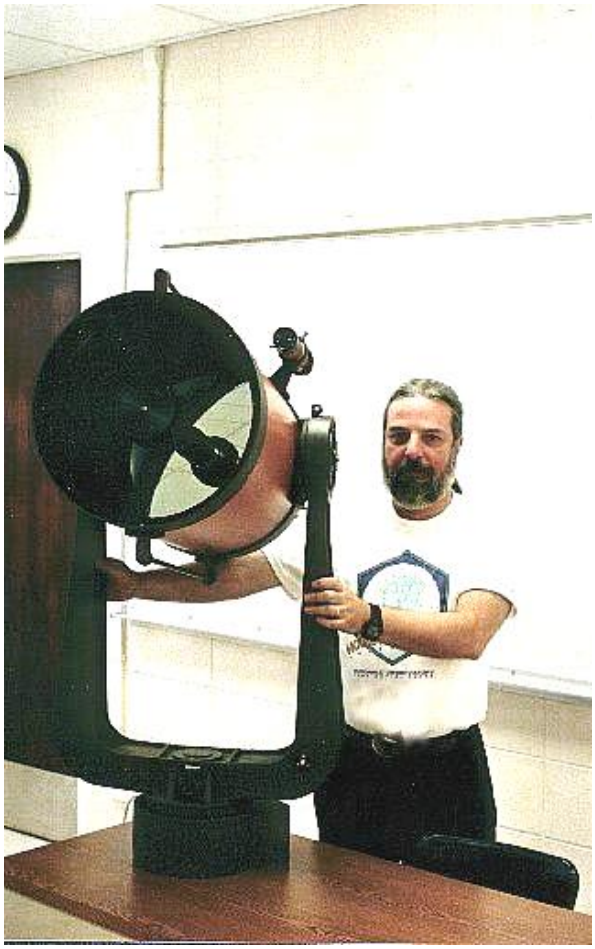
Uncle Rod's
Used CAT Buyer's Guide

10th Edition (2013)

Rod Mollise



Would You Buy a Used CAT from this Man?

A Chaos Manor South™ Production

Table of Contents

Introduction

Been a long time coming, muchachos. The 10th Edition of the Used Guide, that is. If you are a reader of my blog, you know the last couple of years of my engineering career with the Navy were the pits. I moved from manageable destroyers to huge amphibious assault ships, but I was still expected to get an entire ship's navigation system going more or less by myself. "That's what we pay you civilian engineers for, ain't it?"

That's all over now, and after six months of (early) retirement, I decided it was time to finish the long-promised 10th edition of the Guide. Which was at least four years late. Better late than never, I reckon, and I was beginning to think it would *never* get done.

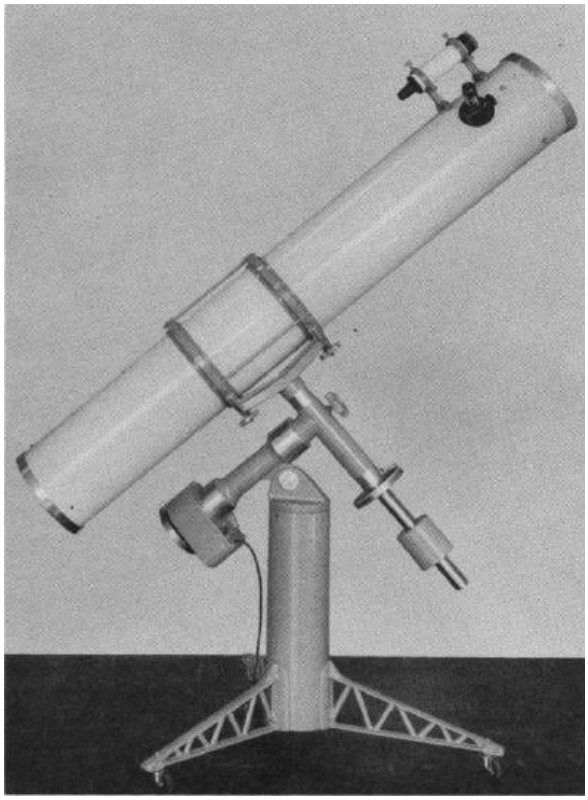
I've said this before and I'll say it again, if *you* see something that needs to be expanded, added, or find something that is just plain wrong, do me a favor and let me know. I don't make a secret of any of my email addresses, but the best way to get my attention is to email me at rmollise@bellsouth.net

Finally, thanks are due to the people who have helped me with The Guide over the years, and especially "Barefoot Bob" Piekiel and "Doc" Clay Sherrod. But this one is for all the many folks who offered aid and encouragement over the years.

Chaos Manor South
Christmas 2013

Before the SCT…

Do you choose the scope or does the scope choose you? Sometimes I think it's the latter. When I decided to buy my first Schmidt Cassegrain telescope in 1976, a brand new Orange Tube C8, I knew *nothing* about SCTs beyond the Celestron ads I'd been admiring in *Sky and Telescope* for years. What I did know was I wasn't happy with my current scope, and had decided to take a chance on a C8. No, I wasn't pleased with what I had, which was odd, since I was lucky enough to own my dream scope.



After making do with an Edmund Scientific 4.25-inch Palomar Junior and a couple of home-brew 6-inch Newtonians from the time I was 12 until I turned 22, I'd had a long time to fantasize about what I'd buy when my ship came in. My dream scope started out as an 8-inch Edmund Space Conqueror, morphed into a 4-inch Unitron Photo Equatorial, and settled down as an 8-inch f/7 Deluxe Cave Newtonian. Which is indeed what I finally wound up with (the acquisition of said scope is a story in itself) when my ship, leaky and listing as it was, finally pulled into port. "And Uncle Rod lived happily ever after." Not exactly.

As the dream scope morphed into reality, a day to day reality I had to live with, a few things became clear. The optics were great, sure. Good, anyhow. Well, perhaps not *quite* as stunning as I'd imagined. Maybe realities never do match our dreams. Or maybe Thomas Cave, Alika Herring, and Company were having some not-so-good days in the Mid 70s. There was no denying, though, that the images the Cave produced were very good if not as perfect as I'd hoped, but images are never the whole story with a telescope, anyway.

I used the Cave a lot, and I do mean A LOT, in the beginning, but it wasn't long before I had to admit this big (to me) Newtonian was not as portable as I'd convinced myself it would be. In fact, there was no getting around the fact that it was *an absolute pain* to carry around and pack into my Dodge Dart.

Since I had to drive a considerable distance from my quarters on a brilliantly lit Air Force base to do much deep sky observing, it wasn't long before I found myself inventing more and more excuses why I just couldn't go observing on any given evening, no matter how clear and Moonless the skies. The experience of wrestling the Cave down three flights of stairs, stuffing it

into the car, driving 40-miles or more to observe, and reversing the whole process at 3 a.m. on cold Arkansas winter nights did not have lasting appeal. It was easier to stay home and watch *Dallas* or head out to the disco.

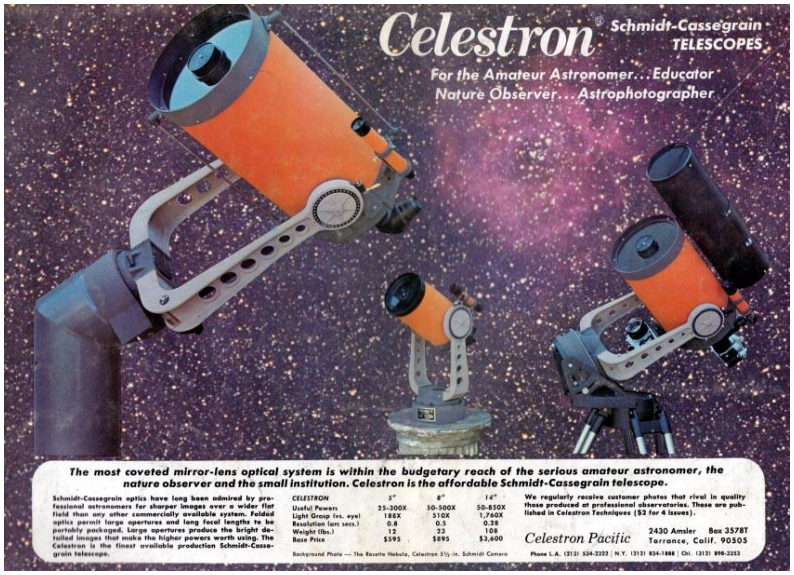
The Cave, its mount, and its drive were also less useable for photography than I'd hoped. Getting a camera attached, the tube balanced, and a guide scope arranged was just as difficult as it had been with my little Edmund Newtonian. The mount, while heavy, wasn't exactly as steady as the Rock of Gibraltar, either. Oh, I took some deep sky pictures with the Cave, but the question was always, "Is that-there a custard pie or M42?"

What to do? I knew I had to have "easier to transport" before I stopped observing altogether. I chose the Celestron C8 for no other reason than that I liked the idea of its short tube and (semi) collapsible tripod. I didn't know squat about catadioptric scopes in general and SCTs in particular. I didn't care whether the C8's optics were 1/8-wave, ¼-wave, or 1-wave. I just wanted a telescope I could live with, one that wouldn't intimidate me into staying home on clear nights.

And, suddenly, it's almost 40 happy years of observing and many SCTs later and I'm just as satisfied with Schmidt Cassegrains as I was on the wonderful evening when I pressed my eye to the eyepiece of my Orange Tube for the first time. I chose well. Or did I *really* do the choosing? Sometimes you choose the scope; sometimes the scope chooses you…

Celestron Orange Tube C8

The original C8, the renowned “Orange Tube” (Celestron never referred to it as anything but a “C8”), is the telescope that made the Schmidt Cassegrain available, practical, and relatively affordable. Celestron sold this initial mass production model for 13 years, from 1970 to 1983, which means there are a lot of these basic models available for purchase on the used market. Though the C8s produced over this long period are all very similar to each other, a few mostly minor changes *were* made to the scope over the course of its lifetime.



The original and beautiful sand-cast fork mount and drive base were replaced with a smoother, more modern-looking, and slightly lighter die-cast design toward the end of the 1970s. The earliest C8s sported a pretty orange finish. While the same (somewhat peculiar) orange-color was used on later C8s, it was applied in a pebble-type finish rather than the attractively smooth coating of the first scopes. The earlier C8s are even more identifiable due to the strongly brownish-looking (which Celestron, in their wisdom called “gray”) paint on the fork and drive base. The paintjobs on fork and drive base were also slightly different in tint.

The most noticeable difference between early and late OT C8s, though, is found in the (optional) tripods sold for use with these telescopes. From its introduction until about 1982, the C8 used the wonderful non-adjustable “triangle tripod.” These tripods were made of relatively small-diameter tubing, with each leg in the form of a long triangle. This worked incredibly well, as a triangle is the most stable configuration for a tripod’s legs (which is why the legs on surveying instrument tripods are also triangular in shape).

That’s part of the secret, anyway. According to Celestron historian extraordinaire, Bob Piekiel, the *real* key to the tripod’s stability is in the way the legs were made. Designer Lynn Jones used spring steel instead of aluminum, and the legs were brought together with about 50-pounds of tension at the tips during manufacture. Assembling the legs under tension in this fashion eliminated “ringing,” which would spell vibration.

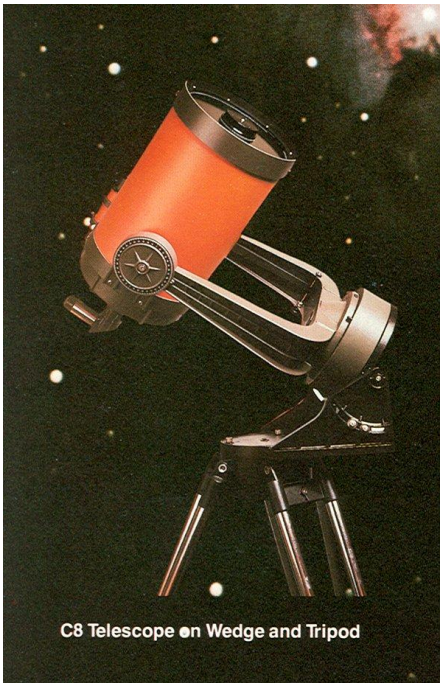
Stable, yes, but users complained that packing the tripod with its non-extendable legs in a car was like wrestling with an octopus. This problem may have had something to do with the fact that, with the infamous 1970s Gas Crunch, amateur astronomers were driving things like Ford

Pintos and Mavericks instead of humongous Galaxies Was there ever a better name for an astronomer's car?). Accordingly, just before the C8 was phased out, this stable support was replaced with an adjustable tripod similar to the ones in use today. One other drawback of the triangle tripod was its chrome-plating-over-steel finish. Due to inevitable bumps and mars, you'll see plenty of rust spots on these tripods in places where the chrome has worn or chipped away.

The Orange Tube C8's Optical Tube Assembly (OTA) is very much like those found on current telescopes. Despite some minor changes in appearance, everything works pretty much the same way on these CATs as on the most modern SCTs. The focusing method is the same (though these old models had a nicer knob), with the primary mirror sliding up and down the baffle tube at the turn of a threaded rod. Accessories mount the same way on a threaded rear part, and collimation is via (Allen) screws on the secondary housing. Like today's budget models, the Orange-tube is equipped with a small but pretty 30mm finder.

The mounting will also be recognizable to today's SCT fancier. The scope is held in a fork that rotates on a circular drive base. There are no sophisticated electronics, of course. What you have is a simple AC synchronous drive motor (actually a *pair* of "balanced" AC motors to reduce periodic error) that can be plugged into a wall socket for normal tracking or into a drive corrector for photography. The clock drive system is equipped with spur-gears rather than a more accurate worm set—though you may be *amazed* at how accurate Celestron's spur-gear system could be. The wedge and tripod, and especially the original triangle tripod, are well made and sturdy.

Are there any potential problems with Orange Tube C8s prospective used buyers need know about? Very few. The OT C8 is, after all, a simple telescope compared to today's electronics-laden models, and there's not much to go wrong. Time *is* beginning to take a toll on the very earliest Orange Tubes—the first mass produced CATs to come off Celestron's assembly line are over 40 years old. We're now, for example, beginning to see occasional drive motor failures. But the simple AC powered synchronous motor is easy—if not inexpensive—to replace, and last time I checked was still available from one of the original suppliers, Synchron. It pays for the prospective buyer to give the telescope a thorough going over in person, if possible (see the checklist in the back of this book), but, again, these are simple scopes, and if they have been adequately cared for (stored in a dry area, mainly), there is not much to be concerned about.


C8 Telescope on Wedge and Tripod

There is one possible show-stopper to be aware of: a few, a very few of the earliest C8s had slightly non-standard rear ports. The threads appear basically the same, but something is different—like the thread pitch. If you are thinking of acquiring an early example, it might be a good idea to take a modern visual back along and make sure it will thread on possible. Our 1973 model works well with current accessories.

Some prospective owners worry about mirror coatings on these old scopes. Technically, they are right to worry. After 30 years, you'd think the mirrors would need recoating—a Newtonian's mirror coatings are typically good for about a decade. Luckily, this does not seem to be the case with SCTs. I can testify that the primary and secondary mirrors on my university's 1973 C8 are still bright and shiny and still produce good images. The closed-tube nature of the SCT is responsible for the longevity of the aluminizing (though I have no doubt our '73's reflectivity is somewhat lower than it was when the scope was new).

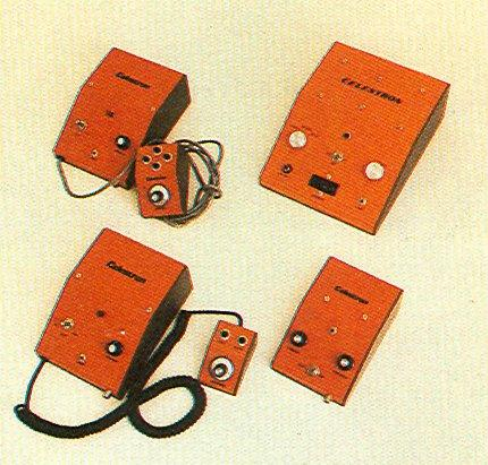
By the way, some of the later Orange Tubes were advertised as having "enhanced optics." Do not confuse that with Celestron's *Starbright* enhanced coatings, however. These enhanced coatings were a simple magnesium fluoride (MgFl) coating on the corrector and (perhaps) a slightly more reflective aluminum coat on the primary and secondary—nothing more.

So an old Orange Tube doesn't need any attention? Not necessarily. After 30 or more long years; especially if the telescope has been inactive for a while, the lubricants on the drive gears and the focusing mechanism (inside the OTA) can probably stand to be refreshed. An experienced owner can easily undertake this work, but for many of us, sending the scope back to the big C is a safer alternative. A return to Celestron for a good cleaning and lubrication isn't too expensive, and can help ensure a beautiful Orange Tube C8 is ready to go for *another* 40 years.

How much should you pay for an Orange Tube? I would not hesitate to buy a good-condition original C8, but I wouldn't pay $1000.00 for one—which is the price many folks seem to try to get for their telescopes. Today, just over a thousand dollars U.S. can get you a brand new basic Celestron (or Meade) 8-inch SCT, which is perhaps a better investment than one of these pretty, but *old*, telescopes if you're mainly interested in using the scope to view the sky rather than collecting "retro" items. The new Celestron will have many more features, including goto. It will be blessed with far better corrector and mirror coatings, too.

However, if the price is right, an Orange Tube can be a wonderful choice. I consider $400 - $600.00 (600 at the high end only for an absolutely mint example with plenty of extras) a more than reasonable price range for Orange Tube 8s in very good shape. If the owner includes some

desirable accessories, like a Nagler eyepiece or two, you might consider paying a more, but not much more. Usually, cost is not a problem. The C8 can be had for good prices if you look around, locally and on Astromart, restrain your enthusiasm, and keep some perspective.



While these are not "current" telescopes in any sense of the word, an Orange Tube is not an orphan, either. Though Celestron doesn't provide anything in the way of support beyond optical servicing/lubing, many other companies still cater to the Orange Tube fanatic. Due to the popularity and astounding longevity of the OT C8, items like focus motors and declination motors and digital setting circle encoder installations are still available for the original C8 from 3rd parties like Jim's Mobile Industries. If you need a drive corrector, though, you'd better go out and get one soon. This is one accessory that is becoming rarer than hen's teeth.

A drive corrector is only necessary if you plan to try taking pictures with an Orange Tube. You'll need a way to guide the scope, and the only way to do that, to speed up or slow down the drive motors a little bit to counteract drive error, is with a corrector. This gadget varies the frequency of the AC current going to the scope a little bit, changing speed slightly. One will not allow your Orange Tube to slew across the sky like a modern goto rig however.

These days the value of a C8 is not as a photographic instrument, but as a wonderful visual scope. It's light but powerful, and you may find you actually prefer the simplicity of a scope with a simple clock drive to a new model with all the computer stuff.

A C8 before There was a C8

Most dyed-in-the-wool CAT fanciers are aware Celestron had been producing Schmidt Cassegrains for a while before that magical day in 1970 when the Orange Tube C8 hit the market. Yep, back in the 1960s, Celestron, then going by the moniker "Celestron Pacific," produced a rather impressive line of semi-custom SCTs designed to appeal to small colleges and wealthy amateurs: C6s, C10s, C12s, C16s and (a few) C22s. But did you know these pretty scopes a C8 sister? C8? A *Celestron Pacific* C8?

Celestron was making this C8, the "CPC8" as it's been called, for at least a year before the release of the Orange Tube. This eight-incher, as you can see in the picture below, was…the same…yet different. Aside from the paintjob, a striking blue and white, the rear cell sported several things missing on the Orange Tube—and every other SCT Celestron has produced since 1970.

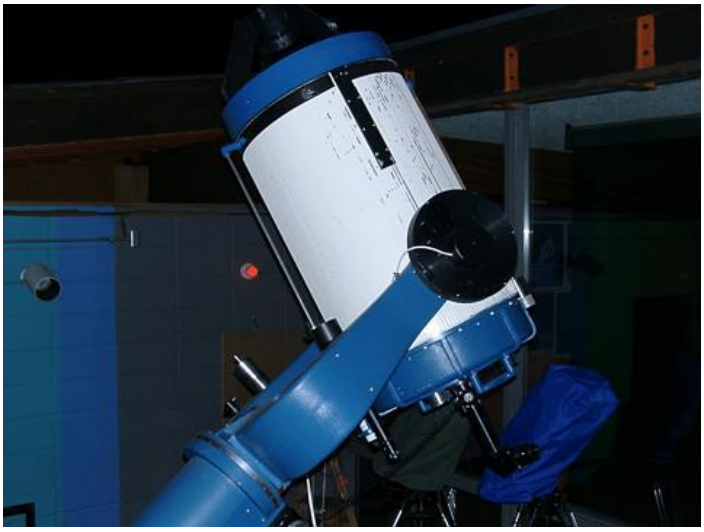
The main difference on the rear cell is that there are adjusters that allow the user to collimate the *primary* mirror. This was scrapped for the Orange Tube both in order to hold down production costs and *aggravation*, as making both the primary and secondary mirrors adjustable made collimation a pain for the uninitiated. Tom Johnson and company discovered that just being able to adjust the secondary was good enough to achieve perfect collimation assuming the optical train was not grossly misaligned during manufacture.

Not much chance of that. Celestron Pacific lavished plenty of TLC on the White Tubes, and it shows in their high build quality. The focusing mechanism, which was also changed for the Orange Tube, is an example. The original "spindle" focusing system on the Blue and Whites, including the CPC8, used a belt to drive three rods that pushed the mirror forward and pulled it back to focus. It was an excellent system that prevented the annoying "focus shift" seen in all post 1970 Celestrons, which use a single rod to move the primary.

Unfortunately, the spindle focuser and the high build quality in general meant the telescopes had to sell for lots of of bucks. Celestron certainly *would* need to save money in production when the time came to produce their Orange Tube C8, their first real consumer scope. The price for the Blue and White C8 was around $1500.00, way, way out of reach of most amateurs in the 1960s (Uncle Rod's first new car, a Ford Maverick, cost $1995.00 in 1970, by way of comparison).

In addition to its collimateable primary and three-spindle focuser arrangement, the CP8C differed from the Orange Tube and all other Celestron C8s since in one other important way. Its focal ratio came in at f/12 or f/17 (your choice) rather than the familiar f/10. The way I

understand it, the f/12 was nominally the "astronomy version," with the f/17 being sold for guide scope use on CP's big CATs. The "Astro" 8 was shipped on a driven fork mount very similar to the one furnished with the larger C10. The guide scope version was equipped Celestron's "tangent coupling" guide scope mount that allowed altitude and azimuth fine adjustment for hunting guide stars. An OTA with a slightly different mounting block was also sold for use as a telephoto lens, and could be placed on a heavy duty photo/movie tripod
Do you want a Blue and White C8? I know *I* do. It doesn't even have to be an 8. A C10 or (ahem) C16 would be just *fine* by me. The mystical allure of a *real Celestron Pacific,* a Blue and White beauty, is hard to deny. But would a CPC8 be a good buy if you could find one used?



Maybe so, *if'n* you could find one. Certainly, the C10s I've used are derned good optically and amazingly well-built, if, naturally, pretty low on the technology totem pole. But I doubt you'll be faced with a buying decision in the case of the 8-inch. The CPC8 is clearly rare. Why? It was apparently never popular with individuals during its relatively short lifespan. It cost nearly as much as the next scope up, the C10, and most people with pockets deep enough to fund a Celestron in those long-lost days opted for the 10-inch. According to Bob Piekiel, they weren't even shown in Celestron Pacific's catalog.

How much would one cost today? However much a seller could convince you to pay for it, I reckon, but I'd guess somewhere in the 1500 dollar *and up* range, with the emphasis on the "up," at least for a good condition astro version on a fork.

Just how many CPC8s are out there? Good question. I've seen exactly *zero* in person, and have seen only a precious few pictures of this shy CAT. I don't have the faintest idea how many working examples might lurking in attics and dusty university physics department storerooms, but there must not be many, or more would have shown up by now. Which doesn't mean you might not find one. While not many were sold to amateurs, it seems, the telescope *was* popular with colleges and universities, with Celestron, according to data found in its old advertisements, selling at least a hundred of them to various institutions. Who knows? You might get a Blue and White C8 for a song at a surplus sale.

Want something even rarer? Celestron also did a 6-inch scope for a while, which seems to be even harder to find than the CPC8. Celestron Pacific did a yet smaller telescope, the C4, but it was never, to my knowledge, sold in a fork mount configuration. The CPC6 was similar to the 8-inch in appearance and construction, and may have been produced a year or two prior to the 8.

Like the 8-inch, the CPC6 was offered in both astronomical (f/12) and terrestrial/guide versions (f/20), with the astro model being mounted on a beautiful little fork/drive base.
Have I whetted your appetite for Blue and White Celestrons and their lore? Like me, you may never own one, but you can at least learn a lot about 'em and drool over their pictures thanks to the aforementioned Bob Piekiel's e-book, *Celestron: The Early Years* (available through Astromart last time I checked).

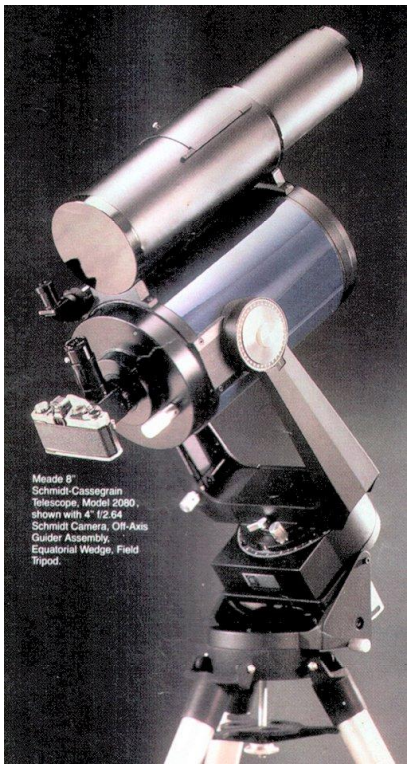
Meade's 2080 Challenge

In 1980 the Earth shook—for SCT fans anyway. That was the year, Meade brought forth its 2080 Schmidt Cassegrain, the first serious competitor for the venerable C8, which remained much the same as it had been when it was introduced a decade earlier. The 2080 made it clear the Celestron scope would have to change, since the new Meade offered some distinct advantages over the Orange Tube.

There was no doubt the Meade was a beauty. Its glossy blue-black finish made the dull orange of the C8 look positively ancient. Today, the 2080 can easily be mistaken for a current SCT while the C8 just looks *old* (or *classic*, depending on your perspective). What does the 2080 have to offer that the C8 lacks beyond the pretty paint, which soon became known as "Meade Blue"?

The only significant design improvement is the scope's *worm gear* drive. As the 1980s came in and serious deep sky imaging was becoming a more common pursuit, astrophotographers were ready for a replacement for the spur gears in Celestron's CATs. The 2080 offered some tracking improvement with its worm system. While the scope's periodic error wasn't much better than that of the C8, random errors, which are harder to guide out than smooth and regular periodic error, were practically eliminated in the 2080. Other than its better gears, the 2080's drive was pretty much the same as the C8's: an AC synchro motor with a line cord. At home you plugged it into a wall socket; in the field you plugged it into a drive corrector or inverter attached to a big 12 volt battery.

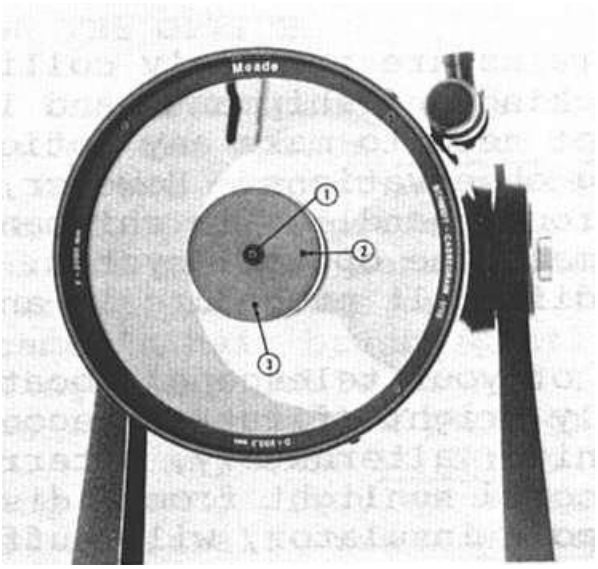
Meade made many claims for the 2080 when it was introduced, but most of the so-called "advantages" beyond the worm gear drive amounted to little more marketing hype. For example, they made a big deal out of this telescope's "oversized primary mirror," and it is true the primaries on these scopes are about *¼ inch* bigger than those on the Celestrons due to a differently-shaped mirror blank. But, despite claims to the contrary, this really means nothing visually or photographically (Meade recently and amazingly resurrected this "larger primary" hype for its ads). The extendible tripod and wedge do look more up-to-date than the spindly-appearing triangle tripod on the earlier C8s, but the original C8 tripod is steadier.



Might a 2080 be a decent telescope today? Perhaps. It's quite capable when it comes to visual work, and, if it is in good condition mechanically can take pictures at least as well as current bargain CATs. One real advantage the 2080 has over the Orange Tube C8 is that you can find one that's a *lot* younger than the youngest OT. Meade continued selling the basic model 2080 off and on for about 15 years, well into the mid 1990s, while the original C8 was phased out in 1983. Because of this longevity, the 2080 is found in a number of different configurations, from a basic 2080 with non-enhanced optical coatings and a 30mm finder, to a 2080 "B" model which possessed a 50mm finder scope and MCOG optics (Meade's name for its enhanced optics, similar Celestron's "Starbright").

While the 2080 is similar to the C8, it does have a few peculiarities. Instead of the familiar three collimation adjustment screws on the secondary mount, early models of the Meade only have *two*. Oh, there's a third screw in the center of the secondary mount, alright, but that holds the mirror in place. Loosening it will cause the secondary to go **kerPLUNK** on the primary. Collimation is accomplished by adjusting the two screws that are at right angles to each other. Not as easy as collimating with 3 screws, but not a show-stopper, either.

A more serious oddity is that some of the earliest 2080s to roll off the assembly line did not use the standard "SCT thread" rear port. The port *looks* the same as those on other 8-inch SCTs, but you'll find you can only thread a standard adapter—a visual back or anything else—on a couple of turns before it jams to a halt. If you're considering buying one of the oldest 2080s, make sure the scope is threaded in modern fashion—as most 2080s were (if you're able to examine the 2080 in person before purchasing it, take along a visual back and make sure it goes on).



The 2080 was followed by a 4-inch SCT, the 2044, and in a move to counter Celestron's C11, a third model was added in 1983, the 2120 ten inch. The 2120 can be recommended; they were usually well made optically and mechanically, if a bit light for photo purposes. The 2044 and its successor, the 2045, though, *could* be iffy optically and should be thoroughly tested before purchase if possible (see the "Little CAT" section). How much moola should you dole out for a used 2080 in good shape? As always, a used CAT costs what someone can convince you to pay, but

for an old one with few accessories? Less than you'd pay for a Celestron Orange Tube in similar shape. For a 2080B in great shape with lotsa frills? Maybe a bit more than that, but not much.

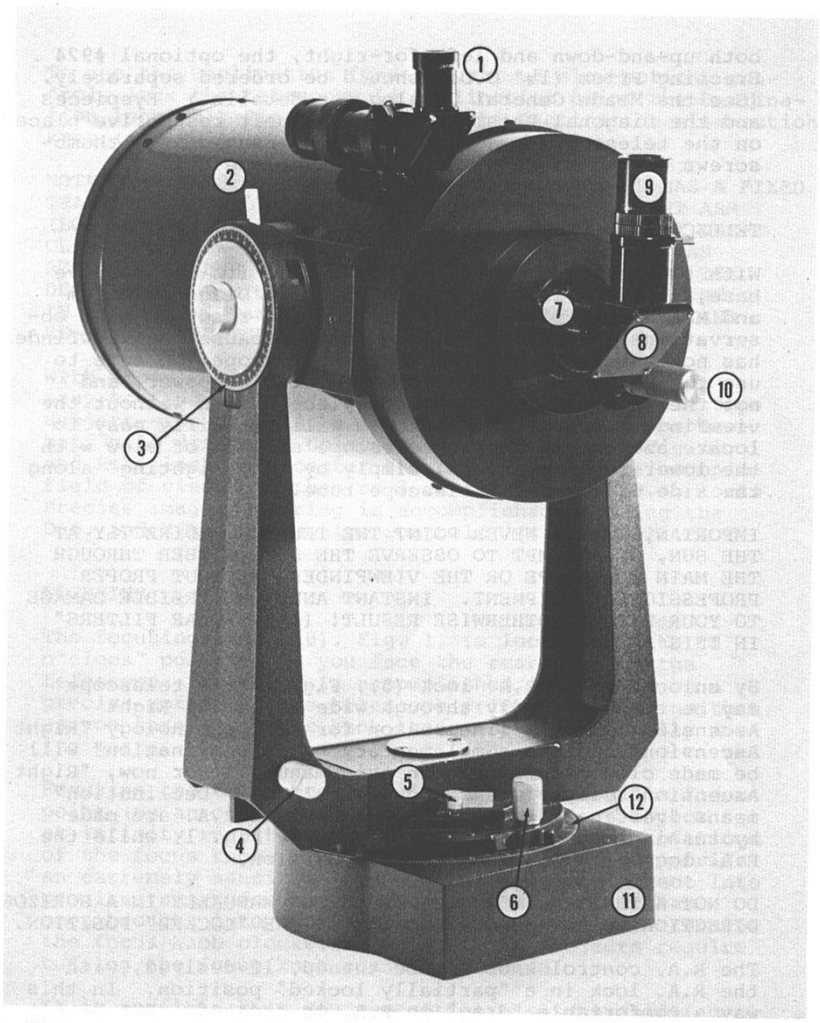


Fig. 1: The Meade Model 2080. (1) Viewfinder; (2) Declination Lock; (3) Declination Setting Circle; (4) Declination Slow-Motion Control; (5) R.A. Lock; (6) R.A. Slow-Motion Control; (7) Eyepiece-Holder; (8) Diagonal Prism; (9) Eyepiece; (10) Focus Knob; (11) Drive Base; (12) R.A. Setting Circle

The Celestron Super C8

Not far from Meade's headquarters in Costa Mesa, California, Celestron's management in Torrance, CA realized they had a *problem*. The 2080 made the classic Orange Tube look ancient. It took a few years for the company to *do* something about it, but in July of 1983 the astronomy magazines contained a striking new advertisement from the Big C.

This full-page, full-color ad was emblazoned with the headline, *"Superceded*." The photo showed the beloved Orange Tube literally being pushed out of the frame by a snazzy looking black CAT, the Super C8.

What made a Super C8 Super? In addition to its more modern and admittedly 2080-inspired looks, the Super brought some genuine improvements to the C8 line. Foremost was that it, like the Meade 2080, was equipped with a worm gear drive system. This was not just any worm gear, either, but one made by the highly regarded Edward Byers company, renowned amongst amateurs for high-precision mounts and drive gears.

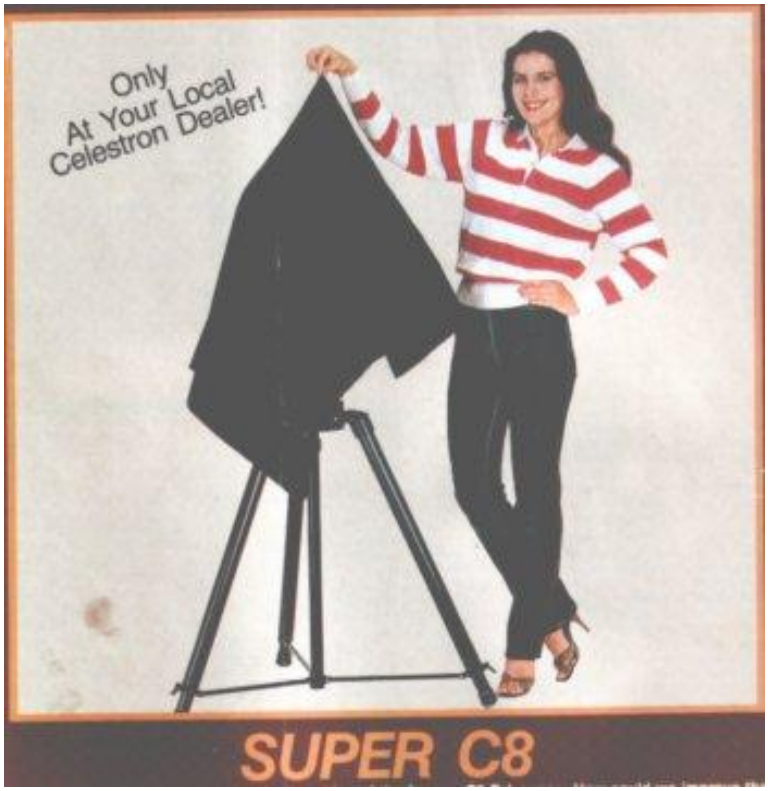
How did this fancier drive work on a C8? Assuming the scope was properly balanced, it was quite accurate. Noticeably better periodic-error-wise than even good Orange Tube spur sets, and much better when it came to random tracking errors. Celestron was *mighty* proud of the Byers gears; some examples of the follow-on scope, the Super C8 Plus, actually have *a little window in the base so you can show off your WORM GEAR to your buddies!* On both the Super and the Plus the drive is still powered by AC motors.

What else? The dinky 30mm finder scope was gone, replaced by a nice 8x50 model equipped with a star diagonal for comfortable (if mirror reversed) viewing. Celestron claimed "improved" coatings were applied to the scope's optics, but real Starbright coatings were an extra cost option (about $100.00 more in big 1983 dollars). Like most pre-mid-1990s SCTs produced by

both companies, the Super C8 was provided with a convenient footlocker-type case that held the scope, drive base and a few accessories.

Is the Super C8 a good old telescope or just an old telescope? Usually, it is quite good, but can be hard to find. It wasn't around long before it was replaced by Super C8 Plus. A well-maintained Super C8 with its gleaming black tube (it was also available with an orange tube for a short time after its introduction) and old-style fork mount is a thing of beauty capable of producing decent photographs and impressive views.

Should you buy a Super in preference to an Orange Tube model of equal or better condition? That depends. If you intend to try imaging with the telescope, definitely. If you're primarily or exclusively a visual observer there's less impetus. Yes, the worm drive of the Super *is* better, but, if all you do is look or take the occasional Moon picture, there's not much reason to choose a Super C8 if it's more expensive.



The Celestron Super C8 Plus

Celestron's new scope, the Super C8, had only been on the market for about two years when the Torrance gang surprised us by replacing it with the Super C8 *Plus*. This telescope has some refinements to offer, but they are of a more incremental nature than those of its predecessor. The fork mounting has undergone minor redesign and is somewhat sturdier than that of the previous original Super. The finder is still a 50mm model, but is held in an improved ring-mount and includes a better, integral, 90-degree star diagonal. The drive motor and gears on this model are the same as those found on the Super C8. The single major advance the Plus brought was that the company's Starbright coatings were *standard* on it, not an option.

