Shootout of the Reticles

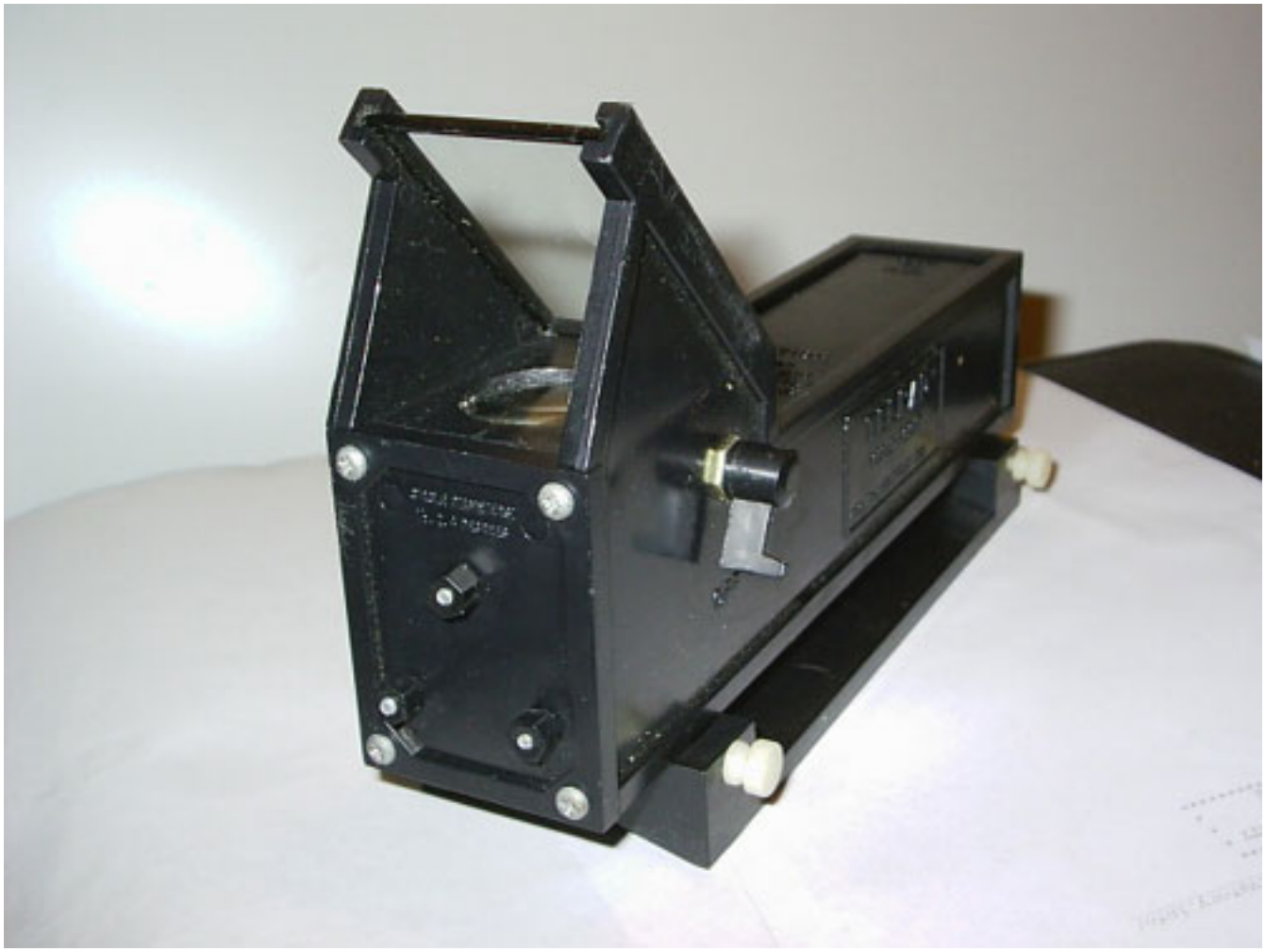
The Kufeld TELRAD (tm) Vs. Rigel QUICKFINDER

by David Knisely

Telrad: $39.95 (various outlets)
Rigel Systems QuickFinder: $39.95 (various outlets)
($42.00 with external 3V AA battery pack from Astrosystems)

Many people are familiar with the multi-ring reticle "1x" finders which are popular these days. While a few people have unfairly discounted their usefulness, when used in the manner they were designed for (ie: as a "pattern maker"), these little wonders can make pointing your telescope at many night sky objects a real breeze. Indeed, these reticle finders are often more effective than the simple red-dot finders in locating objects which are not visible to the unaided eye or even in small finderscopes. The two main reticle finders available today are the venerable TELRAD, and its smaller cousin, the Rigel Systems QuickFinder. Both will act as decent reflex finders and can be helpful additions to the hardware on a telescope tube. However, each has some distinct advantages and disadvantages which need to be considered before deciding to put one or the other on a telescope tube. This review will present the facts about each unit, as well as the results of a head-to-head test of how well they each worked on a telescope under real observing conditions.

