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By Ed Ting
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1) Celestron Anti-Vibration Pads 7/8/00 (About \$45 for set of three)

Sometimes I'm a little slow to learn things. For example, I'd known about the benefits of using an observing chair for years before actually buying one for myself. Likewise, I've seen astronomers using these vibration suppression pads with great success for quite some time before the light bulb went on over my head.



**The Anti-Vibration Pads
Don't Leave Home Without Them...**

...But Don't Leave Them Behind

The pads work by decoupling your mount's legs from the ground. The legs sit on a fiberglass resin, which sits in a gooey, rubber-like orange substance. Vibrations from the ground are damped before reaching the legs, mount, and your telescope. Interestingly, the pads also seem to shorten the damping time from the other, "top down" direction, due to wind, focuser motion, etc.

It works. Depending on the stability of your mount's current setup, I'd estimate the pads should increase your stability by 5%-10%. You should be able to push slightly higher powers with the pads in place.

I am often surprised to hear people tell me that they haven't bought these pads yet because they are "too expensive." Hey, the way I see it, if your rig's stability is marginal right now, investing \$45 for a set of these might prevent you from spending big bucks on a new mount. That's not a bad place to put your \$45, in my book.

There is one disadvantage, and you ARE going to curse me for this. In the observing field, they tend to get left behind, especially after long sessions and on grassy surfaces. Even when you do remember to pick them up, they tend to get lost anyway, like socks in your laundry. So you find lots of people out there with one or two pads in their toolboxes. Perhaps someone could form an online exchange service so that folks can buy one or two pads to complete their collection. Just a thought...

2) Astro-Physics MaxBright Diagonal 7/8/00 (\$300 diagonal only, \$40 for matching 2"-1.25" adapter)

Credit AP for elevating the lowly diagonal to high-art status. To many astronomers, a diagonal is a diagonal is a diagonal - a flat mirror in an angled metal body, another annoying source of cost and possible image degradation, a necessary evil, if you will.



A Beauty of a Diagonal: The Astro-Physics MaxBright

I'd remained unconvinced that expensive diagonals were worth the money until I saw this one. The surface is not a "mirror" per se. There is no aluminum used. Instead, 52 layers of dielectric coatings are deposited by an electron beam evaporator at high temperatures onto a precision optical flat. The result is said to yield 99% light transmission. This process was originally developed for the military for use in harsh environments such as blowing sand and dust. Although I haven't done it yet, it is said that the surface can be cleaned repeatedly.

The MaxBright is said to reduce light scatter by a factor of five, compared to conventional diagonals. Substituting a MaxBright for the already excellent TeleVue diagonal on an apochromatic refractor yields a noticeable improvement in contrast and freedom from glare and light scatter - impressive. Note that TeleVue now has their own version of this product (the EverBrite, about \$260.)

Couple the superb performance of this unit with ultra-high precision machining, (your eyepieces will be a tight fit inside!) and what you have is the best diagonal available today. The MaxBright also comes onto the market during a time when telescope manufacturers seem to be cutting back on the quality of their diagonals (the cheap prism units supplied with the new Chinese achromats are worst of all; some are downright laughable.)

The dedicated 2"-1.25" adapter is also of high quality. For the dedicated refractorophile who demands the utmost in performance. Highly recommended.

3) Brandon Eyepieces 9/11/00

(\$235 list each, about \$200 street, \$85 for wooden case, set of five w/case \$1095 list)

I still remember looking at ads in the 1970's as a kid, gawking at ultra-expensive eyepieces like the Clave Plossls and these Brandons. They seemed so far out of reach, both physically and financially. So receiving a set of these recently, from Vernonscope, through a third party, brought back a lot of memories. I was anxious to test them.



The Brandons, in the case

These are four-element eyepieces of unspecified design, with a 50 degree FOV. The focal lengths offered are 32 mm, 24 mm, 16 mm, 12 mm, and 8 mm. The aluminum construction is *very* lightweight, and one observer I showed them to thought they were plastic. When you pick up the case, it feels like there's nothing inside. I used them over several clear nights in August of 2000 in many different scopes of high quality.

These are sharp, clear, and contrasty eyepieces. They are roughly parfocal with the TeleVue Plossls but have shorter eye relief. If you have always wanted a set of these and can spare the money, go ahead - you won't be disappointed. However, I was able to obtain slightly better results across the board with the TeleVue Plossls and the Ultima/Ultrascopics - they had better light throughput, on-axis and edge sharpness, and contrast.