The Super C8 Plus is more common than its elder sister because it was around for a little longer. The telescope was Celestron's flagship 8-inch for over three years and was sold for quite a while after that. The Super C8 Plus wasn't just long-lived; it was also a well-accessorized scope. In addition to a couple of eyepieces and a footlocker case, the Plus came standard with a wedge and tripod, as would most Celestron CATs from this point on.

Any bad things to beware of? Only one. Super C8 Pluses were made both during and after the Comet Halley craze. Sadly, Celestron's quality definitely suffered during this time due to the huge demand for their scopes and the company's understandable desire to make hay while the sun shone. You'd be well advised to test-before-you-buy *any* Celestron (or Meade) SCT produced between 1986 and about 1990.

The Super C8+ is an attractive and capable SCT. One in mint condition is quite a find and will make you the center of attention for fellow CAT fanciers out on the observing field. However, as with the plain Super, don't pass by a better condition and/or less expensive Orange Tube just to get the worm drive if you are not a photographer. Again, it doesn't make much difference for the visual worker. How much should you pay for either of these two similar scopes, the Super and the Plus? It depends on accessories and condition, but, roughly, about the same as an Orange Tube, 500 U.S.$ approximately.

Celestron Super Polaris C8

With the Super and the Plus, Celestron had at least temporarily caught up in the features race. But it was taking a beating in another arena: *price*. In an age when many amateurs thought $1000.00 was an almost impossibly high sum to pay for a telescope, The Super C8 Plus was really pushing the envelope. Its $1400.00 was an insurmountable obstacle for some observers.

Meade was another problem. When they were in the process of upgrading the 2080 into their next SCT model, the upscale 2080 LX3, they also introduced a basic scope on a German equatorial mount, the 2080 GEM, which sold at the all-important $1000.00 price point. Celestron hit on an expeditious solution. They'd take a garden-variety 8-inch OTA and put it on a GEM made by a third party, Japan's now-famous Vixen. The mount chosen was the Vixen Super Polaris, and, thus was born the Celestron Super Polaris (SP) C8.

What could Celestron sell you for a little less than a grand in 1985? A good-quality outfit that offered few accessories but decent performance for the budget-conscious observer. Actually, if you shopped around, you could find a SP C8 for less than a thousand, but the price came right back up to 1000 in a hurry once you added a few "options" like an RA drive motor.

How good is the Vixen mount? The C8 optical tube was reasonably steady on this GEM, though not as steady as the Super C8 Plus tube on its fork. You can, of course, use the Super Polaris mount for other telescopes if you wish, making it a little more versatile than a fork setup. Equipped with dual axis drives and a hand controller, the Super Polaris is capable of doing excellent guided deep sky photography. Unfortunately, many of the SPC8s were sold with either single axis drives or no drives at all. Luckily, Vixen's designs haven't changed too much over the years, and you should still be able to purchase a compatible dual axis drive system for the Super Polaris mount—if not necessarily cheaply.

This telescope was always considered a bargain/compromise, and was never as desirable or popular as the fork mount models, but Celestron sold a fair number of them, and they are pretty easy to find on the used market. This telescope, in fact, continues to this day in drastically altered form as the **AVX C8**. The Vixen Super Polaris mount and the Great Polaris that followed it are long gone, replaced by the computerized Chinese CG5 and its follow-on, the VX.

Novices: a good condition SP C8 looks high tech on its German mount. Impressive, even. But this was *never* a premium scope. Don't pay a premium price for it. The same 500 that an Orange Tube commands (OR LESS if there isn't a drive) is a good number. The SP C8 was being produced during Halley, so try before you buy if possible.

One oddity about the Super Polaris C8 is that it was one of the first amateur CATs to feature a goto system as an option. By the late 1980s, Celestron was offering Vixen's original **Sky Sensor** computer for the SP C8. This early attempt at computerization included a controller with a library of deep sky objects and a pair of stepper motors. Did the Sky Sensor take the world by storm? No. It worked, but only barely. Finding objects with it required precise polar alignment, and its slewing speed was very slow. It was also power hungry, requiring a large 12 volt storage battery for optimum operation. Most owners found themselves aggravated by these computer shortcomings and only used the SS as a drive/drive corrector.

Another somewhat strange feature was that it was the only C8 with a plastic, flexible handle on top of the tube. That bracket looking thing extending the length of the tube is not a mounting rail of some kind, it is a handle. There was also a built in piggyback bracket. Kinda cool. I have one of the OTAs, and it does a pretty good job on my old Ultima C8 fork.

One interesting SPC8 variant is a model from the late 80s that featured an *Orange-colored* OTA. Whether Celestron was feeling nostalgic, or merely found a cache of orange painted tubes in a warehouse somewhere, I can't say.

Meade LX3

Before Meade introduced the 2080 LX3 in 1985, everybody knew how you made an SCT. You took an OTA ("optical tube assembly"), put it on a fork mount, installed an AC motor, and you were done. The 2080 LX3 retains the basic OTA of the earlier Meade scopes (albeit with improved coatings), but changes almost everything else. In fact, many CAT fanciers point to 1983 and the coming of the LX3 as the birth of the modern Schmidt Cassegrain Telescope.

What's so all-fired revolutionary about the LX3? The fork is beefed up a little. The finder is a nice right-angle 50mm model. The Multi Coated Optic Group (MCOG) enhanced coatings are *standard*. The wedge is equipped with fine adjusters and a compass. All-in-all, a top of the line, *dee*luxe scope. But the revolutionary aspect of the LX3 is found in the drive base.

The laughably simple SCT drive motor, the synchronous AC clock drive was replaced by a quartz-oscillator-controlled DC powered one (it was not a DC motor per se, but an AC motor driven by a built-in drive corrector) that could be powered from an external 12 volt battery or from 120vac household current via an adapter. There's even a hand controller with directional buttons for photography and a two-position switch to select sidereal or solar speeds. The entire telescope is well laid-out and equipped, even by current standards.

Unfortunately, *some* of the advances made by the LX3 make it a somewhat less than ideal telescope for today's used CAT hunter. The DC powered drive with its more sophisticated electronics means there's more to go wrong. Lately the hand controllers have become a real problem. Failures are occurring and there's no source for replacement units. There's nobody at Meade who has any idea what an "LX3" was, and even if there was, there are no parts.

Another caveat is that some of these telescopes were sold with “super enhanced” MCSOG optics. “MCSOG” means Multi Coated SILVERED Optics Group, and “silvered” means that as the scopes age their secondary mirrors (which were the only silvered surface) *tarnish* and degrade. To their credit, Meade proved generous in this regard, repairing/replacing these scopes’ secondaries for free or for a nominal charge (the silvered secondary mirror was technically *not* covered by the scope’s nominal lifetime warranty, I’m told). Unfortunately, Meade is no longer Meade, having been bought out by a Chinese concern, and it’s anybody’s guess whether they’ll be willing to replace/recoat an LX3 secondary mirror for any amount of money.

The problems inherent in an old scope with increased electronics complexity can and *should* give today’s users pause, but in good and working condition the LX3 is a cheap and effective instrument. The PECless drive certainly cannot compare with the accuracy of today’s scope scopes, but good pictures can still be taken with these CATs, and much more conveniently than with an AC powered telescope.

How much? In superb condition, maybe a little more than a 2080, but not much more. 600 – 650 would be a fair price for one in great shape with good optics and some add-ons. Incidentally, the introduction of the LX3 meant the basic 2080, which had been slightly upgraded in “LX” and “LX2” versions, disappeared for a while. Like the 2080, the LX3 is also found in a 10-inch model, which is identical to the 8-inh except for the larger OTA and minimally modified fork arms.

Celestron's Powerstar 8 (and a last C8 Plus)

The introduction of the Meade LX3 seemed to take Celestron by surprise. They didn't respond with a more modern SCT of their own for a while. But it was clear that they would have to do *something*. For the second time, Meade had bested Celestron in the features race, and the DC drive on the LX3 was a much more serious challenge to the Celestron scopes than was the simple addition of a worm gear drive in the 2080 a few years before.

Celestron was no doubt unhappy the Super C8 Plus obviously wouldn't be able to remain the company's flagship instrument for long without some modifications. The Plus remained on the market for less than two years after the introduction of the LX3. As quickly as possible, Celestron brought forth its own high-tech telescope, the Powerstar C8.

When the Powerstar appeared in late 1987, it didn't surprise anyone. It was about what we'd expected: a Super C8 Plus-like SCT with a DC drive motor (unlike the Meade, it had an actual DC motor). Yes, the LX3 was there first, but that doesn't make the Powerstar a bad telescope. It is actually attractive and is a good performer.

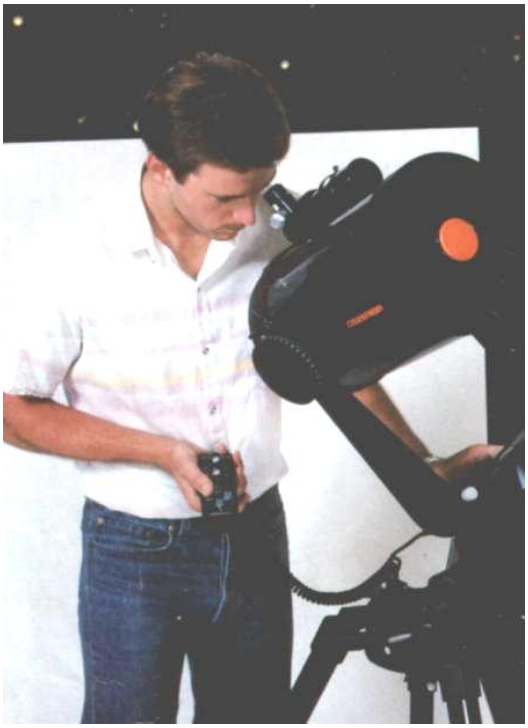
What do we find when we open that dusty old Powerstar footlocker? The OTA is the familiar Celestron black tube equipped with (usually) good Celestron optics. The fork and drive base are similar to what's found on the Plus as well. With one important difference; inside the base is a DC-powered quartz-locked drive motor. An *optional* hand controller was available to make the Powerstar "photography ready." Enhanced Starbright Coatings were another popular **add-on** for discriminating purchasers. That's the basic Powerstar: a DC servo motor driven Super C8 Plus.

The Powerstar C8 proved to be a popular SCT, and Celestron kept producing it for nearly 10 fraking years. During that time the telescope went through an almost unprecedented (for Celestron) number of revisions. In addition to the original Powerstar, there are Powerstar IIs, Powerstar IIIs, Powerstar IVs, and Powerstar PECs.

The nicest Powerstar to stumble across is the last of the breed, the **Powerstar PEC**. In addition to the features of the original model, this early 1990s telescope has, as the name suggests, a DC drive with a Periodic Error Correction Feature. And unlike earlier DC Celestrons, it is powered by an *internal* battery (the initial Powerstar PEC used 6 AA cells; later P-stars used single 9 volt

batteries). Other deluxe features are Starbright Coatings as standard equipment, and an *included* hand controller. The only slightly sub-par aspect of the scope is the 30mm finder.

The other Powerstar models? They are a mixed and somewhat confusing bag. Some have 50mm finders, some include dewshields, some are equipped with piggyback camera mounts, some come with hand controllers. Finally, some were sold without a tripod/wedge and may be on the used market with a variety of wedge/tripod combinations.



The Powerstars are all mostly capable telescopes, and if one is in good condition it would be a fine used buy. Are there any specific known problems with the Powerstar series? Not really. Even the last and best of them, the Powerstar PEC is a lot simpler than today's complex goto models, and is equipped with relatively simple and trouble-free electronics (though not as simple and trouble-free as the AC drive telescopes which preceded it). The only thing to avoid here, of course, is, possibly, a Halley-time telescope.

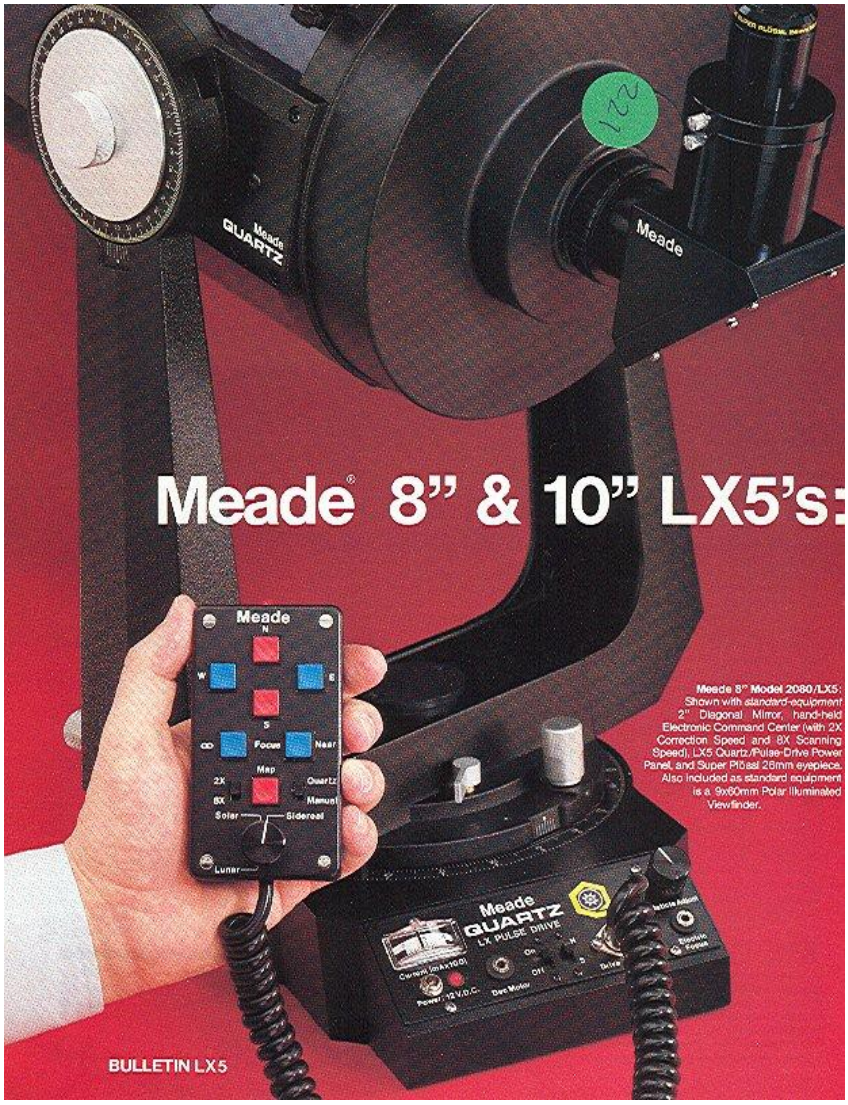
The original Powerstar debuted right at the time of the comet craze, and the Powerstar II was introduced before the dust had settled and Celestron had had time to clean up its optical act. If you're offered a Powerstar or Powerstar II, a *star test of the optics is mandatory* before closing the deal. Mechanically, the scopes from this era should be fine. How much should you pay for one? Depends, as always, on condition, but a little more than an Orange Tube, not a lot more. 600ish, maybe for the PEC model, I reckon.

Celestron did one last Powerstar-like SCT in the early-mid 90s, but discarded the Powerstar name. It was called the "C8 Plus," but, really didn't have much in common with the Super C8 Plus of yore. This was really a Powerstar with a Powerstar DC drive. It was sold contemporaneously with the more expensive Ultima C8.

Unfortunately, it wasn't quite as good as the previous Powerstar PEC. Oh, it had that telescope's 9volt battery powered drive, but the PEC was gone and so, surprisingly, was the worm gear. Yes, the scope had a *spur gear* set. This C8 Plus as shipped was also saddled with a silly little 30mm finder. You may occasionally run across references to a "C8 Plus Computerized," but there wasn't much difference between this one and the standard model. Actually, there was *no* difference in the telescope itself. The "Computerized" model just shipped with a Celestron (Tangent) Advanced Astro Master digital setting circle system. The user even had to install the encoders her/himself.

Meade LX5

Back in its glory days, Meade was not a company to allow the competition to come out with a new model CAT without a quick answer. It wasn't surprising, then, that Meade premiered a new telescope at almost the same time Celestron brought out the Powerstar C8. This was the LX5, the successor to the company's popular LX3. This new scope didn't mean the immediate the end of production for the well-received "3," though. The LX3 remained on sale for quite a while after the introduction of the new Meade (with the 2120 LX3 10-inch being sold at a nice discount).



The first reaction many amateurs have on seeing an LX5 is, *"Wow!"* It is an impressive-looking SCT with a beautiful Meade-blue OTA and an improved control panel crowded with dials, switches and lights. The main advance over the LX3 is that improved control panel and hand paddle. In addition to inputs for DC power, a hand controller, and a declination motor, the LX5 adds a plug for an electric focusing motor. The drive system now includes both 2x sidereal guiding and 8x sidereal micro-slewing speeds. The motor is a DC "pulse motor," rather than an AC synchro driven by a built-in DC-powered drive corrector.

Meade also threw-in some wonderful accessories that are rarely included in the basic price of an SCT today. The LX5 dispenses with the visual back and 1.25" diagonal combination that had been standard equipment on previous Meade and Celestron 8-inch models. Instead, the scope comes with an SCT style 2-inch star diagonal. This may have been offered only as a bit of one-upmanship in the features race, a battle that was well underway by this time, but the 2-inch diagonal was genuinely useful. At this time, the late 1980s, 2-inch eyepieces like the TeleVue Naglers and

Meade Ultrawides were becoming more and more popular with serious amateurs. Another treat for the LX5 owner is the fact that it isn't saddled with a 30mm finder as is the original Powerstar. Meade didn't think even a *50mm* model was sufficient for the beautiful new telescope. The LX5 sports a *60mm* finder, and not just any finder, but an illuminated model with a right angle adapter.

This finder scope can help in locating dim targets; under dark skies every one of the Messier objects if visible in this big finder. Unfortunately, it is somewhat spoiled by the star diagonal. Oh, it's comfortable to use, but since the diagonal uses a simple mirror, everything in the finder is mirror-reversed right-to-left, which means nothing matches what's shown on star charts. The large size of this finder scope also creates a problem. The LX5s are significantly rear cell heavy and badly out of balance due to this heavy accessory.

One very special optional accessory Meade offered for the LX5s was its *CAT* system. In Meade's parlance, "CAT" didn't mean "catadioptric;" instead, it stood for *Computer Aided Telescope*, a **digital setting circle computer** for the LX5. The CAT unit worked, but it had the drawbacks common to all early telescope computers.

The LX5 had to be near-perfectly polar-aligned for these setting circles to achieve much in the way of accuracy. The computer in the CAT wasn't nearly smart enough to take polar misalignment and other problems into account. It didn't offer the library of thousands of objects we take for granted in today's DSC computers, either—the CAT mounted on one of these old CATs merely indicates the telescope's current Right Ascension and declination. The whole installation has a slightly Rube Goldbergesque flavor, too. The computer hand unit bolts onto the hand controller, wires and cables run every which-way, and the encoders that register the telescope's position are turned by small, easily lost rubber belts. The Meade CAT is an historical curiosity and nothing more, offering the modern observer nothing but frustration.

The LX5 is one of my favorite used telescopes. It offers everything the LX3 and the Powerstars do and more. An LX5 with enhanced optics and a working hand controller is usable for long exposure astrophotography and practically any other demanding telescopic task. If the telescope has been taken care of, there's not *too* much to go wrong—not at least when you compare the LX5 to today's computer-loaded telescopes. Very importantly, Meade abandoned the silvered secondary of the LX3 by the time the LX5 came on line, so there's no need to worry about the secondary coating rotting away. Despite the scope's lack of a PEC feature, I would tend to choose the LX5 over the Powerstar; it is certainly superior to the LX3 in every way.

So what's a reasonable price for this SCT? For an 8-inch LX5 in great shape with some accessories? 600 or a smidge more. It is, after all, an old non-goto scope. Be that as it may, an LX5 and a modern DSC system like the Sky Commander or Argo Navis to go with it, and you could be a right happy little camper.

Celestron Ultima C8

For about a year and a half following the LX5 introduction, all was quiet on the SCT front. Oh, Celestron *did* bring its Compustar series of telescopes to market, but those high-priced goto CATs were of relatively little interest to the average Joe and Jane Amateur. Otherwise, Celestron confined its SCT advancements to tinkering with the configuration of the Powerstar. But then, in late 1988, new telescope ads, new *Celestron SCT* telescope ads, hit the astronomy magazines. The new CAT from California was dubbed the Ultima 8. "Ultima" is reminiscent of the word "ultimate," (and was also the name of a 1980s computer game and makeup) and that's a pretty fair description of this classic SCT. Even today, many SCT users consider the Ultima 8 to be *the best* (non-goto) *8-inch Schmidt Cassegrain ever made*.

What makes the Ultima 8 so special? That this telescope was *optimized* for photography and included just about every luxury feature a CAT purchaser of the time could want. The OTA was a stock black Celestron tube, but its optics came standard with the desirable Starbright coatings. The corrector was a deluxe version that was made of Crown glass, which some amateurs think superior to the "float" glass normally found in SCT lenses. There have been rumors floating around over the years to the effect that the optics in the Ultima 8 were hand- picked for excellence at the factory. I have no evidence this was the case, but the optical performance of every Ultima 8 I've used has been very good, at least.

The rest of the Ultima's appointments were similarly fancy. The 50mm finder was not only large enough for easy object location, but also included an adapter that allowed it to be used in a right angle configuration *or* straight-through mode if the owner didn't like mirror-reversed images. There was an illuminator and a special crosshair reticle in the finder eyepiece that, when used with an included round slide-rule calculator, made relatively accurate polar alignment a breeze.

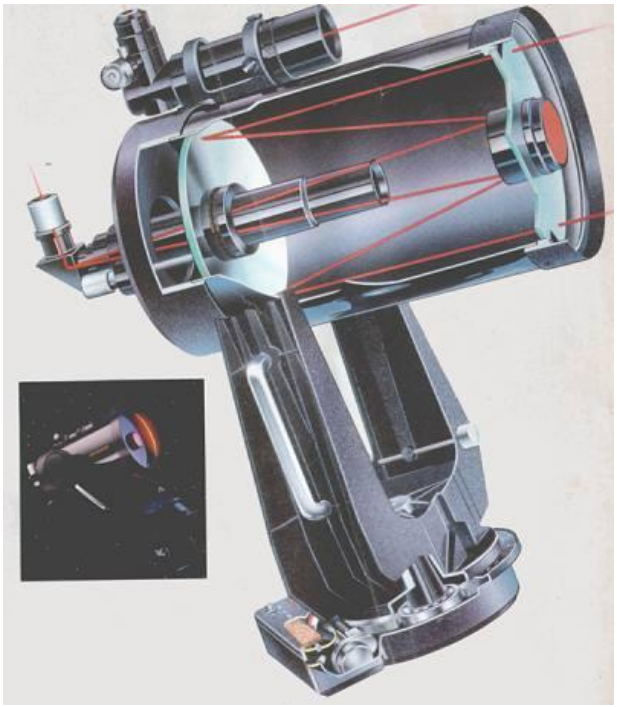
The Ultima's pluses don't stop with the finder and optics. Its *real* attraction is its superb, steady mount. The fork is large and massive, completely redesigned from the lighter model used on

the Powerstar. The drive base this big fork is mounted on is likewise completely new and heftier than what was found on other Celestron and Meade telescopes of the time.

The large polar shaft of the Ultima mount rides on a 4-inch ball bearing assembly, adding to the basic steadiness of this fork. Even more importantly, Celestron changed the way the bearing *attached* to the drivebase. Rather than mounting to a thin, flat plate, as in all the earlier fork mount scopes, in the Ultima it is supported by a ribbed, cone-shaped casting on the bottom of the base—this really helped with steadiness. The drive on the scope is similar to what was used on the Powerstar PEC, and features the same multiple speeds (Solar, Sidereal, King, Lunar, and one higher speed slewing rate) seen on the more modern Celestar Deluxe. Like most Celestron scopes of the time, the HC and control panel are set up for the use of a declination drive motor, but that motor is an extra-cost option.

As above, the Ultima had a higher "slewing" speed that is accessed by pushing a direction button and its opposite number. Want to move east at higher speed? Press and hold "E" and then press and hold "W." The slewing feature also functions with most declination motors. While this slewing mode is documented in the manual, quite a few Ultima owners don't seem to know about it.

There are still more luxuries to be found on this very special scope. The Ultima, in its initial production run, was equipped with *rechargeable* lead acid batteries in the drive base. This is an innovative convenient feature, and one that still hasn't been duplicated (perhaps for good reason, as we'll see later). The included hand controller isn't quite as fancy as the Meade LX5's paddle, but it is well made, possesses controls for an (optional) electric focuser and has a built-in red LED map light.



In the beginning, the Ultima shipped with a wedge/tripod configuration similar to that used on the Powerstar, but that proved less than optimum for this heavy CAT. For that reason, toward the middle of the scope's production run, the original wedge and tripod were replaced with a heavy duty C11 style wedge and a strong, rubber-covered tripod (the ancestor of the "heavy duty field tripod" Celestron used on all its top scopes through the NexStar GPS series). Need to transport the Ultima? Forget cheap footlockers; in a real tour-de-force, Celestron threw-in a molded *airline-shippable* carrying case for its ultimate 8-inch CAT.

After less than two years of Ultima production, Celestron also added the desirable Periodic Error Correction feature ("PEC") to the scope, which was missing from the earliest U8s, making the Ultima as good a photographic instrument as even advanced astrophotographers could wish for. Thanks to PEC, the periodic error on the already-good Ultima 8 drive could be further lessened by careful training to well under 10 arc seconds. This required a steady hand and good seeing, but was definitely doable. The only irritation was that, as is the case with all Celestron scopes prior to the NexStar GPS series, the PEC training was erased when the power was shut off.

Was there anything *bad* about the Ultima? There was price. At around $2300.00, this was the most money we'd been expected to shell out for a non-computer 8-inch CAT. For another thing, while the heavy fork mount and base are wonderful for celestial picture takers, they result in a heavy 8-inch telescope. This was probably the heaviest C8 ever sold, exceeding even today's computer-laden models. Other than that, there's not much to say against the Ultima. *They just don't make 'em like that anymore*.

Should *you* look for an Ultima 8? If you're interested in a used non-goto fork-mount SCT, the answer is a most definite yes. The drive is accurate, and the mount is solid and steady. I've been able to get good photos with my Ultima 8 on evenings when the wind was blowing big Dobsonian reflectors around like weather vanes. It would be fair to say that in its day the U8 made celestial imaging just about as easy as that naturally difficult art can be. I often embarrassedly commented to friends that this scope almost took pictures by itself.

The Ultima 8 was produced for approximately 8 years, and there are some variations depending on the production run. The rechargeable battery was eliminated late in the Ultima 8's lifetime and was replaced with a 9-volt transistor battery powered drive. The features of this drive were identical to those of the PEC-equipped rechargeable units otherwise. The power source change may have been done to cut costs, or it may have been done because having to charge the drive battery was a little more inconvenient than it seemed at first, and at times could be a real show stopper. If the 9-volt model runs out of juice, just slap in a new battery; having the rechargeable battery pack flatline at a star party in the middle of the night will shut you right down. The excellent 50mm finder was left in place on the Ultimas till the end, but the right angle viewing attachment was scrapped in a cost-saving measure.

Any *bad* Ultimas? As mentioned earlier, the earliest U8s were produced with drives that do not have the PEC feature. When I was doing the first edition of the Guide, I was under the impression that not many of the non-PEC Ultimas were produced, but as they keep turning up, it's become obvious that Celestron turned out quite a few of these over the first two years of the Ultima's run. The PEC feature wasn't added until the summer of 1990. Anyway, these days, I'm not sure how desirable a feature non-permanent PEC is, anyhow. Also be aware that these scopes can be difficult to autoguide; you *may* need some kind of relay box between ST-4 guider and the HC input.

The oldest Ultimas are now fifteen years old, and, as can be expected, are starting to have a few problems. Foremost among these is the lead-acid rechargeable battery, most of which have given up the ghost by now. A replacement battery can be found, but not always easily. More serious is the fact that I'm beginning to hear about failing drive electronics. Celestron can't help with Ultima failures of this kind—they have no more parts for the old scopes. In fairly recent times, it has been possible to purchase printed circuit boards for the scope from the maker, Tangent instruments. Whether this is still possible, and even if it is, how long Tangent will be able to supply PCBs, I don't know. I've also been told that at least some of the Tangent circuit boards may be somewhat defective—with non-functional 12-volt power inputs. That is not a huge problem, since the scope will track for 30 – 40 hours or more with a fresh 9-volt battery.

What's a decent price for an Ultima 8? Around 700 – 800. Naturally, the larger Ultimas, the 9.25 and 11, which were soon added to the line, will command more. Oh, if you have your head turned by a pretty Ultima 11, be sure to test the scope before buying. The mount that was so steady for an 8-inch is just sufficient for an 11. Sometimes, The Only Enemy of Good Enough is More Better.

Postscript

The Ultima was my choice of 8-inch SCT for over a decade. I've loved mine more than I have loved any other telescope I've owned in 40 years of observing. But times change and people too. I finally had to admit I was using the Ultima less and less. Make that "almost never." Mostly that was due to the presence in the house of a NexStar 11. No matter how much I used the NS11, however, I didn't and probably never will feel the affection for it I feel for the Ultima 8. In part, this is nostalgia; I bought the Ultima just after the memorable time when I wooed and won my wonderful wife, Miss Dorothy. The scope's purchase and use by the two of us at one of the first star parties we attended together is a pleasant memory. Nevertheless, I just wasn't *using* the U8 anymore, and for one big reason: goto.

I admit to being an unabashed fan of computerized scopes. These days, I want to see as much as I can in the years left to me; I want to *look*, not *hunt*. I also find that as I get older and creakier it's not as easy to contort my body to aim and use a wedge-mounted, non-goto fork scope as it used to be. The seeming last nail in the Ultima's coffin was that, despite its larger aperture, I found the NS 11 (in a wheeled case) just as easy to transport and set-up as the Ultima 8 OTA with her big, heavy fork.

Before giving up on the U8, I decided to try an experiment. I didn't *always* want to haul the NS 11 around. While she was as portable as the Ultima 8 or nearly so, she was heavy and took up

even more space in my Toyota Camry. Having attained the status of *Broken-Down Hillbilly*, it was getting harder to convince myself to throw *either* scope in the car for a quick run at the club observing site on an "iffy" evening weather-wise. Then I had one of those "kill two birds with one stone" moments. I'd remove the Ultima 8's OTA from the fork and place her on a goto GEM mount.

Since I'd be able to break scope and mount into easily manageable pieces, the transport problem would be licked, and with a goto GEM I'd have, well, "goto." Since this was an experiment, I didn't want to spend a lot of money. I'd buy one of Celestron's inexpensive, imported goto-equipped CG5 mounts. If it didn't work, onto Astromart it'd go, and I'd consider a GM8 or a Vixen Sphinx. On the day the mount arrived, I grabbed my toolbox, and, much as it pained me, performed a FORKECTOMY on my poor, beloved Ultima C8.

I was a little sad to relegate that beautiful Ultima fork to a cobwebbed corner of Chaos Manor South. But it was a good thing I did. The CG5 worked perfectly—goto as accurate, at least, as that of the NexStar 11 in a very portable package. Surprisingly, the Ultima OTA is, if anything, *steadier* on the CG5 than it was on the heavy Ultima fork, maybe because of the CG5's outstanding 2-inch steel tripod. That huge fork? It was exiled to Chaos Manor's Equipment Vault for a while, but it got a second lease on life recently via a mount-less 80s vintage Super Polaris C8 OTA that came into my hands. I probably won't use it often, but I will use that wonderful, storied fork occasionally.

The Real Ultima(ate)? Takahashi's TSC225

In 1990, CAT fanciers began noticing small black and white ads in the astronomy magazines. For a new SCT. But Not from Meade, not from Celestron, and certainly not from Bausch and Lomb. No, this was an upscale kitty from Japan's legendary refractor maker, Takahashi.

Geez, Louise, did it look pretty. Beautiful Tak-style tube with all the fixins including a built-in fan to speed cool-down (this is fairly common but was amazing back then). The scope, the TSC225, also featured an extra inch of aperture when compared to proletarian C8s, with a primary 225mm in diameter. Naturally, it had all the appointments we considered luxury items in those days, like a just-plain-wonderful wonderful 50mm Tak finder (if you've ever looked through even a 30mm Takahashi finderscope, you'll have some idea of just how good this "big" one was).

It was pretty heavy, though, weighing in at almost 25 pounds. It also had a slower focal ratio than we were used to—f/12. But, hey, who cared? We'd deal with it. We believed Tak when they promised refractor-like views through this telescope. Anybody who'd charge that much for an SCT had better have the performance to back it up, right? How much? Try nearly 4 grand in 1990 dollars when you included all the required Takahashi "options." In case you're wondering, yes, this $4,000 was for the OTA only.

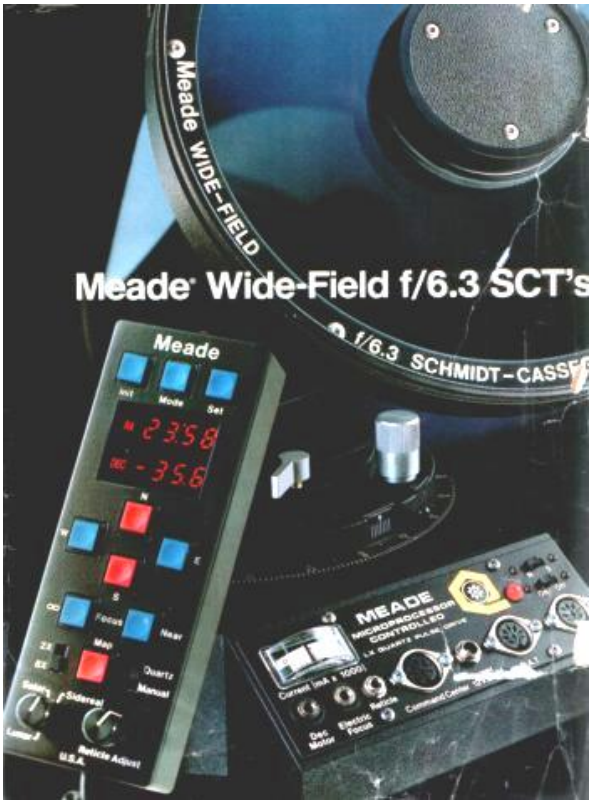
Was it worth it? When you could get a C14 OTA for considerably less than a TSC225 9 inch on a useable GEM? Well, that depends. Certainly as an investment it would have been fine. The 225s still go for the same price—or likely more—they commanded back then. Performance? That's a more difficult question. I've looked through a grand total of two TSC225s. One did, indeed, seem to be everything Tak claimed, delivering absolutely beautiful stellar, planetary and deep sky images. The other, though, seemed so-so. Not BAD, mind you, but not much different to my eye than a Meade or Celestron OTA. But this was a casual test ("Hey Mister, can I look through your pretty scope? Huh, can I?"). Coulda been cool down. Coulda been seeing. Could even have been collimation.

Would I buy one of these if I had four or five grand lying around? Sure. Well…sorta sure. After all, four thousand dollars these days will get you a Celestron CPC 1100 and an Ethos eyepiece or two to go with it, a combo that will likely outdo even the best 225. Luckily, you probably won't

be faced with this painful decision. Takahashi produced its SCT for a very short period of time, turning out maybe a hundred (100) examples—tops. Why? Supposedly, the optician in charge of the 225 left the company. My guess, though, is the scope just didn't sell well. Folks able to pay for a Takahashi were more interested in fluorite refractors or exotic Cassegrain designs than a "lowly" SCT, even one clothed in Tak finery.

Meade LX-6

Meade didn't take the introduction of Celestron's new flagship telescope, the Ultima 8, lying down, they responded with a new and different SCT of their own, the LX-6. What's new about this scope compared to the LX5? At first glance, *not much*. The fork is almost identical to the one on the LX5 and so is the drive base. The only immediately obvious difference on the scope itself is that the control panel has added a few new features, including a built-in output for the Meade "CAT" Computer Aided Telescope digital setting circle system (which by now Meade was referring to as the "DRS," the "Digital Readout System").



The hand controller evolved a little, too, with the LX6 variant's most noticeable new feature being that the display for the DRS can be added internally to the controller rather than bolted-on as in the LX5. As supplied, the space for the DRS is a blank panel that was removed and replaced with the LED readout when/if the user purchased the computer option. A red LED map light was now present on the hand paddle too, just like on the Ultima 8 hand control.

But that was just window dressing. The LX-6 was advertised as a *revolutionary* telescope, and none of these things were very revolutionary. What made the LX-6 different? Its focal ratio. Until this time, *all* Meade and Celestron (post White Tube) 8-inch SCTs had been offered in a focal ratio of f/10 only. This new Meade was rated at **f/6.3**. In fact, it was *only* available in that focal ratio; there was *no* f/10 LX-6.

This new scope immediately attracted astrophotographers. Deep sky picture takers had got used to working with f/10 telescopes, true, but they weren't *happy* about it. The resulting long focal length meant it was impossible to image large objects, and it also meant exposures had to be long. In photographer's parlance, an f/10 system is *slow*. Oh, you could add a focal reducer to speed up the scope, but those available back then, to put it charitably, *sucked*. The Meade f/6.3 changed that, giving photographers wide fields comparable to those enjoyed by imagers using the new short focal length APO refractors. An LX6 is *fast*. Visually, an f/6.3 SCT is also nice, giving low power, wide-angle views with comfortable focal length eyepieces.

The introduction of f/6.3 optics unfortunately led to a misunderstanding. Some amateurs got the idea that images produced by the LX-6's f/6.3 optics would *always be brighter* than those of an f/10 system. *Visually*. This was, of course, untrue. At the *same magnification*, the brightness

of images in an f/10 scope and an f/6.3 scope is the same. The f/6.3 *just yields lower magnifications with a given focal length eyepiece*.

I'm not sure how this mistaken idea took hold. The Meade advertisements of the time I've looked at are careful to state that, **"Images are brighter and fields wider when using the same eyepiece as an f/10 telescope."** Admittedly, however, the wording is slightly confusing, and I have the sneaking suspicion that some dealers hoping to boost sales of this premium-priced scope ($2000.00 U.S. for an 8" LX6 in 1990) may have *hinted* that its visual images were *always* brighter than those in the old f/10s.

