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CELESTRON SKYPRODIGY AT CES • TMB-92L SIGNATURE SERIES • A 3D CAD PRIMER
AG OPTICAL SYSTEMS 18-INCH NEWTONIAN ASTROGRAPH • ASTRO-TECH 8-INCH IMAGING NEWTONIAN
THE "HOME DEPOT" SCOPE • PROTOSTAR'S NEW FLOCKING BOARD • IS YOUR OBSERVATORY ON VIDEO?

William Optics Megrez 120-mm Refractor

A Pleasing Visual and Imaging Performer!

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ATT Contents

Cover Story: Pages 35 - 38

Shown on the cover is the William Optics Megrez 120-mm Refractor reviewed by Dr. James Dire who used the scope to produce the cover image of the double cluster in Perseus. The image demonstrates stars with colors across most of the visible spectrum and shows the imaging capabilities of the scope with stars that are perfectly round across the entire field of view, with many blue, yellow and red stars scattered throughout the image. Dr. Dire used an SBIG ST-2000XCM single-shot color camera with the onboard guide chip which eliminated the need for a guide scope. The exposure time was 10-minutes. Dr. Dire reports that the transparency that night was excellent, but the seeing was no better then than 3 arcsec. To shorten exposure times, he used a William Optics adjustable focal reducer set at 0.75 which resulted in an effective 675-mm focal length at f/5.6.

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ATT Contributing Writers

Art Bianconi's first experience of Saturn was when he was 5. According to Art he said "Daddy! It has RINGS! Mom says I got so excited and yelled so loud that 2 NYC cops came running!" All these decades later, when it comes to telescopes he's still a kid and just as excited. Art lives in rural New Jersey in the Delaware River Valley. He's a successful Mechanical Designer in a variety of engineering disciplines from composite aircraft to fusion reactors.

Klaus Brasch, Ph.D., is a retired biology professor living in Arizona. Getting hooked on astronomy as a teenager through the Royal Astronomical Society of Canada and the A.L.P.O., he took his first grainy moon pictures in 1957 and has pursued astrophotography ever since. He has been widely published in books and magazines, and translated *Urban Astronomy*, *Great Observatories of the World* and *New Atlas of the Moon* from French into English. Klaus frequently lectures on topics ranging from astro-imaging to life in the universe to students, clubs and the public.

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 and a professor of physics and 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.

Penny Distasio has worked for Meade Instruments as a dealer support rep, and even did a stint at the McDonald Observatory Visitor's Center in Fort Davis, Texas, but her main connection in the world of astronomy continues to be Oceanside Photo & Telescope, where she has worked for the past twenty two years.

Jack Fenimore is a retired Air Force pilot whose assignments included arctic operations and combat rescue. He served as Adjutant General of the State of New York, and consultant to the Defense Science Board. Astronomy has been his favorite pastime since elementary school in Albany, NY.

Mark Manner's interest in astronomy started at age 11 when his father showed him the moon in a surveyor's transit. As he got older, he was primarily interested in cosmology. As computers, mounts and optics improved, he became very interested in CCD imaging. He now images with a 16-inch RC and a 6-inch apochromat on most clear nights. He also works with several schools in their astronomy programs.

Wayne Parker and his wife Lorelei are the owners of SkyShed Observatories. They both are avid observers and spend as much time as possible doing so when not filling orders for PODS. Wayne is also well known as a rock musician with the band Glass Tiger which had several hits in the 1980's and still remains one of the most popular bands today in his home country of Canada.

Doug Riley has 10 years of observational astronomy experience with a number of telescopes, all of which have passed over his workbench for tweaking and improvement. Doug enjoys public outreach activities and keeps a blog about outreach and other issues relevant to observational (amateur) astronomers at punkastronomy.com

Rick Saunders an amateur astronomer, inveterate tinkerer and member of the Royal Astronomical Society of Canada, London Centre. His passion is DSLR imaging and on cloudy nights he spends his time designing and building equipment to help further that passion.

