies and for locating objects to visit, using greater aperture and higher power, with the telescope. But ordinary binoculars won't approach the performance of a telescope of the sort we've been discussing - they won't show you exciting detail on the Moon or planets, allow you to split interesting double stars, hunt down much in the way of galaxies, let you lose yourself in the depths of the Orion Nebula. An 8 inch or bigger Dob will.

So, I don't concur with the advice sometimes given to 'Start with binoculars before moving on to a telescope.' This is a bit like advising someone who wants a spaniel to start by gaining some experience with a hamster. Yes, there are essential similarities but it's the differences you'll notice when you go for your first walk in the park together. I don't know whether hamsters and spaniels happily co-exist - I expect there are lots of nice Youtube videos showing them sharing a basket - but binoculars and telescopes *definitely* do. This isn't the place to discuss binoculars in any depth - there are, for example, some superb monster binos that provide breath-taking views, but they're very expensive and outside the brief of these notes - more on binocular viewing in a later instalment

Tip 7: Binoculars: an indispensable companion for a sizeable telescope but not a substitute for one.

Tip 8: Assuming comparable quality, a big telescope will show you more than a small one. There is some oversimplification in this statement - other factors like 'seeing', for example, can be relevant - but, in general and with the sorts of telescopes we're talking about, it is inescapably true. This means finer detail on the Moon and planets, fainter stars and fainter diffuse objects like galaxies and nebulae. So, don't buy a small telescope just because it gleams, looks cool and is bristling with gadgets and electronics. None of this really counts, unless you're just looking for something to stand on the piano. Gleam and look cool as it may, it will perform like what it is - a small telescope with limited abilities. Don't blame the telescope though - it's only little.

So, what about Maksutovs, Schmidt-Cassegrains, and all those other scopes out there? There are many good telescope designs. Each design has intrinsic strengths and limitations and some designs are better suited to specific observing applications than others. This isn't the place for a comparison of the different scope designs and their endlessly debatable pros and cons - maybe another time. The Dobsonian I've recommended here hits the sweet spot absolutely dead-centre in terms of power, versatility, cost and ease of use. The smaller refractor lacks the power of the reflector but, within the constraints set by its size, scores well on the other three qualities.

Choosing a telescope is just the first step. Discovering how to get the best out of it is the next. I'll tackle that in the next advice sheet in this short series.

Meanwhile, if you have any questions about this or anything else astronomical, just send an email to me at: askanastronomer@guildfordas.org and I'll do my best to help.