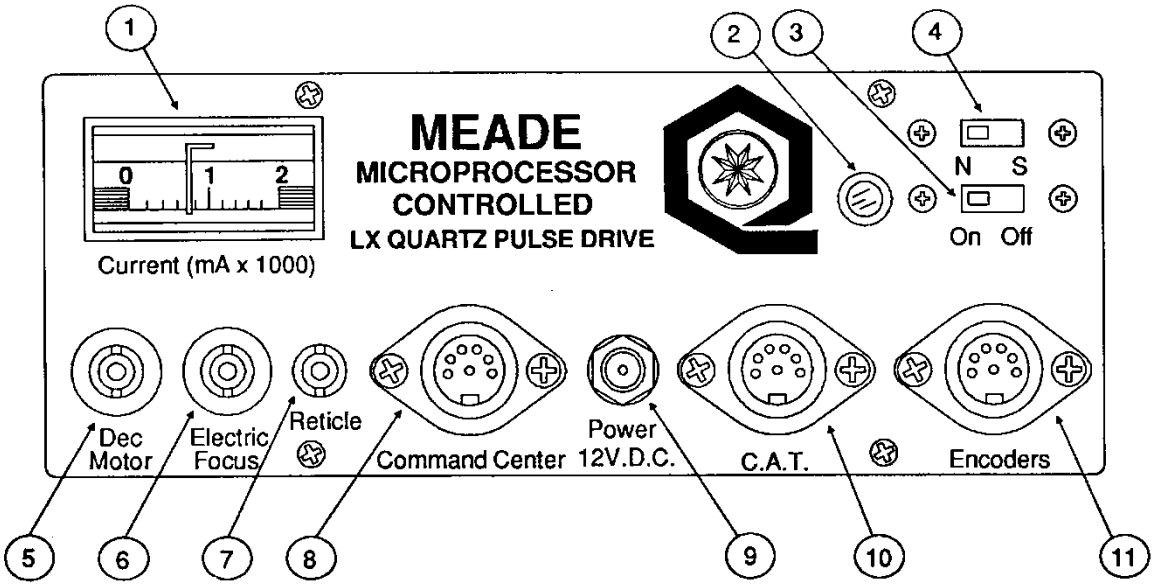
What good's one of these old f/6.3 telescopes today? After all, you can buy a reducer/corrector that will turn an f/10 into an f/6.3 for less than a hundred dollars. Well, f/6.3 reducers work fine, but they can produce *vignetting*—the image circle produced by the scope may not cover an entire camera frame at even brightness. The "real" f/6.3 LX6 does not suffer from that problem. However, only users of largest CCD chips will be affected by vignetting with the reducer/correctors (they were designed to work with 35mm film cameras). Visually, a reducer/corrector will vignette with long focal length eyepieces, but the faster f/ratio means you don't *have* to use long focal length eyepieces to get lower magnifications anymore. It's not surprising Meade stopped selling f/6.3 versions of CATs in 2004. Few were being sold anymore given the popularity of low cost, useable f/6.3 and f/3.3 SCT reducers.

How good a telescope is the LX6? Mechanically and electronically it is every bit as good, maybe even slightly better than, the much-loved LX5. The LX6 features all the luxury accouterments that made the "5" popular: a big 60mm finder, a 2-inch star diagonal, and more. Sadly, mechanics and electronics, not optics, were the LX6's strengths. I would advise any prospective LX6 purchaser to be careful to test the optics thoroughly before purchasing one. The last of the Meade f/6.3 optics sets, those in the f/6.3 version of the LX200 Classic produced in the mid 1990s (I'm not sure any f/6.3 LX200 GPS telescopes were ever *made*, though they *were* advertised), can produce beautiful images. But it took that long for Meade to get the hang of making good f/6.3 SCT optics. Most LX6es are distinctly *average* when it comes to image quality, and a distressingly large number or poor scopes apparently made it out the factory

door and into the world. A star test, or at least a good look at a planet, is *mandatory* before purchase. You cannot *depend* on an LX-6 having acceptable optics.

Finally, please remember that even the best f/6.3 optics will not be quite as sharp edge to edge as f/10 sets. And they will be considerably worse at the edge than an f/10 equipped with an f/6.3 reducer-corrector. The central obstruction is larger too, maybe causing a slight reduction in image contrast. Is it worth putting up with less sharp stars at the periphery of the field to gain photographic and visual wide fields? That's for you to decide.

Me? I loved the look of the LX-6 and the looks I got through 'em, and dreamed of owning one. Didn't happen back then, but it still could. How much would it cost me to get one of my own? There aren't a huge number of LX6es out there, and some owners want far more for them than they are worth. A good example? Really good? 700 US$.



Meade Premiere

Meade pronounced the LX6 a howling success and promoted and advertised the new flagship scope aggressively. Try as they might, though, they couldn't sell amateurs on the f/6.3 focal ratio. It was clear from almost the beginning that many—if not most SCT—users were skeptical of the idea of an f/6.3 SCT. It only got worse for Meade when rumors of problems with the fast optical system began to surface.

Richard Berry wrote a review of the LX6 in *Astronomy Magazine* that was fair to Meade and even-handed, but he didn't hesitate to say in the article that Astronomy had had to obtain not one but *two* replacement scopes before they found one with good optics. With its pretty new LX6 now under something of a cloud, Meade found it necessary to continue production of the older f/10 LX5.

The company didn't want to continue producing two different top-of-the-line telescopes, though, and stopped manufacture of the LX5 a couple of years after the LX6's introduction. Actually, the LX6 also disappeared at this time. Well, it didn't really disappear; it was just renamed, now being called the "Premiere." The idea of the Premiere series was to give the purchaser some choices as well as streamline the Meade manufacturing/promotion process. A number of different Premiere variations were offered. Most importantly, *you could choose your focal ratio*. Meade would supply the CAT with either f/6.3 or f/10 optics. You could get an 8-inch or 10-inch, and you could even pick a scope with a smaller finder and fewer accessories if you couldn't quite manage the two thousand dollars the top-of-the-line f/6.3 8-inch commanded.

There was one other special thing about the Premieres—some of them, anyway. PPEC. "What," you may ask, "is PPEC?" PPEC is "Permanent Periodic Error Correction." PPEC acts like a tape recorder, remembering all the button pushes you made on the hand paddle during guiding to eliminate periodic errors in the gear system. The same thing Celestron had been offering on their Ultima 8 and Powerstar telescopes as PEC, right? Not quite. Meade's system had one important difference. When you turned off the power to your Ultima 8 PEC, the "recording" you'd laboriously made disappeared into the ozone. The next time you wanted to take pictures, you had to "train the drive" (as the process of making a PEC recording is called) all over again.

Not so with Meade's PPEC. The scope held the recording in memory with the power turned off. PPEC was introduced to keep the Blue Tubes even with Celestron in the features race, but this was one time that keeping up with the Joneses

resulted in a good feature being made better. Some of the earliest Premieres apparently didn't offer PPEC, but by 1991 it was being touted in large Meade ads.

What happened to this somewhat innovative way of selling CATs? Mostly, it was swept away by Meade's introduction of the LX200 goto scope. All company resources were directed toward making the computer-scope success, and the former top dog, the Premiere, naturally had to go. The Premiere idea may not have had a long life even if there had been no LX200. While the concept of choosing the optics and accessories of a new telescope appeared sound, in reality the whole thing seemed to utterly confuse telescope buyers, especially novices, and cause nothing but trouble for dealers and the Meade distribution system.

Is a Premiere a good used telescope? Well, if you liked the LX6, you'll also like the Premiere. It is almost identical to the slightly earlier model. The difference is, of course, that you're more likely to find a Premiere with f/10 optics than with f/6.3 ones. The "choose your options" system unfortunately means some of the nice LX5/6 options like the big finder may be missing if the scope's original purchaser had to save some money. As with the LX6, an f/6.3 model's optics should be carefully star tested before purchase. There are substantially more LX6es on the used market than Premieres, since the Premiere lasted only a short time, being phased out beginning in 1992.

The C8 Classic

When Meade introduced its LX6 follow-on, the Premier, in 1990, Celestron for once decided it needed to go the *opposite* way. The company's CAT line was in pretty good shape when it came to high tech. The cost-is-no-object crowd and small college buyers were still captivated by the goto Compustar C8. One click down, the Ultima 8 was making a splash with experienced amateurs, and an even more upscale Ultima, the 11-inch, was on the drawing board. The middle ground was held by the Powerstar PEC and the C8 Plus. If there was a problem with in the lineup, it was at the low end.

The C8 Plus wasn't much of a success. It wasn't cheap enough to attract bargain hunters, and it didn't appeal to mid-level buyers either. *Out it went*. But it needed to be replaced with something. New SCT buyers and those on tight budgets still wanted a thousand dollar *fork mount* scope. The Powerstar didn't fill the need for a simple inexpensive to make and buy telescope. What would?

A telescope much like the original Orange-tube, an SCT for people who didn't like the GEM-mounted Super Polaris C8 that was now Celestron's entry level CAT. While some of us wished Celestron would just bring back the good, ol' Orange Tube, we didn't *seriously* think they'd be daring enough to try such a retro maneuver. We were right; instead they created a brand new and inexpensive fork scope, a CAT that was *like* the orange tube, but markedly different in several respects. They called it the "Classic C8."

The Classic seemed like a breath of fresh air when it was introduced. By the time it arrived, SCT fans had begun to complain that every new model was more expensive than the last, and that the steep price increases were being justified by the addition of more and more features the average user couldn't afford, didn't want, and would never use. The Classic was different.

This scope is almost indistinguishable as far as features and performance from the original and simple Orange Tube C8. It possesses an 8-inch f/10 OTA mounted on a light fork not much

different from the orange C8's. The drive base eschews the fancy electronics used in other early 1990s SCTs, returning to the simple AC synchronous motor and spur gear system of yore (albeit with a single motor, not the "balanced" dual-motor system of the old scopes). The finder scope has shrunk back to a small 30mm. Starbright coatings were available for the Classic, but they were optional.

The price of the Classic also hearkened back to Celestron's beginnings. The new CAT sold for a little over $800.00 without a tripod, just like the first C8s. In order to be able to price the Classic this low given shrunken 1990s dollars, Celestron did have to trim a *little* fat. In addition to the loss of one drive motor, the footlocker case, which had been a familiar feature of all Celestron SCTs, was also dropped (it remained available as an extra cost option).

Despite this de-evolution, the Classic C8 turned out to be a surprisingly good telescope. The spur gear drive is not an astrophotographers's dream, but it is reasonably accurate. The optics are another strong point. By the time the Classic started rolling off the assembly line, Celestron had taken steps to improve its optical quality, bringing Tom Johnson (who'd sold the company and retired a decade before) back to get their house in order again. The "iffy" SCT optics of the Comet Halley Craze in 1986 were finally back to the usually high Celestron standard as the 90s came in.

The Classic 8 is a good all-round performer for the SCT user of today who, like the scope's initial audience, doesn't need or want a lot of high tech gadgetry. This telescope is not nearly as pretty as a *real* classic C8, an Orange Tube, but it will be newer and may even come with Starbright coatings. Any caveats? Not many, other than understanding you are getting what was a bargain scope in its day.

There are quite a few Classics out there, as the company kept the scope in production until the mid-nineties. Often a telescope advertised as a "C8" turns out to actually be a nice Classic rather than an Orange Tube C8. How much? It's old and didn't cost much when it was new. Let's put it down in OT territory or a little below: 400 for a good example, 500 for an excellent one with a little *lagniappe*.

Return of the Meade 2080

Would you be surprised if I told you Meade introduced a basic fork-mount SCT about the same time Celestron tried-out the Classic? If you know anything about the SCT Cold War, you won't be. The 80s and 90s were a constant Arms Race between the two American telescope companies.

The original Meade 2080 had been gone for a few years—since the introduction of the 2080 LX3. This left Meade without a no-frills fork mount scope. Or, actually, without an entry level SCT of any kind. Meade had introduced a German mount SCT, the 2080 GEM, to counter the Celestron Super Polaris C8 in price and features, but it never caught on with consumers, and is one of the rarer Meades today. *Still* needing an introductory CAT, the company tried a telescope they called the "MTS." This boiled down to a fork mount OTA on an old-fashioned pedestal-style mounting. It wasn't much more popular than the GEM. "Well, then," Meade's executives undoubtedly thought, "why not bring back the 2080?"

Why not indeed? The reintroduced 2080 was similar to Celestron's Classic 8 and proved almost as popular with budget-minded consumers. The 2080 of the 1990s is nearly identical to the 2080 of the 80s. It's an f/10 OTA on a lightweight fork mount. The drive is, like that of the Classic, a simple AC synchronous motor unit. Meade retained the original 2080's *worm gear* drive system, however, making for better tracking for astrophotography than what can be achieved with the Celestron Classic's spur gears. A tripod was included with the "new" 2080, but, unfortunately, it was not the same tripod used in the 1980s.

Like Celestron, Meade had to cut the corners to price this scope at around a thousand dollars. One way they did that was by replacing the original decent adjustable tripod with a light third party (Bausch and Lomb) extruded aluminum model. This sub-standard tripod is not much different from the too-light tripods found on some of today's inexpensive telescopes. Naturally, the footlocker case of the original had also been eliminated.

Except for the weak tripod, though, the reintroduced 2080 is a good bet for used shoppers today. Like all AC drive telescopes, there ain't much to go wrong with it. Replace the tripod with a new, sturdier model, add a drive corrector or an inverter, and maybe a set of digital setting circles and you'll have a competent CAT capable of taking on most tasks. Again, and like the C8 Classic, *These were inexpensive telescopes when they were new.* Don't pay over 400 dollars or so unless there are some sweet accessories.

The Meade LX200

Let me take you back, *way* back to the bad old days of amateur astronomy communications, 1992. No Yahoogroups, no Cloudy Nights. There was the Astonomy Forum on the Fidonet computer BBS network, but not many amateurs knew about that. Still, news managed to leak out of the big telescope companies and get passed around somehow. The word on the street in mid 1992 was that Meade was preparing to release a revolutionary new SCT to replace its LX6/Premiere series. That sounded odd. I mean, how much more hi-tech could you get than that dial and light encrusted LX6 drive base? What more could you do with a Schmidt Cassegrain? Surely…Meade wasn't thinking about *GOTO*? Not after Celestron's ongoing Compustar debacle.

Oh, yes they were, and in a big way. Meade had brought the man onboard who'd done the computer code for Celestron's Compustars, Mike Simmons. His mission was to improve and build on his ideas. Not that the Celestrons were bad, mind you. They weren't bad at all for the time, but they were horribly expensive. The LX200, in contrast, would be popularly priced, with the 8-inch hovering at that magical 2000 dollar price point that was accepted as the upper limit for a top-of-the-line 8-inch SCT.

In late '92 ads for something called the "LX200" appeared in the astronomy magazines. Shortly thereafter, the scopes themselves materialized. While the LX200 was destined to be earth shaking, you wouldn't know it from reading the initial Meade ad copy in *Astronomy* and *Sky and Telescope*. Looking at the first LX200 advertisements, it takes you quite a while and some rereading before you realize that these things are indeed goto scopes, that they could *automatically point to an amazing **747 objects*** (more objects were an option, but it is not clear to me that this "memory" upgrade was ever actually made available). I suppose Meade didn't want to *shock* us, and therefore chose to concentrate on the scope's "heavy duty mounting," PPEC, and other pedestrian things rather than the LX200's amazing computer system.

What was the early LX200 like? Surprisingly, it was not much different from the last models to roll off the Meade assembly line ten years later. There was one notable deficiency—other than the small object library—in the very earliest scopes. While the LX200 was capable of operating in alt-azimuth mode from the first, Meade understandably expected amateurs would continue to use the scopes the same way they'd always used SCTs—set up in equatorial fashion on a wedge. That being the case, the alt-az alignment routine was very simple, and involved lining up on a single star. That made tripod leveling and time entry *very* critical. *So* critical most users had a difficult time achieving good goto accuracy in alt-azimuth mode and did indeed use their scopes on wedges.

Meade had an ear to the ground, however, and almost immediately began taking steps to improve and upgrade both the hardware and firmware of their new flagship SCT. In a series of computer updates that took the scope from v1.0 to v3.34 (4.34 for the larger CATs) at the end of production, they both enlarged and corrected the catalog of objects available for goto. Before long, "64,000 objects" began to seem normal to us. Meade also strove to ensure those objects were not just there, but were in the right places, that their coordinates were correct, fixing data for many objects over several revisions of the scope's firmware. The alt-azimuth alignment routine was also spectacularly improved, and by the mid 90s, this comfortable (and now accurate) way of using the telescope became the preferred set-up for non-astrophotographers.

In addition to software upgrades, Meade also made numerous hardware changes over the life of the LX200. Some of these are transparent to the user, like redesigns of the electronics boards, but others had quite an impact. The most famous of these is probably Meade's decision change the 12-volt power supplies of the initial scopes to an 18-volt system. Supposedly, going to 18-volts improved reliability, as 12-volts seemed to result in insufficient motor torque during high-speed slews, something that *may* have caused performance and reliability problems. This switch to 18-volts in 1995 meant both the AC and DC supplies for the scope had to be changed, of course. Interestingly, the 18-volt scopes are *said* to actually work better and *more* reliably on 12-volts (you can operate an 18-volt LX200 on 12-volts, but applying 18-volts to a 12-volt scope can result in severe electronics damage).

What else? Near the end of the scope's run, in 2002, Meade finally listened to its users, who had been reporting various electrical/electronic/mechanical problems with the telescope's declination axis. Many of these users, and, finally, Meade, were of the opinion that the source of these problems was the telescope's declination bearings. Or lack thereof. From the beginning, the LX200 had used simple thrust bearings in the declination axis (Nylon pads instead of metal ball bearings). This *seemed* to cause reliability problems in the declination drive. Perhaps. At any rate, the addition of real ball bearings at least made the declination axis's movements at least feel smoother and "better."

How about the optics? They were usually good, but some examples were better than others, and how good a set you got seems to have in part depended on which aperture you chose. The 8s were usually at least OK, but sometimes marginal. The 10s tended to be excellent, with Dr.

Clay Sherrod having seen, he says, some that actually reached near *null* on testing. On the other hand, the 12-inch could be iffy, and so could the big 16.

You can't talk about the LX200 without talking about its hand paddle. Oh, we'd seen fancy hand controls before, but nothing like the big display and innumerable buttons of the LX200 goto paddle. The controller has a good, readable red LED display and a useable (membrane) keyboard, but does seem dated now. It doesn't do everything but cook your supper like the Autostar, (though the original Classic HC could sometimes get *hot* enough to fry an egg thanks to an 18v – 5v voltage regulator), but it's well laid-out, easy to use, and easy to read.

The LX200 "Classic" is not as feature-laden as the current ACF scopes, but is still very useable. Are there any caveats? A few. The main thing to be aware of is that this is a complex piece of gear. The earlier models, especially—as time went on, Meade was able to do some simplifying and improving of the scope's electronics. Like any sophisticated piece of electronics, the Classic had its occasional problems. One common area of difficulty is, as mentioned above, the declination drive system, with all too many owners experiencing the dreaded "declination runaway." Declination runaway? Not a pretty thing. Poor li'l ol' you turns on the scope, the dec motor whines (or is that grinds?) to life, and continues to drive the scope end-over-end like a demented Ferris wheel until you kill the power.

Is declination runaway a showstopper? No. This doesn't happen with all scopes. And often its cause is simple—cables and connectors. I might suggest however, that it *might* be wise to seek out one of the last of the breed, if you're considering a used LX200. That is, one of the scopes equipped with declination ball bearings in hopes that this might have some "bearing" on the declination problems. In general, "later" is just "better." While SCT optics can last practically forever, there's no denying that a set of ten year old electronics might be reaching Dead Man's Curve on the reliability graph (though most engineers will tell you that the most likely time for solid state electronics to fail is in the first 8 hours of use).

If the price were right, however, I would certainly not be afeared of a, say, '95 LX200. One reason for that is that *you can still get an LX200 fixed;* not by Meade but by various third parties. What would be "right price"? Certainly less than a grand. In the 700 - 800 neighborhood, for a later and well kept example.

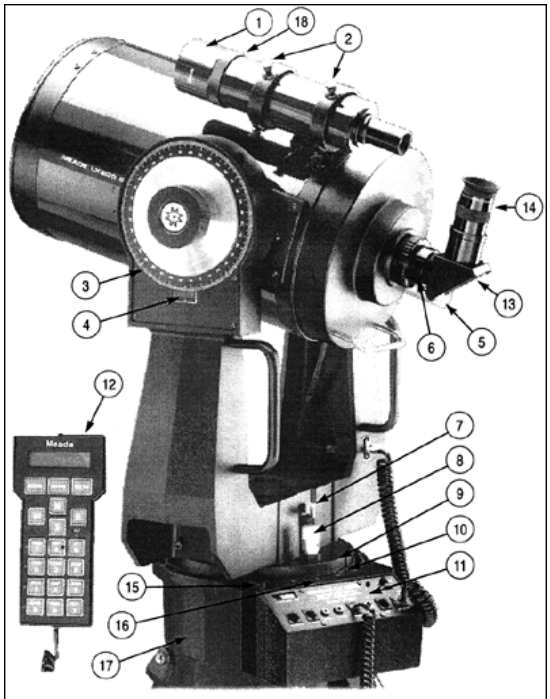
Meade has frequently reminded us of the "LX200 revolution" in its advertisements and catalogs. For once, that's not hyperbole. It's hard to describe just what a revolution the LX200 truly *was* if you weren't there. I remember the first one I used, in November of 1992. It didn't belong to some Mr. Moneybags like the few Compustars I'd seen, but to a plain, old Joe Amateur, a fellow club member. And it not only worked, *it blew me away*.

I was amazed—jaw droppingly—at the way this beautiful 10-inch centered object after object after object and offered world-class views. I loved star-hopping at the time, but this thing showed me there was another way to observe; a way that emphasized *seeing* the wonders of the universe instead of *hunting* for them. There's still fun to be had in the hunting, but the older

and busier I get, the more I enjoy the *seeing*. The LX200 started all that. In some ways, it's the Mother of today's amateur astronomy. Not bad for a little blue-tube CAT from Irvine, California.

Your Old Uncle Rod, though? Strangely, despite using probably hundreds of Classic 200s, if only for quick glances at their proud owners' favorite objects, he's never *owned* one. Somehow, back in '92 I just found all the electronics and computers just too *overwhelming*—and maybe not politically correct for someone who considered himself a dyed-in-the-wool REAL MEN DON'T USE GOTO kinda guy. I've since changed my tune, but have never got back to ol' blue tube grandma. Ya never know, though.

Note: Meade has never referred to the original LX200 as the "LX200 Classic." That's something we—the SCT community—came up with to distinguish it from the newer GPS/ACF telescopes.



(1) Viewfinder Dew Shield
(2) Viewfinder Collimation Screws
(3) Declination Setting Circle
(4) Declination Pointer
(5) Focuser Knob
(6) Eyepiece Holder
(7) R.A. Lock
(8) R.A. Slow-Motion Control Knob
(9) R.A. Vernier Pointer
(10) R.A. Setting Circle
(11) Power Panel
(12) Keypad Hand Controller
(13) Diagonal Prism
(14) Eyepiece
(15) Bubble Level
(16) Hour Angle (HA) Pointer
(17) Drive Base
(18) Viewfinder Focus Lock Ring

Fig. 3: 8" LX200 Telescope

Meade LX100/50

What's a Meade LX50, you ask? That's simple—**it's an upgraded LX100**. *Never heard of the LX100?* I'm not surprised. The LX100 was never a barn-burner where sales were concerned. In fact, I only know one person who owned one. What *was* the LX100? It was a stripped down **LX200**.

When Meade introduced the goto LX200, they completely shut-down production of their top-of-the-line, non-computerized scopes, the Premieres. But they thought some folks might still want a top-quality manual telescope. Something like the Celestron Ultima 8, a "photographer's scope" with a solid mounting, but no computer frippery. So, not long after the LX200 hit the street, the LX100 was introduced. It was essentially an LX200 with the computers removed. Same fork, same drive base (with a different control panel). Seemed like a good idea. *It died an ignominious death.*

The LX100 was a beautiful-looking telescope with some features even the U8 couldn't boast. The Ultima 8 had PEC, but the LX-100 had "PPEC." Like the Premier (and the LX200), the LX100's PEC was trained at the factory and was preserved when the power was turned off. The LX100 was also, like the goto scope, available with a focal ratio of f/6.3 as well as f/10. A 10-inch LX100 was offered, too. Again, the LX100 really *was* an LX200 in every regard except for the computer goto drive features. In addition to the other goodies, the LX100 forks have handles (like the LX200)—an under-appreciated but highly desirable feature for any SCT. There's a built-in map light on the hand paddle, a focus motor control, a reticle brightness adjuster, and, like some earlier Meade scopes, quartz "locked" *and* manual speed adjustment for the RA drive.

So why didn't it *sell*? Meade didn't promote it very enthusiastically. Most of the ads for the LX100 consisted of a small blurb at the end of an LX200 advertisement. All the pertinent information was there, but this was not an approach designed to garner fans for the telescope. It seemed as if what Meade was implying was that if they really *had* to they'd sell you a stripped down LX200—if you were just too cheap or too shortsighted to spring for the real deal. In a way, this was understandable. While Meade needed to keep a non-computer full-featured SCT in the product line, but they didn't want to create a competitor for the LX200. Sadly, the LX100 slowly slipped from view.

Meade didn't leave a gap in the product line for long. Shortly, a new "manual" CAT hit the magazine ads, the **LX50**. At first glance, the LX50 looked very much like the LX100, but there were some important differences. While a 10-inch LX50 was available, both the 8-inch and 10-inch scopes were only offered only in the f/10 focal length. The LX50 drive also lacks any type of Periodic Error Correction. In fact, the whole drive system had been significantly cheapened and simplified compared to that of the LX100 and the Premier/LX6. Surprisingly, a declination motor (using a gear drive) *was* included, but the RA drive system was a distinct step backwards, utilizing aluminum gears rather than brass. The hand paddle was also simplified. In other respects, though—tripod, wedge, fork mount—the scope remained true to its LX100/200 heritage. The lack of PPEC sent a clear message, however: if you were an astrophotographer or CCD imager, you needed to spend the extra money to get the LX200.

So, was the LX50 a poor scope? It was actually a *competent* telescope for visual use. With a little fine-tuning, it was even usable as an imaging platform for long exposure prime focus work. The aluminum-gear models displayed relatively high periodic error, making guiding problematical at times, but to Meade's credit they switched to brass a couple of years before LX50 production ceased.

Though the aluminum RA gears caused some frustration, the real problem turned out to be in the declination axis. The declination drive suffered from cheap gearing and inconsistent speeds. Meade never really got this completely fixed, but an enterprising Florida amateur, **Jordan Blessing** (who went on to build his LX50 accessory business into the short-lived but well-liked Scopetronix), came up with an inexpensive "dec fix kit" that made guiding in declination easier. Actually, while the declination system was a pain, it didn't have much impact on imaging as long as the scope was accurately polar aligned—if the scope was decently aligned, you didn't have to make many declination corrections during guiding. The periodic error on some LX50s was high, but not impossible to guide-out. Certainly, excellent deep sky pictures are possible with the telescope.

The LX50 wasn't *just* a watered-down LX100, not in every regard, anyway. It had some frills and features of its own. Its drive, for example, offered 2x, 8x, 16x, and 32x rates. These higher speeds were certainly more useful than the Celestron Ultima 8's "King," Solar, and Lunar drive speeds that almost nobody used. The LX50 hand controller was not fancy, but was nicely done. The telescope front panel was cool, too, offering an input for a CCD autoguider, something the Ultima 8 and 11 lacked. There was also one other receptacle on the LX50 control panel, an input for something called the "Magellan II."

The Magellan II, which Meade offered for both the LX50 and for the StarFinder series of Equatorial Newtonians, was a good idea. This unit, which resembles an LX200 Classic hand paddle, combines the functions of digital setting circles and a telescope hand-controller, and even offers "semi goto." Semi-goto? It works like this: you move the LX50 by hand toward any one of the thousands of objects included in its internal library. Once the display indicates the object is a degree or so away, push a button on the Magellan II and the scope *slews itself* the rest of the way. Nice. Or it would have been if it had worked. Unfortunately, the Magellan II suffered from a number of problems from the beginning.

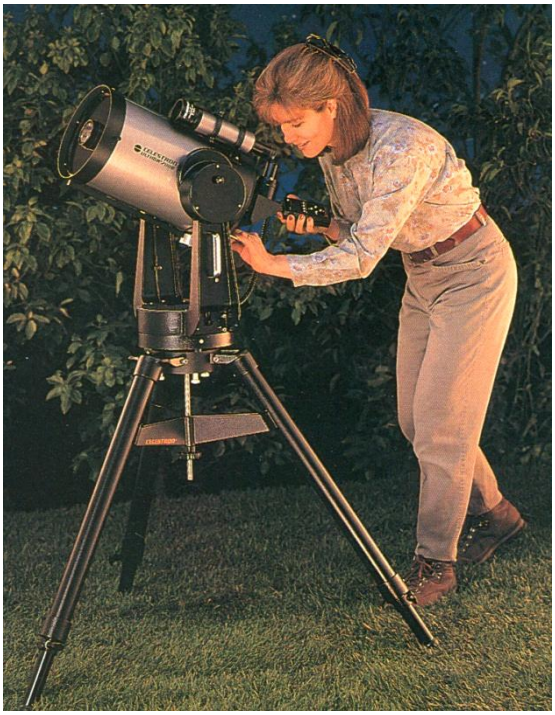
Early adopters found the Magellan *just wouldn't find objects*. The scope's normal, analog, setting circles were much more accurate. This problem resulted from incompatibilities between the firmware included in the base of the telescope and the firmware inside the Magellan II. Eventually, Meade got this sorted out, and later Magellans do work reliably for object location.

Meade quietly eliminated the LX50 from its product line in 2000. The reason, the LX50 was cancelled, I believe, was because Meade management concluded that there was no longer much of a market for non-goto fork mounted telescopes. The introduction of an inexpensive Celestron goto scope, the NexStar 8, helped Meade come to this decision, I'd guess. The LX50's replacement, in fact was the fully-goto enabled LX-90.

Is the LX50 a good buy if you're hunting a used SCT? I'd say "yes" as long as you understand its limitations. The LX50 can be a very pleasant and friendly scope. It does lack PEC, but its strong fork and drive base mean it's actually more imaging-capable than more lightly mounted telescopes that do feature PEC or PPEC. I'd definitely prefer a used LX50 to earlier Meade scopes like the LX-6 and LX5 and the Celestron Powerstar. For that reason, I might be willing to pay more for an LX50 than for an LX5 or LX6. But not too much more. Maybe 600 – 650 US$ for one of the last examples in very good condition.

Celestron Ultima 2000

In 1995, whispered rumors began circulating amongst Celestron's fans and customers: the company was working on a revolutionary new C8. A goto C8. Something more palatable price-wise than the Compustar C8. It would be a scope innovative enough to toss Meade's LX200 onto the scrapheap of history. The new C8 wouldn't just be an affordable Celestron goto scope; it would, like the LX200, be *revolutionary*. And these twice-told tales just got better and better...



The new C8 wouldn't use a worm gear drive, much less a spur gear system. It wouldn't use *any* kind of gears. The scope would feature a roller arrangement that would eliminate periodic error, PE, from the mount equation. Tracking errors would be so small we wouldn't have to worry about making Periodic Error Correction, PEC, recordings. We wouldn't even have to *guide* the damned thing during imaging sessions.

How about goto? Sure. The scope would feature thousands of objects, just like the LX200, but it would have a leg up in this area, too. Not only would this super-scope slew to objects at a speed of 10-degrees per second with the aid of powerful servomotors, it would be able to be moved to objects *by hand*, too. Grab the scope, point it anywhere in the sky, and, since its position encoders would be separate from its motors, the computer would keep track of the SCT's position.

You wouldn't have to unlock the RA and declination axes to move the scope by hand, either. Because there wouldn't *be* any locks. Instead, each axis would have an adjustable slip clutch. Wanna move the scope manually? Just grab it and *move* it. No fumbling for little lock-levers or knobs in the dark. This "SCT of a New Type" would be light and easy to carry, much lighter than a comparable Meade LX200, and it would also be capable of operating in the convenient alt-azimuth mode, just like the Meade.

So we waited. *And waited*. Until 1996, when this dreamed-of scope finally appeared under the moniker "Ultima 2000." While there was considerable interest in it initially, it unfortunately never quite lived up to the dreams of Celestron management—or of thousands of Celestron-loving SCT users. The "U2K," as it was affectionately known, was *never* an LX200 killer, and, to be honest, turned out to be something of a dud. What happened? Several things.

The first “thing” was the drive. I’ve been told that Celestron really did try to implement a gearless drive system. Without success. While I’m not sure exactly why Celestron’s engineers failed, I suspect it had something to do with the need to pack a gearless roller drive into a space the size of a C8’s drive base. While I’ve seen ATM roller drives work well, these are usually sizable affairs.

As time slipped away and the LX200 came to ever more define “SCT” in the minds and hearts of 1990s amateurs, Celestron apparently decided they just *had* to get the new scope out the door, and wound up using a Byers worm gear set. To compete with the Meade, the U2K had to include PPEC, of course. Unfortunately the PPEC didn’t work correctly on the Ultima 2000 till near the end of its life—the computer code for it was all screwed up. Whether this was because of lack of time to finish the programming after the scope design was finalized, or simply because Celestron seemed to have a lot of trouble implementing PEC on *any* telescope until fairly recent times, I still don’t know.

Another place where the U2K came up short was its hand control. The Ultima’s HC looks more like a digital setting circle computer than a goto computer. It’s a lot like a Tangent digital setting circle system (e.g., JMI’s NGC Max). While the Tangent circles work well, their controller and user interface seemed dated even in 1996, with a simple display and tiny buttons. And each of those small buttons controlled multiple functions. Why did Celestron choose to do an HC like that instead of one like the Compustar controller or Meade’s LX200 hand paddle? Maybe because the company was still computer-shy. They tended to farm out *anything* having to do with electronics or computers to contractors. The U2K computer looks like a Tangent computer because it *is* a Tangent computer.

This is not to say Celestron left development of the Ultima 2000’s goto system entirely to a third party. The son of Celestron founder Tom Johnson, Greg Johnson, who had a PhD in computer science, participated in U2K software development according to Bob Piekiel. Bob also notes that famous astro-imager/amateur astronomer/telescope designer Jim Riffle participated in the mechanical design of the U2K.

How was the Ultima 2000’s goto system? Not bad. Able to get most objects into the field of a low power eyepiece most of the time. Certainly, though, the accuracy didn’t approach that of Meade’s system. The Classic LX200, if carefully aligned, is quite capable of putting objects on small CCD chips, even without the company’s “High Precision Pointing” routine. The Ultima 2000? We’re talking errors across the sky of around 15’ to 30’ on average. This is similar to the errors most users experienced with the digital setting circles of the day. That is on the deep sky. Accuracy was worse on the planets. Problems in the software meant you’d be lucky to get your wanderer in the field of the finder. Not a problem for Mars or Jupiter, but irritating for Neptune or Pluto. A firmware upgrade late in the U2K’s production helped with this “planet problem” but did *not* solve it.

One thing that worked well and still impresses is the separate motor-encoder setup. It is just *cool* to be able to grab a-hold of the scope and slew it across the sky by hand with the computer

keeping up. Unfortunately, this wonderful feature is somewhat overshadowed by problems with the Ultima's clutches. Yep, Celestron did implement the rumored lockless slip-clutch system. While this sounded good in theory, it wasn't so good in practice. It could be nice if you had the clutches precisely adjusted and if the scope wasn't loaded down with too many accessories. Unfortunately, most users found it difficult to adjust the clutches. Misadjusted clutches most assuredly would affect goto accuracy.

So, the Ultima 2000 was a lemon of a scope? No. It was actually a far better SCT than its sales figures reflected. The biggest disappointment, the cancellation of the roller drive, really didn't have much effect on the average buyer. The scope's Byers worm system was quite accurate, and, while PEC admittedly did not work correctly, that didn't bother too many people. By the late 90s, the imaging scene was changing dramatically, with far less emphasis on manual guiding of hours long film shots and more people turning to auto-guiders and/or short multiple exposures with CCDs. The Ultima can do a good job as a CCD imaging platform, especially the later Fastar-ready models.

I must admit that the U2K computer was nowhere near as sophisticated as I imagined it would be. In fact, I have a love hate relationship with the Ultima 2000 hand paddle. If I pick it up after haven't used it in a while, yes, you'd better cover your ears if you don't want to hear bad words. But if I've been using the scope (my physics department at the university owns a U2K) regularly, I really get into the Tangent/U2K groove, with the multiple button presses seeming convenient and *right*.

To sum up? This is a nice scope for CAT fanciers mainly interested in visual observing. At a mere 28 pounds, it is lighter than the LX200 Classic 8. It is also blessed with very good Celestron Starbright optics, something that makes up for the scope's occasional *faux pas*. Caveats? If you want a scope with working PEC, ask the owner when it was produced/purchased. If that was "before 1999," ask if the PEC chip was ever upgraded. If you think you might be interested in CCDing, look for a Fastar compatible model. These had the removable secondary mirrors that allow the use of the Hyperstar f/2 imaging system. Also, if possible, try to get one with a case. Celestron discontinued the Ultima 2000's case, which was similar to the excellent one shipped with the Ultima 8s, a couple of years before the end of the U2K's life. How much for a good later example? Maybe about the 700-or-so range.

What was the *denouement* for the U2K? The scope puttered along until just after the end of the Twentieth Century and, slowly, ever so slowly, disappeared with the advent of its more LX200-like successors, the NexStars and NexStar GPSes. An Ultima 2000 11-inch was promised, but never appeared. I suspect the 11 never came to be for a couple of reasons. If the 8-inch wasn't selling like hotcakes, or even day-old bread, Celestron was right to be concerned an 11-inch would sell even worse. I think the light fork and the balky clutches might have been a factor, too, with the heavier 11-inch OTA being "too much."

This poor, often misunderstood scope's most ignominious moment? Despite being named after the year 2000 (we assume), *the U2K's computer suffered from the dreaded Y2K bug.* Ultima

2000s made before about 1999 steadfastly *refuse* to recognize the new century. This is not a hugely serious problem, though, as date inputs are only required for Solar System use, and there are some workarounds. More problematical is finding *support* for the Ultima 2000 if it has an electronic problem.

In spite of the problems and ironies, I still like and recommend the U2K as long as the prospective buyer understands the scope's quirks and limitations. In fact, I think I'll pull the little sweetie out of her case some night soon and give her a much-deserved dose of starlight.

Ultima® 2000 Hand Controller

Celestron Celestar (basic)

As the 1990s rolled on, both Meade and Celestron were aware their popular top of the line SCTs still needed to be accompanied by popularly priced SCTs. Initially, both manufacturers carried on with the Classic C8 and the oft-reborn 2080. While these telescopes did provide a way for cash-strapped purchasers to enter the SCT game, the continuing appeal of AC drive scopes was limited. This led both manufacturers to redesign their entry-level fork scopes. In 1996, Celestron's Classic gave way to a new scope with a rather classy-sounding name, "Celestar."

What's the "basic" Celestar like (I use "basic" to distinguish it from its big sister, the Celestar *Deluxe*; Celestron never called it that)? To their credit, Celestron resisted what must have been a big temptation. It would have been oh-so-easy to slap a 9-volt stepper motor into the base of the Classic 8 and be done with it. What they did, instead, was take the more or less mid-priced scope they were calling the "C8 Plus," redesign the tripod and wedge, make a few other minor changes, and re-release the scope as the Celestar at a *significantly* lower price (about 1100 bucks, street). Keep in mind, of course, that the Celestar is *not* in a whole other class compared to the Classic. We're still talking a 1000 dollar scope, but definitely one that's a step up from AC drive loss leader.