These Brandons have a little more difficulty than the TeleVues in coping with fast optical systems. On f/10 and f/15 scopes they work just fine, but as I moved to faster and faster scopes - the f/9 AP180, the f/8 FS152,

the f/7 AP155, and the f/5.8 Traveler - aberrations increased (especially at the edges) relative to the TeleVue Plossls. The super-fast f/5.4 Genesis was not kind to the 24 mm and the 32 mm units. I do not think it is not a coincidence that these eyepieces are chosen by Questar for their f/14 Maksutovs.

There are a few mechanical quibbles. There are no multi-coatings on the lenses, surprising for eyepieces at this price level. Vernonscope's literature gives some scientific-sounding explanation and makes a case that the old MgF12 single-coatings are actually *better* than modern multi-coatings, but I'm not sure I buy this. The views I got through these are consistent with well-made eyepieces with older-generation coatings.

Also, the rubber plugs that cap the field lens take a lot of effort to remove - if you're a fastidious observer who always caps his eyepieces after each use, this is going to drive you nuts in the field. Finally, even after all these years, the Brandons STILL aren't threaded for standard filters - you have to buy theirs, which take a "wider" thread. If you want to look at the Veil with the 32 mm and an OIII filter, as I did, you have to scotch-tape the filter to the eyepiece. It works, but it doesn't seem very dignified for such an expensive eyepiece.

In the end, then, these Brandon eyepieces are a victim of the rapid pace of technological progress. What was state-of-the-art a few short years ago is merely good today. At \$75 to \$100 each these would be easy to recommend, but as you near the \$200 level in an eyepiece, I think you have the right to be picky. At this price level, I expect something a little extra - extra FOV (Naglers, Panoptics), extra sharpness (Pentax orthos, Takahashi LEs), extra eye relief (Lanthanums, Radians), etc. For the Brandon faithful, these are still good eyepieces, but do check out the TeleVues and the Ultima/Ultrascopic units (and other competing models) before making any firm decisions. For balance, I'll close by saying that the Brandons have a rich and long history in our hobby, and they have their legion of dedicated fans who revere it as one of the world's truly great eyepieces.

4) Cosmos by Carl Sagan 1/12/01

(7 DVDs or 7 VHS videotapes, \$179 list, about \$135 street)

Before Carl Sagan:

"What is an astronomer?"

"A guy in white lab coat with glasses and a calculator."

After Carl Sagan:

"What is an astronomer?"

"Oh, he's a tall, handsome man with a turtleneck and a corduroy jacket and an easy smile."



It's an old joke, but the implications are clear. Carl Sagan changed the way the world looked at astronomers. For those of us in the hobby around 1980, Sagan was our world. For thirteen unforgettable weeks, millions tuned in each Sunday night to PBS (this was before the widespread use of VCRs) to watch the latest installment of Sagan's "Personal Journey" through space and time. It was after watching "The Backbone of Night" that I first began to wonder how I might see the objects in the night sky more clearly. Not long after, I built and bought my first telescopes.

Produced in cooperation with KCET in Los Angeles, *Cosmos* was three years in the making, and by far the largest and most ambitious project ever attempted by PBS at the time. The special effects, courtesy of George Lucas' ILM, still look passable, even good, twenty years later. The show was budgeted at \$8.2 million, enormous for a PBS series. Location shooting took place in the Netherlands, Germany, Britain, India, Greece, Egypt, Japan, Alaska, and Death Valley (which doubled for Mars.)

The notoriety brought on by earlier successes with *Murmurs of Earth*, *The Dragons of Eden*, and *Broca's Brain* alone would be the envy of many a scientist. But even the Pulitzer prize earned from *Dragons* paled next to the spectacular success of *Cosmos* when it debuted in September of 1980.

The show elevated Carl Sagan into popular culture. *Cosmos* was eventually seen by close to half a billion people in sixty countries. The companion book stayed on the best seller lists for over a year, and it is still in print today, twenty years later (I have three copies myself.)

The production values were first-rate. The sets and costumes were elaborate and lavish. I especially like the recreations of the times of Kepler and Huygens, and the eerily-empty library of Alexandria. The music was just as special, and identifying the cues is a game in itself. I caught passages from Beethoven, Albinoni, Haydn, Stravinsky, Vivaldi, Satie, Wagner, Pachelbel, Mahler, Shostakovich (the Largo from the Fifth Symphony figures prominently in several key scenes), Rimsky-Korsakov, Holst (of course), and others. Moody and evocative original music by Vangelis opened and closed the episodes. In fact, I'm told part of the reason it's taken so long for these videos to return to the market were the innumerable delays in securing the copyrights from the music's performers.

