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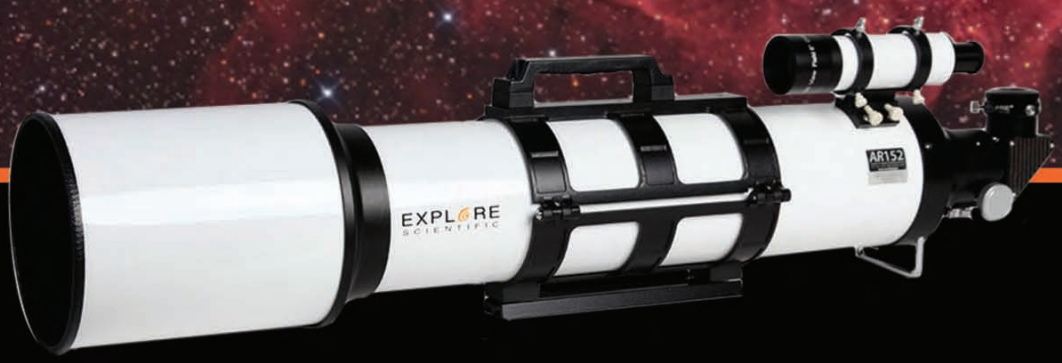
Explore Scientific AR152 Achromatic Refractor

A Quality 6-inch Refractor for Every Budget!



Volume 9 • Issue 3
July-August 2015 $6.00 US

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Cover Story: Pages 32-35

Our cover features Explore Scientific's 152-mm f/6.5 AR152, a fast, affordable, high-quality 6-inch achromatic refractor. Dr. James Dire, no stranger to high-end refractors, provides his impressions of the big refractor after using it extensively for both high- and low-magnification visual observations. The background image is from Ron Brecher's report in this issue on IP4AP's PixInsight tutorials and demonstrates the dramatic improvements he was able to obtain from applying those lessons to maximization of PixInsight's multi-scale function.

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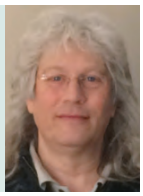

Ron Brecher got involved in astronomy in 1998 he thought he had ordered a toy scope for his 3-year old son using Visa points. What arrived was a 4.5 inch reflector providing breathtaking views of Saturn, Jupiter and the Moon. He then bought a Celestron Ultima 2000 and the views blew him away - he was hooked. He started imaging in 2006 and ever since has been seeking deep sky treasures with camera and telescope.

Dr. James Dire has an M.S. degree in physics from the University of Central Florida and M.A.and Ph.D. degrees from The Johns Hopkins University, both in planetary science. He has been a professor of physics astronomy at several colleges and universities. Currently he is the Vice Chancellor for Academic Affairs at Kauai Community College in Hawaii. He has played a key role in several observatory projects including the Powell Observatory in Louisburg, KS,which houses a 30-inch (0.75-m) Newtonian; the Naval Academy observatory with an 8-inch (0.20-m) Alvin Clark refractor; and he built the Coast Guard Academy Astronomical Observatory in Stonington, CT, which houses a 20 inch (0.51-m) Ritchey–Chrétien Cassegrain telescope.

André Van der Elst is a former chairman of InfoCosmos, a Belgian amateur astronomer association. His "Astro-Tests" have been published in several French and Belgian astronomy magazines, critically testing hundreds of telescopes, eyepieces and other accessories. He has written two books: *Astro-Tests* and *Astro-Guide* (published by Vuibert , France). When he is not testing, you can find him biking all around the green corners of Brussels , Belgium where he lives.

Gary Parkerson discovered early in his amateur-astronomy career that he was as fascinated by the tools of astronomy as by the amazing celestial objects they reveal – perhaps more so. When not writing about astro-tech, he covers industrial technology for a variety of online resources.