Firstly, this is a *lightweight* telescope, one which, at 28 pounds (*sans* tripod/wedge), weighs a tad less than even its surprisingly light Meade competitor, the LX10. This is just a very pleasant SCT to tote around and set up. This portability is somewhat offset, though, by Celestron's decision to forego a case. At the time of the Celestar's release in 1996, the company was beginning a phase-out of cases for all its CATs, and not just the cheapies. Without a case, an SCT and its accessories tend to spread out all over your car. I know you younguns don't *expect* a case, and either pay extra for one or make do with Tupperware boxes, but I still think it was a shame when Celestron (and Meade) decided they had to economize and chose telescope cases as the place to do it.

Cases, schmases. What's the bottom line on the little Celestar? The optical tube assembly is up to the Celestron standards of the time with good Starbright optics, smooth focusing (some folks

think the focuser action of 90s Celestrons is *too* easy, preferring the stiffer focusing of the Meades), and a pretty black Celestron finish for the tube. The fit and finish of the Celestar is in my opinion slightly superior to those of its closest competitor, the Meade LX-10, something typical in the Meade/Celestron SCT face-off of the mid 90s.

How about the obviously light fork mount? A gentle tap of the tube at 150X will take several seconds to damp out. I believe any shortcomings hereare more attributable to their light tripod and wedge (if you could call it that) rather than undersized fork arms.

No, it's not all fun-fun-fun with the Celestar Basic. What *didn't* I like? I did *not* like the scope's "wedgepod," a tripod with the "built-in" wedge. A wedge was *de rigueur* for the Celestar, since, lacking the computer guts of a goto scope, it has to be used in polar-aligned mode. Celestron decided they couldn't just throw the C8 Plus' wedge in the box. Instead, they hit upon a cost saving alternative. The (light) wedge is not separate from the tripod; the legs are attached directly to it.

How well does that work? I guess it's OK for general visual use, but for dabbling in photography or CCD work....well, let's just say it is a *pain* to polar align. The only way to move the scope/wedge in azimuth is by nudging the tripod—kicking it with your foot, that is. The tripod is not adjustable in height, so if you don't find its height convenient, too bad for you. Certainly you can mount the scope on a standard C8 wedge and tripod—for more money.

Subtract another 10 points off this contestant's final score for the measly 30mm finder that rides on the pretty OTA. As I've said (many times) before, a 50mm finder really is necessary for comfortable, efficient aiming of non-goto SCTs. If you buy a used Celestar, you're *gonna* want to replace this peep-o-scope with a 50mm job or a Telrad.

Then there's the drive system. Celestron thought they'd go high tech (and, incidentally, "cheap"). Rather than use the servomotors seen in most other DC Celestrons, this one has a stepper motor (used in computer printers). That was both good and bad. The good part was that this delivered a very consistent drive rate without a lot of electronics. The bad part was that you can see the stepping action if you look for it carefully at high power.

Celestron did the gears on the cheap, too, with the scope being saddled with the oft-disdained spur gears, just like the Classic C8. If you wanted to try deep sky imaging with this scope, you'd need to pony up more $$$ for yet another of Celestron's "options." The hand paddle (controller) was not included with the basic scope. Nor was a declination motor, but we were used to that.

Don't get me wrong, though, this can be a sweet little scope. I ran across a Celestar Basic at a club star party not long after the SCT hit the street. Being anxious to see what the Big C. could offer for a minimal cash outlay, I somewhat rudely pushed its novice owner aside ("Go 'way son, you bother me!") and took the controls. It being summertime, I sent the li'l CAT straight over to Hercules. The image of M13 was, to me, as good as what you'd see in *any* 8-inch SCT,

and I must admit I lingered over the wondrous globular for *quite a while.* Once I was able to get the Celestar roughly polar aligned—curse that wedgepod—it tracked well, too, keeping the glob near the center of the field without any huge periodic error excursions I could see.

What's the used market like for these telescopes? They are plentiful, if not as plentiful as the LX10. It may take a bit of rummaging through Astromart to find one. Often you'll miss this scope or her Deluxe sister. You'll pass over a lot of "C8 for sale" ads thinking they are referring to "real" C8s, Orange Tubes, that is. Instead, the owners are actually selling *Celestars*, which many owners refer to as C(elestar)8s. If you want a basic, battery powered scope for visual use, and weight/portability is a consideration, you could do a lot worse than this guy. Pricewise, this is a newer scope than an Orange Tube, but it was cheap when new, so offer about what you would for the average OT: 500 smackers or thereabouts.

Meade LX10

In 1998, the University of South Alabama Physics Department was out to revamp its astronomy program. After years of "indoor-only" astronomy, they were adding both outdoor astronomy labs and me (as instructor). The first order of business was, naturally, telescopes. SCTs. Eight of them. But which to choose? Clearly, the Ultima 2000 and LX200 were out. Expense aside, what was wanted was manual telescopes. Yep, Rod was gonna teach a new generation or two the joys of reading star charts and figuring-out analog setting circles.

Luckily, both Meade and Celestron still sold basic fork-mount CATs; Celestron had the Celestar "basic," and Meade was pushing its LX10, which appeared in 1996, the same year Celestron brought forth its new loss-leader (hardly coincidence, I'd guess). It was close, very close, but we went with the Meade. The LX10 offered a few advantages in addition to a slightly lower price tag.

Well I remember the first night my students and I got a chance to use our spanking-new LX10s. I was, to tell the truth, somewhat apprehensive. Meade was not then—or now—renowned for its Quality Control prowess, and over the years I'd seen quite a few of the company's inexpensive 2080s that belonged in **Uncle Rod's Dog Pound** instead of on an observing field. This time, though, I was frankly impressed.

I had only examined one of the telescopes briefly when they came in, so this evening with the students was my first opportunity to give the LX10s a thorough visual inspection as well as a field test. Given the LX10's bargain basement price of about a grand, I expected a lot of plastic, but that was not the case. These scopes seemed as well-built as any other SCT of the time. The attractive blue OTAs and black forks/drive bases were nice looking, though fit and finish were slightly to those of the Celestar, I thought.

One other thing I noticed right away was how nice and light these little scopes were. At about 30 pounds without the tripod, the LX10 is a couple of pounds heavier than the equivalent Celestron scope, but these extra pounds make absolutely no difference. The LX10 is splendidly portable. This portability was a very important attribute for us, since the students would have to carry the scopes from a storeroom, down a flight of stairs, and a considerable distance

outside to the observing area. I was worried about that, but it turned out I didn't need to be. The students, even the smaller women, had absolutely no trouble with the LX10s—standard undergraduate complaining notwithstanding—and were able to get them outside and onto their wedges without much fuss.

One big help in this regard was the LX10 case. While Meade, like Celestron, had discontinued their footlocker style cases by the time the LX10s started coming off the line, they did offer a soft-sided case for the scope as an extra-cost option. This relatively inexpensive canvas case wrapped around the packing foam shipped with the scope and made the LX10 manageable and portable as well as lightweight.

After the experience of nudging and sometimes kicking the Celestar Basic's tripod legs to do a polar alignment, the normal LX10 wedge/tripod combo was a relief. We purchased Meade's "standard" (i.e. "cheapest") wedge/tripod combo, which included a light but sufficient wedge. The tripod was also fine, but I noted that it did not include a "spreader"--though this did not appear to adversely affect stability. Like the Celestar tripod, the tripod normally sold for use with the LX10 was not adjustable.

A quick examination of the wedge revealed an altitude fine adjustment, but not one for azimuth. The Meade tripod/wedge setup makes it easy to adjust the scope in azimuth, however. Unlike Celestron wedges, which are fastened to their tripods with three bolts, Meade's are affixed to the tripod by a central threaded rod secured with knobs. For azimuth adjustments during polar alignment, the "top," wedge-side knob is loosened a little and the wedge is rotated on the threaded shaft. I find it reasonably easy to make fine adjustments by moving the wedge by hand. I did find I had to be careful the students didn't loosen the knob too much. Didn't want these beautiful new scopes nose-diving to the concrete sidewalk we use as an observing pad.

While the LX10 wedge is acceptable for visual use, if photography is contemplated, you'd be well advised to consider an upgrade with good fine-adjusters for both altitude and azimuth. The LX10's standard wedge does feature an altitude adjustment, but this is nothing more than a single, smallish bolt pressing on the tilt plate. It's hard and fussy to adjust, and I don't let the students mess with it. I've preset the wedges for our latitude, and content myself with allowing the kids adjust in azimuth during polar alignment.

Accessories? You can't expect too much in the thousand-dollar-SCT world, but what was in the box with the LX10 was a cut above what was shipped with the Celestar basic. The 26mm Plössl and the star diagonal included with the scope were both of surprisingly good quality. At this price point, I expected Meade to include one of their dreaded "Modified Achromat" (Kellner) oculars. What I found, though, was a good Series 4000 Plössl. Finally, unlike with the Celestar, the LX10's hand control is included.

While the skies were clear on our first night out with the scopes, haze gradually moved in, and, looking north, we were barely able to make out Polaris without optical aid. While helping the

students do a rough polar alignment for the first time, it was forcefully brought home to me just how much of a pain in the butt 30mm finders are. If I were to buy one of these telescopes for myself, the first thing I would do would be to replace this marginal affair with a 50mm finder or a Telrad. It's a shame to put a too-small finder on a good optical tube.

And the optics on the LX10 *are* good. I have no doubt that they are, as Meade oft pointed out in LX10 advertising, the same as the MCOG ("Multi Coated Optics Group,") optics sets that were used in the much more expensive LX200s. After my students had polar aligned their telescopes and done a few other simple exercises, I treated them to high power views of Jupiter and Saturn. Though Saturn was less than 20 degrees off the horizon, the Cassini division was obvious, as was some definite disk detail. In my opinion, the views appeared to be just as good as those offered by *any* 8-inch SCT. Perhaps even more surprisingly, the views were remarkably consistent in all eight scopes. You can imagine the reaction of the kids to their first look (for just about all of them) of Saturn. These little telescopes *delivered*.

Of course, good optics ain't worth a hoot, if you put 'em on a mount that shakes and shimmies with every breeze and every touch of an excited young hand. The fork mount Meade used on this scope, while heavier than the one provided on the scope's immediate ancestor, the 2080, is not overly strong looking. And yet, the scope was decently stable, with a sharp rap to the tube dying out in a few seconds at 200X.

The LX10's drives worked well, and while they (like the drives of any Meade or Celestron SCT) showed some periodic error, it was, at about 30 arc seconds or a little more, not outrageous. The LX10, like the Celestar basic, doesn't have PEC, so you can't train PE out. One thing I didn't like was that the drive's on/off switch, idiot light, and jacks for the (included) simple hand controller are mounted vertically on the drive base—they are hard to get at and see in the dark with the scope mounted on its wedge. Since the power light is not easily visible, some of the students forgot to turn off their drives prior to packing their CATs away. For most users, ergonomic considerations having to do with the on-off switch and light pale beside the fact that Meade did not scrimp on drive gears. Unlike the Celestar basic, the LX10 has a *worm gear* system.

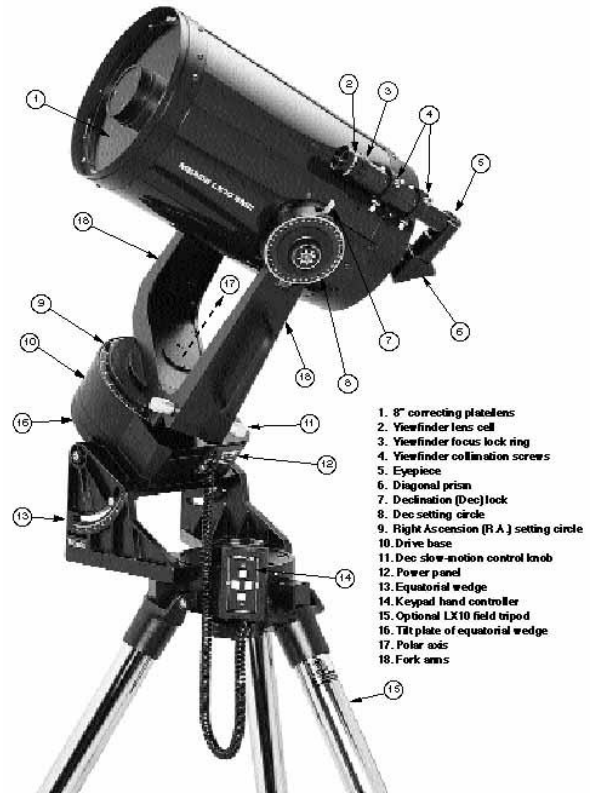
One peculiarity of the LX10 electronics? You can power them via either a 9 volt battery or six AA cells (placed in a provided holder). Unfortunately, this versatility is made somewhat less impressive by a battery cover/access door that is the *dickens* to remove, even in daylight. At least you won't have to pry it open very often. Meade quotes "50 hours" for battery life, and that's about what I've experienced.

Caveats? Not really. Well, almost none. Some LX10 users have experienced poor drive rate accuracy. Apparently, temperature can affect the oscillator that governs the speed in the LX10's R.A. drive system. This does not happen with all telescopes, and is usually not a problem if you're using the scope visually, but it can be fixed via an adjustable pot (potentiometer) in the drive base.

Occasionally you'll run across an "LX10 Deluxe." This does *not* bear the same relationship to the standard LX10 that the Celestar Deluxe does to the Celestar. The LX10 Deluxe *is* the standard scope, but with a 50mm finder, a declination motor, and some astronomy software thrown in. The scope was also sometimes available with Meade's Magellan I digital setting circle system. Unlike the Magellan II, the Mag I usually worked OK, but is not a major reason for buying a particular used scope.

How much do you pay for an LX10? Like the Celestar, somewhere around 400 - 500. For a Deluxe? A little more? For one with the Magellan computer? A little more, still, but not much. This is not a fancy telescope and it is not a recent telescope, with the *youngest* examples now going on 10 years old.

What became of the LX10? As the new century came in, the opinion at Meade was that there was no market for a non-goto fork-mount SCT, and thus no room for one in the product line. I had expected the demise of the LX10, but still felt a little sad when, in 2004, it became obvious its days were numbered. It was a good and economical telescope. Perhaps the greatest testament to the worth of the LX10? Mine have survived fifteen years of the tender mercies of undergraduates and, with just a little occasional TLC on my part, are still working as well as they did on night one.



Celestron Fastar C8

This is an odd (and rare) bird amongst the CATs. No, I'm not talking about a C8 *equipped* with Celestron's removable Fastar secondary system; I'm talking about the first telescope to incorporate this feature, the Celestron *Fastar C8*. Apparently, this scope was only available for a single year, 1997, and disappeared with Celestron's decision to equip its other top-end scopes, the Ultima 2000 and Celestar Deluxe, with the Fastar system.

The Fastar C8's mount looks somewhat like that of the Celestar Deluxe with only a few immediately obvious differences. The first is the included declination motor. Unlike that on the Deluxe, which was a standard removable job that was pushed onto the dec slo-mo knob, the Fastar's motor was semi-permanently mounted. It was not internally wired, however, despite some reports to that effect; the dec motor connects to the drivebase via a coiled cord.

What else? The fork arms are longer in order to allow a CCD camera attached to the corrector to pass unimpeded through the fork arms (otherwise: CRASH!). The fork arms are also beefier than those of the Celestar Deluxe, if only slightly so. Oh, there's a pretty, multicolored "Fastar" sticker on the tube. The RA drive setup is basically identical to that of the Celestar Deluxe: PEC (not PPEC) and a good worm gear set. Like other Celestron scopes of the time, the Fastar C8 was powered by a 9-volt "transistor" style battery. Unlike similar Celestrons, however, the Fastar takes *two* of these cells.

As far as the Fastar ("Hyperstar" for you younguns) optics operation goes, the scope was identical to Celestron's current setup. You unscrewed a retaining ring from the secondary mirror assembly, gently removed the secondary mirror mount, and replaced it with a set of corrective optics and a compatible CCD camera for imaging at a fast f/1.95. Otherwise, the OTA isn't much different from any other Celestron of its day. One thing it did have that most other Celestrons didn't was a focus turns counter, a mechanical digital readout. This counter proved problematical on the other scopes of the time that featured this, the GEM mounted CG series, so I not sure how effective/reliable the counter was on the Fastar 8.

One thing is sure: the Fastar came with more accessories than any C8 in recent memory: a 12vdc cord, an AC adapter, a hand paddle, a dew shield (a shorty to allow easy access to the secondary), a wedge with latitude adjusters, a rear-cell counterweight (to offset the weight of a camera), and a "heavy duty" field tripod. No case, though, alas.

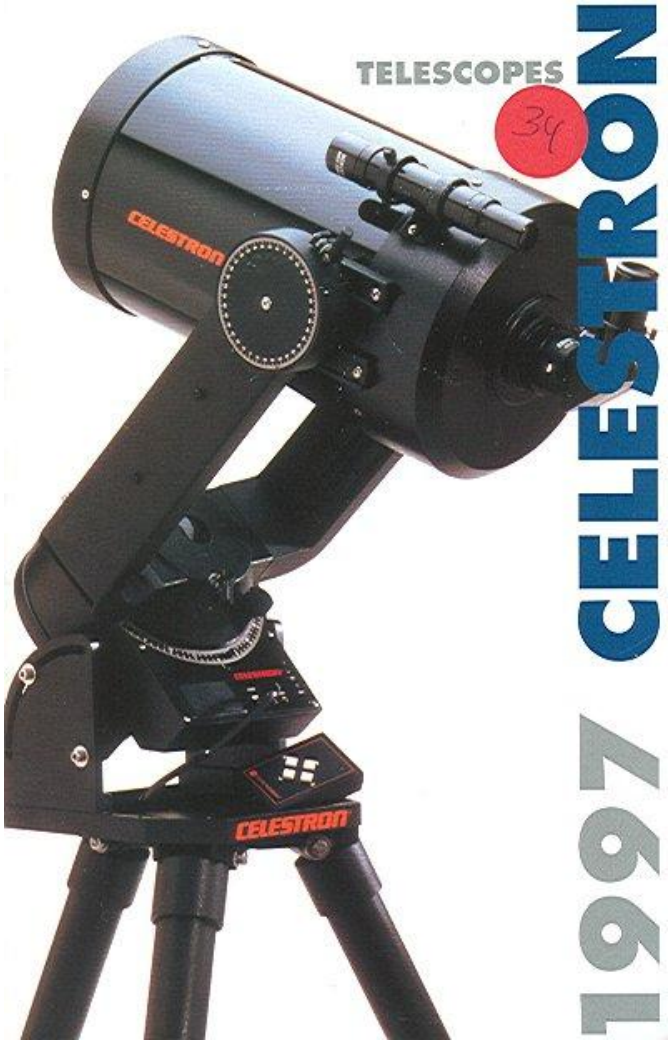
The Fastar's hand paddle was a real tour de force, its like never having been seen before or since on a non-goto Celestron SCT. It not only does the normal hand controller functions; it also displays time and date, provides a stopwatch (with alarm) for timing astrophotos, and even shows ambient temperature. Like the much simpler Ultima hand control, it has a red map light (LED) built in. It also includes one other feature the Ultima lacked, a port for auto-guiding. To do all these things, the Fastar HC needs its own power source in the form of a 9-volt battery. There's also a lithium button cell to keep the time/date current.

Concurrently with the Fastar-8, Celestron was selling an SBIG CCD camera, an ST237, under the name "Celestron PixCel 255" intended for sale/use with the scope. While the camera was a pretty decent performer, it wasn't long before users realized a variety of non-Celestron-badged SBIG and other CCD cameras, including some of those from Starlight Xpress, would work just fine at the Fastar focus too.

Would the Fastar be a good buy for a CAT-crazy used shopper? Maybe, but it's not likely you'll find one. Over the years I have talked to a grand total of ONE Fastar-8 owner. If you *could* find one, though, what then? If the price wasn't crazy, this could be a purty effective imaging scope, especially if you equipped it with a set of digital setting circles. The only concern would be PEC. I would guess this one would have the same PEC problems displayed by the Celestar Deluxe and the Ultima 2000.

Celestron Celestar Deluxe

In 1996 Celestron was selling a $1000.00 SCT, the Celestar basic; the soon-to-be-gone Ultima 8, which was over a thousand dollars more; and the even more expensive Ultima 2000 goto rig. When it came to Celestron's fork mount scopes, you either turned out your pockets or you settled for a Celestar. Companies like full product lines, though, product lines with items that appeal to every consumer. Clearly, a mid-range scope was needed. Something new and different.



What did I expect? *Another Powerstar*. After all, Celestron had given birth to at least five Powerstar models previously. What could one more hurt? Call it the Powerstar 2000, yeah. What came out of Celestron in 1997 wasn't much different in capabilities from the last of the Powerstars, the Powerstar PEC, but it *was* a new scope with a new design and a (somewhat) new name, the "Celestar Deluxe."

While the Deluxe model shares the Celestar name with its low-rent sister, that's almost all the two have in common. Celestron's muddy advertising photography of the time makes the scopes look more alike than they really are. The forks, for example, appear almost identical in the ill-lit photos. In reality, the Celestar Deluxe fork is substantially heftier than that of the basic, if not even close to the size (and weight) of the Ultima 8's massive mounting.

While the Deluxe uses the same good Starbright optics as the Basic, there is one major difference in the OTAs. The Deluxe, all but the first examples, anyway, features *Fastar*. This was/is Celestron's CCD imaging system in which a scope's secondary mirror is removed and replaced with a camera (and a corrective optics set), allowing wide field picture taking at f/2. The Celestar, which in many ways is more the descendant of the briefly-sold **Fastar C8** than of the of the Powerstar 8, is, unlike the basic Celestar, equipped with the removable Fastar secondary mirror.

Now, if you're gonna do serious CCD imaging, the drive has to be able to support that. Spur gears need not apply. Not only did Celestron replace the basic's spur gears with a nice worm set, they also added PEC, Periodic Error Correction. Not PPEC, Permanent PEC, like in the Meade CATs, though. Even at this late date, the PEC training that you so laboriously recorded in order to get the Celestar's periodic error (typically somewhat less than 30 arc seconds) down was *temporary*. You lost it every time you turned off the drive. Celestron also stuck with the basic Celestar's stepper motor concept for the scope. That didn't prove to be a problem for most users doing deep sky photography, though some did see image vibration as the motor "stepped" when using the scope visually at high power. What *was* a problem? PEC.

Not only was the Celestar Deluxe's PEC not permanent, it didn't work right. Not too long after the scope got into the hands of users, a surprising discovery made. You were wasting your time doing PEC recordings. It didn't help a bit. Zero. Zip. Zilch. As was the case with the Ultima 2000, the drive software (any time you have a stepper motor, you have to have software to run it, even on a non-goto) had a glitch, and the glitch made PEC inoperative. Celestron did eventually make things right, dispensing updated ROM chips to Deluxe owners, but it took 'em a couple of years to do it.

At least Celestron got the tripod/wedge right. Better, anyhow. They used the standard (and good) Celestron Heavy Duty field tripod of the time. They did not, unfortunately, re-use the heavy-duty Ultima 8 wedge, opting instead for a lighter—if adequate—one similar to that found on the initial production Ultima 8s.

Might the Celestar Deluxe be the used SCT of your dreams? Perhaps. If you're a visual observer this is a good performer with a steady mount and a more solid feel than an LX10 or a Celestar basic. But it really doesn't bring anything to the table for a visual observer the Ultima 8 and Powerstar 8 don't. The Deluxe's main appeal is for someone who's seeking a (non-goto) *imaging* scope equipped with Fastar—and the autoguider input, which the U8 lacks. This scope was, like the basic Celestar, available with an included digital setting circle system as an extra-cost option: "Celestar Deluxe Computerized." How mucho? Less than an Ultima 2000, more than the basic. Somewhere between 600 – 700 depending on accessories and condition.

Any bow-wowing *Cave Canums*? PEC. If having a working PEC feature is important to you, make sure you're buying a scope with the replacement chip. You'll never be able to get one from Celestron now. I doubt there's anybody left at Celestron who knows what a "Celestar" was. If you can't try before you buy, try to obtain some proof that the chip swap was actually made.

Personal opinion? I'm sorry to say I've always found the Celestar Deluxe a little "blah." Not that there's much wrong with the telescope. There's just not much differnt about it. It has PEC and Fastar, but PEC was old-hat by the time the Celestar Deluxe crept out of Celestron's factory. Fastar? That had already been seen in the Fastar 8 and the (much more fascinating) Ultima 2000. To me, this scope was a place-keeper, not a whole lot else.

Celestron NexStar 5/8

Oh how the mighty had fallen. Celestron, once *the* SCT maker, whose telescopes were the gold standard, the CATs everybody lusted after, had fallen to second place. In a field of two. The days of Celestron as a rip-roaring innovator lead by its visionary founder, Tom Johnson, were long over. After being sold to Diethelm, a Swiss holding company, in 1980, Celestron had slowly, ever so slowly, wound down (the 1985 – 1990 Halley debacle didn't help). The company brought some good and popular products to market as the 1980s passed into the 1990s: the Ultima 8, the 9.25-inch SCT OTA, and a few others, but there was no denying the company had lost ground to Big Blue, especially following the release of Meade's LX200, which became *the* SCT of the 1990s.

It took Celestron half a decade of fumbling to roll out a goto scope intended to compete with the LX200, the Ultima 2000. Unfortunately, the U2K was an interesting failure, but a failure nevertheless, and, as the 90s waned, the company's European owner had had enough. In 1998, Diethelm sold the formerly glittering jewel of a scope maker to, of all people, **Tasco**, the Miami, Florida based telescope/optics importer whose name had become synonymous with "junk" (many amateurs forget Tasco sold some flat-out *excellent* scopes during the 60s and 70s).

The resulting ignominy was hard for Celestron owners to bear. You had to put up with jokes. *Lots* of jokes: "Hey Unk! I really like your **T-8**. You know, your *Tasco* 8!" But the Tasco buyout, at first anyway, didn't turn out to be such a bad thing for Celestron. Almost immediately, the company's advertisements, which had been dreary, muddily printed affairs for a long while, began to change. There seemed to be a new spirit alive at the company and that was reflected in ads that looked nearly as glitzy as Meade's multi-page extravaganzas.

There was More Better Gooder to come, as, in 1999, a scope appeared in the glossy ads that promised a real Celestron resurgence. Advertisements for an SCT that signaled a new determination to take on Meade and the LX200. There would still be some bumps on the road to Celestron becoming a contender again, but the little telescope in these new ads, the *NexStar 5*, at least began that journey.

What was my first impression of this reincarnated C5, the "NexStar 5"? I'll admit it *wasn't*, "MAN, what a futuristic, clean-looking scope—it would look right at home on the bridge of the

Starship *Enterprise*." No, that would come later. My *first* thought was, "MAN, another dratted single arm fork, just like the C5 Plus." Then I reconsidered. The C5 Plus, which had recently been phased-out, had been quite stable on its one-arm-bandit mount. Why not give the new kid a chance? My second thought? *Hope to hell this one is better goto-accuracy-wise than the Ultima 2000.*

That was really the question. While the Ultima 2000 was an "interesting" telescope, its goto was certainly not in the same class as that of the LX200. Would this new telescope be better? As soon as I got my sweaty little paws on one, I determined the answer was "yes." While not as dead-eye accurate as a well-aligned LX200, the little C5 had no problem putting objects in the field of view of a low power eyepiece. The hand controller you used to send the little beast to its targets? What a revelation. Gone was the DSC-like Tangent hand-paddle of the U2K. In its place was a space age looking phaser of an HC that brought me back to *Star Trek* associations.

The NS5 was clean-looking and beautifully designed. *Thought* had actually gone into an SCT's design for once. Not only did the hand-control *look* cool, it fit your hand perfectly. When you weren't using it? It occupied a recess on the side of the fork arm, and made the scope look even *cooler*.

Not that Celestron had an LX200 killer here—not yet, anyway. While the NS5 hand-paddle *looked* sweet and was a derned site better in every way than the U2K, it didn't come close to duplicating Meade's feature set, not that of the original LX200, and not on the new Autostar that was available for the goto ETX125s that would be the NX5's direct competition. The Celestron, for example, lacked Meade's "sync" function that could keep a goto scope accurate all across the sky; the Celestron's database of target objects, 18473, was paltry by Meade standards; and the original NexStar controller lacked a lot of the "nice to have" things standard on the Meade computers like "object identify."

Despite these lacks, the NS5 quickly developed an audience. It was cute, it was zippy (6.5° maximum slewing speed), and it was reasonably portable at about 17 pounds. For the first time in a long time, there was a Celestron scope that made the Meades, even the sprightly ETX, look like yesterday's news. It was also immediately obvious its build quality was substantially better than the very plasticy competition, the ETX125.

Given the NS5's immediate success, it was not a surprise that Celestron soon introduced a big brother, the **NS8**. It was exactly the same scope save for a larger OTA and a longer fork (resulting in a weight for the scope of about 35 pounds) designed to accommodate the larger OTA. Like the NS5, the NS8 sold well, and the two scopes (and the GPS models that would follow) would allow Celestron to survive another few buyouts on the way to regaining an even keel mid-next decade.

What kind of a scope is a NexStar 5 or 8 for the used buyer? There is good and there is bad. Remember, we are *only* talking about the original NS5/8, here, not the later NexStar 5/8i or the even more recent NexStar 5/8SE. Mechanically, the earliest NexStars are pretty solid if not without their problems. Some, for example, were plagued with a balky declination axis. The

cause, however, turned out to be simple—an improperly torqued nut that attached the scope to the fork arm. I'd expect that any original NS5 or 8 would have long since had this problem addressed. There was also some backlash in the declination axis, though this was more irritating than debilitating considering the scope's frank orientation toward visual observing.

On the computer/software side, the early NexStar hand controllers, which Celestron soon upgraded (the initial HC firmware load shipped with the scopes was v2.12.12.6), were not completely bug free and Celestron continued to update the firmware as the years rolled on.

One of the few peculiarities of the early scopes was owners found that, as the evening wore on, the telescope's initially good goto accuracy would slowly become worse. This was annoying, but easy to deal with. While the scope did not have sync, it did allow the user to "replace" the initial alignment stars with new ones, which returned the scope's good behavior. Another annoyance was that some of the early scopes had a hard time talking to PCs if you wanted to use one to control the scope. Unfortunately, the only way to upgrade an early Celestron hand controller's software was to exchange the HC with Celestron for a new one.

My "in the field" impressions? This (the 5 or 8) is a friendly scope, especially for novices. It's easy to align: enter date, time, latitude, and longitude, and the scope (in its Auto Align mode) chooses two stars for you to center and slews to them. While some people don't like it, I find the NS scopes' Star Pointer finder (a red-dot bb gun affair) easier to use for goto alignment than a conventional finder scope would be. No, the computer *doesn't* offer many features, but makes up for this with its simplicity and user friendliness. The goto is fine, and every bit as accurate as that of my modern ETX125PE, for example. Optically the NexStars are as good as any other 5 or 8-inch Celestron OTA of the era, and that is very good.

While Celestron didn't exactly fill the NS boxes with accessories, they didn't scrimp either, and gave you enough to get you started. You got a 25mm Plössl (imported), a 1.25-inch diagonal (imported), a visual back, and an AC adapter (you could also power the scope with 8AA batteries). The included tripod, an extruded aluminum one, wasn't optimum for the 5-inch and decidedly too shaky with the 8inch. It is useable, but that is about it.

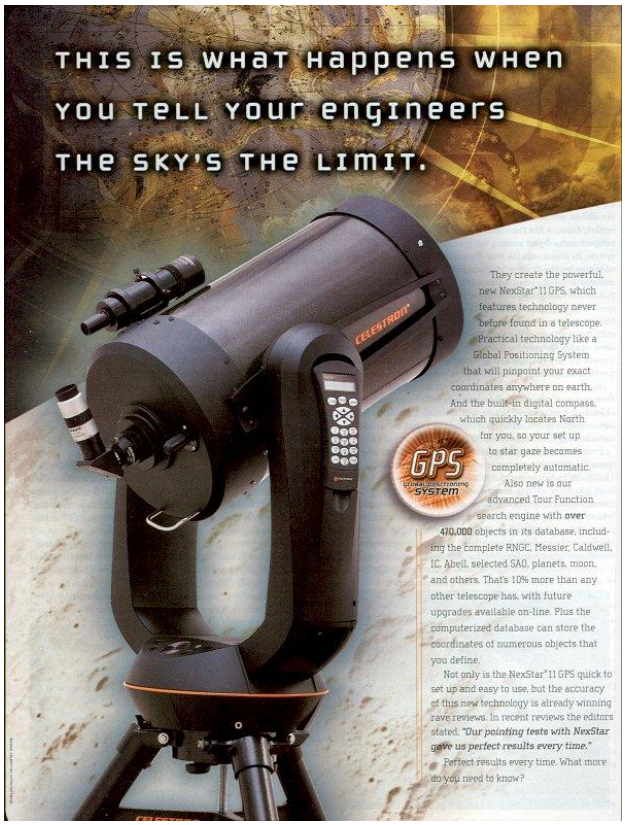
Bad Things? Not many. The first NexStar SCTs are hardly state of the art, so don't pay a lot for one. Yeah, the li'l NS5 originally sold for dang-near 1200 buck-a-roos, but the far more full-featured and reliable NS5se went for a comparatively measly 800. Same things goes for the 8-inch. Way back in the last century, you'd pay as much as 1500 for one, but now an NS8se with more features than you can shake an ETX at can be had for the noticeably smaller street price of 1200 dollars. In addition, while the early NS5 and 8 came with the company's excellent Starbright coatings, their cheaper descendents feature the even *better* XLT coatings group. The new scopes also come with much more full-featured, user-upgradeable hand controllers. How much for the original? In good shape, maybe 500 for the 8, about a hundred less for the 5.

Finally, if you want to do astrophotography, *don't get an original NS 5/8*. While the new SEs and the previous i scopes are not exactly ideal for imaging, people are using them for that purpose,

at least on a beginning level. The early ones? Their drive and gear accuracy, while fine for visual use or planetary picture taking, would make deep sky imaging an exercise in frustration for most folks.

Celestron NexStar GPS

2001 turned out to be a big year for Celestron. They'd already got our attention with the Nexstar 8 and 5, but most of us figgered it was asking too much to expect the beleaguered company to take it to the *next* level. We also knew Meade was working on a new blockbuster of a scope. We assumed (you know what they say about that word) they were putting together an "LX300." It seemed obvious the LX200, who was showing her age after almost a decade at the top of the charts, was ready for the Last Roundup. Before an LX300 could appear (as the LX200GPS), however, Celestron, like General Nathan Bedford Forrest, who served in what Unk Rod's ol' Granny called "The Glorious War for Southern Independence," *Got There Fustest With the Mostest*. The "mostest" in this case was the **Nexstar 11 GPS.**



What did we think when the first NS11 ads hit the magazines? I don't know about the "we," but I know *I* wanted one. What you had was:

- A goto fork mount C11 for 3000 dollars.
- The OTA's tube was made from carbon fiber.
- The scope was equipped with Celestron's Fastar Secondary System.
- The included NexStar hand controller was a significant upgrade over what debuted with the NS 5/8, and contained 50,000 objects and a new automated alignment routine.
- The scope utilized **a GPS receiver** to help perform the scope's goto alignment.

Yeah, I wanted one *bad*.

By the time I screwed my courage to the sticking point and handed my credit card to a Celestron dealer, the scope had been on the market for about a year, and I'd read some pretty good reviews. Dennis DiCicco, whose opinion I respected highly, gave it a glowing notice in the February 2002 issue of *Sky and Telescope*. What were Unk's impressions when the UPS man dropped off those big boxes in Chaos Manor South's front hall in the spring of 2002?

I'll be honest, when I had the scope unpacked, and was preparing to mount the NS11 on her tripod for the first time, what I felt was stark, *staring **FEAR***. Sure, I've dealt with big CATs over the years, and have been known to wrestle an Orange Tube C14 onto a wedge by myself a time or two (when I was younger and dumber). But this was different. Sitting in my living room, the NS11's spanking new OTA/fork/drive base assembly didn't look a *whole* lot smaller than a C14,

and, unlike the OT14, you couldn't break the tube/fork down into manageable pieces. Not only that; my NS11 was just *so* pretty and new—the thought of dropping the big scope while attempting to put her on her tripod (even directly onto the tripod head in alt-az fashion, which is a heck of a lot easier than a wedge) gave Your Old Uncle the willies.

Turned out I needn't have worried. Yes, the Nexstar 11 is a hefty enough scope at 65 pounds, but, like the Nexstar 5 and 8, but even moreso, thought went into her design. Some consideration went into the placement of the handles on the fork for once, and they make it easy for even the broken-down-hillbilly set to lift the scope and it get onto the tripod.

Celestron didn't follow Meade's lead and just screw a couple of rack-handles onto the fork. One *is* a rack-style handle, but even that is well-designed, with a corresponding depression in the fork arm to accommodate your hand. The other handle? It's not really a handle per-se. There's a hole in the underside of one fork arm that forms a handle. You grip the rounded underside of the fork arm (easier to do than describe) with your fingers extending into the hole. The result is that after just a little practice, putting this large scope on its tripod becomes laughably easy.

So, I had the scope on the tripod. What *about* the tripod? It's good and bad. It is the standard "heavy-duty field tripod" that was shipped with Celestron's more expensive telescopes of the 90s and early 2000s. Unfortunately, in the course of trying to keep the price down on the NexStar 11, I suppose, this tripod was cheapened. Gone are the rubber-coated chrome plated legs. You are left with bare metal legs that have been painted with textured paint.

That's not all. The tripod leg spreader *looks* identical to the one included with the Ultima 8's HD tripod. As soon as I picked it out of the box, though, I was shocked to discover that it was now *plastic*. Overall, this version of the tripod is noticeably lighter than the original. Actually, though, that's a good thing if you're lazy like Unk Rod. I *could* use the original heavy-heavy duty tripod that came with the Ultima 8 for this scope, but the new tripod is a lot easier to schlep around and I've never bothered to mount the 11 on the Ultima 8's tripod.

Fortunately, this downgrading of the tripod doesn't seem to have hurt anything. It's still as steady as ever, and despite me cranking the knob down pretty hard, the plastic spreader has never threatened to snap on me. The same problems that have afflicted other models of the HD tripod afflict this one, though. The leg end tips have a tendency to come unglued and fall off, and the bolts attaching the legs to the tripod head sometimes loosen. As for configuring the tripod for best steadiness, leave the legs un-extended and take the rubber crutch tips on the legs. For even more steadiness, take 'em off and place the tripod on the included vibration suppression pads.

Yes, Celestron, apparently a little skittish about how steady this big scope would be on a light tripod, included a set of three pads in the box. These little metal and Sorbothane disks, one of which goes under each bare tip of a tripod leg, contribute significantly to stability. It was a nice gesture for Celestron to throw 'em in, anyway, though, but for alt-az operation, you will probably find the scope steady enough for most purposes without them.

Once the NS11 was on the tripod, I fished around in the big box to see what else Celestron had included. Not a lot. In addition to the vibration pads, there was the Nexstar HC, which looks identical to the models shipped with the earlier NS scopes; a fairly clearly written manual; a stamped metal corrector cover; a 40mm Plössl eyepiece; a 1.25-inch Chinese-made star diagonal, a 1.25-inch visual back; an AC power supply; and a 50mm finder with mount. Normally, this finder was an OK Chinese import normally. For once, though, your Unk *lucked out*. At the time I bought my scope, Celestron was out of the Chinese finders, so I got an excellent Japanese 50mm job (with the polar alignment reticle).

