

# “That’s a BIG Refractor, Paw-Paw!”

## The William Optics Megrez 90 APO Refractor

### Uncle Rod Mollise



Yes, as our lovely model, Teresa, said during the photo shoot, the William Optics Megrez 90 is a big refractor. A big APO, anyway. Cats and Kittens, this is where the rubber meets the road, refractor-wise. At 90mm you’ve passed those cute li’l compact 66es that are so popular now, those sporty 80 apochromats that everybody wants, and even the luxurious TV85. Yeah, with the Megrez 90 you’re movin’ out of the land of cute, li’l grab ‘n go outfits and into the realm of big boy’s and girl’s telescopes. What makes this particular telescope worthy of Uncle Rod’s notice, though? There’ve been plenty of APO

refractors available in this size range for years from TeleVue, AstroPhysics and Takahashi. What’s special about this one?

I think several things are special about this telescope, but the most special thing is that the average Joe or Jane Amateur can actually dream of owning one. As I’ve said frequently lately, there’s a revolution going on in the world of APO refractors, a revolution lead by Taiwan’s William Optics. They are turning out bunches of apochromatic lens-type scopes at prices the masses can finally afford. The Megrez 90, for example, can be had for 998 George Washingtons. While nearly a thousand dollars is a not insignificant sum for many of us to consider spending on our magnificent obsession, it’s a danged sight better than what you’d pay for an apochromatic (“color free”) refractor in the recent past. That popular 85mm scope mentioned earlier? Try about twice what the Megrez 90 costs.

So the William Optics 90 is inexpensive. But is it the right telescope for you? Price aside, is it a good telescope? Keep reading parads, keep reading, and all shall be revealed.

The first thing we need to have a heart-to-heart about is the size question. Can you possibly enjoy and live with a 90mm telescope? If you're thinking of adding the Megrez to a stable of scopes, the answer is an unqualified "yes." As you'll see, this telescope is an incredibly versatile tool; one you'll find many uses for even if not as your "primary" visual scope. But what if the Megrez 90 is to be your only telescope?

Ah, that's a harder question to answer—for some folks, anyway. For many of us, a 90mm aperture APO is actually at the *high* end of what we can and will use night-to-night. If you're an urban dweller who must waltz a scope around the yard in order to dodge streetlights, you'll soon tire of even a 6-inch Dobsonian. Put the Megrez on a suitable mount, though, and you won't hesitate to turn off the boob-tube and head for the backyard. If you're an apartment dweller who must observe from a rooftop or a corner of a busy parking lot, the Megrez will be a godsend.

There are plenty of small, portable telescopes of all kinds available, however; everything from the AP Traveler on the high-end to the Orion/Synta StarBlast on the low end. Why should someone looking for performance in a portable package choose this small scope? How did the Megrez 90 perform, exactly? How well is she built? How good and how good a buy? Let's find out.

One cloudy November day, your Old Uncle Rod was minding his own business, relaxing within the storied walls of Chaos Manor South, inventorying the stock of Rebel Yell between bouts of Web surfing. BING-BONG (even after living in the ol' manse for over a decade, I still expect to hear Lurch intone "MAIL'S IN" every time the doorbell rings). Anyhoo, I stirred myself from the kitchen to see what the heck the racket was about. 'Twas the UPS man, and he was bearing an awful big box emblazoned with the famous William Optics swan logo. HOTCHA! The 90 was here.

When the dust and Styrofoam peanuts settled, what I was lookin' at was what you see in the picture below: the gold trimmed white tube of a big apochromat. I was a little stunned. Until you see this scope in person, you have no idea how, well, "hefty" it is. With the collapsible dew shield extended, she's (sans diagonal) 21 ½ inches long. Collapse the shield and the scope shrinks to about 17-inches. She's not a lightweight, either; with the tube tippin' the scales at a wee bit over 7 pounds with no diagonal or eyepiece attached. I am not exaggerating when I say everything about this scope screamed "quality" and "heavy duty" from the get-go. I've had a look at some of the other import ED/APO scopes currently available, and while some have impressed me with their optics (for the price), none has come close to the mechanical quality of this one. Details, though, I know you want details. Let's take a bow-to-stern tour of the M90.



Removing the pretty, gold lens cap (with a swan on it, natch), reveals the objective and cell as seen in my image. The objective lens is the heart of the matter; it's what makes an apochromat an apochromat as opposed to an achromat.