The Contestants



Telrad

Steve Kufeld's creation, the Telrad, has held a firm place in amateur equipment circles for many years. The unit is basically a rugged elongated black plastic box 8.25" long x 1.75" wide, with a tilted piece of 1/8 inch thickness glass mounted in a thick plastic housing at the back end. With the 45-degree tilted glass plate housing on top, the maximum height of the unit itself is about 4.25 inches, not including the base mounting plate. The Telrad is mounted in a modified "dove-tail" fashion to a plastic base plate 7 inches long by 2.25 inches wide, which is fixed to the side of the telescope tube (usually permanently). Two nylon thumb screws on the side of the base plate allow quick and easy removal of the Telrad itself for storage when the telescope is not in use. Mounted on the scope this way, the Telrad's maximum height at its back end is about 5 inches from the surface of most telescope tubes. The base comes with sticky pads for temporary placement of the base on the tube, as well as two well-separated screw holes for permanent mounting (recommended). The Telrad is not terribly heavy as accessories go.

It weighs in at around half a pound, which is lighter than some eyepieces but nearly as heavy as some of the lighter 8x50 straight-through optical finders. Due to the nature of its size and base, the Telrad is

probably best mounted on optical tube assemblies larger than 4 inches, although I have seen it mounted on telescopes as small as a 2.4 inch refractor.

To see the reticle against the sky, the user merely looks along the telescope tube into the the Telrad "window" at the unit's rear end. The reticle appears as three concentric narrow red rings of light with small gaps in the outer two rings spaced 90 degrees apart. The rings are half a degree, two degrees, and four degrees in diameter, and their brightness is fully adjustable from "off" to barely visible against a dark sky, all the way to very bright for finding things under moon-lit conditions. The brightness is controlled via an "off/on" adjustment switch potentiometer located on the right side of the Telrad. The Telrad's visual window is fairly large, being 1.38 inches wide and about 1.69 inches high, with the base of the window sitting nearly three inches off the surface of the telescope tube. This allows the eye to be placed at a convenient range of positions well behind the back end of the unit and still be able to clearly see the entire reticle as well as a lot of surrounding sky. The thick and fully-accessable glass makes the Telrad's window fairly easy to clean if dust or skin oils get on its surface.

The 3-ring projected reticle is created by a red Light-emitting diode (LED) and an overlay inside the Telrad's box, the light from which is bounced off a tilted alignment mirror and then sent up through the main glass lens to bounce off the back of the glass Telrad window and over towards the viewer's eye. Some of the early Telrads had problems with the glue holding the main lens in place, although gluing the lens back in (use RTV silicone glue) is not terribly difficult. Direct sunlight should not be allowed to enter the Telrad's lens from above, as sunlight shining directly into the lens has been known to melt the internal reticle! Some of the opaque dewshields available as an option are often good for preventing this potential problem, as well as for keeping dew from collecting on the glass window. The Telrad is powered by two "AA" cells which can be easily accessed via a slide-off panel on top of the box. Battery life is fairly long, as the LED used for illumination draws very little current. For proper fine positioning of the reticle to align it with the telescope, three adjustment knobs are provided on the back end of the Telrad. Several accessories are available for the Telrad, including extra bases for additional telescopes, dew shields, and pulser units to make the reticle pulse on and off repeatedly if desired.

The Rigel Quickfinder

This is the smaller and newer of the two reflex-finder units. The QuickFinder is a small light vertical-standing box about 4.5 inches high and 1.5 inches on each side. Like the Telrad, it sits on a fixed detachable base (2.5 inches by 2 inches in size) which is fixed to the telescope, either by sticky pads or via one hole for a permanent screw into the telescope tube itself. On its base attached to the telescope, the top of the Quickfinder is, like the Telrad, about five inches above the surface of the telescope's tube. The QuickFinder's base is less than half the length of the Telrad's, so it might go on a smaller scope somewhat more easily than the longer Telrad. Its lighter weight may also have a bit less of an impact on telescope balance, especially if the user wants to put the QuickFinder right up at the front end of the

scope. The QuickFinder has a small button on one side of its lower section which allows for a quick release to remove it from the telescope for storage (recommended, as if left on the instrument, its height could allow it to be broken off of its base accidentally). I found that it took quite a bit of pressure on this button to get the QuickFinder to release from its base, as the button is merely a plastic "bump" on a flexible section of the lower end of the QuickFinder unit. The black plastic used for the Quickfinder is somewhat thinner than that of the Telrad's. The upper third of the QuickFinder contains the rectangular hood open on each end for the viewing window. Below the hood is housed the projection lens and internal electronics for the dimming control and pulser.