What was I most excited about? Beyond the joy of a new scope: "WHOO-HOO…UNCLE ROD DONE GOT HIM A STARBRIGHT C11!" I was curious about the GPS receiver. What exactly would it do for me? Ten years ago GPS was still Heap Big Juju to your old Uncle.

As soon as it got dark, I got a taste of the NS11's fascinating and (to me at the time) *amazing* GPS alignment routine. I powered-up the scope using a 12vdc cord (optional) and the 12vdc jump start battery pack I'd bought down to the local WallyWorld. I connected-up the battery, plugged the HC into the scope (you can either plug into a receptacle in the recess in the right fork arm where the HC is stored or into an "Aux" port on the base), found the power switch, and set on-off to O-N.

The scope nodded and twirled around a bit in the course of leveling and finding north with the aid of an electronic compass and level sensors, and stopped and started listening for GPS satellites. It waited and I waited for about 5 – 10 minutes. This can be normal for these scopes if they've never been used or have been moved a significant geographic distance. The "almanac" they'll have in memory for the GPS "constellation" will be out of date, and they'll have to download a new one from the GPS SVs (satellites). That done, the scope acquires satellites, gets current time and geographic position, and heads for the first of two alignment stars, which you center in the finder and in the main scope.

How did this go the first time? Right well. No, the alignment stars were not in the finder, but I had already been told about the NS11's "compass calibration" routine that would take magnetic variation into account and make those initial slews closer. While magnetic variation is small down here, doing this procedure did help, and allowed the scope to place the alignment stars in the field, usually the inner 50% of the field, on subsequent alignments.

How good was the NexStar 11's goto accuracy? If carefully aligned, the scope (we're talking alt-az mode here, but goto accuracy is comparable in a wedge/eq setup) will routinely place any object from one side of the sky to the other in the field of a wide field eyepiece at 200x. Thinking back to my many deep sky big game hunts with the scope, I don't believe it's ever missed when I've done a careful alignment. I mean not once. As for tracking accuracy, it's pretty good. I don't do a lot of deep sky imaging with the scope, preferring to use a GEM mounted C8, but the periodic error is well under 30 arc seconds, and the scope is equipped with PPEC, which will allow you to reduce that even further.

Goto is cool, but how about *optical* coolness? The telescope's optics, like most late 90s and later C11 optics sets, are outstanding. It does a wonderful job at high power on the planets, and presents one of the best star tests I've seen in an SCT. During the entire time the NS11 was in production, Celestron was able to produce this quality of C11 optics scope after scope after scope.

Mechanically, the NS11 is also a winner. Focus shift is small enough at about 40 arc seconds on my example, and focusing action is smooth via the rubber coated knob on the rear cell. It is not *quite* as "easy" as the focus on my Ultima 8 OTA, but it's easy enough, and sometimes I think a little *less* easy is better. In alt-az mode, the mount is quite stable, with shakes dying out in a second or two at high power if you're using the vibration pads. Its stability in eq mode will depend on the wedge you've purchased for the scope (you won't find one in the box). A large wedge, larger than the Celestron Heavy Duty Wedge, is advisable.

One mechanical facet of the scope that always attracts attention is the tube's material. Most NS11s have carbon fiber tubes (there was a shortage early on, and for a while C shipped the scope with an aluminum tube at a slightly lower price). The carbon fiber tube brings good and bad to the party. For imagers it's mostly good. Its lower expansion coefficient means smaller focus changes over the course of an evening. It also makes the scope a few pounds lighter. Unfortunately, if you live way up yonder in Yankeeland, it *slows* cool-down for this C11. If you move the scope from hot room to cold backyard, be prepared to wait a couple of hours for complete cool-down for critical tasks like planetary imaging (this process can be speeded by a device like the Lymax SCT cooler, of course).

Firmware-wise, the scope is not too different from the Nexstar 5/8. Other than the GPS alignment routine (other non-GPS alignment routines are also available), the main difference in the GPS HCs was more objects in the library (about 50,000 including stars). Like the non-GPS Nexstars, computing duties are split between the hand controller and a "motor controller" board in a fork arm.

This is a wonderful, beautiful scope, and I've loved it since that first real outing under a dark sky at Chiefland, Florida's 2002 Spring Chiefland Star Party/Picnic. Like any SCT, it's hardly perfect, of course, and there *are* a few glitches for the used seeker to be aware of.

Most importantly, the motor control board firmware in early NS11's caused the scope to "jump." You'd be observing at high power, and, once a minute or so, the scope would jump a few arc seconds (in alt-az mode) as it tracked. Celestron cured this through firmware upgrade releases, though it took a number of versions to exterminate this hardy bug. If your MC firmware version is at least v40.40 or 4.06, you're good to go (you can display the MC firmware version on the HC). Any different, and you need to upgrade. Thankfully, Celestron offers a free software utility to upgrade your motor control firmware via Internet download. You'll also need a special cable, the "programming cable," which plugs into the "PC" port on the base of the scope. This is different from the normal *serial* cable that plugs into the base of the hand controller, and which allows you to control the scope with PC programs.

One thing to REALLY look out for? If the motor control firmware is **v1.0**, not only will the scope have jumping problems; its motor control firmware will *not* be able to be upgraded. These early scopes require a new (upgradeable) MC board. Celestron should still be able to sell you one.

Other problems? Mostly small annoyances. The GPS receiver's memory is kept alive with small battery. This battery is recharged when the scope is plugged into a power source. If you don't use the scope for a long time—months—the battery may become discharged and you will lose your GPS memory. This is not a big deal. All it means is that it will take longer to get a GPS fix. The receiver will have to download a new almanac (ephemeris). The battery can be recharged by leaving the scope plugged in and turned on for about 48 hours (use the AC adapter, and leave the HC unplugged). Occasionally, this battery will need replacement. For most versions of the NS11 GPS board, this is not difficult. For details refer to Mike Swanson's wonderful Nexstar Resource Site at http://www.nexstarsite.com for details. In fact, Mike's webpage is the FIRST place to go when you have *any* NS11 questions.

"But how about the NexStar **8** GPS, Uncle Rod, how about that one?" In addition to the NexStar 11, the first GPS scope out the gate, Celestron also produced 8-inch and 9.25-inch versions. These are excellent telescopes. You lose aperture, sure, but gain even more stability. In all other respects, they are identical to the NexStar 11

Whither the NS11? It was only with us for a little more than four years. Celestron, following its buyout by Synta, upgraded all its scopes, switching to newer Chinese produced versions, with the NexStar series morphing into the CPCs. The legal battles with Meade probably shortened the GPS' life, too. Meade one a patent lawsuit over the alignment routine which has the GPS scopes point north and level, believe it or not. In order to avoid paying royalties, Celestron developed its SkyAlign alignment system, and decided to debut it with the new CPCs.
What is a NexStar GPS like as a used scope? One is a very good prospect. My own NS11, the beloved Big Bertha, is still working as well as she ever did at age eleven, and so are the other

GPSes I've encountered. Still, this is an OLD telescope now, with the youngest approaching their first decade. 1000 – 1200 max for the 11, and less than 1K for the 8 and 9.25.

24 Meade LX90

THere wasn't a whole lot goin' on down Irvine way in the year 2000—leastways, that's what we *thought*. At **Meade**, I mean (back in the day they were based in Irvine, not far from the Ducks' stadium). The LX200, despite being eight years old that year, was still the SCT of choice for more amateurs than you could shake a 2080 at. The Autostar-equipped ETX had come out the previous year, and the Meade LX50 was hanging in there. Why should Meade market a new scope?

Despite the surface calm, however, all was not as rosy as it seemed. Sure, the LX200 was the queen of the SCTs, but she used yesterday's technology. She was expensive too; not everyone who wanted one could necessarily get one. Because of the older technology, the scope was expensive to *produce*, and provided less green stuff for Meade's coffers than you'd a-thought. To top it off, the next scope down, the LX50, was never very popular. People wanted goto scopes now, and the LX50, despite the abortive semi-goto provided by the cantankerous Magellan II system, didn't have it. What would Meade do? Replace the LX200 with an *LX300*? An Autostar equipped LX200?

Nope. Not yet, anyway. Instead, what Meade debuted in 2000 was the somewhat blandly named **LX90** (couldn't have a higher number than the top scope, and "LX100" had already been used). What was an LX90? The big, glossy ads said it all, "*Now you can buy the telescope of a lifetime at a price you never thought possible*."

Meade hype? Nope. The LX90 was and is a wonderful scope and was a breakthrough at the time. What did that price-you-never-thought-possible, $1695.00, get? You got an 8-inch OTA on a newly designed fork and drivebase. This fork/drivebase/OTA combination was light at 33 pounds, but, surprisingly, steady. The big deal, though? The scope was accompanied by a 497 Autostar featuring 13,235 objects. This hand box was identical to the 497 controller usaed with the goto ETXes, and featured the same slewing speeds and other functions. Don't get the wrong idea, though, kids: the LX90 was *not* an upscaled ETX.

Which was what I thought it would be when I first heard about the LX90. Either that *or* an 8-inch LX50 with goto tacked on. Wisely, the company did neither of those things. The LX90 was new from the ground up. Sure, the fact that it uses the 497 makes it similar to the ETX in some ways, but the mount is nothing like that used on the ETX. It is much beefier and all metal, as befits a fork for an 8-inch CAT. Also, the LX90 control panel (hand box connection, computer

connection, power switch, etc.) is on a fork arm rather than on the base. This meant Meade did not have to use the hard-stop system so beloved of ETX owners (NOT) to keep internal cables from wrapping, as they'd have had to do if they'd put the panel on the drivebase like on the ETX.

Don't sound much like an LX50 does she? Alas, that's not a completely good thing. The OTA was similar to that of the earlier scope (the rear cell was redesigned), but the fork and drivebase were noticeably lighter than those on the LX50. With the drivebase, that is mainly looks. The control panel is on a fork arm, so the LX90's base can be round, without a protruding panel as on other Meade scopes, making it *look* smaller and less impressive. The fork, though, *is* lighter than the LX50's hefty tines. This is offset, of course, by the fact that the LX90 could be (and usually was) operated in alt-azimuth mode, and was, for that reason, naturally less prone to the shakes than the LX50, which had to be tipped over on a wedge.

Speaking of tripods, one was included in the purchase price of the LX90 (Meade and Celestron's "optional tripod" conceit being outdated by now), an adjustable model that was considerably nicer than the bargain basement one shipped with the LX10. Digging around in the Styrofoam peanuts, also revealed a 26mm Meade Super Plössl, a corrector cap, and a semi-decipherable manual. Not a lot of extras, but, hey, what did you expect from a scope that undercut the price of an 8-inch LX200 classic by 600 bucks?

Was this, then, the replacement for the aging LX200? Meade made abundantly clear that was *not* the case (we'd have to wait another couple of years for that in the form of the LX200 GPS). The LX90 was, when you read the fine print, somewhat crippled compared to Meade's flagship. For starters, the LX90's onboard library of 13,235 objects, while quite appropriate for an 8-inch telescope, sounded stingy compared to big sister's 64,359. The Autostar had lots of cool stuff, though, and was obviously both more "advanced" and blessed with more features than the LX200 hand paddle. Save for one: **PPEC**. The 90 had no PPEC ("permanent periodic error correction"). Originally, it didn't even have *PEC*. Nor was there a way to autoguide an LX90 scope ST-4 style. To do that, you had to purchase an optional "909 Accessory Port Module." You could guide a stock scope with a serial computer connection.

Howsomeever, in spite of Meade's efforts to keep the LX90 from stealing the LX200's thunder, it did just that for a lot of people. The LX90, it quickly became obvious, was a more modern and reliable telescope. Lack of PPEC? Not too many people cared. Most folks who bought the scope would never have used PPEC if the scope had had it. Hell, most *LX200 users* never tried it. Aside

from the fact that only a small portion of SCT owners ever use their telescopes for deep sky imaging, as the century ended more and more imagers were autoguiding, and PPEC was no longer so necessary for good pictures

Not everything was "Not quite as good as on the LX200," either. In addition to the Autostar, the LX90 featured a revamped power system. No more funky 18vdc AC supplies and DC converters ala' the LX200. The 90 could be powered by a 12vdc external battery with the simple (supplied) DC cord or by onboard C cell batteries (if you liked buying batteries). If you wanted to run it off the mains, Meade could provide a simple wall-wart supply that was much less expensive than the Classic 18vdc supply.

The big deal, though? The LX90's introduction was one of *the* most trouble-free Meade had had in a long time (or has had since). The LX90 was *the little scope that could*, and you just didn't hear of many troubles or many scopes making a return trip to California. It was unheard of, for example, for the LX90 to morph into an obscene carousel due to declination runaway problems—something all too common with the classic LX200. If anything bad can be said about Meade as regards the LX90, it's simply that it's a shame they didn't apply some of the design decisions made for this one to the LX200GPS.

Optically, the scope is the same as any other post-2000 Meade 8-incher. That is, pretty impressive. The LX90 optics most assuredly provide bright and "snappy" views. The optics of the LX90 are not just similar in performance to those of the LX200; the same ones are used for both scopes. There is no "LX90 optics" production or "LX200 optics" production.

Mechanically, like other Meade OTAs, the focus mechanism uses thrust bearings rather than ball bearings (like Celestron). This definitely makes for a stiffer focusing action, and may also contribute to Meade's somewhat greater degree of focus shift and a greater tendency toward focus backlash as compared to the "other" brand.

Is there anything about the (older) LX90 to alarm a used buyer? Not really. As long as an LX90 has been treated kindly, it should be as good as ever. It's really a simple scope—for a goto scope—with the brains being in the reliable (and replaceable) Autostar. Speaking of the Autostar, it can be upgraded—easily—to the latest and the greatest features. One thing to look around for: **UHTC**. These superior optical coatings were available for the LX90 as an extra cost option. Quite a few LX90 buyers, unfortunately, did without to keep that cool LX90 price. Hold out for a UHTC scope if at all possible—it does make a difference.

Whatever happened to the LX90? It may still be with us in somewhat altered form. It's not completely clear at the time of this writing which products the new Chinese-owned Meade will keep and which they will ditch, but the LX90 is still featured prominently on their web page. And it's still basically the same old LX90, albeit with a GPS receiver, and Meade's new and less attractive rough, non-gloss blue paintjob.

If you decide to buy used, what should you look for, and how much should you pay? In addition to the basic, classic LX90 and an updated GPS scope as above, Meade produced one with its ACF (coma reducing) optics. These can do a very good job optically, and are desirable. Any caveats? Shortly after Meade transferred production to Mexico in 2007, the LX90, which had always been uber relibable, began to experience problems with its declination/altitude drive. There was “jumping” in that axis during alt-az tracking. Meade finally go this (firmware) problem fixed, but it took a while. If you are contemplating buying one of these later LX90s, check it for proper tracking at high power in alt-az. You can identify these scopes by their use of GPS, the presence of a red-dot type finder, and by ACF optics (indicated by a label).
Finally, Meade was so happy with the success of the LX90 that they just couldn’t leave it alone. They introduced 10 and 12-inch aperture versions shortly before the move south of the border. While the 10-inch can be okay, the 12-inch should be avoided unless its priced at the level of a used OTA alone. All Meade changed for the larger apertures was the length of the fork arms, which makes the 12-inch shake more than Little Richard at the keyboard.

How much should a used LX90 cost? The original model is not a youngun now, and I would not dream of paying over 800 dollars (depending on accessories) for one in good shape. The later GPS models? Assuming they check out, a little more, but not too much more. This was never an expensive telescope. It was a simple one with minimal features. But in the case of the LX90, that was its strength. It just works.

CG = Celestron GEM

Let's turn back the clock to the early – mid 90s. This was not a particularly happy time for the Big C. In addition to a certain lack of direction imposed by their long-distance ownership by Swiss holding company, Diethelm, they were faced with the seemingly insurmountable task of competing with Meade's LX200. Celestron was eventually to bring forth a competitor, the Ultima 2000, but till then the company needed an attention grabbing scope line that wouldn't cost too much to produce. In 1992, a plan was hatched. Celestron would target "advanced" amateur astronomers (i.e. astrophotographers) who wanted an SCT but didn't want a fork mount or goto. What that meant initially was a C11 OTA on a heavy-duty German Equatorial Mount. How to save money? Don't make the GEM, *buy it.*

Thus was Celestron's fondly remembered CG11 born. While the company got the CG idea together in 1992, it was 1993 before ads began appearing in *Sky and Telescope* and CGs began appearing on star party fields. What was a CG11? Simple: it was a stock black-tube C11 OTA mounted on Scott Losmandy's (then fairly new) G11 mount. There's nothing new here; it's the *combo* that's the thing. By 1992, the G11 was becoming the wannabe "serious" amateur's fave entry-level mount. Even today it's a good medium-duty GEM; it's machined rather than cast, and has a respectable payload capacity—60 pounds. The G11 is also a pretty puppy, all decked out in chrome and black machined aluminum and stainless steel. Electronics? Primitive by today's standards.

The mount is equipped with reasonably strong (not overkill, certainly) dual-axis servomotors controlled via a standard (for the time) Celestron hand paddle that's indistinguishable from the one shipped with the Ultima 8 and other Celestrons of the time. The HC plugs into a "console," a little box bolted to the mount, which provides a few functions the Ultima lacks—backlash compensation, for example. Guide rate is selectable, too, and can be set to 30%, 50%, and 1x sidereal. While the Ultima drive only has one "slew rate," the G11 has three: 4x, 8x, and 16x sidereal. That won't allow the scope to go zipping from one side of the sky to the other, but is handy for object centering/finding.

These electronics and motors drive two 5.625-inch gears. While that sounds impressive, the gears and the worms that drive them are one of the mount's few weak spots. First-off, the main gears are made of aluminum and are somewhat prone to producing periodic (and non-periodic) error. All in all, the G11 aluminum gear performance is quite good, however. More serious was the mounting system used for the worms that drive these gears. When properly adjusted, tracking can be excellent; the problem is getting to that proper adjustment and

keeping it there. The bearings on the axes were also occasionally a problem for folks who poured on the piggyback scopes and other accessories, and Losmandy upgraded the bearings in 1995 to improve the mount's performance with heavily loaded C11s and with the C14, which was by then being offered with the mount as the CG14.

Otherwise? Not much else for Unk to grumble about. The polar alignment scope was initially hard to get and old G11s may lack one (it wasn't that hot anyhow). Some folks didn't like the non-adjustable tripod sold with the scope, but it was sturdy.

How about the OTA? Early ones are OK; later ones are better. In Unk's opinion, it really took Celestron until 1994 – 1995 to completely exorcise the Halley demons, so I'd try to hunt down a mid-decade CG11 (or any other CG aperture) if I were in the market for one. Overall, though, it's hard to go wrong with the CG. As you'd expect, the scope is equipped with Losmandy's standard "D" dovetail, which provides a steady means of attaching scope to mount.

Is the CG11 for you, then? Maybe. Make sure you want to handle somethin' of this size. It's much larger in person than it looks in those old magazine ads. That said, the fact that the mount/OTA breaks down into component pieces, the heaviest of which weights less than 40 pounds means folks who don't feel able to tote around an NS11 GPS or a CPC 1100 could be right happy with this one.

Not *big* enough? Celestron, as above, also did a CG14. How is it? The mount is at its limit with that Big Kitty, but the pair is certainly sufficient for visual work. One big thing that recommends any of the CG sisters is that since the mount is still in production it can be repaired and upgraded—heck, you can even fit it with a newfangled goto rig in the form of the Gemini system.

For some folks, the CG 11 and 14 were too much—weight and money. And some people just wanted Different (and maybe "better"). For them there was the CG 9 ¼. To do thisun, Celestron followed the same formula they had with the CG11: mount a Celestron OTA on a Losmandy GEM. In this case, the mount is the (still sold) Losmandy GM8, the G11's little sister. What was the result? Ho-hum. The 9.25 OTA is certainly nice (though the earlier models incorporated a prone-to-malfunction mechanical counter for the focuser), but the mount *ain't*.

Oh, the GM8 head is purty enough; it's like a shrunken G11, all stainless-steely and loverly. It ain't the rock of Gibraltar, however, and putting a 9.25-inch Celestron on it and expecting it to do astrophotography may be asking a *wee* bit much. To make matters worse, Celestron, wanting to save George Washingtons on producton, put the GM8 on a cheapo **extruded aluminum tripod** they got from China. The result? The telescope is OK but nothing special.

Would I buy a CG? Perhaps. Remember, you can easily make your own used "CG11" (or 9 ¼ or 14) by mating a more recent used G11 and an OTA of your choice. That is probably preferable to hunting for the Real Deal.

A few words about the C9 ¼ OTA

Now's as good a time as any to play **myth-buster**, I reckon. 9.25 OTAs, old or new, are excellent SCTs. They are not magic, however. Do they produce better images that a C8? Yep. But *almost* all of that is due to their *extra inch and a quarter of aperture*, not some hoodoo Marie Laveau optics.

When this OTA was released, all kinds of weird stories went 'round. You still hear some of these tales; specifically: "This one is so good because it ain't an SCT. It's got a parabolic primary, not a spherical one." Even people with the smarts to know better were trumpeting this foolishness. What do y'all think the *corrector on the front of the scope* is for if this ain't an SCT? *This is a normal Schmidt Cassegrain*. The only difference being a just slightly slower focal ratio for that **spherical primary**, about f/2.3. That allows the scope to get by with a secondary mirror with a lower (4.3x instead of 5x) magnification. Which may contribute to the scope's slightly enhanced performance.

The CI-700

Celestron sold quite a few Losmandy mounted CG scopes to quite a few happy amateurs over about five years. Then it came to a screeching halt in 1998. "Why, unk, why?" I don't know that there's ever been an official explanation, but I suspect the reason was twofold. First, it's no secret Scott Losmandy has always had trouble producing G11s in sufficient numbers to meet the large and continuing demand. Bringing Celestron into the mix meant more demand, more dealers—you get the picture. Also, I would guess some of the folks at Celestron wondered whether they might not be able to produce a similar GEM in-house and kick the ol' profit margin up a notch. Whatever the reasons, Celestron decided to produce a similar mount of their own, the CI-700. Maybe in part, anyhow. I've *heard* Losmandy produced some/all the CI-700's components.

The CI-700 is a mount with both friends and foes. For some reason it seems to excite strong feelings amongst GEM fans. There's not much reason for that, though. In almost every important way, this mount is very similar to its inspiration, the G11. Load capacities are nearly the same, and both mounts track equally well (with the CI-700 actually having a slight edge here, maybe due to its use of bronze gears instead of the aluminum drive gears used in earlier Losmandy G11s/CGs). The CI-700 is maybe not quite as elegant-looking as the Losmandy, but it's certainly attractive. The on-the-top-of-the-RA-housing polar scope does look a little funky, yeah, and the little alignment scope's optics ain't that hot, but the polar finder on the CG11 wasn't much either. If there's a place where the CI-700 is markedly worse, it's not in appearance or appointments, but the electronics.

Not the drive system itself, which is quite reliable and mostly unchanged from what was used on the CGs; the problem is the connectors. Instead of using RJs or DBs, Celestron unwisely chose to use sometimes flaky and always easily damaged multi-pin connectors. This stumble is somewhat ameliorated by the fact that most of the CI-700's wiring is routed internally, making for a nice, neat setup.

The CI-700 was sold in two configurations, the CM-1100 and the CM-1400, equipped with 11-inch and 14-inch OTAs respectively. Both models were available with Celestron's "Advanced Astro Master" digital setting circles, a Celestron-branded Tangent DSC rig. The big question in my mind back then, however? Digital setting circles were OK, but when would Celestron begin selling a goto enabled CI-700?

Adding a computer to this mount is a fairly simple operation; even today Losmandy sells a Gemini goto system specifically for the 700. But most folks don't want add-ons; they want "out

of the box." It was pretty obvious, I thought at the time, that the days were numbered for a non-goto scope/mount in the CM1100/1400 price range ($3499.00/$5299.00). Celestron agreed, but rather than merely tricking-out the CI-700 with a computer, they discontinued the mount altogether (in 2003), completely redesigned it, and cranked things back up with the CGE.

Does a CI-700 make sense for a used buyer? This is a rugged, nice-performing GEM. Since it "ain't a Losmandy," most owners are willing to let one go for considerably less than they would a G11 rig. It's not "today," but can be easily fitted with DSCs or, as above, with a real-life goto. Watch them weird little connectors, but if you have the chance to snag this mount, maybe with a nice 11 or 14 OTA, go for it.

Celestron CGE 800/925/1100/1400

The CI-700 was gone. The honchos at Celestron/Synta didn't think there was a place in the Celestron lineup for a non-goto mount anymore. That may or may not have been true, but one thing was sure, the mount that followed the CI-700, the CGE, was a distinct improvement on it—in most ways, if not all.

One thing that helped the CGE? By the time it hit the streets in 2003, Celestron had got most of the bugs out of its NexStar hand controller. They had worked hard to improve the firmware since the company's new goto system debuted with the NexStar 5 several years earlier. The CGE's goto accuracy was never a problem, not if the mount's hardware was in order, anyway.

You could buy the CGE mount without a telescope from the beginning, but Celestron also offered attractive packages that included any of its 8-inch and larger SCTs. This was notable both because the 8-inch and 9.25-inch SCTs were finally being sold with big mounts, and because of the price breaks Celestron started giving on its mount/scope combos. As the Tasco Celestron morphed into the Employee-owned Celestron and that wound up as the Synta Celestron, the company began aggressively marketing GEM-telescope combos.

The SCTs that came with the CGE were no different from any of the other Celestrons of the time: good optics with Celestron's new "hyper" Starbright XLT coatings. The mount? It continues Celestron's recognizable "sorta like a G11" pattern, with one major alteration. In addition to a GEM mount head and a tripod, there's an "electronics pier" that comes between tripod head and mount and contains, yep, electronics, and also connectors for the hand controller and the mount's R.A. and declination motors. There's also a PC port that can be used with Celestron's *NexRemote* software.

A similar electronics pier is used on Celestron's current CGE Pro GEM mount, where it causes a big problem: it raises the head so high that it's difficult get even a small scope mounted. Luckily, unlike the Pro, the CGE uses a tripod that's not tall enough to create a problem. The

CGE tripod, which is like a Celestron Heavy Duty Field Tripod on steroids, has legs that can be extended and collapsed. The head (not the electronics pier top) is not much more than three feet off the ground with the legs completely retracted.

How does a CGE *look*? Pretty sweet. While the G11/CG heritage is evident, it actually looks more like a CI-700 with its "flat" R.A. and declination housings. There is some attractive orange metal trim, and the CGE is undeniably strong looking. That's not just looks; it is genuinely sturdy without being overly heavy. The GEM head is 42-pounds (about 45 with the electronics pier attached), but you don't have to lift it too high to get it on the tripod. The tripod itself weighs in at 33-pounds. The payload capacity? 60-pounds, a C14 and some accessories that is. As is often the case, though, that's for visual. For imaging you can knock that down to about 40 or a smidge less.

So how does it work? The CGE *can* work well. Not surprisingly, this G11 mount is past its limit for imaging with a C14, especially if there's a breath of wind blowing, but people have taken good images with C14s and CGEs on calm nights. The combo is very useable for visual work. Periodic error on a well-balanced CGE is generally in the 15-second range or less, and is easy to guide out. With a C8, or a C9.25, or even a C11, this GEM can be an impressive performer.

As above, goto is good, very good in typical NexStar fashion. But, also as above, only if the hardware is right. When the CGE hardware ain't working right, the problem is generally the cables running from the mount to the electronics pier, usually the R.A. and declination cords. The problem is three-fold. The cables Celestron used were cheap Ethernet patch cords that tended to get stiff in cold weather; the mount-side connectors on the printed circuit boards were cheaply done; and the type of connectors used on cables and PCBs, RJ-45 Ethernet connectors, were cheap and not very robust.

What would happen was that in cold weather the cables would stiffen up, and movement of the declination cable as the mount slewed, or just moving the R.A. cable during setup and tear-down could cause continuity problems with the cables and their male RJ connectors. Worse, movement of stiff cables would make the female connectors on the mount circuit boards flex, eventually causing

problems there. Many CGE owners replaced their cables with better ones and cured the problem. Unluckier folks had to replace the cables, their RJ plugs, and the mount's RJ receptacles with higher grade ones available in kits from third parties.

Please note that most cable problems occur with mounts used in cold climates, but that mounts used *anywhere* can have problems after a while. If only Celestron had routed the cables internally or had used better connectors. If they had, the CGE would have been one of the best mount values of all time.

Any other downchecks? Yep, mainly having to do with hardware, as in "bolts." You will need a hex-head wrench to detach the mount head from the electronics pier or the head/pier from the tripod. More incredibly, you will need a wrench to adjust/lock the mount's altitude when polar aligning. I believe some creative scope-junk merchants offered no-tool bolt sets for the CGE that fixed this, however.

The sum up on the CGE (which was replaced by the CGEM/CGEM DX)? If it doesn't have cable/connector problems, a used CGE can be an incredible buy. While it was inspired by the G11, there is no doubt in the world that the Celestron NexStar HC and firmware are far better than any of the third party goto systems Losmandy has offered. Mechanically, the mount is fully the equal of the G11 and maybe even better in some respects (the gear setup is better than that of most G11s and easier to adjust if necessary).

What should a used CGE cost? Is there a scope included? Accessories? How old is the mount? A CGE mount alone will usually go for around 1500 to 2000 dollars for a clean, functioning example. That's pretty darned good, since a CGE is a definite step up from the CGEM/EQ-6 class of German mounts.

Great Polaris C8

As you may have noticed, back in the day Celestron didn't put its smaller OTAs on its big GEMs. There was a hosed-up GM8/C9.25 combo but no big GEM for the C8. Why? Maybe because of the mistaken assumption that no one would buy an eight-inch on a large mount. Eventually a light bulb went off: a C8 on a G11 class mount is a hell of an imaging platform. But until C wised up, until the coming of the CGE, there was a need for a medium-light GEM mount for the C8 for buyers who didn't want a fork.

Celestron carried on its love affair with Vixen for a while longer following the obsolescence of the Great Polaris C8. Between the end of the SP C8 and the coming of the Synta CG5, there was a German mount C8 some folks consider the best—or at least the most elegant—of the medium GEM breed, the GP-C8, the Great Polaris C8 (1993).

What's a GP-C8? Take a C8 OTA, slap a Vixen compatible dovetail rail on it, and mount it on a Vixen Great Polaris. Well, what's a "Great Polaris" then? The GP was Vixen's successor to the Super Polaris. It is somewhat beefier than the SP, but considerably smaller than the next step up, the GP-DX. Actually, what it is is a good mount.

The GP is able to carry a C8 or even a C9.25 without complaint, do imaging with either scope, and do it fairly well while remaining very portable indeed. The tripod, the last wooden legged tripod in a popularly priced mount (i.e. cheaper than a Takahashi), is quite stable. Fit and finish are good, if not in the Losmandy-and-up realm. All-in-all, a good match for the C8.

"That's the good, gimme the bad, Unk." The bad was that the "reasonable" $1300.00 this scope/mount cost became not quite so reasonable once even an (optional) dual axis drive system was purchased, just as was the case with the Super Polaris. Want the stuff that was becoming *de rigueur* as the 1990s wound down, things like goto or even just PEC? That $1300.00 climbed to $2300.00+ with the addition of Vixen's Skysensor computer system.

Should you get a GP-C8? Maybe. Likely it won't have goto, but if you can live without that or are willing pony-up the cost of an after-market computer upgrade from Vixen or third-parties, you could be as happy as a bird with a GP-C8. Oh, one other thing… Some GP owners are disturbed to find their mount's performance is not worlds better than their buddy's plebian CG5 goto mount. When the CG5 was first released, it was a laughably poor clone of the GP. Synta has improved things over the years, however, to the point where the CG5 is now close in function

to the Great Polaris. I'm afraid that's just the way the world works, Skeezix—but the Great Polaris is still a great GEM, CG5s or no.

Meade LXD GEM SCTs

There've been some fairly radical changes made to the commercial SCT in the years—over 30 now—that Meade and Celestron have been battling it out. One thing has remained constant, however: when one company does something, the other soon does the same thing. Usually trying to play one-upsman in the process. So it was in the GEM arena. Celestron began selling its CG series scopes, met with some success, and before we knew it there were Meade GEMs too. Actually, there's some question as to who got there first, since the Meade LXD ads began appearing in late 1992, about the same time Celestron began pushing the CG11.

Whatever. The interesting thing was the GEMs Meade mounted the pretty, white SCT OTAs *on*. The "SSC" series was to use the same hefty German mounts, the LXD 600 and 700, as the company's new line of apochromatic refractors. The 8-inch and 10-inch SCTs would use the 600, while the 12-inch and 14-inch would be available with the considerably larger LXD700. Wait a minute. "14-inch SCT OTA"? We all know Meade didn't begin selling an SCT of that aperture until over a decade later (2003), with the coming of the LX200GPS series. What gives?

That's what I wanted to know. And who better to ask than Mr. Meade SCT himself, Doc Clay Sherrod. Doc said these early 14-inchers were prototypes and were never sold, and that while a few Meade 14-inchers made it out of the factory and into the hands of amateurs, these "Were not complete telescopes." In other words, no matter what was shown in the ad in *Sky and Telescope*, you could not really have a 14 mounted on that massive LXD700 GEM. You *could* have an 8-inch, or a 10-inch, or one of a few 12-inchers sold.

What's the straight poop on the 600/700 LXDs? If nothing else, these are hefty mounts. The LXD600 is slightly larger than the modern HEQ5 (Sirius). The LXD700? It dwarfs the EQ6 (Atlas), which is not exactly a flyweight. While the LXD600 shipped with the standard Meade field tripod, the 700 required the company's enormous Giant Field Tripod (sold with the fork mount 12-inch SCT). In addition to the choice of OTA aperture, the new buyer also needed to choose the drive type that would be installed in the GEM: the #1664 Electronic Drive System or the #1697 Computer Drive System. The 1697 provided either the LXD 600 or 700 with the same goto capabilities as the Classic LX200 via the same hand controller (jam packed with an amazing 747 objects).

How good are these mounts? Certainly, they are stable. If there's a bring-down lurking, it has to do with the drive systems. The Computer Drive, which was what most SSCs were purchased with, was OK but not perfect. Despite being nearly identical to the system used on the LX200 of the day, my experience and the experience of the owners I've spoken to was that it was not quite as accurate as the fork scope when it came to object locating. I've also heard some comments that the motors seemed "under powered." Finally, I've been told these big mounts' periodic error/tracking accuracy was not always anything to write home about.

Why didn't Meade seek to improve the SSC? Actually, Meade did work on them. After a while, the 600/700 morphed into the slightly modified/updated follow-on GEMs, the LXD 650/750 (though very few SCTs were sold on these mounts). By the late 1990s, Meade hadn't run any SSC ads in a long while; they continued to sell the ED refractors on the mounts before they too faded from view.

What was the basic problem with the SSC? Hard to say. It wasn't price. At about $2000.00 with the LX200 drive, the 8-inch SSC-8 was no more expensive than its fork mount sister. If I had to guess the main reason for these scopes' short run, I'd have to say it was because Meade did not promote them aggressively. Why not? Search me. Maybe because the fork mount scopes were such a success and had a greater profit margin? That's just a guess. As to why amateurs didn't respond to these impressive-looking scopes? Again, no clue. Maybe it was just that by this time "Meade" had come to mean "fork mount" in the minds of U.S. amateurs.

The SSCs weren't the only GEM mount SCTs at Meade during these years. Meade also sold a pair of 8-inch CATs on small imported mounts (Chinese, that is), the LXD 300 and LXD 500, which deserve a place in the history books simply for being the most inexpensive complete (or nearly so) 8-inch SCTs ever sold.

The cheapest of this pair, the LXD 300 203SC/300, is mainly notable for its insane price: $795.00. What did you get for this miniscule amount? You got a white painted 8-inch OTA which was otherwise exactly the same as that used on the LX200 or any of Meade's other 8-inch SCT configurations. You got a useable 1.25-inch star diagonal, a visual back, a good Series 4000 Super Plössl eyepiece, a 30mm finder, and you got the LXD 300 mount.

What was this GEM like? Minimalist at best. What it was, more or less, was a clone of the Vixen Super Polaris. How good a copy? Not so good. The problem was not just the lightweight mount head, but also the spindly extruded-aluminum tripod. One look at this thing and I start to get seasick. Nevertheless, if you exercised a light touch on the focus knob and slow motion controls

and avoided high power, it was bearable. The mount shipped without a clock drive, but the optional and simple #535 single axis model was available. Not having a declination motor made it hard to guide the scope for photography, but you'd have to be a real masochist to want to try picture taking with the LXD 300 mount, anyway. A polar alignment scope was also available for extra moola, but if you wouldn't be taking pictures, you probably wouldn't need a close polar alignment. If nothing else, the LXD 300 provided the cash-strapped newbie an easy entry into the world of CATs, and the good OTA could be placed on a better mount when finances permitted.

What if, however, somehow or some way, the new amateur could scrape-up another hundred bucks? $895.00 would buy the considerably more versatile LXD 500 203/SC500. Same OTA, same tripod, but a better mount. The LXD500 GEM is more a clone of the Vixen Great Polaris, and that makes the scope somewhat more stable than the LXD300. Again, the accessories are minimal: a Series 4000 26mm Plössl and a 30mm finder. Also like the LXD 300, the OTA is a gleaming white, and makes for an undeniably attractive package with the black GEM (which is a lot like today's LXD 55/75). As with the cheaper scope, both drive and polar alignment borescope were optional. While the LXD 500 uses the same polar alignment finder as the LX 300, there is a dual axis drive system (the #1702) available for use with the mount in addition to a single axis (#1701) system.

The 1702 dual axis drive was the one to get if you intended to try astrophotography with the LXD 500, which quite a few people did with surprising success. One amateur of my acquaintance, Paul LeFevere, even managed to successfully guide the LXD500 with his Meade 201XT autoguider. He not only got the cantankerous 201XT to play nice with the LXD 500 he got some fairly impressive 1-hour exposures with this lowball combo (this was the day of 35mm imaging, remember). Which is not to say astrophotography was a picnic with the LXD 500. The mount head was still a bit small, and that tripod? Sheesh!

I don't hear much about the LXD 300 and 500 anymore. And there's no reason I should. They were cheap, simple scopes never destined for "classic" status. They did make quite a few novice CAT fanciers very happy, however, and are worthy of notice for that if for nothing else. Buy one used? That's possible. Enough were made that they still turn up. The question is "why"? Unless you just want the white OTA, there are better used choices available for not much more. If one were offered for a song, however, especially the LXD 500 with working dual axis drive, though, even ol' Unk might be tempted.

Celestron ASGT

It's hard to believe the ASGT CG5 is gone. Yes, Celestron's inexpensive goto GEM mount SCT had a good long run, nearly ten years, but it's been such a feature of amateur astronomy that it's hard to believe it's been replaced by a new model (the VX). Meade had its LX90, a simple and reliable goto scope, and Celestron had the ASGT, which is notable for the same reasons. But, if you are new to the game, I reckon I'd better explain what an "ASGT" and a "CG5" were and are.

"ASGT" was simply Celestron's designation for the 8-inch and 11-inch SCTs it sold on its CG5 German equatorial mount. That mount, a clone of the Vixen Great Polaris, had had a fairly long history at Celestron before it morphed into its final form, the ASGT not long after the turn of the new century.