This particular lens is an FPL-53 air-spaced doublet with the "reasonable" focal ratio of  $f/6.9$ . What is FPL-53? Well, your old Uncle ain't any kind of an optical guru, but he's told that this FPL-53 stuff is "fluorite glass," that ED stuff you've heard so much about. As for the physics involved in "refractive indices" and such like, Uncle Rod doesn't much care. What he was and is interested in is, "How well does this objective keep the PURPLE MEANIES away?" I did not want to see purple haloes around bright stars and purple shadows on the Lunar terminator.

Doing the “flashlight test” (yeah, I know I tell y’all not to do that, but do as I say, not as I do), shining a bright light on the objective at an oblique angle, revealed a perfect looking lens and coating. The coatings on this scope, by the way, are referred to by WO as “STM coatings.” I ain’t exactly sure what that means, but what I saw was that the objective tended to almost disappear, even under the harsh light of a photographic strobe. What was returned was a faint, violet-ish reflection. While only a test under the stars would reveal how well this lens would work, it sure looked good.

Peering down the tube, revealed the presence of knife-edge baffles. Yes, real baffles. Folks, it’s been a long time since William Optics used the foam baffles they experimented with for one of their initial scopes, the li’l 80mm Megrez “Short Tube 80 Killer” achromat of yore. Optically and mechanically, WO is on a par with any of the big boys now. Make that: “*easily* on a par.”

What else? Well, you’ve gotta have a dew shield, at least if, like me down here In Possum Swamp, you live where heavy dew is the rule rather than the exception. The collapsible shield on the 90 is everything one oughta be, long enough (7-inches) and thick enough (a tad over 1/8-inch) to keep moisture off the objective. Yeah, down here in the swamp I still need a dew-heater strip for long observing runs, but for quick jaunts into the backyard the generous length and heat-retaining thickness allowed me to forego dew controllers and big batteries. The inside of said dew shield is painted a good, flat color. Like most of the dew shields I see on commercial scopes, its interior is a little closer to flat-dark gray than flat black, but it does its job, and I didn’t notice any spurious reflections.

How about the tube? It’s purty, if not quite as purty as the shiny tubes of the WO 66SDs (which are available in all the hues of the rainbow these days). The Megrez 90’s tube is a good, practical non-gloss white. White really is the best color for a scope tube when it comes to aiding thermal equilibration (those pretty black tubes are about the worst choice in that regard). The slightly textured finish means the scope won’t show fingerprints every time you touch it like those sexy gloss-finished OTAs.

Over the years, I’ve come to the conclusion that the quality of a telescope’s focuser is almost as important as the quality of its optics. In order to produce good images, no matter how well-made a scope’s lenses and/or mirrors are, you must have a focuser that is sturdy enough to hold the optics in exact alignment, and one that’s smooth enough and precise enough in action to make focusing easy at high powers. The focuser on the Megrez easily fulfills these requirements. If you’ve used WO’s recent refractors, the focuser is easy to describe: it’s a scaled- up model of those found on the smaller aperture instruments. If you haven’t used other WO refractors, what this focuser is is a heavy duty Crayford. It’s rotatable (so you don’t have to loosen and turn the diagonal to achieve a comfortable viewing angle), and features a very smooth

and slow fine-focus knob. The course focus knobs (see the image) are not rubber-coated like you'll see on some import refractors, but they don't need to be. These generous-sized knurled knobs were easy for me to use in gloves on cold nights—the ultimate test.



In practice, I found the focuser a dream to use. I had absolutely no trouble focusing at high powers, and, even more telling, it was easy to achieve exact focus using the fine-focus knob when I was CCDing. Any complaints? I thought the focus lock screw could provide a more positive locking action. I had to crank it down purty good with a heavy camera on the focuser. This was not really a practical problem despite my perception of it needing to be easier to lock firmly, however. Yes, I had to twitch the screw pretty good, but that wasn't overly difficult, and the focuser never slipped or threatened to, even with the scope pointed at high altitudes with a hefty SBIG on the end of it.

What else? Well, if you buy the complete Megrez 90 package as opposed to just a bare tube, you'll get, in addition to the OTA, a 2-inch dielectric diagonal (the scope is equipped with a 2-inch focuser and a 1.25-inch adapter). This diagonal is the new William Optics carbon fiber model. Carbon fiber? Yep. The side plates, as seen in the photo, are made of this space-age material. Does it help optically? Ain't sure, but it sure looks SWEET.