All was not well on the set of *Cosmos*. Sagan and director Adrian Malone reportedly hated each other. Cost overruns and disagreements over artistic decisions wore peoples' nerves (including Sagan's) thin and raw. It didn't help matters that Sagan was going through a bitter divorce from Linda Salzman at the time, and that his father passed away during the filming of the series. Some felt Sagan relied too heavily on Ann Druyan's advice (the insertion of Hypatia in Episode 13 was largely due to her influence.) Some special effects were not delivered as promised, and shots of Sagan grinning euphorically in his spaceship were substituted instead, to the eternal delight of his detractors. Those who knew him well reported that Sagan was not quite the same person after *Cosmos*, and the changes were not all for the better.

No project this large and ambitious escapes criticism, and *Cosmos* was no exception. First and foremost on the list was Sagan's speaking style, which remains a source of parody even to this day. He had a way of pausing in mid-sentence and then...PUN-ching through a particular word or syllable (BILL-yuns.) Some did not like the "Spaceship of the Imagination", which looked like an empty cathedral with a cheesy, glowing-crystal control panel. Still others have objected to the show's overt political stances, which they felt were out of place in a program of pure science. And I could have done without Ann Druyan's dreary new introduction.

In making *Cosmos*, Sagan was aiming to write a program for the ages, but in reality the series clearly reflected certain values of the times. Those who followed Sagan's career can attest that he was completely obsessed with the idea of a nuclear war between the United States and the Soviet Union. It

shows in the program. While any rational human being is naturally alarmed by such a prospect, it becomes a little tiresome when you start hearing about it every few minutes on the program. This resulted in a negative, even bitter appraisal of mankind on Sagan's part. Freeze-frame your video and check out what Sagan has chosen to write under "Humanity" in the "Encyclopedia Galactica" - My goodness!

I bought the DVDs, which have been tastefully remastered in Dolby Digital on 7 discs. If you own a DVD player, you really should get the discs instead of the videotapes - the sound and picture are better, you get fast random access, and they don't wear out. Also, the DVDs are Region Zero, so you don't have to worry about compatibility issues. I had minor hardware problems. Episode 5 tracked erratically, and I was unable to get my DVD player to track any of Episode 6 at all. I have asked for replacements.

Purists should note that this not the same *Cosmos* series that was broadcast in 1980. Not exactly, anyway. If you have an original set of the videotapes, hang on to them. On this new version, certain images have been added and updated (these are usually easy to spot) and I think I caught at least a couple of places where the narrative was altered as well. At the end of many of the episodes, Sagan appears again with an update on the topics presented. I really looked forward to seeing these, but all of the segments are way too short, and Sagan still can't seem to stop talking about nuclear war (again, not that this isn't important, but I'd like to hear *new* information.) In one of the updates, Sagan uses the time to plug his novel, *Contact*.

The series takes the viewer on several trips through astronomy, cosmology, chemistry, biology, and history. Some of the material is brilliantly presented, so much so that you forget you're learning; you're too busy having fun. I especially like the calendar representing the time of the Cosmos from the Big Bang to the present. There's a tiny lighted pixel for the last twelve seconds on December 31st that represents all of human history so far. This was the essence of Sagan at his best: simple, graphic illustrations of abstract concepts delivered so powerfully that you never forget them.

One friend I know says that Sagan had a way of explaining complex ideas so well that you couldn't help but understand them. Sagan does a marvelous job of explaining relativity - once you see Carl riding his bicycle in Italy you will never forget the principles of light wave propagation. The sections on the Flatlanders, and of Alice and her friends coping with varying g's, are priceless. The show also contains the best explanation on the Rosetta Stone that I have ever encountered. And once you see the segment on the Japanese Heike crabs, you will never look at seafood the same way again.

Time and time again, Sagan comes through with a clever analogy, an unforgettable biography (can anyone ever forget Milton Humason and his humble assistant, or Kepler miserably seated at Tycho Brahe's ribald dinner table, or Huygens' evening of music and observation?) or a simple reflection on the pure joy of knowledge and discovery. Several sections, including the endings of "Traveler's Tales" and "The Lives of the Stars" have their words so beautifully chosen and spoken, they approach the level of poetry.

No matter what you thought of Carl Sagan, this set is required viewing for those in this hobby. It is as vital a part of astronomy's popular culture as *Burnham's Celestial Handbook* and *Starlight Nights*. I watched all 13 hours in a couple of marathon sessions and will probably do so again in the near future. Even if you've seen them before, now is the time to remake your acquaintance. If you haven't seen them yet, I envy you - the joy of discovery of these videos still awaits.