The CG5 story began with the G8, Celestron's 90s rerelease of a C8 on a mid-size German mount. Meade had its 203SC LXD300 and LXD500, and Celestron had the G8 on a similar Chinese (Synta) mount, the CG5, Celestron called it, that looked a lot like the Vixen GP. Why did Celestron discontinue the Great Polaris C8 on the real Vixen mount? Cost, I reckon. Vixen's prices, never low, had been climbing during the 1990s. Celestron needed something like the LXD 500, a mount that could be imported for a lot less than the real deal commanded.

Was the Synta clone of the Vixen as good as its inspiration? No. While, in my opinion, it was better than the LXD300 by a country mile, and somewhat better than the LXD500, its fit and finish and periodic (gear) error were not up there with the Great Polaris. The tripod, an extruded aluminum job, was no better than the dratted LXD tripod, and the mount head's loose mechanical tolerances were ameliorated by what amateurs came to call "Chinese glue-grease."
While the CG5 wasn't as good as a Vixen, it wasn't that bad, either. If anything prevented me from giving the combo of C8 – CG5 a thumbs up, it was that pitiful tripod. A buddy of mine had a G8, however, and it was not a bad scope, not bad at all for a price just under a grand as Y2K approached.

The most amazing thing about the CG5 story? That Synta continued to improve the mount. Shortly after the turn of the new century, the G8 was history; it was replaced by a configuration Synta (who now owned Celestron) was calling the "ASGT CG5." What was different? The glue grease was gone or at least the amount of it was reduced, ball bearings had replaced thrust bearings on the R.A. axis, and the tripod was now a sturdy 2-inch steel-legged job—the same one Synta used on its big EQ-6 (Atlas) mount. And…most amazing for me…the mount had been given a NexStar computer goto system.

As I mentioned in the Ultima 8 section, not long after the ASGT was released, I found I was tired of my manual fork mount SCT, and decided to switch to a goto GEM, the CG5. When it arrived, I slapped the C8, which I'd prepared with a Vixen style dovetail beforehand, on it and hauled the rig out to the backyard. Sure was a lot easier than lugging around the Ultima fork, but I had my doubts as to how well it would work. How could an 800 buck Chinese mount goto anything? I figured it might get me in the neighborhood of targets—at best.

I set the mount up, roughly polar aligned, went through the 3-star alignment procedure (in a few years, Celestron would up that to six stars with a new hand controller and software), and hoped for the best. It was spring, so I thought bright M64 would be a good test object. I mashed the appropriate buttons, the mount slewed, I put my eye to a medium power eyepiece not expecting to see a thing…and…and…

There was the galaxy, nearly centered. M63? Same. M53? Yep. I was frankly amazed. Any object I could hope to see in my light polluted sky with a C8 through gaps in the trees was in the field of my 12mm Nagler after a goto. Not that there weren't a few downs to go with the ups. The CG5 was one noisy mount. I've often described it as sounding like a "weasel with tuberculosis." It was also, as I soon found out, power hungry, being fully capable of running down a jump-start battery in one cold evening. Finally, the plastic motor housings were cheap looking and tended to rub on the mount head in certain orientations.

And yet, this thing was freaking amazing. As I discovered at the 2005 Chiefland Star Party, it was fully capable of delivering a hundred or more objects in one night. Its goto accuracy was amazing and easily the equal of the accuracy of my NexStar 11. How good it was is demonstrated by the fact that I often used the C8/CG5 during The Herschel Project, my quest to see all 2500 of those dim objects. Reliable? Never had a problem that wasn't pilot error. I've had it for over eight years now and it just keeps going…and going…and going. It is a modern classic.

Is a CG5 or a complete CG5/SCT package a good used buy? Yes. As long as the mount has been treated kindly, there is little to go wrong. Failures can occur in any electronic device, but they are not common with the CG5. Don't pay a lot for one, of course. For a CG5/C8 in good shape with some accessories, 800 or so is a good number.

I'm often asked about the larger ASGT configuration, the version with the C11 OTA. On the Internet astronomy hangouts, you'll hear folks opine that that can't possibly work, that the C11 is too heavy for the mount. Usually, these are folks who've never actually tried the C11/CG5, however. A good buddy of mine has that very setup, and I've used it frequently over the years and been very happy with it. No, you probably wouldn't want to use it for imaging, but it is fine for visual.

How *about* imaging? I took plenty of 30-second unguided shots with the C8 and CG5, and was able to stack multiple subframes into impressive pictures. Guided, I could do 10 – 15-minute

exposures, the limit for my skies. The CG5 may not be *optimum* for imaging, but it dang sure can do it.

That word I keep using regarding the ASGT is “classic.” The CG5 *is* a modern classic. I upgraded to the mount’s successor, the VX (and got a new Edge 800 C8 to go with it), last spring, but you know what? On my last run with the CG5 at the Deep South Regional Star Gaze Spring Scrimmage, the good, old CG5 worked as well as it ever had, delivering nearly 100 Herschels in one night. Every one of them was in the field of my small chip video camera when the mount’s slews stopped, and every one of them looked good in 30-second exposures. The highest praise I can give? Like the LX90, the ASGT CG5 just *works*.

Meade LXD55/75

As I have mentioned a time or two, Meade and Celestron have always played "keep up with the Joneses." One company introduces something new, and the other comes out with a similar product. With two similar outfits competing for a limited number of amateur astronomer dollars it couldn't be any other way. So it was that Celestron's CG5 series was joined in the ad pages of *Sky and Telescope* by Meade's LXD55 scopes.

What were these scopes like? They were mixed lot, everything from Meade's standard 8-inch SCT (in a white tube); to a resurrected Schmidt Newtonian in 6, 8, and 10-inch apertures; to a pair of imported (China) achromatic refractors, a 5-inch and a 6-inch. All were placed atop a goto GEM mount Meade had manufactured in Mainland China by Jinghua, the LXD55 (the motors and electronics were installed in California). Under casual inspection, the LXD55s are attractive and maybe even impressive looking.

There wasn't much about the LXD55 to surprise anybody. It, like Celestron's CG5, is a German equatorial that's clearly inspired by the design of Vixen's timeless Great Polaris. Yep, take a Chinese GP clone, bolt on a couple of motors (servomotors just like in the CG5), add the Autostar hand controller, and you have a decent goto mount just like the CG5, right?

Well, maybe. The problem for the LXD55 was not the idea, which could clearly work; it was its execution. Almost everything on the LXD55 was substandard. Beginning with an extruded aluminum tripod that was undersized for the LXD55/C8 combination, and was preposterous when it was called upon to support a 10-inch SNT.

The real problem was the build quality of the mount head itself, though. Folks, the components of this thing looked like they were sand-cast in somebody's backyard during a Saturday night keg party. The dovetail saddle was particularly poor, and was unable to hold even smaller tubes securely. This was brought home to me one night at a Chiefland Star Party. During a slew, the 10-inch SNT set up next to me fell out off the mount and onto the ground. And I'd watched the owner secure it tightly to the mount just minutes before.

How were the slews, by the way? If you did a middling good polar alignment, gotos via the included Autostar hand control could be OK. Unfortunately, the motors used incredibly poor and flimsy encoders that didn't last. That alone was enough to ruin goto accuracy, but there was another gremlin lurking that would kill it if the encoders didn't.

The transfer gears that drove the mount's worm gears were held in place by setscrews that were of harder metal than the shafts they impinged upon. That caused the gears to loosen up over time. At first, goto accuracy would go to hell, and, eventually, the motors would just spin without moving the scope. The gear setscrews could be tightened by the user, but that had to be repeated periodically.

How was the periodic error on the mounts? Some good examples showed about 30-seconds, but that was not always the case. At any rate, using one for imaging was an exercise in frustration. The poor tripod and the loose, poor tolerances on the mount meant picture taking was difficult with the 8-inch SCT, much less with the 6-inch refractor or 10-inch SNT.

Say what you will about Meade, one of their hallmarks is that they've usually tried to correct their mistakes. In the case of the LXD55, it was clear no amount of tinkering could fix all its problems. Instead, the company chose to bring in a completely new mount, the LXD75, as a replacement.

Once you get past the LXD75's pretty white paint job, you see it's much like the LXD55. But, again, how well one of these clone mounts can work is a matter of execution, and the execution of the LXD75 is much, much better.

The tripod has been upgraded to a steel job with 1.5-inch diameter legs that is considerably more stable than the extruded aluminum horror. While the mount uses the same Autostar controller and motors similar to those on the LXD55, it is clearly better. It looks better with improved castings, and feels better, more like the CG5 than loosey-goosey LXD55.

How is goto accuracy? It's not quite up there with the CG5, mostly due to Meade's GEM firmware not having a good cone-error correction routine like Celestron's "calibration stars" system, but is in general OK. Tracking is also comparable to that of the CG5, usually hovering around a 30-second periodic error mark. I still wouldn't try photography with a 10-inch Schmidt Newtonian, but it is doable with the 8-inch SCT.

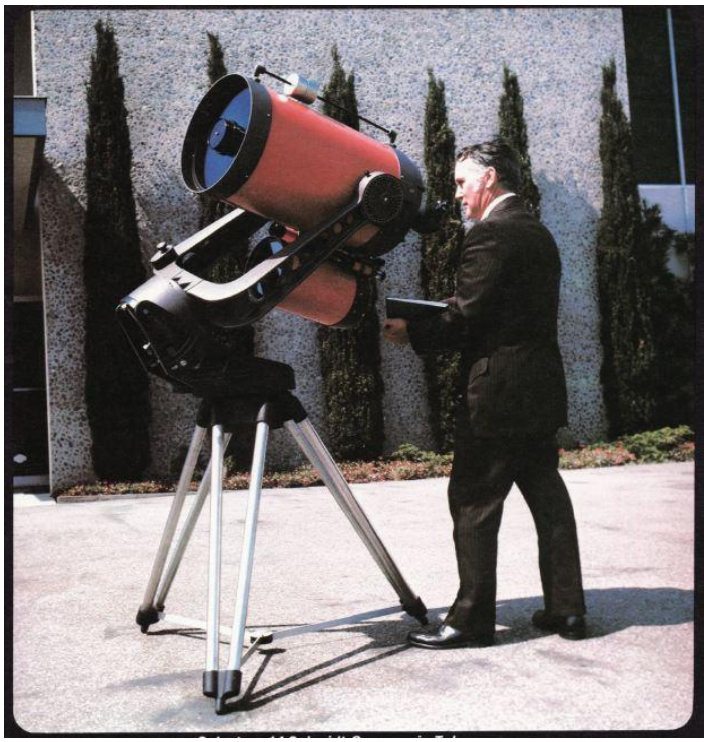
Any remaining warts? Alas, yes. One of the LXD55's most annoying problems, the loosening of the transfer gear setscrews, also afflicts at least some LXD75s. Supposedly, this was fixed during the production run, but I would not bet money on that.

Should you consider a used LXD55/75? In the case of the LXD55, the answer is “no.” Not unless you are only interested in the OTA that’s paired with it, and then only if the mount were basically thrown in for free. The LXD75? Maybe. It’s better, but in my opinion still not quite as good as the CG5. I have, for example, never seen a CG5 torn down for repair on a star party field; I have seen a couple of LXD75s undergoing major surgery.

Celestron C14

As 1972 came in, Celestron was marketing two mass-produced SCTs (their semi-custom Blue and White SCTs were still available for order), a little one, the C5, and a medium-sized one, the C8. That didn't quite cover all the bases, though. Mr. Johnson and company decided it was time for a big Orange SCT. One that would appeal to small colleges like the C16 had, but which would also be affordable for the most serious amateur astronomers. Thus cameth the legendary C14.

There've been bigger Schmidt Cassegrains over the years; not just the Celestron C16 and C22, but the Meade 16-inch and 20-inch telescopes, which are still available (maybe). But no other SCT has had the panache of the C14. For many amateurs, it's a lifelong goal. Even if when they get within reach of that goal, they decide it's not really what they need or want after all.



What's a C14 like? It is the odd duck in Celestron's SCT lineup, not just because of its humongous size and weight (which has averaged around 50 - 60-pounds for the OTA alone over the years), but because of its focal ratio. It is an f/11 while all the other Celestron SCTs are f/10s. It' also notable because it is the only Celestron SCT not available in a fork mount configuration.

It wasn't always that way. From 1972 and through the 80s, the 14-inch was available on a big fork. And I do mean *big*. From the start, Celestron realized not everybody would be able to permanently mount the C14. Even some colleges and universities wouldn't have observatories and would need be able to move the scope around. Celestron designed a fork that, unlike the fork mounts of all their other scopes (before or since), allowed the tube to be removed easily—sorta—and which could be disassembled for relatively easy set up.

How did that work? OK. But I don't care if it's a 1970s Orange Tube C14 or a modern 14-inch Meade LX600, getting a 14-inch OTA on a fork mount in the field is not easy. It is most assuredly not a job for one person, and it is not always a picnic for two.

How else did the C14 differ from her little sisters? There were two “focuser stabilizer” screws on the rear cell, which could be screwed in to immobilize the big primary mirror to prevent it from flopping when the scope changed attitude, the forerunner of the sophisticated mirror locks on the Celestron Edges and Meade ACFs. What else? The rear port was a big one to allow full illumination of 2-inch eyepieces and medium format camera film (there was, as today, a reducer to give the scopes the standard, smaller Celestron rear port). The C14 came with a 2-inch diagonal and a 2-inch eyepiece. A 40mm finder was standard.

Most of the differences were in the scope’s drivebase, however, which was more like the ones on the old Blue and Whites than those of the new Orange Tubes. Not only was the R.A. drive gear a worm rather than a spur gear as in the C8 and C5, there were two motors, an AC one for tracking, and a DC one for higher speed slewing. A DC declination motor was standard. Overall, while cheapened up a little—the famous three-spindle focus drive system of the Blue and Whites was gone—the C14, whether in its initial Orange raiment or its later black-tube finery was a worthy successor to the C12 and C16.

As the 80s and Halley faded, one thing was becoming clear to Celestron management: they just weren’t selling as many C14s as they should be. One reason for that was the C11, the next scope added to the lineup. While it didn’t have the reach of the C14, it was close, and plenty of people liked it shorter focal length and lower focal ratio (f/10), especially for picture taking.

There was another reason, too, that gigant-a-normous fork. Not only was it hard to transport, it had a periodic error that wasn’t so hot. It was also the last scope in the Celestron stable with an AC drive. In addition, this was a time when “serious” amateurs and astrophotographers going back to the German equatorial mount after a couple of decades flirtation with forks.

Finally, there was the C14’s dirty little secret. Though the C14 optics could do amazing things with all that light gathering power and focal length, they often weren’t as good as they should have been. The primary complaint being optical roughness, which tended to handicap the scope’s planetary performance, where it should have excelled.

Step one of the C14 renaissance was the phase out of the fork mount, which was replaced by the Celestron (Losmandy) CG (G11) mount. The optical tube could also be purchased separately if you wanted to put it on your own big GEM. Some amateurs mourned the loss of the big fork, but they were few. It wasn’t just big, it was looking more and more outdated as other fork mounts moved to computer control.

Then there was the focal length “problem.” Celestron dealt with it the same way they did for their other scopes. Instead of introducing faster SCTs for a photography-crazy generation of amateurs, they marketed a Jim Riffle designed f/6.3 “reducer/corrector,” which not only sped up the C14 to about f/7, but also improved the scope’s field edge. While not perfect—there were reflections and inevitable light fall-off at the edge of the field—the reducer did a good job with 35mm film.

Finally, Celestron began to get its optical quality house in order. This was mostly in response to the decline caused by Halley's Comet, a time when the company wore out its workforce and tools, but this also helped the C14, which had never been as optically consistent as the other telescopes. As the 1990s proceeded, the C14s became better and better, and are now every bit as good as the smaller scopes.

So, what are we talking about used here? I've covered the later variants, the CGs, and CIs, and CGEs already, so here we are mainly talking fork mount Orange and black scopes. What's there for the used buyer? Maybe a good scope if you understand what you are getting and what you are getting into.

First off, make sure you are willing to deal with a fork mount C14 size-wise. Don't even *think* about buying one without seeing one in person. If you don't have a permanent observatory or a way to wheel one out of the house or garage and onto an observing pad, you will need two people for scope set up *every time*, and you will not like the process.

Also, be aware the C14's drive system is primitive by modern standards. There are no computers. You can track, and you can slew at relatively slow speeds, and that is it. While upgrading the fork to a goto system isn't overly practical, the addition of a good digital setting circle system like the Argo Navis or the Sky Commander can almost bring an old scope up to date.

Don't forget about all that focal length, almost 4000mm of it. Even when equipped with a reducer, this is not a scope for wide field imaging. That is one reason many amateurs decide their long dreamed of C14 is really a C11. But don't let me dissuade you. If you've got your heart set on the C14, and its capabilities fit in with your observing programs, go for it. A good one can blow you away.

How much? As always, it depends on age, condition, accessories, and optical quality. A good middle of the road price for a fork mount C14 is about 2,000 dollars for a nice example.

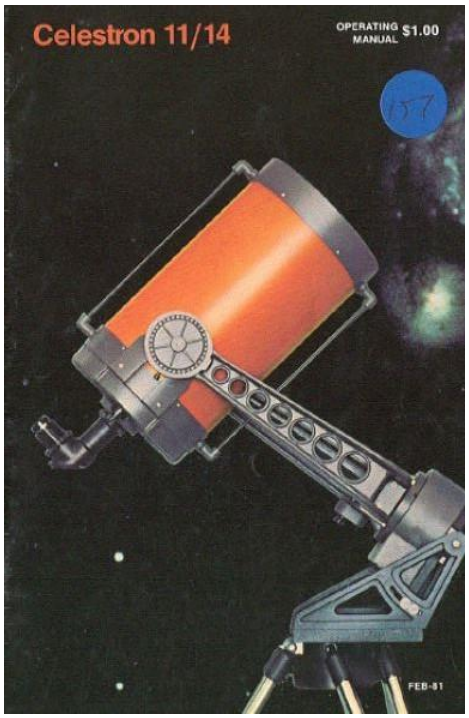
The C11

Since the C14 was so big, heavy, and expensive, the head-shed at Celestron decided the product line needed something bigger than the C8 but smaller than the C14. You woulda thought that would have meant the return of the C10 from the Celestron Pacific days, but when the new one rolled out in 1980 it was, oddly, an 11-incher.

Why doesn't the original C11 fork mount rate a separate section? Because the scope in its pre Ultima 11 form is kinda plain Jane. The mount is very much like a downsized C14 fork, but without the dual speed motors and the ability to detach the tube from the fork easily.

Still, it is a very nice telescope, one that became known as the "C14 killer," since many amateurs, as was mentioned previously, found the lower price and weight more than made up for the decrease in performance as compared to the C14. The C11 remained in its original, simple form from its inception until the ascendance of the U11 in the early 1990s, but, strangely, I don't see many of them. There seem to be many more black and Orange C14s around.

Anyhow, the C11, whether in the original Orange Tube form or its later black incarnation can be a fine telescope for someone who wants an instrument with some reach, and who is not bothered by the lack of a computer or other modern frippery. C11s tend to go for about 1200 – 1400 for a scope in excellent shape.

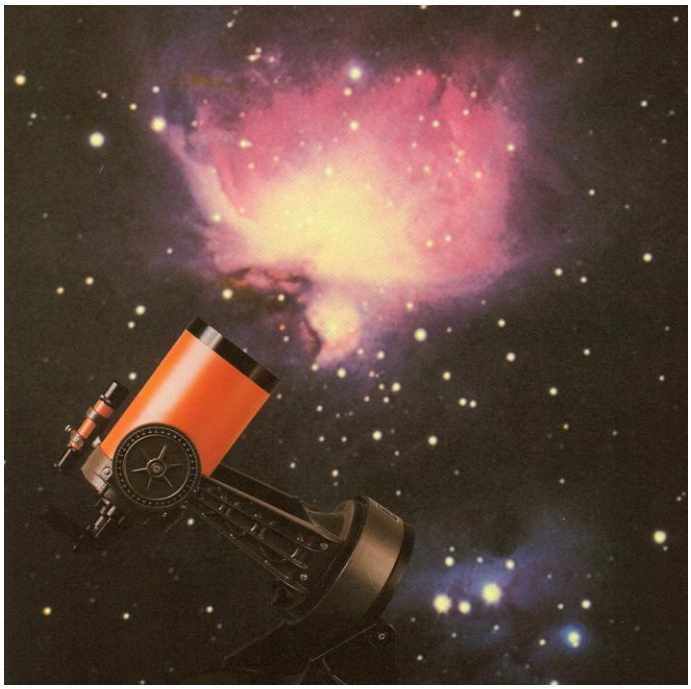


The Little Kitties

Sub 8-inch Telescopes

Celestron C5

The Celestron C5 SCT has always been a *funny little telescope*. Not funny as in "ha-ha," you understand—there's been nothing to laugh about quality-wise. This 5-inch f/10 Schmidt Cassegrain has always been respected for its optical and mechanical fineness. No, "funny" because it has always been a scope that's seemed out of place and time for both its maker and the amateurs who've considered buying one.



The story of the little beggar began in 1971, a year after the introduction of the original Orange Tube C8. Celestron Pacific, had collapsed its once extensive line of "pro" SCTs (the C10, C16, C22, etc.) to one scope, the C8, though you *could* special order the C10, at least, into the 70s. By 1971, they were looking to broaden things out again. There was a powerful reason for doing so: m-o-n-e-y. The Orange Tube, once you added "options" like a tripod and a wedge, hovered at $1000.00 U.S. That may not seem like much *these* days, but old-time amateurs will tell you a thousand bucks for a scope seemed like an insurmountable obstacle in the early 70s.

How about down-sizing the C8, then? Celestron reckoned a 5-inch CAT would still be a good performer, could sell for less than the 8-inch, and would have the side benefit of portability. Celestron debuted the C5 at the attractive (for an SCT) price of just over $500.00.

What was this new scope like? It was indeed a downsized C8 in every respect. As much like its big sister in every way as possible. How well did one perform? Pretty well. With a few caveats. The Orange Tube C5, the early ones anyway, had nothing in the way of enhanced coatings—MGFL coatings did become available later (these OTAs should have a sticker reading "special coatings"). This has a definite and detectable effect when you're comparing an Orange Tube to a more modern C5 with Starbright or XLT. Also, despite the reputation the C5 has had for

optical goodness, it must be said the earliest models to roll out of Torrance could be distinctly variable in that regard.

Features? *What features*? This is, like the C8, a simple telescope. It has an AC synchro drive (using spur gears and dual motors) and a small finder. That is it. Oh, Celestron did throw in a decent case—but it would have been unthinkable for a Celestron telescope *not* to include some kind of "footlocker" back in those innocent days.

The rear port on the C5 was the same as that on the C8, meaning that most 8-inch accessories will work on the C5. The exceptions are items, like off axis guiders and large diagonals, that run into clearance problems with the scope's drivebase or the focus knob. Oh, by the way, not all original C5s are "Orange Tubes." In 1983, with the coming of the Super C8, Celestron began phasing-out the distinctive orange colored C5 OTAs, going to a more "high tech" looking shade of black. Thus, at least some of the original series of C5s have glossy black tubes. This comprises a relatively small fraction of the C5s produced, however, and most "Orange Tube" C5s really do have orange tubes.

Many Orange Tube C5s are extremely good telescopes. In fact most all of them are. But they cannot violate the laws of physics. They perform like any other obstructed 5-inch telescope with quality optics: very good on the Moon, also good on the planets, and bearable on the deep sky. Let's face it, if you live in light polluted environs the C5 ain't exactly gonna be a powerhouse on DSOs. Globulars, for example, will be blobs—*bright* blobs—but blobs (many will resolve right nicely under better skies).

The main advantage of the C5? Portability. At 13 pounds without tripod and wedge, it's really quite possible (barely) to carry one out already mounted on tripod, plop it down in the backyard, and be observing in minutes. You'd have thought that alone would have made the original C5 a huge success. Unfortunately, ease of transport was not as necessary for the 70s amateur as it is for today's SCT User.

Back in the early 70s many folks still had respectably dark backyards. If they bought a C5, it was usually for one reason and one reason only: it was *less expensive* than a C8. To keep the C5 selling it had to remain noticeably less expensive than the C8. That created a problem for Celestron. The C5 was not much less expensive to produce than a C8. Sometimes "smaller" is actually harder to do, and this was the case with the C5.

In 1977, the base price for the C5 (just the scope—no wedge/tripod) increased from $595.00 to $795.00 in one fell swoop. Being a relatively innocent and relatively young chirper back then, I had no idea of the economics involved and wondered if Celestron were purposely trying to kill the C5. Sadly, the scope wasn't able to remain viable in the magical "below 1000 dollars" range for much longer. In 1980, the price went up *again,* to $995.00 this time, squarely in C8 territory.

In 1986, with Comet Halley approaching, telescope mania hitting the general public, and Celestron unable to keep up with C8 demand, the solution to the C5 "problem" became

abundantly clear. Bye-bye C5! The C5 was gone, and I thought I'd never see its like again. Luckily I was wrong.

Seven years after the C5 disappeared, it was back. Actually, Celestron released *two* new C5s in December of 1992. The first of these, the C5 "Classic," had a lot in common with the original (and with the then-new bottom tier C8, the Classic). It was equipped with a simple AC powered motor, a spur gear drive system, and a too-small 5x24mm finder. A light "tabletop" wedge was included with the new C5, but the scope was much happier atop a standard Celestron wedge and tripod.

The OTA was a lot like the original in most ways, but it had a white finish rather than an orange one, and featured a built-in piggyback bracket. Somehow, though, it was not quite as attractive as the old Orange Tube C5. It worked every bit as well, though; being optically as good as or better than the original.

There was one big strike against the new 5s, or so we thought. The double arm fork of the original C5 had been replaced with a single-arm arrangement. At first, amateurs were appalled. How could this *possibly* be stable? Had Celestron cheapened the C5 so much that it would now be unusable? We were wrong, it turned out. The scope looked a bit funky perched on its single arm, yeah, but it was still quite stable and very usable. The much-admired Quantum 4 and 6 Maksutovs, we remembered belatedly, had also done well on their "one arm bandit" mounts.

I mentioned *two* C5s. What was the story on the other new telescope? The second C5, the C5+ (plus) as it was called, was only different from the other new C5 in one regard: it featured a 9-volt servo motor powered drive. A nice little hand controller was included in the purchase price. As on the C5 Classic, the gears on the Pluses are of the spur type, but quite accurate. After a while (by about 1995), the C5+ gained the all-important Starbright coatings as standard equipment. The small finder was also replaced at this time—with a reasonably good 30mm job.

Why did Celestron see fit to reintroduce the C5? They knew amateur astronomy was changing again. By the 1990s, amateurs were becoming appreciative of the power of small equatorially mounted scopes (after a decade-long love affair with mega-dobsonians). Amateurs were also finding modern 50-hour-a-week lifestyles and a need to travel to dark sites made a 22-pound scope a winner (the C5 had gained a little weight over the years). Oh, and, as always, Celestron

felt the need to compete with Meade, who had recently brought back *their* small SCT, the 2045, in the form of the 2045D.

Neither of these new C5s was cheap, with the C5+ commanding a price by the end of its life that was actually *higher* than that of the then bottom of the line C8, the Celestar (basic). But, apparently, demand was good, and the Plus and the Classic C5 rocked along for almost four years. In 1996 Celestron eliminated the Classic, possibly because they just weren't selling that many of 'em. The Plus continued, but the "free" hand paddle was now made optional. This was also, incidentally, Celestron's practice with the Celestar 8-inch. Apparently, when you're trying to hold the line on the bargain level telescope overhead, every little bit helps.

Unfortunately, the fork-mount C5 Plus barely managed to hang on for another three years before getting the ax *again*. The whole thing seemed a little strange when it happened in the summer of '99. Meade, after all, was coming on *strong* with the ETX line of small fork mounted Maksutovs. Was Celestron going to concede the smaller-than-eight market to its competitor? Not at all.

Celestron merely took the C5 off the fork and plunked it down on a Synta (China) made GEM, the "CG3" (aka, EQ2). While this combo, which Celestron called the "G5," *looks* a little wobbly, it performs well, and was a fairly worthy successor to its honored C5 ancestors. It was also very reasonably priced.

The G5 was only a stopgap measure, though, a place holder while Celestron worked on the NexStar 5, its first modern goto telescope. For their first toe in the water for competing with Meade for the goto market, Celestron chose a C5, but it was quickly eclipsed by its bigger sister the NexStar 8. The NS5 wasn't the only goto CG5, however. When Celestron brought out the CG5, a C8 was there in the ASGT stable

"And the cute little NexStar 5/ASGT 5 lived happily ever after, the C5's place at Celestron forever assured." For a while, it looked like that would *not* be the case. By 2005, things had changed again, with the C5 once more fading away. Following the buyout of Celestron by Synta, one of the new owner's first moves was to introduce a C6 SCT (a 6-inch hadn't been seen since the White Tube of the 60s). And the last C5s, the CG5 (GEM) mounted version and the NS5i fork mount scope, were suddenly GONE.

AGAIN, this didn't last. The little feller must have some admirers deep inside the bowels of Celestron or its new parent, Synta. The C5 was BACK just a few months later in the spiffy new C5SE edition, a single arm fork setup with—get this—a new-fashioned ORANGE TUBE! For a

mere $699.00! This C5, like all the SE models, is made in China, but it is a very nice telescope and is a worthy heir to the lustrous C5 tradition.

Want a used C5? That's good, but be sure you understand the liabilities as well as strengths of the small wonder. Be certain you can get by with 5-inches of aperture if this is to be your primary scope, don't need a drive with photographic accuracy (unless you fancy a CG5/C5), and don't mind paying almost what a C8 of the same vintage commands. The original Orange Tube C5s are beautiful and perform very well, but, unfortunately, there don't seem to be too many around. As for the reborn non-goto C5s, the C5 Classic and the C5 Plus, either of 'em can be a good investment and may be easier to find than an Orange Tube.

How much for a C5? An Orange Tube C5 will sell for a price comparable to that of a C8. Maybe a little lower, but not much. The newer C5s? You should expect to pay somewhat less for a C5 Classic than for a C5 Plus, of course. Remember: the key to differentiating a C5 Classic from a Plus is the battery operated drive. In terms of utility, there's not that much to recommend one over the other. Most people don't buy a C5 for photography, and the addition of an inverter and one of the handy 12volt power packs sold for jump-starting cars makes any AC drive C5 just about as portable as the Plus.

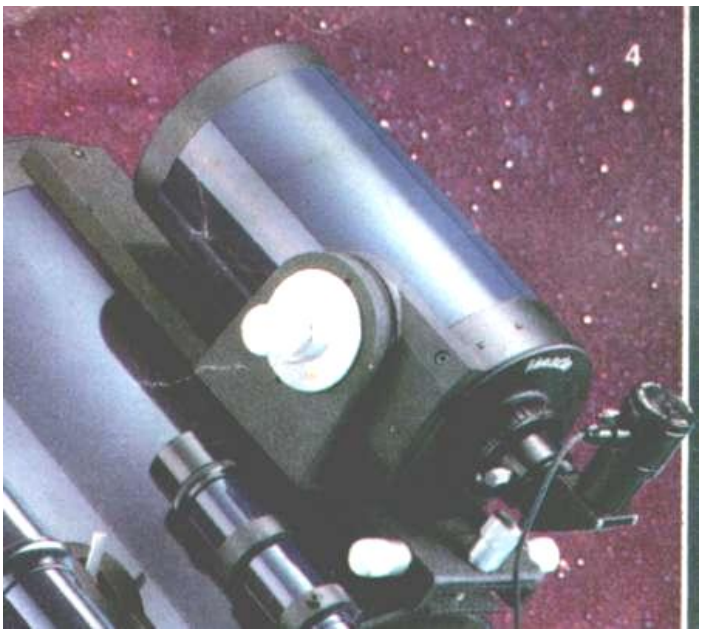
You can also find used NexStar 5s, the original NexStar 5, but I'm conflicted about that one. There were plenty of bugs in the early scopes' firmware, and the drives were nothing to write home about. A more modern C5i, the scope that came after the original NexStar is a safer bet.

What do *I* think of the C5? I've considered buying one for portability's sake off and on over the years, but have never quite got round to it. In truth, the average C8 is easy enough to trot out into the backyard. A few years ago I finally made up my mind that I wanted a super-portable CAT, but when the time came to purchase one, wouldn't you know it, the C5 was on one of her recurrent hiatuses. I couldn't find a good used one for the right price, either, and wound up with a Meade ETX125PE with all the modern computer bells and whistles instead. And so it goes with the C5.

Meade 2040 and 2044 SCTs

In 1981, only a year after introducing its first SCT, Meade was well on the way to becoming a serious competitor for Celestron. The 2080 had been a pretty sizable hit, and the company quickly rolled out a line of accessories and smaller scopes to reinforce its CAT, referring to the whole shebang as the "Meade System 2000." One of the elements of this "system" was the incredibly rare Meade Schmidt camera, **the 2066** (a 4 inch f/2.54). This thing was of limited appeal, and didn't hang around too long. The other additions, though, were, in one form or another, to become fixtures in Meade's stable for many years to come.

Most notable of these was the 2040, a 4-inch SCT. Like Celestron, Meade had a problem: the 8-inch scope, at a thousand dollars with wedge and tripod, seemed nearly as horribly expensive to amateurs of the recession afflicted 80s as the C8 had to the amateurs of the 70s. Celestron tried to address this sticker shock with its C5; now Meade had its own little CAT designed to do the same thing.



Meade's smaller SCT was "only" a 4-inch, but the 2040 was a pretty little thing with a nice, shiny blue tube. The 2040 was not just a slightly smaller doppelganger of Celestron's C5, it was considerably different mount-wise, riding on a single-arm fork like the one on the Celestron C90 MCT and the Quantum Maksutovs. As was the case with the later C5+, however, a single tine fork is not *necessarily* fatal for a small scope. The 2040 was stable, if not solid as a rock on its little mount.

In a marketing strategy identical to the one Celestron used with its C90, the 4-inch OTA was also available in a Spotter version, the **1022**, and as the **1020** Telephoto (no finder, no diagonal), which Meade recommended as a guide-scope for the SCT. That was OK *if* you didn't mind lots of trailed stars caused by using one moving-mirror-focusing scope to guide another moving-mirror-focusing scope in the long exposure film days. What's worth saying about the 2040 in the final analysis? Not too much. It was a competent performer (usually), and the AC spur gear drive was OK. But not many of the 2040s were made before it de-evolved into the almost identical and *slightly* more numerous and familiar 2044.

When we began to hear that Meade was replacing the 2040 with the "new-improved" 2044, we assumed the scope and mount *might* be upgraded to something closer to the considerably more expensive and fancy C5 (the 2040 listed for "only" $545.00 in 1981).

However, the 2044 turned out to be not quite what we were expecting. Instead of a "Meade C5," what we saw, when the Meade full-color ads hit the magazines in 1983, was a 4-inch SCT with an OTA identical to the one on the 2040, but with a considerably *lighter* and obviously cheapened mount.

The drive base on the 2040 had been similar to the one on the 2080, and the fork arm, while smaller than the arms on the 8-inch scope, was still nice and hefty. The new model's single fork arm and drive base, however, reminded me more of what had been furnished with Quantum's super-lightweight scope, the ill-fated Quantum 100. In one fell stroke, all the rumors of an "elegant" Meade 4-inch were stifled.

The 2044, despite my impressions when it was released, is, in retrospect, a nice-looking instrument that's blessed a certain attractive simplicity and *élan*. Back in the 80s, though, instead of considering the 2044 to be clean-looking, elegant, or high-tech or thinking "Questar" or "Quantum," most amateurs just thought the telescope looked *cheap*. Meade trying to save a few bucks by making the single-arm mount on the 4-inch *even lighter*, huh?

This small SCT can actually be a very pleasant telescope to use and—especially—to carry around. Let's face it, a fully loaded C5 with a field tripod and wedge ain't *that* much more portable than a C8. There's little doubt Meade probably *was* trying to save a few dollars, but what's wrong with that? The 2044 was not only cheaper to produce; Meade could sell it for less, still make money, and still deliver a useful scope. The 2044 mounting was fine for visual use, if a little shaky, and was driven by an AC spur-gear more than sufficient for visual use.

How about the optics? To put it plainly, a few 2044s were very good or excellent, most were average, and a few were downright poor. The majority of the 2040/2044 mirror sets I've seen over the years tend to be in the "average" category. OK, if nothing to write home about. The 2044's optical system was usually *good enough*, but the Meade 4-inch SCT never established a reputation for optical excellence as the C5 had.

Now, Meade was certainly not unaware of the less than stellar reputation its small wonder was earning. Our disdain for the light single-arm fork mounting on the 2044 was quite clear. As a result, the scope was around for barely two years before giving way to an improved 4-inch, the 2045. What can the 2044 (or, maybe even better, the 2040) offer a modern user? Simplicity and portability at a lower price than any vintage of C5. Check the optics, sure, but this is a downright comfortable and friendly little telescope, unarguably better built (metal, metal,

metal) than the current ETX Maks. No, the optics ain't blow-you-away like those on the ETX, but they won't make you run screaming into the night, either. 'Course, the catch is, you're not likely to find a 2040 or a 2044 for sale, as they were made in far smaller numbers than Meade's "next one," the ubiquitous 2045. How much do you pay for one? A couple of hundred max is probably fair.

Meade 2045

By 1985, Meade's little CAT, the 2044, was history. It just hadn't worked out. But was Meade gonna throw in the towel on smaller SCTs? Not hardly. The 2044 was rather quickly replaced by the 2045 and the 2045/LX3.

Meade Model 2045: 4" Schmidt-Cassegrain Telescope with Motor Drive. (Shown with optional camera adapter for terrestrial or astrophotography; camera not included.)

The 2045, the *plain vanilla 2045*, is much like its ancestor, the 2044: 110V AC spur gear drive, diminutive 5x24mm finder, and three small tabletop legs rather than a real tripod. What made the 2045 different from the 2040/44? The fork, my friends, the fork. Realizing the error of its ways—at least in the eyes of the amateurs of the time—Meade replaced the light single-arm fork of the 2044 with a more normal double tine unit.