Richard S. Wright Jr. has been an avid amateur astronomer for more than 25 years, and is the lead author of a best-selling book on graphics programming. For over 9 years he has worked as a software engineer for Software Bisque and has contributed to TheSkyX and Seeker Theater Suites, and on Bisque's mobile products for iOS. Richard likes to take credit for bringing Software Bisque back to the Mac, and refuses to run Windows at the scope, or as part of his imaging work flow. He loves to go camping... anywhere with dark skies.

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The Explore Scientific AR152 Achromatic Refractor

A Quality 6-inch Refractor for Every Budget!

By Dr. James R Dire

When it comes to telescopes, size does matter – so when one shows up to a star party with a six-inch refractor, people will notice and flock over to take a look at it. And exactly this scenario happened to me recently when I set up my brand new Explore Scientific AR152 achromatic refractor at a Kauai Educational Association for Science and Astronomy (KEASA) monthly public star party (**Image 1**) for first light. Aperture envy exasperations abounded!

The Explore Scientific AR152 achromatic refractor is a 152-mm f/6.5 air-spaced doublet refractor. I purchased the optical tube assembly (OTA) alone, as I already owned several go-to German equatorial mounts (GEM) that were suited for this 23-pound telescope. For first light I mounted the AR152 on an Orion Atlas GEM (Image 2).

The AR152 arrived in a double-layered cardboard box with *Styrofoam* protecting the OTA from movement during shipping. The accessories were bubble-wrapped and packed in a smaller box inside with the OTA. The telescope did not come with a carrying case, but that was okay for me because, after first light, I installed it on a Celestron CGE Pro mount inside the KEASA observatory.

Image 1 - The author and his Explore Scientific AR152 achromatic refractor pictured at a Kauai Educational Association for Science and Astronomy (KEASA) monthly public star party for first light.

Among the included accessories are a nice hinged, three-ring cradle with easy-to-turn knobs (**Image 2**), a Vixen-style dovetail plate, and a second smaller plate on top of the cradle to hold piggy-back accessories. The scope comes shipped with a removable carrying handle attached to the upper plate (**Image 3**). There is a second handle on the bottom of the tube just in front of the focuser for holding the tube when placing it into, or removing it from, the three-ring cradle or mount.

The objective end of the tube had a

fixed dew shield making the overall length of the telescope 41 inches. The dew shield is perfectly sized to keep out stray light. A dust cover slides inside the end of the dew shield with friction fit to keep the optics dust free when stored.

The telescope comes with an 8x50 finderscope featuring a two-ringed bracket that attaches to the OTA with two sturdy *Teflon* screws (Image 3). To keep the cost down, the finderscope is a simple straight-through model. I prefer to use an image-correct 90-degree finderscope, especially if I am doing a lot of star hopping, but when using a go-to mount, the finderscope is only used for the initial mount setup. I can tolerate bending my neck a few times to look through the finderscope during the initial alignment. Afterwards, the mount's GOTO commands places any object I want to view in the main telescope's eyepiece.

The telescope comes with a two-speed, two-inch focuser. The coarse-focus knob is on the left (Image 3). The right side (**Image 4**) has smaller 10:1 fine-focus knob concentric with a larger course-focus knob. The drawtube can be locked in place with a setscrew on the bottom of the focuser. I found the focuser to operate very smoothly and was impressed by its quality, considering the overall low price of the telescope package.

The final included accessory is a nice 99-percent reflectivity carbon-fiber diagonal with a 2-inch compression ring and a 2-inch to 1.25-inch adapter. The diagonal is firmly secured into the drawtube with not one, not two, but three setscrews! The accompanying images show the telescope with a 31-mm Tele Vue Nagler eyepiece in the diagonal. The size of the refractor makes this behemoth eyepiece look rather insignificant. This is my longest focal length eyepiece. The AR152's relatively small f/6.5 focal ratio results in a 988-mm focal length. This eyepiece yields a 2.6-degree field of view at 32x, truly a rich-field experience!

Image 2 - The AR152 on an Orion Atlas GEM.