Unlike the Telrad's thick glass window, the QuickFinder's window is a thin (2mm) piece of smooth flat clear plastic (possibly Plexiglass or Lexan) 0.875 inches wide and about 0.983 inches high, which is somewhat smaller than the Telrad's window. This thin clear plastic piece is slightly smaller than the hood itself and is glued *only* on one end at the front base of the hood, with an air space all the way around the clear plastic. This can make it possible for the QuickFinder's window to be broken out if a small object like a loose pencil or pen were accidentally pushed into the hood. For this reason, the QuickFinder should *always* be stored by itself in a small separate box or compartment to protect it from possible damage. The small hood and plastic window material also makes it a bit more difficult to clean the the window if dew or something else gets deposited on it. The bottom of the Rigel QuickFinder's window sits about 3.63 inches above the surface of a typical telescope tube, which is slightly higher than the Telrad's, although with the Telrad's larger window, this is not a significant QuickFinder advantage.

Unlike the larger 3-ring reticle of the Telrad, Rigel QuickFinder's reticle contains only *two* concentric rings with the inner one half a degree in diameter and the outer one two degrees across (both rings also have no tiny 90-degree gaps like the Telrad's). The QuickFinder's red rings are adjustable in brightness and precise location by knobs on the front side of the QuickFinder (the side away from the viewer). The power/brightness knob can be turned easily with gloves on, but the smaller alignment knobs to position the reticle almost require bare fingers. The QuickFinder also includes an even smaller knob for the "pulser", an electronic control which allows the reticle to pulse on and off with a 50% duty cycle whose speed is continuously variable from always on to the slowest pulse period of about 1.8 seconds (ie: 0.9 seconds "on", and then 0.9 seconds "off"). The basic version of the Quickfinder use a small 3V camera battery in the lower part of the unit to power the reticle, but newer versions from Astrosystems have the optional external "AA" 2-cell battery pack already afixed to the outside of the QuickFinder. There were just a few reports of problems with the original battery configuration, so perhaps this is why Astrosystems went with the external pack. Unlike the Telrad's nice slide to get to the batteries, the external pack requires the use of a small Phillips screw driver to open it. In any case, battery life should be fairly long, as the electronics do not draw a great deal of current.

The Showdown

I had purchased a QuickFinder to put on the front of the dewcap of my 100mm f/6 refractor, as I was occasionally having trouble getting to the new "correct-image" right angle optical finder I had installed earlier. The Rigel unit came with two bases, so I used the included sticky-pads and did a temporary

placement of the QuickFinder right next to my Telrad on my 10 inch f/5.6 Newtonian. This way, I was able to do an instant comparison of both reflex finders. The night was clear with a fat moon low in the east (ZLM 5.2) and Mars in the south, so it looked to be a pretty stringent test for the two finders. I broke the performance of the two reflex finders into various "issues": 1. Size/Weight, 2. Eye Convenience and Image Quality, 3. "2 rings verses 3 rings", 4. Dew Susceptability, and 5. Construction and Ruggedness.

Issue #1: Size/Weight.

Here clearly, the Quickfinder has an edge, as it is smaller and much lighter in weight than the Telrad. For small telescopes, the QuickFinder is probably the better choice, but for larger ones, the Telrad is not a terribly awkward piece of equipment to have mounted on the tube. Neither finder's weight or size was a factor when they were used on my 10 inch Newtonian.

Issue #2. Eye Convenience and Image Quality:

The first thing I noticed was that the QuickFinder required a bit more precise positioning of the user's eye to see the two red rings than the Telrad's reticle did. This is probably due at least in part to the smaller window of the QuickFinder. If I put my eye right up to the window, it was easy to see the rings, but as I moved back slightly, the positioning became a bit more difficult to maintain, although I still had little trouble doing it. As I moved back, other problems began to crop up with the view in the Rigel QuickFinder. The outer ring began to get a bit less distinct on its outer edges beyond about 9 or 10 inches, and by 17 inches, it was getting slightly distorted. Beyond about 17 inches, only portions of the outer ring were visible as I moved my head, and the inner ring began to show some slight distortion. Clearly, optimal viewing range for this finder is less than 10 inches from the eye, despite some advertising claims for a range of up to 18 inches. The Telrad performed noticably better than this. It showed *all three* of its reticle rings out to a distance of about 13 inches, and, to judge it more fairly against the 2-ring QuickFinder, the Telrad showed the inner two of its rings out to a whopping *26 inches* behind the window, with no decrease in sharpness of the rings with increasing viewing distance from the window.