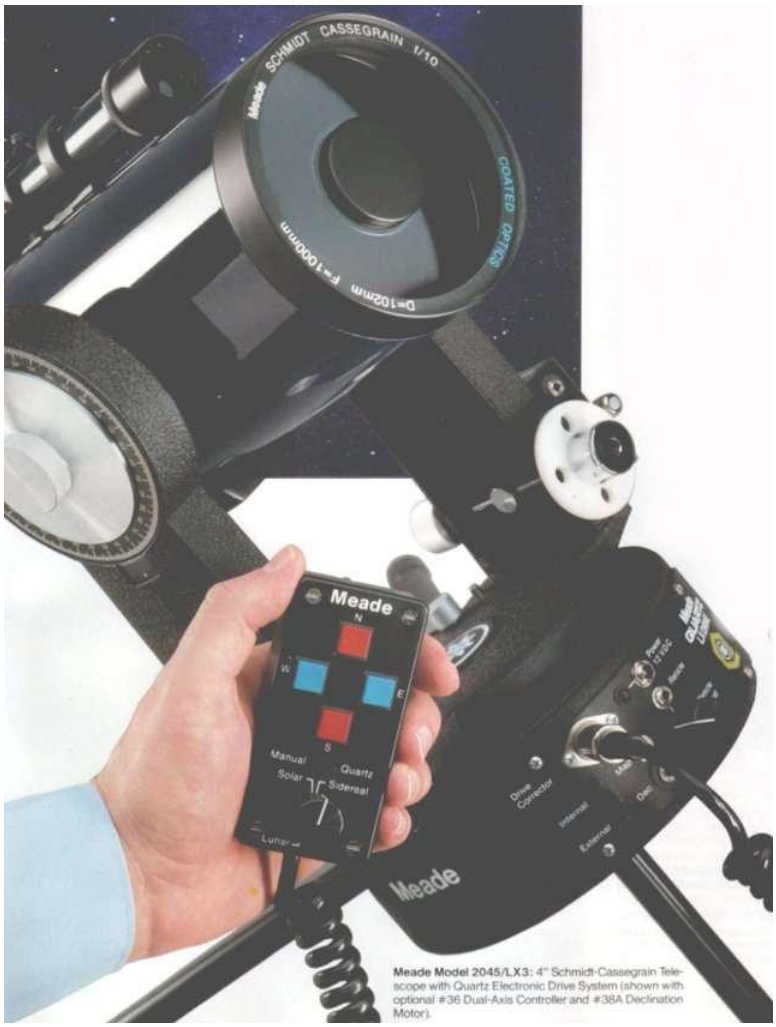
The 2045's support is definitely heavier-duty than the mount on the 2044. The 2045 is actually very much like a 2080 8-inch SCT. As with the C5, it's as if an 8-inch were left in the dryer too long and shrank. Same RA lock as the 2080. Same declination tangent arm adjustment as the 2080. Same style dual setting circles as the 2080. Same rear port arrangement as the 2080. Same old-fashioned AC drive as the 2080.

There was little, if any, change from the 2044 optics, though. *OK images*, but not world-beater quality. Meade did make MGF_2 coatings on the corrector plate standard on the 2045, though, and they did advertise the telescope as being "diffraction limited." Unfortunately, that meant about as much back then as it does today—i.e., very little. The coatings did help some. I've seen a number of 2045s over the years, and, while I haven't run across any that were truly *horrible*, I have yet to find one that I'd describe as "exquisite," either. Workmanlike? Yes. I'd rate the average C5 as "better", and not just because of the extra aperture, either (though, as was mentioned earlier, despite the legend that has grown up around the C5, that scope hasn't always had great optics either).

Should you pony-up for a 2045? Sure, why not? If the price is low enough this makes a good portable scope. The accessories, though not extravagant by 80s standards, are quite nice in today's reckoning; the scope came with a lovely aluminum carrying case and not one but *two* eyepieces (albeit simple Kellners, Meade's Modified Achromats). A prism type star diagonal was standard. Want to do more with your small scope than just look? This 2045 is actually more adaptable for photography than some more modern small CATs. If you can find a drive corrector (for you youngsters, that's a fancy inverter) and a declination motor to fit the scope,

you're on your way. Of course, if you *really* want to take pictures with a small scope, you might want to look for one of Meade's *fancy* 4-inchers…

"GREAT GOOGLY WOOGLIES!" That was my reaction, more or less, when I got my first look at Meade's *other* 4-inch CAT, the 2045/LX3. This is one fancy puppy…er… "kitty!" It's furnished with the same fork, drive base and OTA as its more plebian sister, the 2045—it's what Meade put *into* that drive base that was so amazing back then. The innovative Meade LX3 quartz DC drive system has been stuffed into this little telescope.



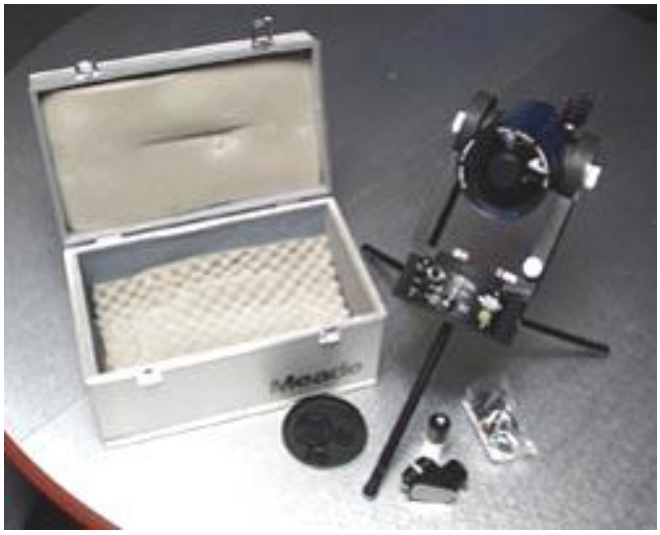
Meade Model 2045/LX3: 4" Schmidt-Cassegrain Telescope with Quartz Electronic Drive System (shown with optional #36 Dual-Axis Controller and #38A Declination Motor).

The LX3 can be powered by AC *or* DC with the appropriate cords, meaning the days of toting around a drive corrector in addition to a battery were over. Photo bug bit? Add the optional #36 hand paddle (which Meade called a "dual-axis controller") and the #38 declination motor and you were in bidness. 'Course, if you wanted to take pictures, you'd have to put this little guy on something better than the rinky-dink tabletop legs that shipped with it. But, hey, who was complaining? This was one of the prettiest small CATs *ever* produced.

So, why aren't used scope buyers beating the bushes in search of a used LX3 4-inch? A lot of folks today have never even *heard* of this scope—things change fast in CATdom, and nobody much (except your Old Uncle and a few of his buddies) seems to dwell on the ancient ones. Another reason is that there aren't that many of these Fancy Dans around. Why? Back in the 80s, this scope's price was a big problem. At close to 800 smackeroos with no options, you were definitely in C8/2080 territory.

Sure, this was a nice little "portable observatory," just as the Meade advertisements claimed, but, dollar for dollar, most buyers preferred a bigger—albeit less full-featured—8-inch instead. In other words, the same syndrome that has always been the C5's downfall. Today, when portable scopes have mucho appeal, the LX3 would no doubt be very popular, but that was not

to be back in the day. There never was a 2045/LX5, and the "3" slowly faded away. Optics? Despite multi-coatings on the corrector, a big advance, the 2045/LX3s still were looked upon as somewhat shaky image-wise. I don't know if this was fair or not, as the few 2045/LX3s I've had a chance to use have seemed decidedly better than the base 2045 (though Meade *claimed* the OTA was the same except for the coatings). I *like* this little scope, and if one were offered to me, I certainly wouldn't kick it out of bed for eatin' crackers!



The 2045 LX3 was attractive and full featured, but by 1990 it was *toast*. Actually, it didn't really disappear; it *de-evolved*, becoming more like its sister, the 2045 standard model. Meade replaced both these telescopes with a new 2045, the "2045D" in late 1990 (although both the 2045 LX3 and 2045 Standard continued to be sold for quite a while, until dealer stocks were exhausted).

De-evolved? In what way? The D's OTA was the same, featuring Meade's MCOG ("Multi Coated Optics Group") SCT optics, but the fancy LX3 drive and hand paddle went *bye-bye.* The 2045D still has a DC drive (stepper motor) powerable either by AA batteries or a 12v battery via a cigarette lighter cord, but there's no provision for varying the motor speed for photo guiding. The 2045D's clock drive is, in fact, much like the drive system on the original ETX, the ETX R.A.—install batteries, switch on, drive runs. The drive's only feature was the ability to change the direction of drive rotation for Southern Hemisphere operation. A declination motor was available for the D, but without a means of changing the speed of the RA drive for guiding, there wasn't much point in putting a dec motor on this scope.

The scope has a miniscule 5x24 finder, a diagonal, a 25mm Modified Achromat eyepiece, and a set of three of three silly little table-top legs. Case? You could get one, but it was optional and cost 79 dollars. A field tripod was an available option for $249.00 (wedge included). Which brings us to the matter of the telescope's price. When it was released, the D cost danged near as much as the 2045 LX3 did—a new D would set you back 800 smackers in 1991. Meade did manage to get the price down after a while, but the high initial pricing may explain why the 2045D never really caught-on with amateurs.

Can I say anything nice about the 2045D? The best part of the scope is its optics. By the time many 2045Ds had gone out the door, Meade, like Celestron, was beginning to pull out of its Halley-generated optics slump. I can tell you that not *all* 2045Ds are good, but quite a few are very good, noticeably more than was the case with prior Meade 4" SCTs. The fact that the R.A. drive lacks a means of adjusting its speed for guiding is not a big deal. Most people used—and use—these scopes as portable visual instruments, and the fancy LX3 drive was wasted for that

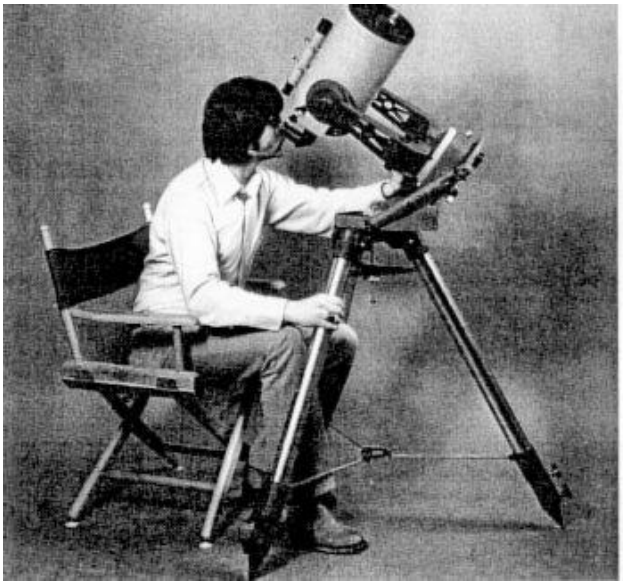
reason. All in all, not a half-bad little CAT. It may not have quite lived up to its stated role as an "Eleven and a Half Pound Observatory," as touted in the Meade ads, but it was and is a pleasing, sturdily constructed little thing. I recommend it.

What happened to the 2045D? It hobbled along through 1995 or so (though production may have actually stopped before then). What sunk it? Three letters: E-T-X! In 1996 Meade shifted gears, eliminating its 4 inch SCT and going to a slightly smaller (3.5") MCT. One with outstanding optics. None of the several permutations of ETX are as well-built as the 2045s as far as the mount goes, but they are much better optically. So the 2045 is gone forever? Maybe. Maybe not. Meade has recently introduced a pair of sub 8-inch SCTs, the 6-inch Lightswitch and its less fancy sister, the LT, so it's not out of the bounds of reasonableness to think they might bring out a four to supplement 'em before all is said and done.

The 2045D is not common on the used market, but neither is it overly rare. A realistic price would be a couple of hundred, plus some more for a scope in outstanding condition, with a nice set of accessories, and a real tripod.

Criterion Dynamax 6

"A FABULOUS NEW MULTIPURPOSE OPTICAL SYSTEM WITH THE POWER OF PALOMAR!" read Criterion's 1970s ads for their small CAT, the Dynamax 6 SCT. Hyperbole in telescope advertisements ain't exactly new, and there's plenty of it even today, but from a perspective 30 years down the road, I'm still struck by the sheer CHEEK of those Criterion folks. Oh, don't get me wrong, the company's 6-inch CAT looks nice. But the Dynamax 8 looked nice too. And most of us know that the 8 wasn't exactly top drawer as far as optics are concerned. Or mechanics. Or electronics. What made the 6-inch different from its much-maligned bigger brother?



Only its size, muchachos. In every other respect, the 6-inch CAT was very much like the 8-inch. Same spindly mount (though the 6's lighter tube assembly helped there), same less-than-accurate AC spur gear drive. Same sub-par optics. That last is really what defines these telescopes. The mount and general build quality aren't that great, but could be forgiven if the optics were superb. Or just consistently good. Alas, they usually ain't even workmanlike. Correctors tend to be rough, and the optics are, in general, poorly matched—correctors and primary mirrors don't work well together. That's a shame. If these scopes had been capable of good optical performance, they actually would've offered some advantages, including a whole inch more aperture than you-know-who's C5.

But the Criterion 6 couldn't fight its way out of the proverbial paper bag when it came to optics, much less deliver, "The power of professional observatory optics…" as the Criterion spiel claimed. There may be some optically good 6es out there, some folks say there are, but as is the case with the Criterion 8, I've never seen one. This was A Nice Idea, but the half-hearted execution led to a scope that was not ready for prime time. Pass it by. Nuff said?

Bausch and Lomb 4000

The mid 1980s, "Halley-Time," was an odd period for the amateur astronomer. People who'd never thought we were anything but slightly *cracked* in our obsession with the heavens were suddenly coming to us, hat in hand, with deadly serious questions: "My wife wanted me to ask…*please*…a buddy of hers at work says Halley is going to hit Earth. *The Government is hiding it from us.* What is the TRUTH?"

It wasn't just the impressionable among us who'd gone *Comet-crazy*. Even mass merchandisers were positively *twitter-pated*. Stores that had previously carried only the worst 60mm con-jobs now stocked real telescopes. Or at least telescopes that were a *little* more "real" than your average 1980s Jason or Tasco.

That was the scene when your unsuspecting Old Uncle Rod (not so old then) was first confronted by a Bausch and Lomb 4000 4-inch SCT. The little bird turned up during a reconnaissance of a Service Merchandise store (a long-gone jewelry and a-little-bit-of-everything-else seller) located in Gautier, Mississippi. "What a pretty little thing! *Just like a C5 or Meade 2045.* Right there on the store shelf in front of me! And only 500 bucks! What a *steal*."

Or was it? Unk's wife at the time (NOT the wonderful Miss Dorothy) *sure* didn't think so. It could have been made of platinum-trimmed gold and she wouldn't have liked it, however. Me? I'd already heard horror stories about the "quality" of the B&L 8000, suddenly became possessed with the chilling fear that Bad Scopes always inspire in me, and slowly *backed away* from the little siren.

"Little siren" is right. Even today this is an attractive SCT. It's small and cute, and the mount is nicely finished. All-in-all, the 4000 seems considerably more solid than big sister 8000. I'm sure that *quite* a few non-astronomer *volk* bought this little thing while in the grip of Comet Fever (it's *educational*, hon, *for the kids!*). Other than the fact that for these folks an f/11 SCT was about the worst possible type of instrument for viewing the (in)famous comet, how would a 4000 perform, then or now?

I have no doubt that those non-amateurs who actually got this scope pointed at the Comet were incredibly pleased. But, honestly, if the Meade 2045 is a Ford Fairlane, *this* thing is a Ford *Pinto*—with a smoldering gas tank. Those I've looked through have had optics in the range of "fair" to "*astonishingly* bad." One was *so* bad that I wondered if that really was a corrector plate or just a piece of flat glass on the front of the tube.

Most 4000s are not *that* bad, delivering passable views of deep sky objects and recognizable images of the Moon and planets, but the Ground Truth here is that the little CAT was poorer than a contemporary C5 or a Meade 2045, and a modern ETX will walk all over it. In short, the optics had everything in common with the seldom-seen and not-so-hotsky Criterion-badged 4-incher (Bausch and Lomb bought out Criterion and continued its business into Halley Time).

As delivered, the scope came with a tabletop tripod, two (cheap) eyepieces, a miniscule finder, and an AC clock drive. The 4000 closely resembles a Meade 2045 in every respect. A bargain today? For a 100 bucks or less, maybe. *If* you can arrange for an optical check and don't expect too much, that is. With Meade ETX 90s being available used for less than 200 dollars, the B&L 4-inch is not a scope that has much appeal left. Many 4000s were made and quite a few were sold, so there is no shortage of 'em on the used market if you just *have* to have one.

Yeah, I *know*…that *poor little CAT* sittin' on a dealer's table at a star party tugs at your heart-strings. "*Please* give me a good home, Uncle Rod," it mews. BEWARE!

HERE COME THE MAKS!

MCTs: Maksutov Cassegrain Telescopes

Quantum's 4, 6, and 8… Questar Killers?

The Seventies, like the 1960s, saw Joe and Jane amateur salivating over the expensive Questar MCTs. Not that most of us could afford one. Or even *begin* to afford one in the case of the Questar 7-inch. Rank and file amateurs couldn't even conceive of *saving up* for one of those. In the early 1970s, you could have either a Questar 7 OR a FORD MUSTANG for the same money.

Stratospheric prices or not, these Maksutovs had a powerful attraction for the amateurs of the time. We didn't know much about the MCT design, to tell you the truth, but we were *told* by those in the know it was something special. The appeal of a compact scope was also beginning to be overwhelming (try loading an 8-inch Optical Craftsmen Equatorial Newtonian into the back of your Ford Maverick). It wasn't only practicality. The Questars were just so darned *beautiful* in those every-month-inside-front-cover advertisements in *Sky and Telescope*. I wanted one bad.

With the coming of the gas shortage in the early 1970s, many U.S. amateurs did give up their GEM mount monsters, but they abandoned them for *SCTs* from Celestron, not for high-priced Questar MCTs. In 1976, though, it looked like that might change. Optical Techniques Incorporated (OTI) was started by Bob Schneck, a former Questar Vice-President, that year. The company, which also included several other ex-Questar staffers in its ranks, set out to do just one thing: out Questar Questar. Schneck and his associates intended to do this both by building on the Questar design, which they felt still had room for improvement, and, most interestingly for cash-strapped sprouts like me, selling larger aperture MCTs at considerably lower prices than those Questar demanded.

By early 1978, this new company had begun deliveries of its telescopes, initially in 4 and 6-

inch apertures. How did they stack up to the vaunted Questar, at that time the paragon of quality? Very well. Unsurprisingly, the Quantums were very similar to the Questars. After all, not only had the company been established by ex-Questarites, they used many of the same vendors and parts suppliers as the Q gang. Most importantly, the optics came from the same firm who's made most of Questar's optics, J.R. Cumberland, Inc. of Marlow Heights, Maryland. No, Questar didn't and *doesn't* do its own optics, but this never compromised the quality of its scopes. It has a pretty stringent set of specs that incoming optical sets must meet. That was also the case with OTI—at first, anyway.

The optics for the Quantum Maksutovs didn't just come from the same source as those of the Questars, they were almost identical in design. The Quantums are (relatively) long focal length Maksutov Cassegrain Telescopes of the familiar all-spherical Gregory design that features the silvered-spot-secondary on the inside of the thick meniscus corrector plate. Coatings for the Quantum Maks were available in either standard aluminum for the mirrors and magnesium fluoride for the corrector, or as an enhanced coatings package that featured silvered mirrors and a high-transmission coating for the corrector plate. There was one area where OTI didn't try to keep up with Questar: primary substrate. Mirrors for the Questars were available in Pyrex, Cer-Vit (a ceramic sorta stuff), and Quartz; OTI offered only Pyrex.

The Questar and Quantum telescopes were also quite similar mechanically. Both were fork-mounted and both utilized a moving mirror focusing arrangement. The Quantum also mimicked *some* of Questar's famous "control box" setup. The Questars, then and now, allow you to switch a Barlow lens into the optical path or use a (dew prone) wide field finder objective in place of the normal optics at the touch of a control on the rear cell. This Questar scheme, designed to allow the observer to stay at the eyepiece, has its detractors—some people never get used to the finder setup, especially—but it's one of those wonderful little design touches that's kept Questar in business over the years. Quantum duplicated the Barlow system, but eschewed the under-tube-switch-in-finder. Whether this was due to patent considerations, cost, or philosophy I'm not sure.

The Quantums also failed to reproduce one other Questar hallmark, the slide-on dew shield. Oh, you could buy a dew shield for your Quantum that fitted over the OTA, but this was not quite the same as the beautiful, engraved Questar item. Nevertheless, Quantum did have a one-up on Questar: all its optical tubes could be removed from their mounts ala' the Questar duplex system, enabling the scope to be dismounted from the drive and fork and used as a spotting scope or telephoto lens (assuming you wanted to use an f/15 telephoto lens).

However…there is one immediately obvious way the Questars and Quantum differ, and that is their forks. The Quantums weren't really forked you see…they were half forked. That's right, like today's Celestron NexStar 8SE, the Quantum 4 and 6 were mounted on a "one arm bandit," a single arm fork. This mount is very well made, however, and the lack of the "other" fork tine does not compromise the scope's steadiness. As for the rest of the mount, it's nice-looking with its shiny metal and all, but is really just plain vanilla—by today's standards, anyway.

What you have is the same thing you'd have on a Celestron Orange Tube C8 (or a Questar) of the time, a drive powered by a synchronous AC motor. Plug the scope into the wall, it goes. Unplug it, it stops. You could use a battery and a drive corrector to power the Quantum in the field and make guiding corrections during deep sky astrophotography. Or you could just use a battery and an inverter. Most people used an inexpensive inverter, as you'd have to purty much be a masochist to go deep sky shooting at f/15. If you weren't taking pictures, you really didn't need to be able to make the small tracking corrections drive correctors allowed.

The Quantum 4-inch is the most commonly encountered of the OTI scopes, if not necessarily the most desirable. "Most common" in that Quantum was able to get 645 4-inchers out the door before all was said and done. This is a delicious little scope; it's very similar to a Questar 3.5. In fact, a well-made Q4 is every bit as good as a Questar 3.5. Don't expect much gain from the extra half inch of aperture, however; you'll notice little difference in image brightness between this scope and a Questar 3.5. Make that, "you'll notice no difference."

The 4 does look nice, however, even compared to the classic Questar. The tube on the Quantum 4 is a mite longer than that of the Q3.5, since the primary mirror has a slightly higher "native" focal ratio (f/2.5). This longer tube seems to give it a nice, *streamlined* look. You don't really even notice the lack of the engraved starmap/Moonmap. The blue of the Quantum tube looks just, plain elegant, the RA and declination slow motion controls on a well-maintained Quantum 4 are buttery smooth, and the focus is appropriately precise and responsive.

It isn't all gravy thirty plus years down the road, however. This is a good time to mention the Quantum focus *bugaboo*. OTI coupled the focus knob to the focus mechanism that drives the mirror via a twisted, toothed belt rather than with a direct drive. This is usually not a problem for the 4, but after this many years, these belts may have begun to stretch and go bad in big sister Q6.

Accessory-wise, the Quantum was OK, if not generously decked-out by the standards of the time. What you got by 1980 was the scope, mount-drive base, a 16mm Brandon eyepiece, a lens cap, a (nice) wooden carrying case and a 6x30 finder. Tabletop legs for the drive base were an option, as were wedges, tripods and dew shields.

What are the Quantum 4 prospects for today's buyer? Typically, a well-maintained 4 is considered a very desirable item, one lusted after mightily by Maksutov fanciers. Owners are not likely to let one go at a bargain price. This is exacerbated by the fact that only 645 of 'em are out there, tops. It *is possible* to find a 4-inch in less than pristine condition, and it's possible to have one restored by people who know what they're doing, but by the time all is said and done you might just as well just have bought a good condition used Questar 3.5 and saved yourself a lot of time and trouble. In its day, the Quantum received a lot of good comment amongst amateurs, but it didn't really blow us away. Maybe because, despite the promises that we'd be able to afford one, it was, at $1395.00, not *much* cheaper than its Questar inspiration. No, the 4 wasn't as intriguing as you'd think, but the telescope's 6-inch big sister? That was another story.

The Quantum 6 is a legendary telescope. Almost every CAT-toting amateur has heard of it and wanted (or wants) one. It's a little surprising, then, to find out Optical Techniques produced a measly 288 6-inchers. The small number was no doubt due both to the relatively high price this f/15 scope commanded, $2595.00 in 1980, and, perhaps, the apparent difficulty OTI had producing them. The thing is, though, that 2600 smackers, if you had 'em then (I didn't), was a positive *bargain* compared to the price of the equivalent Questar, the Questar 7 (called the "doctor's scope" and not just because of its beautiful operating-room-instrument appearance). Actually, in several ways the Quantum was a *superior* scope. Cool-down time for the 6 is reasonable; it's pretty horrendous for the Questar 7 except in mild climates. The 7 is a big scope that needs a big mounting. The Q6 is more manageable. Really portable.

Which is not to say this is a perfect CAT. The optics were of the same high order as those of the 4 when the company was in its heyday, but in other areas OTI ran into problems upsizing the 4-inch design. The single arm fork on the 6 is stable *enough*, but not as stable as that of the 4. The drive gears and motors are the same as those on the smaller scope, so drive performance was never quite as good, and, apparently due to this under sizing, some Q6 motors are failing now. There was also the aforementioned focuser drive belt. Like the drive system, what worked for the 4 wasn't quite good enough for the 6. The heavier primary mirror meant that the belt drive system for focusing was somewhat marginal in the beginning, and, as these belts have aged over the last 20 years, they've become real problems. Luckily, it is possible to have the telescope's focuser converted to "direct drive," and this has been done to quite a few of the 6es out there.

Nevertheless, if you could get your hands on a Quantum 6, you'd *have something*. You'd have to be a REAL Maksutov fan to seek one out, since you'd have to be willing to spend a lot of money in either tracking down and paying for a mint specimen or in having a banged-up example resuscitated, but *you'd have something*, alright. An MCT that is, yes, I'll say it, *better* than the Questar 7 (whatever *that* means), and definitely has an air of sophisticated panache!

The Quantum 6 featured the same accessories as the 4-inch with a single exception: a 50mm finder replaced the 30mm model. Actually, there was one other thing the 6 had over the 4. The eyepiece holder (both scopes feature a Questar-style built-in diagonal) could accommodate 2-

inch eyepieces. This was an unheard of luxury at the time (if not that useful—most people were still loaded down with 1.25" Orthos).
6-inches ain't enough for ya? You don't just want something *better* than a Q7, you want something *bigger* too? OTI tried. Toward the end of the company's life, they attempted to introduce an 8-inch Quantum. This was an f/15 scope identical to the 6 inch except for its aperture. The scope was to be sold as an OTA only—initially, anyway. Sadly, the 8 never got off the ground, with OTI going down in flames shortly after it was introduced. I'm told a grand total of 8 telescopes were produced before the end.

A final Quantum is the seldom seen Quantum 100. This appears to be a cheapened 4-inch on a very light, very portable mount. I don't have much information on this model other than the picture below, so I would appreciate details on it if anyone out there in CAT Land can supply them.

Are there any BAD Quantums? Surprisingly, yes, a few. In the months before the company's demise in mid-1980, there was supposedly stress and pressure aplenty at the firm's Pennsylvania factory (located not far from Questar headquarters, by the way). The optics for the telescopes still came from the same, good source, but assembly and alignment of the components was not as painstaking toward the end. The company also discontinued their initial procedure of star-testing each and every Quantum that went out the door. This meant that some less-good optics *probably* went into the scopes rather than being returned to the vendor for a rework.

How did a company with such a bright future succumb? What killed the dream? The reality of economics. It turned out that there was a good reason for Questar's high prices. Producing scopes at the quality level of Questar, which Quantum duplicated as best they could, took M-O-N-E-Y. Profits on the scopes at the price range Quantum established were miniscule. Maybe sometimes even in negative territory. Couple that with the fact that these prices were still too high for most amateur astronomers to afford, and you had a recipe for disaster. By the time OTI faced facts the company was gone.

But not forgotten. Most amateurs, CAT fanciers, anyway, who were around in the late 70s and early 80s have fond memories of Quantum if they were able to use one of the company's CATs, or at least good impressions if all they saw were the advertisements in *Sky and Telescope*. The scopes were exquisite and insanely cheap *for the quality and care inherent in them*. If it's your goal to find and buy a Quantum, my hat's off to you. I believe that is a noble quest.

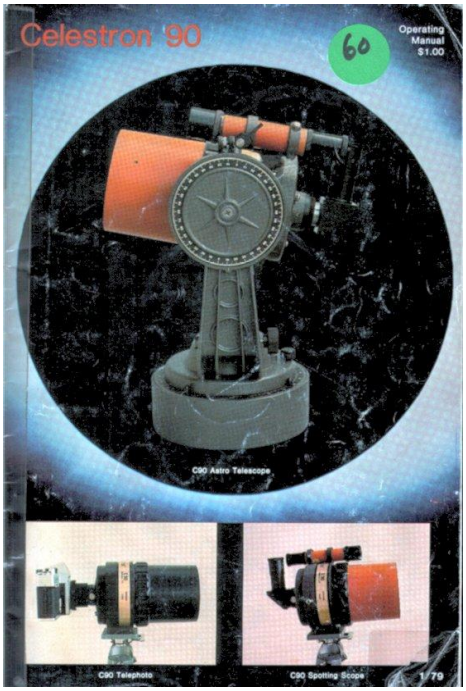
Actually, OTI is not completely gone. It lives on in a shadow existence even today in the form of Davro Incorporated, which was started by OTI survivors. The company doesn't make telescopes for amateurs, being involved in defense work for the most part. But they will still refurbish the old Quantums, a measure of how proud the men who made these telescopes still are of their *considerable* achievement.

*Note: Special thanks to Quantum expert extraordinaire, **Jack Estes**, whose contributions made this entry possible.*

Little Bitty Kitty: The Celestron C90

Think "Celestron" or "Meade" and you naturally think "SCT." They are the scopes that have made both companies famous and have always been their bread and butter in the "serious" amateur market. Both companies have flirted with other Catadioptric designs over the years, however. The Maksutov Cassegrain has been an especial interest of Meade, who made these scopes a major part of their business for years. There are the ETXes—all of the larger than 70mm models have been MCTs—which are incredibly popular, and a sometimes a big 7-inch MCT (now discontinued) on LX50 and LX200 mounts.

Celestron, on the other hand, hasn't been as wont to experiment. They do sell various scopes of various designs in addition to SCTs, but these are all beginners/bargain scopes. SCTs have pretty much been *it* for the Big C with one major exception: the much maligned C90.

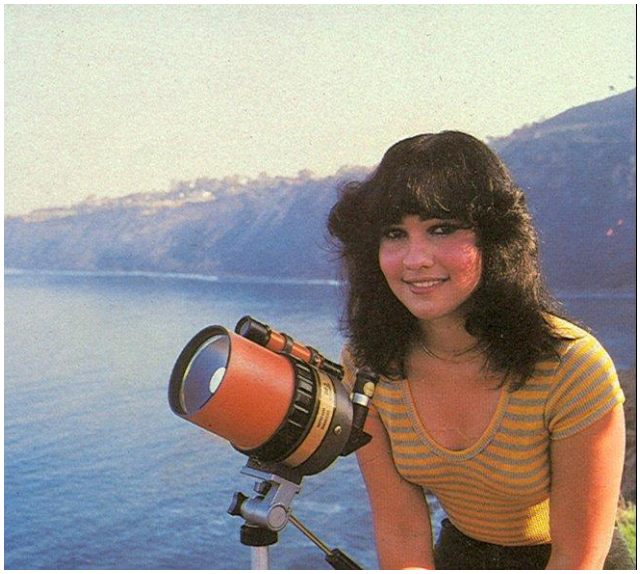


In 1977 I began hearing rumors about a new Celestron telescope, one that would be *considerably* cheaper than the C8 or even the C5, both of which hunkered down close to the 1000 hard-to-get 70s dollars mark. Was I disappointed to learn the new scope was called the "C90" because it offered only 90mm of aperture? A little. The late seventies and early eighties were not a time when many amateurs longed for small, portable scopes, not CATs smaller than 8-inches, anyway.

When the Celestron ads began to trumpet the C90, a couple of things were readily apparent: while small, the C90 was *cute*, no doubt about that. It was also cheap. Sort of. At a list price of $495.00 it was equal in cost to some of the serious Newtonians that still inhabited the pages of *Sky and Telescope*. One thing that did pique my interest, at least, was that this was not an SCT, but an exotic Maksutov Cassegrain, *just like the Questar*.

Anyhoo, for better or worse, there it was, the Celestron C90. To be exact, there *they* were: Celestron introduced three C90s: the Astro, the Spotter, and the Telephoto. The 495 simoleons got you the most interesting (to us amateurs) of the three, the "Astro" model. This is an attractive portable set-up even today. The essential C90 Astro is an f/11 Maksutov-Cassegrain OTA with an aluminized-spot secondary. This cute (I keep using that word) Celestron Orange-painted C90 barrel rode on a small but reasonably sturdy single-arm fork mount. The drive wasn't high tech, being an AC synchro model, naturally, but it did work. Also included were an 18mm eyepiece and a 2.5X barlow (these were both in .965" format, but an optional adapter was available that allowed the use of a 1.25" star diagonal and eyepieces). Riding on the OTA

was a tiny 5x24mm finder. The whole shebang was housed in an attractive and useful hard carrying case.



The *other* 90s? The spotting scope and telephoto lens configurations? The spotter was nothing more than the Astro OTA without a mount. A ¼ 20-tpi under-tube mounting block that all 90s (including the Astro) featured allowed the spotting scope to be placed on a standard photo tripod. The Telephoto was slightly different. Instead of a pretty orange tube, most had a black one—to look more SLR-like, I reckon. There was no diagonal included, just a T adapter for hooking scope to camera like any other generic telephoto lens. With the addition of the proper accessories, it was possible put a diagonal on the Telephoto C90 and use it as a scope, but there wasn't a finder, so you'd have to rig something up on your own to help in aiming this high focal ratio scope at targets.

Yeah. "Cute." Right. How well did it *work*? We've all heard horror stories about the C90, which has been less than kindly referred to as "a crummy telephoto lens masquerading as a telescope." This is the time to dispel at least some of these tales. There have no doubt been *some* lemon C90s sold over the years, and I've been among the C90's tormentors in the past.

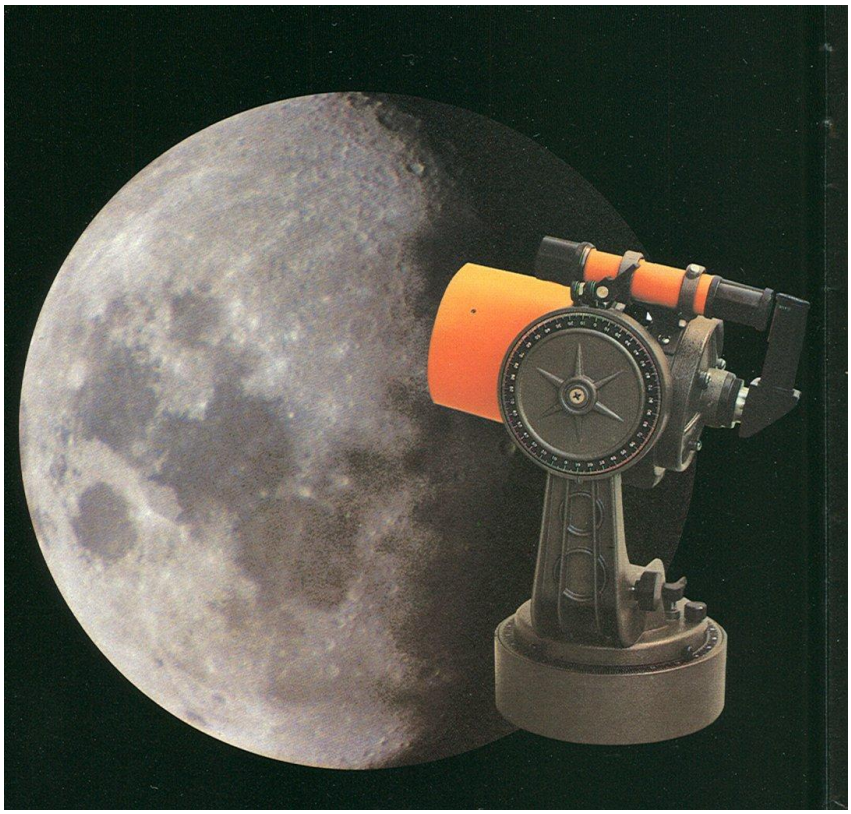
When I stopped and thought about it, though, I started wondering where these horrible 90s were. The fact is that I've not been able to *find* one of those bad ones everybody complains about. Many of the little scopes, in fact, compare quite favorably to the Meade ETX 90 in optical quality. Which is NOT to say they are perfect. C90s are not Questars or Quantums, and don't *always* equal the ETX. The majority of C90s I've been able to test *are* relatively impressive optically, however.

So why does this kitten get such a bad rap? There are two principal reasons. First, there's a tendency for people to mount the scope on a tripod that's too light for it. Most of the C90s sold since 1978 have been Spotters or Telephotos, and many have wound up on K-Mart tripods for astro use. This is a bad thing. The 90 *looks* small, but the OTA is actually fairly hefty, and the relatively high magnification it operates at means it needs sturdy support.

Then there's the C90's focusing method. It doesn't move the primary mirror to focus like a C8 or C5; instead, the barrel is twisted to focus—like a camera lens. If the scope is sturdily mounted and all is well mechanically with the OTA, this arrangement works fine. If the C90 is placed on a light tripod, though, accurate focusing becomes difficult because of the need to

grasp the barrel, which causes enough vibration to make finding perfect focus impossible. The scope delivers “bad” (out of focus) images no matter how good its optics *really* are.

Other than optics, how is the scope, and, especially, the Astro? Pretty derned nice. Adding the optional wedge and “Triangle Tripod” Celestron offered for the Astro model really drove the price up to crazy levels (try 700 bucks in ’78), but it makes for a sweet, steady, ultra-portable setup. It ain’t *all* sweet, of course. There’s that *incredibly silly* 5x24 finder. Not only is the finder small, it’s a little close to the OTA, making it hard to get an eye at it. Another annoyance is the scope’s .965” setup on the rear cell. I still can’t understand why Celestron did that. Sure, you can get a 1.25” adapter, but you can expect to see some vignetting with 1.25-inch eyepieces longer than 32mm in focal length.



There’s another problem when it comes to using the C90 for astronomy, though, a problem that has nothing to do with its build quality. The 90s are, well, 90mm scopes. Perfect for quick-look use, but not exactly deep sky powerhouses. I have had some very pleasing views of the Moon and planets with these little Maksutovs, but this is not the scope for serious Solar System observation. Nevertheless, this is a fun CAT. It’s easier to adapt for photo use than Meade’s modern ETX, and has a much higher quality feel—being metal rather than plastic.

Whither the 90? The little bugger kept on rockin’ in one form or another for almost 25 years. The Astro was the first 90 to fade away, but it took a long time to disappear—‘till about 1990. Celestron’s 1989 catalog, the last one in which the Astro scope appeared, prominently features a yummy-looking Astro 90 with a shiny Celestron-black tube. There’s also a *very* beautiful *brass* C90. After 1990, the C90 continued on in its spotter guise, gaining rubber armor. Not much was heard of the 90 as an *astronomical* telescope again until the late in the decade. At that time, Celestron reintroduced an “astro” 90 in the form of a C90 optical tube mounted on an imported EQ2/CG3 German equatorial.

This “G3” C90 was a nice configuration, with the GEM, the same mount used for the C5/G5, providing very solid good support for the small MCT. No, the G3 wasn’t nearly as pretty as the Astro fork, but it was sturdier, and certainly cheap enough at less than 400 dollars. Alas, the G3 disappeared from Celestron’s lineup in late 2001. And, shockingly, not long after, even the C90 spotter was gone.