Yep, if you do the whole Megrez 90 package, you get the scope and a diagonal. But you will also need something that's not in the box: a finder. You might say, "Hey, Uncle Rod, this is a small wide field scope; I can get by without a finder." Nope Nossir buddy. Not if you want to keep your hairline intact. Even if all you need a finder for is to sight go-to alignment stars, you're still gonna need a finder of some

kind. Since I used the OTA on a go-to mount and didn't need much of a finder, I found a zero-power sight more than adequate. What worked well and looked great was one of the new multi-reticle red dot "bb gun" sights that are now appearing on our shores. William Optics sells one, as well as the mounting stalk/block you'll need to attach the sight to the tube. Be aware you'll have to hot-foot it down to the hardware store to get the proper metric screw to attach the finder mount to the focuser assembly, but that is not a big deal.

What else is there? Like her smaller WO sisters, the 90 includes a "footsie" with  $\frac{1}{4}$ -inch 20tpi holes that will allow you to attach the scope to camera tripods and similar mounts. Unlike the footsies on the smaller scopes, this one is an integral part of the focuser/rear cell assembly and cannot be removed. In practice, this does not create a problem, since the longer tube of the 90 as compared to the smaller scopes means you can mount the M90 using tube rings and not worry about the  $\frac{1}{4}$  20 footsie interfering with them.

Yeah, you can buy the Megrez 90 as a "bare OTA" for \$998.00, or you can dish out a little more, \$1098.00, and get that "package." Should you? Hail yeah. This is a no-brainer. For one extra C note, you get the nice dielectric diagonal mentioned earlier and, importantly, a *good case*. You'll want to protect your investment, after all. The Megrez 90 case, seen in my pictures, is a nice aluminum-reinforced affair with vinyl side coverings. I was a little put-out that it doesn't provide as much space inside for accessories as the cases that ship with the smaller WO APOs, but, as Miss Dorothy observed, I never use that extra space in cases anyway, and downsizing the M90 case means it's still small enough and manageable enough to be easy for a broken down old hillbilly like me to tote around to star parties.

But the true test of a telescope is out on a dark observing field. I had to wait a couple of evenings for those bad, old clouds to scurry off, but scurry off they did, and I headed out across beautiful Mobile Bay to the little town of Fairhope for

First Light. Fairhope, Alabama is now a bedroom community for Mobile, and the skies sure ain't what they used to be. Not that that mattered much. There was a great-big, fat ol' Moon hanging over the horizon by the time I got set up.



Which brings up a good question: what do you set one of these scopes up on? If you're a grab 'n go kinda person, I suggest the William Optics EZ Touch alt-az mount. The M90 is a fairly heavy little sucker, 9 pounds or so with a wide field eyepiece and 2-inch diagonal in place, so only the very heaviest and most awkward and least portable camera or (better) video tripods will be sufficient. The EZ Touch is reasonably priced and far more easily lugged around the yard than a humongous

video tripod. The M90 is not a tiny, lightweight scope by any means, but mated to the EZ Touch, it might be just the sort of *git-up-and-git-out* rig you've been dreaming about. Capable enough to show you cool stuff, but not so big as to keep you in the La-Z-Boy watchin' Survivor instead of the stars.

If you contemplate doing any imaging, or just want the convenience of computerized go-to, you'll, like me, probably put the Megrez on a medium-weight German Equatorial Mount. In my case, that mount was the Celestron CG5 ASGT. The 90 was just a perfect match for this rig: the combo was lightweight

enough for me to be willing to haul it out to the club dark site on “iffy” evenings, but steady enough to allow me to do plenty of imaging. A Vixen Sphinx or a Meade LXD75 would be two other GEMs that would be well-matched for the M90.

But how do you attach the consarned telescope to a mount like the CG5? It does, as I said, come with a ¼ 20 mounting bracket, but that’s clearly insufficient for astronomical use. You’ll want to bolt the scope’s little footsie to a good dovetail bracket via a pair of ¼ 20tpi bolts. I used a WO Vixen format dovetail (built like a tank) to mate the scope to the Vixen-compatible CG5. As you can see in the photo, this arrangement leaves the scope’s front end kinda hanging out there in space. WO, in the (good) manual that comes with the 90, suggests you support the front end with a 90mm tube ring screwed to the forward portion of the dovetail. In reality? Didn’t need it. With the scope bolted to the dovetail as in the picture, there was no flexure I could detect either visually or in my images, and the vibrations induced by your Uncle givin’ the scope a good hard finger-thunk (like he used to do to the back of the head of that cute girl, Debbie, who sat in front of him in 6<sup>th</sup> grade) died out in a second or less.