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The William Optics Megrez 120-mm Refractor

By James R. Dire, Ph.D.

NOTE FROM EDITOR

A feature article detailing the functionality of the William Optics Digital Display Gauge is scheduled for followup this spring in *ATT*. The particular WO Megrez 120 that Dr. Dire tested was shipped by William Optics to Suffern, New York, for display at WO's NEAF 2010 exhibit, and the Digital Display Gauge was demonstrated repeatedly while there. The subject scope was then shipped by *ATT* from Suffern to its offices in Louisiana, where it was tested for accuracy of collimation and overall mechanical and digital function. From there telescope was shipped by *ATT* to Dr. Dire's home in Hawaii. By the time he received the scope, the DDG would not power on.

The cause of failure of the DDG unit to power on is simple: *ATT's* managing editor has since confessed to having drained the battery in the DDG unit and forgetting to replace it before repacking the scope for shipment to Dr. Dire. The DDG feature was just too cool for him to resist using the battery to exhaustion.

In 2003, I became interested in purchasing a hydrogen-alpha solar telescope for viewing the sun. For about the same price as a dedicated H-alpha telescope, I decided to purchase a 0.7-angstrom bandwidth, 40-mm (1.6 inch) H-alpha filter set and a high-quality 80-mm (3.1 inch) f/6 refractor to use with it. I had never owned a good quality refractor and this equipment would allow me to conduct solar observations as well as use the refractor for wide-field nighttime observing, and possibly CCD imaging. Since my main goal was narrow bandwidth H-alpha observing, it didn't matter whether the telescope was an achromatic or apochromatic refractor. So I bought an achromatic refractor.

I should explain the differences between these two refractor types. Refracting lenses suffer from what is called chromatic aberration; different wavelengths of visible light do not focus at the same distance from the lens. To counter this effect, refractors usually have two or more objective lenses. In a two-lens system, the doublet is designed so that two different visible wavelengths focus at the same point. This is called an achromat. Most of the chromatic aberration is eliminated, except near the short-wavelength end of the visible spectrum. In a three-lens system, the triplet is designed so that three different visible wavelengths focus at the same point. This is called an apochromat, or APO for short. The result is that all visible chromatic aberration is eliminated. Because there are more elements in the objective, APOs are usually heavier and more expensive than achromatic refractors.

My 80-mm telescope performed quite well with the H-alpha filter. The nighttime views where also stunning. I was hooked on refractors! The scope did show noticeable purple fringing around bright stars and planets, as well as the Moon, the usual sign of chromatic aberration in doublets. CCD imaging did not work well with the telescope because of this aberration.

For that reason, as well as aperture fever, I sold the 80-mm achromat and purchased a 4-inch f/7.9 apochromatic refractor. The