Why? The “why” is known only to Celestron’s marketeers, but I assume that by the turn of the century it was much more practical and economical to buy small Maksutovs from than to produce them in-house. Be that as it may, I miss the “old” C90, and I kinda feel bad for talking it down over the years without knowing as much about it as I should have. This was an underrated scope all its little life, and still makes a great grab ‘n go scope or, with its decent aperture, and non-moving mirror, *a guidescope*.

As of this writing, 2013, the C90 *is* actually back. In a sense. Celestron is selling a 90mm MCT under the moniker “C90.” This CAT has absolutely nothing to do with the original C90, though, being similar in appearance to the other imported Maks Celestron has sold over the last decade. Is it a worthy successor to the real C90? It seems to be. While the quality apparently varies a little, by all accounts the new one, which has a bargain basement price, is a good performer.

Should you consider buying a used “classic” C90, Astro or otherwise? Do you need a grab-‘n go/travel scope? Will you use one often enough to make owning one practical? If the answers are “yes,” go for it. As always, star-test if possible, and, very importantly, try the C90 *in person*. It’s small in size and some folks find it fussy and frustrating to use (the same can be said for the 90mm ETX). My final verdict after all these years? This is a sweet, good-natured little scope. *I like it.*

The Mighty ETX

What can you say about a legend? One thing's sure: you have to at least admit the ETX *is* a legend whether you consider yourself a Meade fan or not. Ah, yes, well I remember that golden day back in '96 when…

Your old Uncle was sitting on his you-know-what, browsing through the latest post-Richard Berry issue of *Astronomy Magazine* issue to appear in the front hall of Chaos Manor South. Since it's my usual practice to read magazines from back to front (god knows why), it took a while for me to reach the big Meade ads that resided up front. What did I see when I got there? *Meade had* (gasp) *cloned the Questar 3.5.*

How *well* did they do **The Deed**? How closely did this new telescope, the "ETX" (which letters, we learned later, stood for "Everybody's Telescope"), stack up against the original, the legendary, Q3.5 Maksutov? How well, especially, in the eyes of a generation (Baby Boom) of amateurs who'd, almost to a man and woman, at least occasionally *lusted* after the beautiful little Questar?

The original ETX 90 (later referred to by the company as the "ETX RA"), wasn't a Questar; that was evident just from looking at the magazine ads. It was obvious there was a considerable amount of plastic involved. The question foremost in *my* mind, however, was: *optics, optics, optic*s. How close could the Meade glass come to the vaunted J.R. Cumberland optics of the real deal?

It wasn't too long before I got my hands on one of the little puppies and had my answer: *to my middle-aged eyes, the ETX optics were indistinguishable from those in the Q3.5*. They were *that* good, yes. Over the years since I tried my first ETX, I've had a few Questar fanatics challenge me on this point, claiming the Q's images are "higher contrast." I've never seen that. I didn't rely on memory of what the Questar optics are like, either. Way-back-when in the 1990s, I did an actual side-by-side shootout between the ETX 90 and the Questar 3.5. Result of my back and forthing on Moon, planets, and deep sky? No difference did I see. None. Nada. Zip. Zilch. So, the inexpensive ETX ($495.00) was the equal of its inspiration, the Questar, which cost at least six times as much? Yes. *Optically*.

Alas, a telescope is not just optics. There's the "everything else," and it was in this everything where the Meade came up short. You're probably thinking, "Ah-hah, that bad old plastic." Not really. While most of the scope was made from plastic (fork arms, drive base, rear cell) that really wasn't what caused the Meade to finish a distant second. It was, rather, the *execution* of the *details*. The Questar 3.5, as you probably know, includes as a part of its design an ergonomic control box on the rear cell. You focus, switch a Barlow in and out, and change the eyepiece to its through-the-main-eyepiece-finder mode with well-placed buttery-feeling controls.

The original ETX? It was graced with a too-small focus knob that became difficult to access when the OTA was pointed much above the horizon. While the focus action was smooth enough, I certainly wouldn't describe it as "buttery," and turning said control resulted in fairly obvious mirror shift (the Questar *usually* has almost none). The other controls, RA and DEC slow motion knobs and locks, like the focuser, *worked*, but were poorly placed, and just felt "cheap."

There's also the RA drive situation. While the ETX is a small scope, its high focal ratio, f/13.8, means that even a 25mm eyepiece yields the relatively high magnification of 50x. You need a clock drive for an f/14 telescope, even a 3-incher. The li'l guy did have one, if only for the R.A. axis. Unfortunately, this drive was a little cantankerous. Once you aimed the scope and locked the R.A. lock firmly to engage the drive, it took a while to "catch." As much as 30 seconds for some examples. You learned to put the desired target on the edge of the eyepiece FOV to ensure it would be somewhere near the center when the drive finally kicked in. This (battery powered) RA drive, by the way, didn't have any kind of hand control. You turned it on, it ran; you turned it off, it quit. Some ingenious entrepreneurs devised motorized RA (and declination) slow motions for the scope, but all these had a bit of a Rube Goldberg feel. Also, to some extent, piling options on the little thing felt like gilding the lily. The ETX was a simple scope that (mostly) *worked* just as it came out of the box.

A little doubtful about this Questar knockoff? Then or now, all it takes is a look at the Moon through one to change your mind. The best description is "APO like." The image is *that* good; clear, sharp, high-contrast, beautiful. Sure, after a while the limitations inherent in 90mm

aperture become apparent. 90mm is 90mm, and at this focal length what you can expect is great views of the Moon, nice "casual" views of the planets, and dim views of medium to small sized Messiers (and other bright DSOs). Large objects are, of course, truncated by the scope's relatively narrow field. One plus for the ETX as compared to the Questar? At least you didn't pay three grand for 90mm of deep sky enjoyment.

Problems? Caveats? Abandon-all-hopes-ye-who-enter-heres for the used buyer? Given the scope's basically inexpensive nature, surprisingly few. Yeah, it's mostly plastic, but if it's been treated kindly and stored adequately (not in some hot attic) with dust caps in place) all should be well. There's really only one major problem you should be aware of: *the sliding secondary baffle syndrome*. Like its Questar inspiration, the ETX is a Gregory-style Maksutov. That is, the secondary mirror is a silvered (aluminized) spot on the corrector. To provide good contrast, this spot must be surrounded by a baffle. Unfortunately, the adhesive used to affix this baffle to the ETX 90s corrector plate had an unfortunate tendency to start letting go after a while. That meant the baffle would slowly slide down the corrector, becoming ever more de-centered. Meade eventually corrected this problem, and provided adhesive fix-it kits to owners in trouble. Now? The new Meade owners won't be inclined to do a thing for you, I'd guess.

What can you expect to find included with a used ETX? Well, Meade and third parties provided a world of "stuff" for the proud ETX owner, everything from cases, to the aforementioned drive/hand controller kits. You might get any of this. What came out of the box, though? The scope. A good eyepiece (initially a Plossl, but a Kellner toward the end). Three little (useless) Questar tabletop style legs. Which brings up the fact that you'll need a real tripod. Meade sold full-size tripods for the little guy, and it can be adapted to a photo-video tripod with fair ease. A sturdy tripod is *not* an option. The high magnification nature of the scope makes one mandatory.

Any other downchecks? Being an R.A. drive-only non-computerized scope, the original ETX must be polar aligned in order to track sky objects. The geometry of tipping the scope over so the forks point at the pole means you will find the ETX can't be pointed very low to the south. That is, however, also the case with the ETX's far more expensive inspiration, the Questar.

One very noticeable deficiency? The finder. Lacking the Questar's luxurious reflex finder arrangement, the ETX, be it the ETX of 1996 or fairly recent models, was saddled with a too small and hard to use finder. Small aperture and awkward placement make it a real joy to use—NOT. Meade did begin to offer "improved" and right angle finders after someone finally convinced them that the original scope's miniscule straight-through model was *insane*, but these improvements, while welcome, were never enough.

The Autostar ETX (EC/AT)

Just when we thought Meade couldn't surprise us again, they did. With a computerized goto model of the ETX. Not only did this ETX include the same good optics as the original, it added goto and alt-az tracking via something called an "Autostar." Yep, the Autostar first appeared for use with the ETX; tell your LX200 ACF wielding buddies to put that in their pipes and smoke it the next time they start teasing you about your small wonder. The ETX blazed the trail for all the Meade goto scopes that followed, making the computer controller on the LX200 "classic" look and feel primitive by comparison.

I probably don't have to describe the Autostar, since it's so ubiquitous these days. Suffice to say, it was a revelation back in 1999 when Meade introduced it. In addition to providing multi-speed motorized slewing and alt-az as well as polar aligned tracking, this ergonomically designed handbox seemed to do everything but make the coffee. Not only would it give rise and set times for objects, it would scroll a message across its little red LED display telling you more than you ever wanted to know about your target. It wouldn't just go to thousands of Messiers and NGCs, it would let you add your own objects.

Alas, much more than in the original, *execution* became a factor with the Autostar equipped ETX. It was, frankly, asking a lot for an inexpensive little plastic scope to reliably goto celestial objects. As early adopters found out, even if you were maniacal about carefully aligning the telescope, targets still might not wind up in the field of even a low power eyepiece. The vagaries of an inexpensive gear system, coupled with a long focal length, coupled with a need to assemble these scopes cheaply, meant problems were inevitable. Even so, ETXes that are not grossly defective can do at least a reasonable job of pointing.

What might you, Miss or Mr. Used Buyer, want to be wary of when considering an Autostar ETX? In the near-decade the Autostar ETX has been on the market, users have suffered just about every problem imaginable. And not just in the hardware realm. The Autostar software was fairly buggy at first. Luckily, Meade made the Autostar user upgradeable (online) and has continued to exterminate bugs and add features as the years have rolled on. Hardware, though? A list of possible problems, a very partial list, includes:

- The slipping secondary baffle (just like the original) on some earlier Autostar models).
- A "right tube adapter" that breaks over time, meaning you can no longer lock the scope in declination.
- Too much grease on the declinaton axis, making it impossible to lock the scope down.
- Bad cables for the Autostar.
- Defective Autostars.
- Egregious mirror shift (mainly on the 125; more on that scope below).

- Broken hard stops. These stops, initially made of plastic, were designed to prevent the scope from rotating so much in RA/Az that the cable bundle running up to the fork breaks.
- Defective declination gears.
- Excessive backlash on both axes.

This is not meant to scare you away from the ETX, only to emphasize a need to "try before you buy." Chances are the ETX you are considering is afflicted by none of these maladies. *But it might be.*

What's in the box? Surprisingly, until recently one thing that was *not* in the box was the Autostar. For most of the ETX's life, the Autostar computer was an extra-cost option. What was included with the scope was a "manual" controller. Without the Autostar, what you had was a scope that, like the original, had to be polar-aligned to track. All the EC/AT adds without an Autostar is motorized slow motions/slewing on both axes. Like the original, a good Plössl is standard. Oh, and you'd need to buy the tripod separately as well, just as with the first 90; all that's included is a set of those crazy li'l tabletop doo-hickey legs. If you're buying an ETX that has actually been used, chances are the owner will be including both tripod and Autostar in the deal.

The ETX 125 and 105: Big Sisters

90mm ain't much aperture. As the 1990s gave way to the oughts, Meade realized larger versions of the ETX might help Everybody's Telescope develop an even wider audience. First up was the 125, a 5-inch version, whose extra aperture really, really helps in the "what can you see" department. The 125 can access everything Celestron's legendary C5 can deep-sky-wise (within the restrictions imposed by the ETX's narrower field of view), and that's a lot. It can also, like the C5, show a surprising amount of detail on the planets. Actually, it can show *more* than the C5, as its optics, despite what you may have heard, are noticeably higher in contrast and a bit sharper as well.

125 bad stuff? Almost all the problems that can afflict the Autostar 90 can afflict the 125, but it brought a couple of new problems to the table as well. Some early examples showed a huge amount of focus shift. Turn the knob to focus, and Jupiter might move all the way out of the field. Meade cured this problem in short order, but there may still be used scopes with this annoying problem out there. Almost as bad in some folks' opinion is the ETX fork's steadiness or lack thereof. The 125 is capable of delivering quality views at surprisingly high magnifications due to its excellent optics, but, ironically, it's hard to accurately focus the scope at high power. Meade didn't so much design the 125 as just upsize the 90. The plastic fork that is sufficient for the 90 is *almost* a no-go for the 125.

How about a little less aperture for a little less money? Meade's last ETX introduction was the 105. This 4-inch scope benefited from the company's years of ETX wrangling, and incorporated some hardware improvements that make it the most reliable of the EC/AT scopes. Alas, the loss

of almost an inch of aperture, though, does have an effect. This CAT is markedly less capable as a primary instrument than the 125. It also wasn't *much* less expensive than the 125, and most people wanting More Better Gooder spent the extra bucks. This *inbetweenness*, despite the scope's otherwise good reputation, meant it never sold like li'l sis or big sis, which led to Meade's eventual phase-out of the 105 (in 2006). The 105 might be a very good used buy—if you can find one. Fewer were made and sold, so this is a somewhat rare bird on the used market.

The New Breed

In 2005, Meade updated the ETX again with the PE series. This version incorporates some significant changes and improvements. Gone is that lousy little finder of yore. It's been replaced with a much more useable red dot sight, which is incorporated into the scope's LNT ("Level North Technology") module. The red dot is a much more practical aid to getting the scope aligned than the small finders, and also has some clever features. It, for example, turns itself off after the alignment process is complete (it can be turned back on via the Autostar), and the red "dot" can be varied in brightness or even made to blink if desired.

The LNT and associated circuitry do more than furnish the scope with a bb-gun style sight; they provide a more user-friendly alignment system for the ETX. Using the LNT alignment method, all the user must do is turn the scope counterclockwise until it encounters the hard stop (metal in the PE), and turn on the power. The scopes gets the time and date from its precision internal clock, finds north and level via electronic sensors, picks an alignment star, and slews to it. This alignment process, which is similar to the procedure for Meade's GPS-equipped SCTs, means all the user must worry about is centering alignment stars with the Autostar's direction buttons and pressing enter.

Meade upgraded both the 90 and the 125 (and, for a while, the 105) with this LNT gadgetry, but went even farther with the 125. The plastic fork of yore is now only plastic on the *outside*. Beneath the plastic covering is a real, metal fork. This makes the 125 considerably more stable than its predecessors. ETX PEs come standard with an Autostar, a decent tripod, a tripod carrying bag (nice, if cheaply made), and a 26mm Meade Super Plössl.

Any caveats? Some of the earliest models' LNT modules were defective and/or prone to intermittent operation. The "lens" of the earliest PEs was a plastic lens that, if you werern't careful, was easy to break off while moving or storing the telescope. Meade fixed that and upgraded the finder and associated circuitry/software a couple of times already. One minor "problem"? Meade decided to do away with the traditional blue ETX tube for the PEs. The OTAs of the initial ETX PEs were silk-screened with deep space images (see Uncle Rod's 125PE below). Some people like this, some hate it. Eventually, Meade decided to make the plain blue tube an option for the PE for this reason.

What happened to the ETXes? Almost unbelievably, Meade, in the throes of its economic meltdown discontinued the scope that had been one of its biggest money makers for years. Oh,

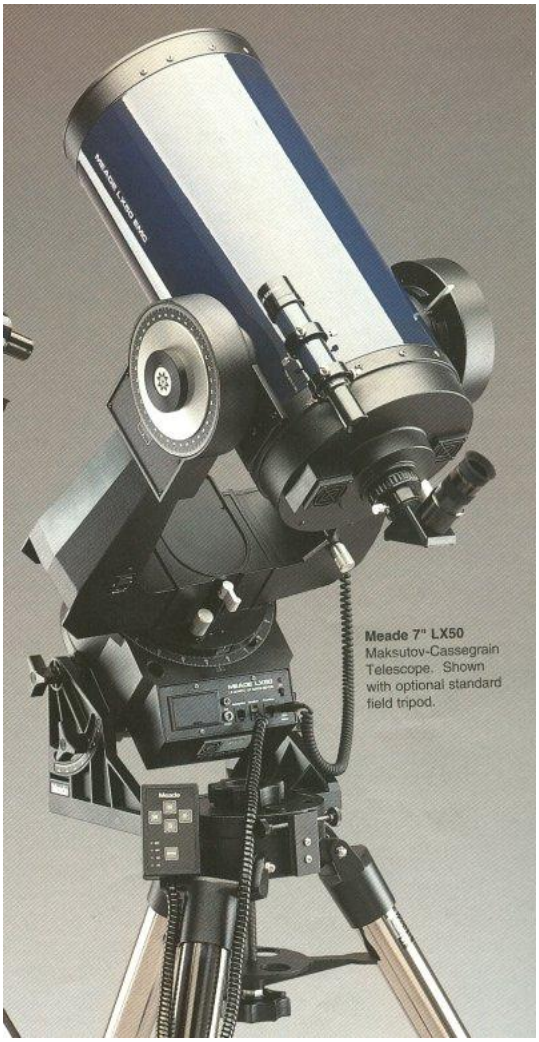
it continues on in the form of a cheapened 90 (with optics that are only fair), but that is it. I would not be surprised to see the new owners of Meade bring it back, however. It deserves it, and with a little TLC could be better than ever.

If all this ETX history seems confusing, there is a place to go where all will be clarified. There's a tremendous amount of ETX information available online, mainly on one wonderful website. If you need more than what's here, the best place to look for all things ETX—always—is Mike Weasner's Mighty ETX site, (http://www.weasner.com/etx). While Mike has stopped updating the page due to problems with his ISP and the noticeable decline in interest in the scope as the ETX has been phased out, he is keeping what is there now up, and that is a good thing.

What's Unk Rod's final word on *all* ETXes? If you don't want to spend a lot of money, can live with small to smallish optics, can also live with some quality compromises, but want very good optics in a portable package, one of these little kitties might be just the thing. Which one? You decide what you need aperture-wise, but my advice is "the more recent the better." Meade has continually improved the ETX year in, year out.

Meade LX200/LX200GPS 7-inch MCT

In 1995, Meade was on a winning streak, having just hit one out of the park with the LX200 (classic). They were introducing new gear, cool new gear, left and right, so it wasn't a complete surprise when they brought out a 7-inch Maksutov in both goto and non-goto versions using the LX200 and LX50 mounts. What did surprise us was how CHEAP it was. Compared to the Questar 7, anyway. The Meade 7-inch MCT was only about a hundred bucks more than a 10-inch SCT. This was a nearly unheard of low price for a big Mak, especially one with so many charms. Even the non-goto LX50 model had a mount and drive system far more sophisticated than that of the Questar 7. Sure, the Questar 7 OTA (some of 'em) had that sophisticated Barlow/finder control box. The Meades, however, sported dual cooling fans, something the Questar sure coulda (and still could) use.



Optically? It's hard to get a sense of what's average for this telescope, as there have never been many out in the field to look through. Oh, plenty of Joe and Jane Amateurs were enthusiastic to have a quality MCT available for this good price, but most of 'em spent their telescope dollars on the LX200 10-inch SCT instead. Most of the scopes I've seen have very good optics (though not every one of them), and produce high quality, high contrast images fully on a par with the Questar.

If there are two things that will influence how much you like this scope, however, they are focal length and cool down. With a focal ratio of f/15, you won't be showing off the Pleiades to your boyfriend or girlfriend, but you may be surprised at how good many medium-small deep sky objects look: superb contrast and nice tight stars. Planets? Real groovy. Once the scope cools down, adjusts to outdoor temperature, that is.

New 7-inch owners were hoping the fans Meade mounted on the rear cell would banish the cool down demon that had always tormented the poor Questar 7. Surely, two fans blowing air into the OTA would help. Nope. Sorry, there, Boudreaux. Sho' *didn't*. Not as much as we hoped, anyhow. The telescope's users were puzzled for quite a while as to the "why." Until some brave soul broke down an M7. What did this explorer find? A big, heat-absorbing cast iron weight in the rear.

Meade put this weight in the rear cell in order to balance the longer-than-an-SCT tube on a standard fork. Yep, that was the gremlin. What to do? Some folks didn't have to do anything. In a mild climate like California or Possum Swamp, the fans did enough to make the scope behave thermally. Everybody else? Either accept the fact that the Meade would, like the Questar, sometimes *never* cool down. Or you could keep the scope in an unheated area. Or you could try to remove the weight and rig up some kind of a Rube Goldberg balance system. Meade also sold the scope as an OTA only, but, strangely, seems to have added that dratted weight to at least *some* of those scopes.

Cool down or no, the M7 had quite a few devotees. *Still* has some. Sadly, though, they were never there in large enough numbers to keep the telescope going over the long run. It went barely a decade before disappearing. I was a-feared, frankly, that it was a gone pecan in 2002. That was the year Meade shut down the LX200 Classic line and introduced the GPS. But, no, a couple of years later, in 2004, back came the 7 in her new finery. Meade even *sold* a few of 'em. By 2006, however, the scope was really gone. I'm not sure there was ever a formal announcement from Meade about its demise. There should have been. Despite a few *faux pas*, this was a wonderful CAT.

In the used market? The problem is not price. The scope does hold its price well, but does not go for exorbitant amounts. 1200 – 1500 or less is common. The problem is availability, especially if you are looking for a GPS model. If you find one, however, and you can stand the focal length and cool down blues, yeah, I will envy you your beautiful Meade 7.

The Intes MK66 and MK67

As the 1980s gave way to the 1990s, memories of the decades-long Cold War between the United States and the Soviet Union began to fade and a number of interesting Russian products began to appear in the good, ol' USA. At first these were largely curiosities—surplus Soviet paratroop badges and the like. It didn't stay that way for long. As trade really opened up, we began seeing a wide variety of Russian industrial goods. Everything from tractors to *telescopes*.

Yes, telescopes, *amateur telescopes,* being peddled by a number of Russian makers. Foremost among them, at first, anyhow, was a Moscow firm called "Intes." They entered the U.S. amateur gear market with a 6-inch f/10 Maksutov Cassegrain called, in no-nonsense Russian fashion, the "MK65." This scope, which was sold only by a single U.S. dealer initially, had a number of problems. The optics were often—if not always—pretty good, but the "everything else;" the focuser, especially, could be problematical. Intes, however, as it turned out, was serious about selling telescopes in the U.S., and followed this misstep with a genuine classic, the MK67 MCT.

The MK67

A look at the 150mm aperture MK67 immediately brings visions of the Russian Steppe, dour babushkas, and T72 tanks. If the Questar 7 is a Ferrari, the MK67 is a *Zil*. Quality-wise, this Rumak Maksutov is much closer to an Italian sportscar than a Soviet limousine, however. Not that it *looked* it. As you can see in the image, the MK67 is, well, a little *plain*. White paintjob. Some decal lettering. "No-nonsense" sums it up.

Like its predecessor, the MK67 offers 6-inches of aperture, but its focal ratio has been slowed down a bit to F/12.5, and considerable mechanical improvements to the focuser and mirror cell have been made. Vital statistics? This is an all-spherical system in the Rumak (Sigler) style. "Wuts they-at mean, Unk?" It means that, unlike the Gregory-style Maks (Questar, ETX, etc.), the Intes uses a separate secondary mirror in a mount—like an SCT—rather than a silvered spot on the corrector lens. This makes the scope easily user collimatable, just like an SCT. The higher focal ratio helps the primary (Pyrex with Silicon Monoxide overcoatings), the secondary (same), and the corrector (multicoated BK7 glass) produce a flatter field than a standard SCT. While the

secondary is fairly large for this aperture (53mm with its baffle), the scope delivers good contrast.

What else? Well, this ain't no lightweight. 14 pounds is pretty heavy for a 6-incher. It's easy enough to schlep around, though, via the built-in carrying handle-cum-piggyback-camera-mount seen in the photos. That much weight does make it inadvisable to skimp on mounts. Not only is this Mak comparable to an SCT weight-wise, the tube is slightly longer, and for best results the scope should be placed this on something in the CG5 GEM range AT LEAST.

Not only is the MK67 Spartan in the looks department, it's also Spartan when it comes to accessories. Intes definitely skimped here. You did get a case, a soft sided canvas affair, but there was no eyepiece included, and the finder shipped with most of the scopes, a 7x35 model, is best described as "putrid." The only other thing included with this CAT that could remotely be called an "accessory" is the Vixen compatible dovetail bar attached to the OTA.

How about that focuser? There was good and bad there. The original wasn't very effective, as it had a tendency to slip, but was eventually replaced by a very respectable Crayford. Quality really wasn't the problem where the focuser was concerned, however. The problem was *utility*. Unfortunately, the scope, unlike the SCTs we're so familiar with, used a fixed primary mirror and focused by moving the eyepiece in and out with the Crayford.

This arrangement, while it obviously eliminates the focus shift inherent in moving mirror scopes, provides little effective focus travel. About 35mm. You could use a 1.25-inch diagonal with 1.25-inch eyepieces. Or a 2-inch diagonal with 2-inch eyepieces. But you *couldn't* use 1.25-inch eyepieces in a 2-inch diagonal via an adapter. There just wasn't enough travel to accommodate that set up. In addition, 2-inch eyepieces with "weird" focus characteristics wouldn't work either. The 12mm Nagler 2, for example, a hybrid 1.25-inch 2-inch eyepiece, couldn't be racked out far enough when used in a 2-inch diagonal. To work in the MK67, it *had* to be placed in a 1.25-inch diagonal. Cameras? Even worse—most would not come to focus.

Despite the above annoyances, however, the MK67 was most assuredly a nice scope optically. While Intes quoted a wavefront error for the 67 of ¼ wave, most owners found their scopes actually tested out closer to 1/5 – 1/6 wave. As mentioned earlier, contrast was quite good despite the somewhat large secondary assembly, and the scope would do a heck of a job on the Moon and planets. Deep sky? The MK67 was limited only by its aperture and by the relatively narrow fields brought on by its f/12.5 focal ratio. In tests, this scope was often said to perform "like a 4-inch APO," but many users found it slightly better than that. Like all medium – large MCTs, the MK67 had a respectable "cooldown time," so folks who lived up north in Yankeeland often found themselves waiting an hour or three in the wintertime for the scope to "settle down."

What should the used buyer interested in the MK67 beware of? Not much, really. This is a sturdy scope designed for the long-haul. Tips? Don't mess with the primary. The primary mirror on these MCTs *can* be collimated/adjusted via pairs of push-pull Allen screws on the rear cell.

Leave these alone unless you really know what you are doing. Normally, only collimate by means of the Allen screws on the secondary. Finally, beware of paying too much for one. The scope sold new for less than $850.00, so don't shell out too much for one no matter how sweet it looks.

Intes actually sold *two* MK67's: the standard scope discussed above, and a "Deluxe." In addition to the features of the Standard, the Deluxe offered a more thermally stable Sital primary instead of Pyrex to aid with cool down, enhanced mirror coatings rather than standard aluminum, and a built-in aluminum dew shield. Intes also "guaranteed" a 1/8 wave error for the Deluxe.

The MK66

Before long, *another* Russian landed, the Intes **MK66**. This scope is identical to the MK67 in every way (including optical quality) save one: it focuses like a Celestron or Meade SCT via a moving primary mirror, and features an SCT compatible rear port/visual back. This is really a tremendous advantage. Not only does it open up a whole world of accessories for the 66 (people have used SCT focal reducers successfully with the MK66); it eliminates the focus travel problems inherent in the Crayford-equipped MK67. "Focus shift?" you say. "How about focus shift?" It's minimal in this telescope. The combination of a relatively small primary and good engineering mean you won't be much bothered by that particular gremlin from the Kremlin.

Intes offered a Deluxe version of the MK66, too. This model adds the same features as the Deluxe 67 to the basic scope: better primary substrate, better coatings, bigger (if not much better) finder, better wavefront error specs.

The upshot? If you want an MCT in this aperture range, it's hard *not* to recommend the MK66 or MK67. On a modern goto mount like the CG5, this scope can be a real performer, leaving the ETX125 in the dust as far as light gathering power and build quality go. If I had my druthers, I'd get the MK66, as I don't think the fixed mirror focusing arrangement of the 67 was a very practical one for a compound scope.

One last thing should be mentioned: the company that made this telescope, Intes, is now out of business (as of 2006). That shouldn't mean much to the used buyer, however. There's little, if

anything, that should ever need replacing on this rugged kitty. It would take quite some doing, even, to break the (thick) corrector.

How do you get one? Intes is gone, but they made and sold a considerable number of these scopes, so it is not difficult to find one (the 67 is, unfortunately, more common than the 66). Can't find an Intes MK67 to suit you? Keep your peepers peeled for an *Orion Argonaut 150*, then. U.S. dealer Orion (Telescope and Binocular Center) sold the scope for a while badged as the Argonaut. This scope, shown in the image below, is identical to the standard 67 except for the paintjob (black). Orion offered the scope as an OTA or in a package with a lightweight GEM as an option. Unfortunately the GSO-made mount was a bit *too* light for this scope in my opinion.

The Constant Classic: The Questar 3.5

Like a lot of folks in the astronomy biz, I reckon, I have a habit of slinging around the word "classic" when referring to my favorite telescopes. Some of the CATs your ol' Uncle has been known to append this term to are:

- The Celestron Pacific Blue and White SCTS.
- The Celestron Orange Tubes.
- The Quantum MCTs.
- The "Classic" LX200.
- The Celestron Ultima 8.
- The NexStar GPS

Those are all good—or even great—telescopes, but the *real classic*? The one CAT that is so fine (too fine to be mine) that it has continued to be sold, bought, and loved for over 50 years nearly unchanged? *The Questar 3.5.*

THE QUESTAR TELESCOPE IS A VALUABLE TEACHING TOOL

It is indeed gratifying that every month more and more elementary schools, high schools, and colleges are buying Questars. Many educators have realized that it isn't always necessary to spend hard-won tax dollars to build an observatory with a large, expensive telescope in order to provide an astronomy course. If you have $10,000 to spend, for example, 10 Questars would furnish a whole class in astronomy or general science with superfine telescopes, with the added advantage of being able to use them in the daytime for safe solar work and nature study. Moreover, today's fine plate-glass windows permit flawless views of the heavens, except near the zenith and for this a skylight might be utilized. A south-facing window will permit following of the moon and many other important sky objects.

Recently we received a letter from Mr. Curtis W. Gable, an eighth-grade science teacher who decided to experiment with his own Questar in his classroom. He used it for teaching the types of astronomical instruments and for studying the sun with Questar's safe, external solar filter.

The students responded with such delight and exuberance that a regular program involving other science teachers and approximately 200 students was developed the following year. The course helped to identify several students who proved to be capable of high-quality work in astronomy.

This student interest led next to the forming of an astronomy club which met several times a month. Its wide range of activities included a discussion of current events in astronomy, a presentation of special reports on astronomical subjects, the showing of 35-mm. slides, practice in the use of the telescope, and special observation sessions. While club members brought in their own telescopes, the Questar, because of its being so easily set up as an equatorial, and because of its clock drive and setting circles, was the most useful for teaching.

We were particularly interested in the instruction course each student was put through before he was permitted to use the instrument. First he was given some typed pages of information to read, which included a numbered diagram of the Questar and a correspondingly numbered list naming and describing the parts of the telescope. Another page explained the optical system in detail, comparing it with conventional telescopes. There were directions for locating a celestial object, and, finally, a list of rules for club members.

Group instruction in the handling of the Questar was followed by the individual guidance of each member. He was given several "dry runs" in its use and was permitted to touch only the control knobs. Great emphasis was put upon keeping fingers off the optical surfaces. The safety factor of the sun filter was particularly stressed, and any violation of the safety rules resulted in the dismissal of the club member. The teaching was thorough, leaving nothing to chance. Each club member had to demonstrate that he had mastered the technical information and had skill in its use.

Mr. Gable says that the results were well worth the precautions; that with proper instruction, strict discipline and constant vigilance on the part of the owner or teacher, groups of children can use the Questar without damage to it or themselves. He feels that if Questar owners would follow the above procedure they need have no fear of letting young people use them.

Actually, Questar is a rugged little giant of a telescope, so well built that it can stand considerable abuse. Some have been out in the schools now for nearly ten years, and occasionally one comes back to us for cleaning and inspection. We seldom find anything seriously wrong. Even one or two that had been dropped sustained only minor damage. The drives will show wear, just like the brakes on your car, in proportion to the hours of use they have had, but this is a simple replacement for which our charge is five dollars for each drive. Furthermore, we have a special low-rate service charge for all educational institutions, which the schools have found most reasonable.

Indoor Comfort With Questar

Time was when trying to see through a windowpane with a fine telescope would have been out of the question. But today's plate glass is so remarkably plane parallel that anyone can have an observing corner like this. The glass happens to be the double insulation type, yet no distortion of image occurs at high power, and the light loss is so negligible that we can still see the companion of Polaris with a Questar.

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QUESTAR

Box 10, New Hope, Pennsylvania 18938

What's a Questar? If you were brought up in the amateur astronomy of the 1960s, I don't have to tell you. You remember the full-page inside-cover ads for these telescopes that appeared in every issue of *Sky and Telescope* for years and years and years. Pictures showing this beautiful little—I've often referred to it as "jewel-like"—Maksutov Cassegrain Telescope in all its glory. These pictures were often accompanied by tales of the scope's observing prowess that seemed to defy the laws of physics. There were sometimes even astrophotos taken with the tiny Mak, beautiful photos that put the blurry "Moon pictures" Little Rod made with his Tasco and his Argoflex to *shame*. For you young sprouts? "Questar" usually refers to that company's 3 ½ inch f/14.6 Gregory-style MCT. Where did it come from? What's it good for? Why should you want one, *if* you should?

The Questar was the brain-child (I almost want to say "love child") of one man, Lawrence Braymer. He became infatuated with the idea of selling a Mak-type scope, and began laying the groundwork for the Questar in about 1946. His original idea was for a 5-incher, but as the project began to get off the ground, this was scaled back to 3.5-inches in the interests of portability (and maybe affordability, too—Braymer intended to make his telescope as well as it was possible to make a scope). In 1950, Questar Corporation

formed, and by 1954 3.5s were rolling out of the company's New Hope, Pennsylvania plant (they are still there). Questar, now a subsidiary of a larger concern, has continued to produce 3.5-inch (always), 7-inch (sometimes), and 12-inch (very occasionally) scopes for the amateur, industrial, scientific, and military markets ever since.

Just describing the Questar in terms of design, aperture, and focal length doesn't begin to sum the scope up. Braymer wanted to make a fine scope and he succeeded. To begin with, the optics have always been well-figured, well-tested, and (almost) always as good as it's humanly possible to make. The spherical primary, while normally Pyrex, is available in a variety of substrate up to including quartz, and with a variety of coatings up to and including protected silver ("Broadband Coatings"). The borosilicate multi-coated corrector, like other Gregory Mak lenses, features a "silvered" spot that forms the secondary mirror. Interestingly, this spot was on the *outer* surface of the corrector on early Questars. That was done in order to avoid paying royalties to Mr. Gregory and/or Perkin-Elmer. By the mid 1960s, however, the secondary had migrated to the interior surface where it remains. Optical specs? I don't recall seeing Questar publish any lately. Suffice to say, most scopes will reach theoretical limits under perfect conditions.

Some folks are surprised to learn Questar does not and never has made their own optics, but that's the way it is. As mentioned in the Quantum discussion, the optical sets of production Q3.5s made since 1958 have all been made by the same company, J.R. Cumberland. Prior to '58, amateur optics legend Tom Cave made mirrors for the Q 3.5. The correctors were made in Japan at that time. Cave did somewhat under a thousand mirrors for Mr. Braymer. Most people who are familiar with the telescopes believe the Cumberland optics are superior to those made by Cave and the Japanese supplier.

As always, a telescope is more than just its optics. Great optics in a lousy OTA or on a lousy mount make for a lousy scope. The body of the Q is hardly "lousy." You or I may not always agree with or admire the design details, but the OTA and fork mount mostly *work*, and allow the telescope's excellent optics to strut their stuff.

The Questar 3.5 OTA is a finely-wrought aluminum affair. The first thing that usually catches the eye, of course, is the lovely anodized tube with the engraved star map. That's not *really* the tube, though. Slide the "star map" forward so it forms a clever little dew shield and the actual tube, which is engraved with a simple Moon map, is revealed. *Naturally*, the corrector end is protected with an anodized, thread-on dust cap.

The rear cell is where the action is, however, and is one of the things that's made the scope famous. The eyepiece holder of the earlier scopes doesn't look "standard." And it's not; a 1.25-inch ocular won't fit. More modern OTAs accept "normal" 1.25-inch oculars, but the holder on the original scopes is designed for the two special Brandon eyepieces that were shipped with the scope, a 16mm and a 24mm. These were and are fine eyepieces, but, yes, it's possible you will want to use Naglers instead. If that's the way it is, an adaptor can be purchased from

several sources to enable the older 3.5 to use regular 1.25s. You *may* find, however, that you don't really need more eyepieces.

The Questar, you see, includes a built-in Barlow. Flip a "switch" on the rear cell control box, and a 1.6x Barlow lens is moved into the light path. Need very low power for finding objects (the Q has no finder or finder-mount to mar the lines of its lovely tube)? Flip another switch and the eyepiece is diverted to the optics of a built-in low power/finding system (slung under the rear cell). This delivers 4x and 6x with the included eyepieces. Finally, there's a port on the rear cell for attaching a camera in straight-through fashion (yep, like the ETX).

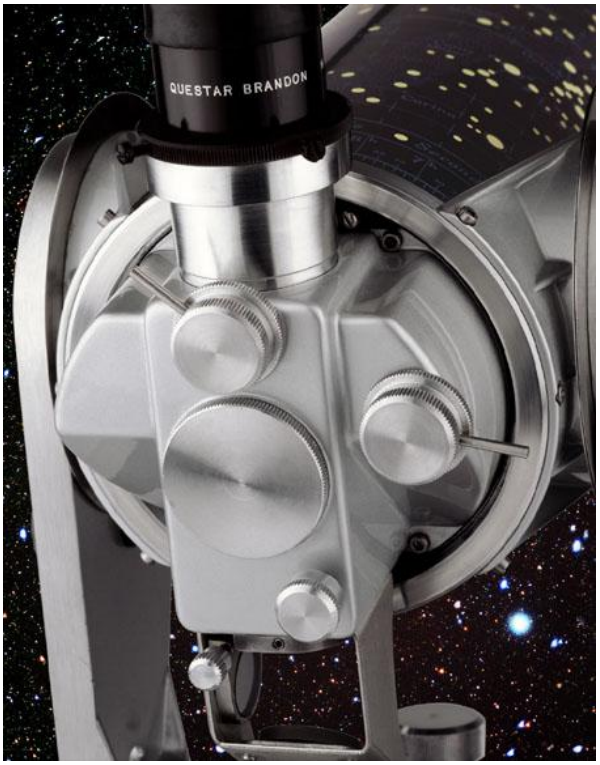
A CAT OTA needs a mount, of course, and what most Questar buyers opt for is the company's time-honored dual-tine fork. It's as beautiful as the OTA, but the mount is where the Questar 3.5 loses a little ground. Despite the fine appearance and (usually) fine mechanical action of its locks and slow motion controls, this little fork is just not really that "practical."

Unlike its Meade competitor, the Questar does not have computers inside its beautiful body. All it has is an RA clock drive (believe it or not, still an AC job, but a 9-volt battery powered version is available as an option). That means the scope must be polar aligned for it to track the stars. