

# Simple telescope design question

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Hi, I'm new to the group. I have been learning about telescope designs for a month or so, and have a question that I haven't been able to find the answer to; I thought one of you might like to answer it.

My question is about a variant of a Newtonian reflector. A Newtonian reflector has a parabolic primary and a flat secondary that is placed on the optical axis some distance shy of the focal point. The light reflected off the secondary goes to the eyepiece.

Would it be a Bad Idea to reverse the order of the two mirrors? The flat elliptical mirror would have to grow to have the same diameter (along it's *\_shorter\_* axis) as the parabolic mirror, and would be similar in position to what I think is called a Steering Mirror. Light would hit the steering mirror, then the parabolic mirror, then pass through a hole in the steering mirror and go directly into the eyepiece, like this (only longer):

```

pppp.....S
ppp ... S
pp ... S
pp ... S
p ...
p.....|= Eyepiece
p ...
pp ... S
pp ... S
ppp ... S
pppp.....S

```

I can't believe noone has considered this simple variant on a Newtonian before; so does anyone know the name of this design? Also I've never heard of one being constructed, so there must be some significant problem with it. Can anyone tell me what it is?

The obvious fact of this design that makes it look worse than Isaac Newton's design is the large, heavy flat mirror instead of a small,

light one. But here are the advantages I see that make me ask:

1. The only real collimation required is collimating the eyepiece to line up with the optical axis of the parabolic mirror. If the steering mirror is slightly out of alignment, you see a slightly different portion of the sky, but nothing goes awry optically. In a Newtonian, the diagonal has to be correctly aligned to bounce light directly down the center of the mount for the eyepiece, and then the eyepiece has to be correctly aligned along that same axis.
2. Counterweights are often used to balance a Newtonian telescope, because its weight is predominantly at one end. In this design there is already weight at both ends, which should minimize the need additional weights.
3. I believe steering mirrors are often used by owners of large binoculars to put the eyepieces in a more convenient place, and to reduce the amount of weight that has to be moved to steer the field of view. The steering mirror in this design should provide both of those advantages, but without being an extra optical element that steals light as it is in other cases.
4. The "obstruction" is a hole rather than the back of a mirror. To use the obstructed light in a Newtonian reflector, another diagonal mirror would have to be used to divert the light before it hits the secondary; and that mirror would grab some of the light, and have to be aligned with the components that use the otherwise wasted light. In this case, the light passes through and can be viewed with an (on-axis!) viewfinder, or for digital astrophotography it can be focused, collected with a second CCD, and ultimately added back into the digital image. [Having two detectors on the same optical axis might allow for some fancy cross-comparison of off-axis light, for example from two different optical designs, allowing both to be corrected into a superior image...but I digress.]
5. The prime focus would be somewhere after the light had passed through the hole in the steering mirror. This presents a golden opportunity to use an iris to eliminate the farthest off-axis light and enhance contrast when viewing the moon or other bright objects, does it not?
5. A Maksutov or Schmidt corrector could still be used, placed in the light path before the diagonal mirror and out of the way of the light reflected from the parabolic mirror. If one is willing to place the corrector even farther from the flat mirror, I think a less curved corrector could be used; mightn't that make them cheaper (at the expense of ending up with an even bulkier, L-shaped telescope)?

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All in all, it sounds like rather a good idea to me. So how wrong am I?

Thanks,

Max Robinson  
Seattle

(This is a rewording of a similar message I posted to alt.astronomy, before I knew about this newsgroup. Apologies if you've read it twice now).