Gary Seronik

Meet the Chief

Could this new optical design be the wave of the future for ATMs?

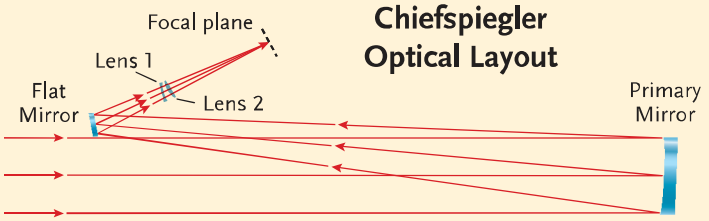
IT'S NOT EVERY DAY that a new optical design emerges from a telescope maker's workshop, but thanks to Ohio ATM Ed Jones, that's what's happened. Meet the Jones-Herschelian, a catadioptric Herschelian schiefspiegler that Ed dubs the Chiefspiegler, or Chief for short.

"This is the scope of the future!" says Ed. That's a bold statement, but the closer you look at the Chief, the more you're likely to agree. For many amateurs, off-axis reflectors represent a telescopic ideal, combining the unobstructed light path of a refractor with the perfect color correction of a reflector. There have long been off-axis designs (including the well-known schiefspiegler and Herschelian variants), some of which are practical to build and use, some less so. All avoid the central obstruction found in other reflectors by tilting the primary mirror so that the focal point can be intercepted without blocking the incoming light. Such telescopes are known generically as tilted-component telescopes, or TCTs. While TCTs solve one problem, they create another.

Tilting the primary mirror introduces an alarming amount of astigmatism into the image. There are two ways to minimize this optical aberration. One is to make the scope's focal length long — this is why most off-axis telescopes tend to be in the f/12 to f/20 range. The other is to add corrective optics. Virtually all TCT designs combine these approaches, and this has limited their appeal to most ATMs. The beauty of Ed's Chiefspiegler is that you get the TCT benefits, but in a scope that's relatively easy to make *and* can have a focal ratio as fast as f/5.5.

ED JONES

Ed Jones dubbed his new design the Chiefspiegler, or Chief for short. The 12-inch f/7 tilted-component telescope seen here is simple to build and a pleasure to use. The scope's folded light path positions the eyepiece lower than a conventional Newtonian of the same focal length.



The scope featured here is a 12.5-inch f/7 Chief. The optical layout shown above is quite simple when you break it down into its components. There's the primary mirror, which is a conventional f/7 Newtonian paraboloid, and a 3.2-inch-diameter flat mirror that directs light from the primary to a pair of single-element lenses that eliminate the aberrations arising from the tilted primary. The lens closest to the primary is plano-concave (negative), the other is plano-convex (positive).

Any competent mirror maker should be able to fabricate the lenses. As Ed notes, "The work is like hogging out a telescope mirror, but on a much smaller scale. It's easiest to modify an off-the-shelf lens, provided you can

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Above: **The Chief's critical components are two lenses. While viewing through the eyepiece, Jones sets the tilt angles of the lenses with a pair of threaded rods that adjust the spring-loaded cells.** ***Right:*** **For transport, the Chief breaks down into components.**

find one of the right diameter with sufficient thickness. Unfortunately, commercial lenses more than 2 inches in diameter are rather scarce. For my 12-inch scope I made the lenses from some good quality BK7 optical windows." If grinding lenses is more than you want to tackle, you can make an 8-inch f/10 Chiefspiegler with off-the-shelf lenses from Newport Corp. (www.newport.com; part numbers KPC064 and KPX211) or other sources.

Compared to a typical Dobsonian reflector, the only unusual construction aspects of the Chief are the lens cells, since they must provide adjustments for the tilt between the lenses, the position of one lens on the X axis and the other on the Y axis, and the tilt of the lens pair relative to the optical axis. Ed devised a pair of double-hinged boards for his lens cells. The lenses are held in place with clips and their X and Y positions fine tuned with nylon-tipped screws. There's a detailed description of how Ed made these adjustments at http://home.isoc.net/%7Eejones/.

I can't say if the Chief will bring TCTs into the telescope-making mainstream, but its simplicity will surely entice some ATMs to give these fine performers serious consideration. Indeed, if you have a primary mirror in the works or already completed, you might consider going the Chief route. You can discuss this design with other ATMs on the "spiderless" Yahoo group, and you can e-mail Ed at solarview@isoc.net. The future awaits! ✦

Contributing editor ***Gary Seronik*** *is a veteran telescope maker who is considering making his next scope a Chief.*

Chief Optical Specifications*

Primary mirror	**8-in. f/10**	**12.5-in. f/7**
Diameter	8.0	12.5
Radius of curvature (R1)	–160.0	–172.8
Tilt	2.6°	3.1°
Lens #1**		
Radius of curvature (R2)	flat	flat
Diameter	2.0	3.12
Center thickness	0.0984	0.1612
Radius of curvature (R3)	–10.173	–8.972
Tilt	10.595°	15.042°
Air space to Lens #2	0.45	0.65
Lens #2		
Radius of curvature (R4)	10.173	8.312
Diameter	2.0	3.0
Center thickness	0.1674	0.3750
Radius of curvature (R5)	flat	flat
Tilt	–6.096°	–9.172°
Air space to focal plane	11.908	9.406
Image tilt	2.28°	1.06°

* All dimensions in inches ** All lenses are BK7 optical glass.