Be that as it may, with the mount set up and fat ol’ Diana hanging above the horizon, my first target was obvious. Slewed the 90 over to the Moon, inserted a medium focal length eyepiece, and prepared to be either pleased or appalled. I mean, I know how bad it can be, having used a 90mm f/11 achromat on a big Moon a time or three and having been “rewarded” with a view that looked like the purple-hued blacklight posters of my youth. Could this relatively inexpensive APO do better? After all, this is a two-element objective, and the Smart Guys will tell you you really need a three element for perfect color control.

I won’t string y’all along: I was impressed. With the scope pointed at the near-full Moon and my eye off axis, I could detect a yellowish line along the Lunar limb, yeah, but I was never sure this was in the scope, the eyepiece, or my eyes. The few shadows along the vanishing terminator were black, not purple (I verified this later on a last quarter Moon that sported plenty of terminator detail). Granted, my eyes ain’t what they used to be, but when a scope ain’t right, particularly a refractor scope, it’s still obvious to me.

What’s darned near as hard for a refractor to deal with as the Moon? Bright stars. We’ve all seen the purple haze around achromat stars that ruins the look of a bright cluster like the Pleiades. This refractor? Vega was perfect in focus, and I didn’t notice much—if anything—in the way of funny colors on either side of focus, either.

Color is the major part of the “refractor equation,” but optical quality, the figure of the objective, is important too. With that in mind, I tried a star test. Unfortunately, a front was a-blowin’ through, making it hard to exactly quantify the objective’s condition vis-à-vis over or under correction, but from what I could tell, it

looks...terrific. Given all the shimmering and boiling, near's I could tell, the optics in this example were very well corrected indeed (and in excellent collimation).

The Moon is cool. Sure, but what a lot of y'all are gonna buy a scope like this for is not staring at the Moon or Jupiter or Saturn or Mars. You're gonna glom onto it for wide field viewing and imaging of the deep sky. With that in mind, I headed out to our club's dark site as soon as Luna began to shrink. Our site is not perfect, being only about 45 minutes from the city of Mobile (resulting in a pretty nasty light dome to the east), but it is quite useable, with the Milky Way being visible on any clear, Moonless night, and Zenithal magnitudes easily at 6 or better.

I'd originally thought I'd divide my time between imaging and observing, but a couple of things conspired to turn it into a visual-only evening. First, your silly and simple-minded Old Uncle left the camera's powersupply at home. Secondly, the field was filled with excited novice observers. The local Coast Guard Auxiliary had held their annual cookout at our site. The affair was just winding up, and all these nice folks were anxious for a look at the stars.

First target? A globular star cluster, of course. Globbs may or may not be the most beautiful deep sky objects of all, but no one can deny they are marvelous in any amateur scope that can resolve their myriad suns. Which glob, though? Hercules' M13 was well below the horizon. How about M15 in Pegasus? My old Short Tube 80 achromat would show this one easily, but only as a bright and starless blob. The M90? Could it? Would it? WHEW! M15's preternaturally bright core was attractive, but, most importantly, the cluster gave up plenty of stars around its periphery. The same was true for all the Messier globbs I ran down on this evening. Even dimmish M56 in Lyra, which was getting close to the western horizon, showed-off a few sparkers. The fact that the 90 was able to deal with the Messier globbs was important to me. I would not want to use any scope for visual work that couldn't deliver at least a hint of the true nature of these great balls of stars.

Other objects? I looked at a bunch thanks to the go-to prowess of the Celestron mount, but what gave the most pleasure to the most people on this evening? Pedestrian old M45, the Pleiades. In a low power wide field eyepiece, the whole cluster was visible, a field full of bright blue sparklers (and no Purple Haze) set against that evocative cliché, "a field like black velvet." For me, the view was wonderful for two reasons: in addition to the lack of spurious color, the color that was visible seemed "true." And, most surprisingly, I was seeing hints of the Merope nebula. For my customers, the excited Coast Guard folks lined up to see the seven pretty sisters? The innocent beauty of the view seemed to just bowl them over. As one woman said, "I've looked through all the telescopes out here, but this is the way stars should look—they are so tiny and perfect and lovely."