5) Astro-Physics Mounts

(400GTO, \$3580; 600EGTO \$4500; 900GTO \$5950, 1200GTO \$7500)
(All include head, servo drive, keypad controller, Digital Sky Voice software)

These are my favorite equatorial mounts. They're better than ever now, with a new, high-precision Goto system. The 400 is the mount most start with - it's rated for 5" refractors, or SCTs up to about 8". The head weighs 21 lbs. I have found it has similar capacity to a Losmandy GM8. The 600 costs only a little more, but has a much higher capacity - 6" refractors or 10" SCTs. The 600 head weighs 27 lbs. I think of it as a heavyweight Losmandy G11.

The 400 and 600 mounts are billed as "portable" mounts, but having lugged a 600 through four airports over a course of a week, I'd be tempted to challenge this. Both the 400 and 600 have tripod options (as opposed to the piers.) The lightweight David and Sanford tripod (\$345) is nice, but for maximum stability I suggest the wooden unit at \$545 (watch your feet, sharp spikes below!)

Moving up to the 900 GTO, you're in Big Mount territory. The head weighs 50 lbs and it's rated for 70 lbs, although I suspect it will handle somewhat more if the load is short enough.



AP Mounts (L to R): 1200 GTO, 900 GTO, 400 GTO w/ Traveler (10" Starmaster and 20" Obsession in background)

The 1200 GTO is huge. The head alone weighs a whopping 91 lbs and it's rated to carry a 140 lb instrument. Although it's technically "portable", I think of the 1200 as a semi-permanent observatory-class mount. The declination shaft alone weighs as much as one of those generic small equatorial mounts from the Far East!

All these mounts are beautifully-made. Also, the motors are of such high quality, they purr as they slew across the sky. There's a bewildering variety of accessories available for these mounts, check AP's web site for details.

Prospective buyers need to be aware that the prices quoted are for the head only. You need to add the pier (or tripod for the 400 and 600 units), counterweights, and sliding bars/ dovetail plates/ etc to make a complete working system. By the time you get done, you could be out another \$1000 or more. Also, there is a multi-year waiting list for all of these mount right now, just as with AP's telescopes. Plan accordingly.

When you do get your mount, unpacking the thing is a pleasure in itself. In my experience, no one -not Obsession, not Starmaster, not TMB, *Nobody*- packs their equipment as thoroughly and intelligently as Astro-Physics.

All of the scopes now come with Digital Sky Voice, which is a PC-based voice

Finally, those who own many mounts and telescopes should consider converting all their AP and Losmandy units to the Losmandy Universal Dovetail Plate system. AP sells an adapter that screws into the top of the equatorial head. There are also several adapters for dedicated use with Meade and Celestron SCTs. Although slightly less stable than the flat and ribbed plate setup used by AP, the Losmandy Dovetail Universal Plate is convenient, and makes setup and makes tube-swapping a snap.

Highly recommended for discriminating, well-to-do observers.

6) William Yang Focusers and Diagonal 7/1/01

(Newtonian Focuser \$148, SCT Focuser \$158, Diagonal w/ 1.25" Adapter \$130)
(Available from Anacortes)

If you're over the age of 30, you probably remember a time when form followed function in this hobby. If something was on your telescope, it was there for a reason. Well, these good 'ol days are GONE my friend - beautifully-made products are popping up everywhere now.



**Newtonian Focuser (L), SCT Focuser (C) and
2" Diagonal (R) from William Yang**

Take, for instance, these gorgeous accessories from William Yang, the same folks who bring you those optical tube assemblies for TMB, APM, Megrez, and others. The focusers are super-smooth, and are gearless with a tension screw on the barrel. The 1.25" inserts have compression rings so you don't scratch your eyepieces. The SCT focuser also rotates, a nice touch. I tested

the diagonal with my Traveler and found it to be of comparable quality to units in its price range, including the standard TeleVue unit. A couple of club members even felt the mechanical quality might even be a little better than the TeleVue, which is very high praise.

One thing to note: the Newtonian focuser has 2.25" X 4" mounting centers, which is a little unusual. Many JMI focusers, for example, are 2.25" X 2.25". So if you are retrofitting an existing focuser, you may have to do some drilling (luckily though, the focus travel is similar to the 2" JMI units, so you probably won't need to mess with your secondary placement.)

The quality is high, the fit and finish beautiful, and the prices are reasonable. Highly recommended!

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