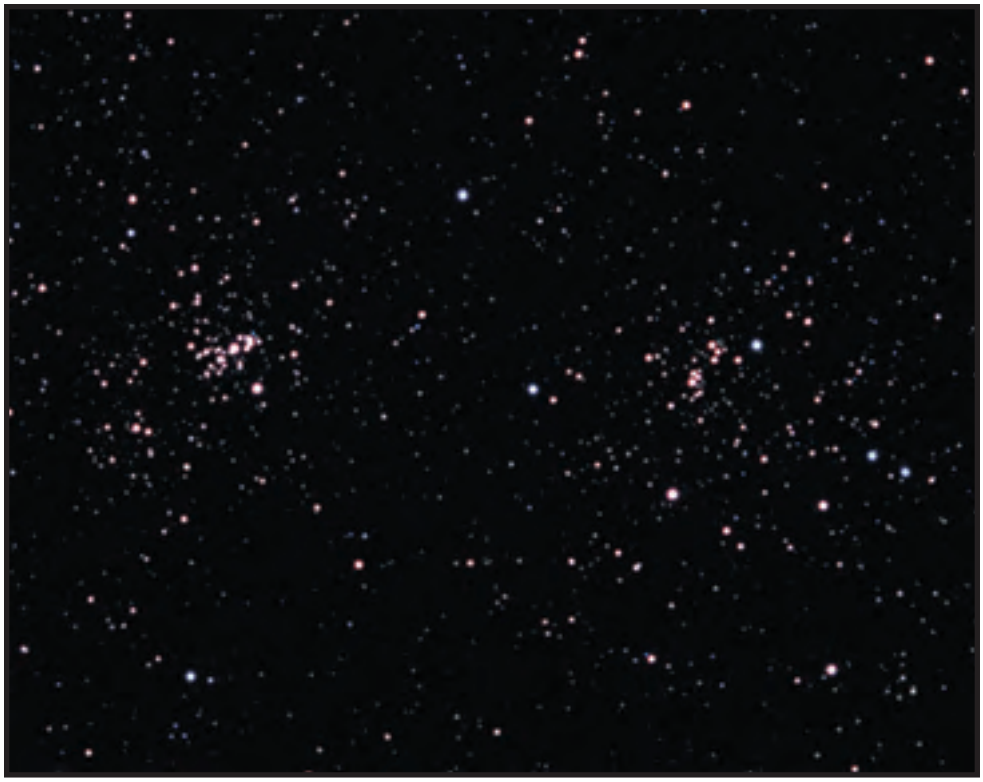

Image 1 - The Double Cluster in Perseus, NGC 869 and NGC884

APO provided higher magnification for solar viewing and worked quite well for digital imaging (see image gallery at www.wildwood-pines.org). A higher f-number results in less spherical aberration (another problem with refractors) than lower f-number refractors. For imaging with large-format digital cameras, I use a 0.8x focal reducer/field flattener.

Today, many telescope manufacturers produce doublet refractors that use low-dispersion glass and special coatings that allow them to perform very close to an apochromat. Some call these telescopes semi-APOs or even APOs, but in my opinion the latter is stretching it a bit too far.

Last fall, I had the opportunity to test drive a new refractor, the Megrez 120, made by William Optics. The Megrez 120 uses a 120-mm (4.7 inches) f/7.5 air-spaced doublet made with FPL53 ED glass with STM coatings. FPL stands for femto-photoluminescent, and FPL53 is a specific type of this glass that contains no lead or fluorite. The ED in the specification means extra-low dispersion. FPL53 glass has about the lowest index of refraction of any glass made. Finally, STM means super transmission. The STM coatings eliminate internal reflections between the elements in the objective.

The Megrez 120 is the largest in this William Optics' line, which includes apertures of 110 mm, 90 mm, 88 mm, and 72 mm. The Megrez 120 has a beautifully painted white tube with gold-colored trim. It comes with a 2-speed manual focuser with a Digital Display Gauge (DDG) and a nice set of aluminum tube rings. The focuser can be rotated 360 degrees to allow a diagonal to be optimally positioned for any viewing angle. The scope also comes with an adapter to use 1.25-inch eyepieces, but it does not come with a diagonal, a must for visual observing. I recommend purchasing a high-quality 2-inch diagonal with this telescope.

The first night I used this scope, I only performed visual observations. The first thing I noticed when I unpacked the scope was how much lighter it was than my smaller 4-inch APO. I attached it to my German equatorial mount and then attached a 9x50 finderscope

Image 2 – The Pleiades, M45

onto the top of one of the tube rings.

Almost all of my viewing was done with a 12-mm Tele Vue Nagler eyepiece providing 75x magnification. My first target was the double cluster in Perseus (NGC869 and NGC884). Both star clusters easily fit into the field of view and the stars were perfect points out to the edge. The 4.7-inch aperture provides 38 percent more light gathering power than a 4-inch refractor and higher resolution. Both of these were apparent in side-by-side comparison with my 4-inch APO.

I next slewed the telescope onto some planetary nebulae, namely M27 and M57. Both were quite impressive with excellent contrast. I could see considerable detail in the Dumbbell. Afterwards, I steered the telescope to Comet Hartley to spy its stellar-like nucleus and faint coma.