More significant was the problem of motion-induced parallax. The Rigel Quickfinder's reticle moves around a bit as you move your head slightly, and the effect gets worse the farther back from the QuickFinder's window you are. With my eye almost right up to the window, there is only a very slight shift (probably less than 3 or 4 arc minutes) in the position of the reticle with maximum head movement, but by the maximum viewing range of 17 inches, the shift of the inner ring's center was approaching half a degree! I have seen this parallax in other QuickFinders on other scopes, so it appears to be a minor design flaw. By contrast, the Telrad showed ZERO parallax at *any* distance from my eye and with any level of head movement. The QuickFinder's parallax made its impact most noticable when I turned the scope to Mars and had it at 446x. When I moved the scope off of Mars to look at the moon, I could always get the scope right back on the planet with Mars near the middle of the field even at 446x by using the Telrad reticle. However, I could not always do so consistently when I used the Rigel

QuickFinder, although Mars was never very far outside of the field when I did fail. The QuickFinder's parallax is probably not a severe problem when doing wider field finding of deep-sky objects, especially if you keep your eye and head steady and reasonably close to the window. For higher power work, it might be good to also have an optical finder on the telescope if a QuickFinder is used.

Conclusion:

The Telrad provides somewhat better optical performance and viewing convenience than the Rigel QuickFinder.

Issue #3 "2-ring Vs. 3-ring Reticles"

The next issue was the 2-ring reticle verses the 3-ring reticle. While the Quickfinder worked well for simple "point and look" exercises, for some of the large-scale "pattern making" in areas where there are few guide stars, the extra outer 4-degree diameter ring of the Telrad seemed to make finding things just a bit easier. Larger star-hop distances were a bit easier to judge with the 4-degree outer ring present in the Telrad. The larger window of the Telrad also made for a more comfortable viewing experience, as there was more tolerance for head placement or slight movement without losing the view of the reticle than was found when using the QuickFinder. The little gaps in the outer two rings of the Telrad also helped orient my view a bit, making the outer rings seem a bit less intrusive. When adjusted for minimum brightness, both the Telrad's rings and those of the QuickFinder were barely visible, although the QuickFinder's seemed just a tad brighter. The pulsing action of the QuickFinder might help some people who are bothered by the rings' presence, although with the Telrad, the user can just shut them off briefly with a slight turn of a knob, or install the optional "blinker" circuit. I often found the pulsing feature of the QuickFinder unnecessary and, occasionally, a little annoying, especially if I moved my head and lost the reticle during one of the "dark" times of the blinking cycle. I prefered keeping the reticle on all the time and set to near minimum brightness, as I often have my Telrad set to.

Conclusion

For me at least, I find the 3-rings of the Telrad to be somewhat better for finding objects using the "pattern making" method than the Rigel QuickFinder's 2-rings are.

Issue #4: DEW!

Both finders are susceptable to dewing of the window so a dew shield for each of their windows is often needed. There is a slight dew shielding of the QuickFinder's window by its hood, but the hood is really a little too small to make it very effective under moderate to heavy dewing conditions. With the Telrad, the glass window is tough, and slight dewing can be wiped clean with a soft cloth. However, the window of the QuickFinder is not as accessable and is more fragile, so "brute-force" cleaning of dew off the window with some sort of cloth is probably not recommended. With moderate to heavy dewing, a dew shield is definitely required if the finders are not to be rendered useless. I use a large Astrosystems dew

shield for my Telrad which has a "front door" on one end that remains shut unless I am using the Telrad. This reduces the dewing considerably. A longer plastic dew shield could easily be fashioned for the Quickfinder, although I have not seen commercial dew shields for it. The use of "heat guns" for clearing dew might not be a good idea for the QuickFinder, as too much heat may cause problems with the plastic of the window. The window is probably best cleaned with a Q-tip, although again, one must be careful not to put too much pressure on it.

Conclusion

Both reflex finders need external dew shields, although the QuickFinder might not dew up quite as fast as an unshielded Telrad.

Issue #5: Construction and Ruggedness.

Here, the clear winner is the Telrad. The thicker plastic, larger size, fully-supported thick glass window, and two-screw release make it a more rugged choice of reflex finder than the QuickFinder. The QuickFinder is not exactly going to break at the first touch, but it is definitely a little more fragile. In the dark, fingers reaching for the Quickfinder might accidentally hit the plastic window, at best smudging it, and at worst, breaking it off. Again, the QuickFinder has to be protected if you are just going to throw it into an eyepiece case for storage (my Telrad has my little tape recorder sitting inside the Telrad's dew shield up against the window, and nothing has broken yet).

Summary

Both the TELRAD and the Rigel QUICKFINDER are useful finding tools. If size and weight are highly critical issues, the QuickFinder might be a better choice than the Telrad. Otherwise, at least this observer finds that the Telrad is a somewhat better performer overall and would be my first recommendation for a 1x Reflex finder.

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