When it comes to visual use, I do urge some caution before choosing the M90. Folks, it is a 90mm aperture telescope and, no matter how well made, it cannot violate the laws of physics. That said, there is plenty to be seen with it. I rate the visibility and appearance of objects in the M90 as being on a par with what I see in my most-used grab 'n go telescope, the Orion 4.5-inch StarBlast (an f/4 Newtonian). While I've liked the StarBlast very much, I fear the M90 has spoiled that for me. Yes, the StarBlast delivers a wide field, but stars more than about 60% of the way out from the center of that big field begin to look like eggs. Toward the edge, these eggs hatch into seagulls. This is with high-quality eyepieces, by the way. In the Megrez? Star look wonderful out to the very edge. Only at the periphery do they begin to look eggish—and these eggs never “hatch.”

So, I'm telling you that the Megrez 90 delivers fine images. I wouldn't blame you for being a mite skeptical, though. One person's “fine images” can be another person's “blurry mess.” I thought, that bein' the case, that I'd take some CCD pictures with the 90, both in an attempt to show you just how good the deep sky images this little telescope produces are, and, since many people will use the scope almost exclusively for this purpose, how it performs as an imager. A couple of caveats, though. First, as most of y'all probably know, Uncle Rod ain't no Jack Newton. He can produce a recognizable image, but he's still in the ranks of “CCD Novices.” Also, by December, even down here on the Gulf Coast, our (usually stable) skies were mighty disturbed. Stars were bloated visually and in images, and it was not overly easy to acquire a good guidestar. That said, I think these two pictures will give you some idea of what the scope can do in the imaging realm. Hey, if I can do this well, what can somebody who knows what he/she is doing produce with the Megrez?

What's involved in configuring the Megrez 90 for CCD imaging? You gotta make her longer. Like most refractors sold in the United States, the Megrez is set up for use with a star diagonal. That means attaching a camera directly to the focuser sans diagonal (as you should) creates a problem: the camera will not reach focus. You can't move her out far enough. You'll need an extension tube of some kind. William Optics makes a 2-inch “photo adapter” for this scope to serve that purpose, and considering the fact that very many people who buy this scope will want to take pictures with it, I think the adapter should be included with the scope. That is not the case, however, so I had to improvise. I left the 1.25-inch nosepiece on the SBIG CCD cam and lengthened the 90's focuser by means of an old Barlow. Since I didn't want to add to the scope's focal length, I unscrewed the optics element from the Barlow, leaving me with a 1.25-inch diameter metal tube with a setscrew at one end. Due to the weight of the camera, there was a wee bit of flexure, no doubt, involved in using this setup, but it worked.

What else would have been nice for imagers (and users in general)? The WO 66SD has a focuser visual back that can be unscrewed to reveal “SCT threads” so you can use SCT accessories on the little refractor. This is very handy if you

want to use an SCT diagonal or, which would have been great in my case, any of the multitudinous SCT imaging accessories that many of us have accumulated over the years.



Yeah, my setup worked, but what did I work it on? My favorite wintertime CCD target of course. That NASTY NAG, the Horsehead Nebula (IC434/B33) area near Zeta Orionis. I pointed the scope to the Horse's corral, acquired a guidestar, and let 'er rip for a 15-minute exposure. I didn't use any fancy aids like focal reducers or field flatteners. I wanted to see—and thought you would want to see—how the scope performed all by its lonesome. Due to the seeing,

the stars were bloated, even though I used an IR block filter on the camera (pretty much *de rigueur* when you're doing CCDing with a refractor). How's the field flatness? Well, I'll let you judge for yourself. While I didn't use an STL11000, the ST2000 doesn't exactly have a small chip. I took in a lot of sky, and the stars look pretty good even at the frame edges. I was very pleased indeed with these

results. What was most amazing to someone, like me, used to using larger scopes (and film) for imaging over the years is how deep this “small scope” went in only 15 short minutes. I did M45 as well, but, as you can see, conditions were pretty gull-derned bad earlier in the evening when the cluster was conveniently placed.

Is the Megrez 90, in the end, the right scope for you? Only YOU can answer that, but what you should consider, in addition to how relatively inexpensive the M90 is compared to similar refractors, is how versatile it is. What’s it good for?

- It’s good as a portable scope for urban astronomers.
- It’s good as a grab ‘n go scope for anybody.
- It provides stunning wide field views of the deep sky from dark sites.
- It’s no slouch on the Moon and planets.
- It’s a very capable imager.
- You could use it as a guidescope (though that seems a “waste” of such a capable instrument).
- This will be a good “piggyback” scope for an 11 – 12-inch or larger SCT.
- If you love finely made things, but don’t like to spend money needlessly, this is the scope for you.

What more can I say? Just take that last bullet, set it in capital letters, underline it, and repeat it a few times. That’s *this* old boy’s opinion and his final word on the Marvelous Megrez 90.