The Andromeda galaxy was quite a treat in the Megrez 120. With the 12-mm Nagler, M31 and its two satellite galaxies, M32 and NGC 205, were all fully contained in the same field of view. I could see much more structure in the spiral arms, than in my smaller APO. The Pinwheel galaxy, M33, is always a challenge due to its large size and low surface brightness. But in the dark skies on the west side of Kaua'i, I could actually trace out the brighter regions of its spiral arms in the Megrez. I also found the fainter galaxies M74, NGC1023, NGC7331 and NGC891 in this telescope, however this aperture did not offer any detail for these smaller galaxies.

The biggest treat was viewing Jupiter with the Megrez 120 with my 5-mm Nagler eyepiece (180x). This aperture provided just the right amount of light to see incredible detail without filters. Multiple belts and zones, polar structure, the Great Red Spot, and two white ovals were clearly visible. Plus, I was able to watch Galilean moons and their shadows transit the planet's disk!

I dedicated the second night out with the scope to CCD imaging and decided to use my SBIG ST-2000XCM single-shot color camera with the onboard guide chip. This eliminated the need for a guide scope. The transparency that night was excellent, but unfortunately the seeing was no better then than 3 arcsec. To shorten exposure times, I used a

Image 3 - The Orion Nebula, M42

William Optics adjustable focal reducer set at 0.75. This resulted in an effective 675-mm focal length at f/5.6.

Again, my first target was the double cluster in Perseus (**Image 1**). This cluster-pair contains stars with colors across most of the visible spectrum. The exposure was 10-minutes. Note, the stars are perfectly round across the entire field of view, and many blue, yellow and red stars are scattered throughout the image.

Next I shot the Pleiades (**Image 2**). The entire cluster did not fit on the camera's CCD, however it should on larger format chips with this telescope. The 30-minute exposure picked up a lot of the nebulosity surrounding the cluster. When tested under this most extreme of applications, purple halos around the brightest stars in the image are an indication that the doublet, despite using low-dispersion glass, is not entirely eliminating the chromatic aberration when combined with the adjustable focal reducer.

My last test image with the Megrez 120 was of the Orion Nebula (**Image 3**). This image was also 30 minutes. The seeing had degraded somewhat and the guide chip had more difficulty tracking the guide star. This resulted in the larger star sizes in the image. Still, there is good detail in the nebula structure.

Visually, I found this scope quite a delight to use and would highly recommend it for the following uses. The nearly 5-inches of aperture make this scope perfect for lunar, planetary and star cluster viewing. The scope is also perfect for splitting close double stars or viewing double stars with good color contrast. With respect to color correction, visually it performed as good as my more expensive, but smaller triplet APO. In general, small refractors aren't the best scopes for faint, deep-sky observing, but the Megrez 120 certainly is the best scope in this William Optics line for use in a Messier marathon.

About the only thing I can say negative about the scope is that the focuser, while certainly competent, did not operate as smoothly as the premium unit on my 4-inch APO. I had to completely loosen the focuser lock to make minor adjustments with the fine focusing knob – something I do not have to do with my 4-inch APO. However, the William Optics focuser's 360 degree rotation allowed the eyepiece to be rotated to a comfortable viewing angle without affecting the focus, something I don't have on my APO.

I mentioned above that this model comes with a Digital Display Gauge (DDG) focuser-position readout. By the time I received the scope, the DDG would not power on and I did not concern myself with replacement of the battery; the DDG function is one I am not likely to use because it is not integral to my well-established focus routine. Some who use the DDG under widely-varying temperature ranges might find that the accessory would only be useful in obtaining a rough focus, since thermal expansion/contraction of the telescope tube with temperature can significantly change the focal point of the telescope, making a previously verified and recorded 3-digit focus value inexact. But for even those users, the DDG function should greatly speed obtaining rough focusing for imaging, leaving ultimate fine focus to be accomplished using other techniques commonly used by astrophotographers. ATT