The telescope's doublet objective is factory collimated but can be collimated in the field if needed. **Image 5** shows the collimation set screws as well as the multiple baffles inside the tube to improve contrast by minimizing stay light from reaching the focus point.

One might expect to pay a four-digit price tag to own a 6-inch refractor with such quality, workmanship and accessories. But at this writing, the AR152 lists for a mere $750! What's the catch? Well, this is not an APO. It's a doublet telescope that uses crown flint glass. While the glass is good quality, it is not extra-low dispersion (ED) glass like that found in semi-APO doublets. Therefore, for bright objects such as the Moon, planets and the brightest stars, there will be false color on the edges of the objects. Expect to pay three to five times as much for a 6-inch doublet with ED glass and ten to fifteen times as much for a triplet APO of the same diameter.

Most people use telescopes to look at

Image 3 - The ES AR152 ships with a hinged, three-ring cradle, a Vixen-style dovetail plate and a smaller top plate for piggy-back accessories. It also includes a removable carry handle, an 8x50 finderscope and a 99-percent reflectivity 2-inch carbon-fiber mirror diagonal.

the Moon, planets, star clusters, nebulae and galaxies. Very seldom do we look at 1st or 2nd magnitude stars – so who cares if the optics don't eliminate the false color around brighter stars? Secondly, the Moon is too bright to view in a 6-inch telescope unfiltered. I own a two-inch H-beta filter for looking at certain nebulae, but I find this filter is also great for dimming the bright Moon down to a pleasant illumination, and it totally eliminates the chromatic aberration. Granted, the Moon appears blue, but it is pretty much monochromatic anyway. For bright planets like Mars, Jupiter and Saturn, color filters typically help improve contrast. I found that yellow, green and orange filters were great for seeing different detail on these planets, and they greatly reduced the false color of the doublet refractor.

Two of my first targets with the telescope were Jupiter and Saturn. Jupiter was so bright it was surrounded by a quite noticeable purple glow. However, the detail on the planet was impressive. With my 12-mm Nagler eyepiece (82x) the Great Red Spot was clearly visible, as were transits of the Jovian moons and their shadows. Saturn was not as bright as Jupiter, and I did not notice the same purple halo. The rings and Titan were capture in won-

Image 4 - A 10:1 fine-focus knob is located on the right side of the focuser, concentric with a larger coarse-focus knob.

Image 5 - The AR152 can be field collimated via push-pull set screws shown here. Multiple knife-edge baffles inside the tube improve contrast by minimizing stay light from reaching the focus point.

derful splendour.

My next target was M42 – the view was absolutely fantastic. The Trapezium and swirling gases impressed all who lined up to look through this telescope. I then examined a number of galaxies including M51, M84, M85, M101 and M108. All were much more impressive in this 6-inch scope than any of my smaller aperture APOs, one of which cost more than $2000!

The most impressive class of objects I viewed with the AR152 were star clusters. I observed M35, M36 and M38. The sharpness of the stars was excellent. Globular clusters were equally impressive. I viewed M3, M53, M5 and M13 – the detail rivalled an 8- to 10-inch reflector! Later in the evening, I viewed Omega Centauri when it reached its maximum elevation 20 degrees above the horizon. This view alone was worth the price of the telescope.

Fast refractors do suffer from field curvature. Usually this is only apparent during imaging, which then necessitates a field flattener. But with 6 inches of aperture, I did notice some field curvature with a few of my longer focal length eyepieces. However, this was no more bothersome than coma in an f/5 Newtonian.

I did not attempt imaging with the refractor. Chromatic aberration would require imaging through narrow-band filters and adjusting the focus for each filter. Theoretically, anyone with the proper equipment could use this scope for this type of imaging and obtain very good results.

In conclusion, this telescope has impressive value as a large rich-field refractor for visual use. The size will surely attract attention at observing events. For deep-sky objects, the view will definitely wow anyone who looks through it. The price brings a 6-inch refractor into the reach of just about anyone's budget! ATT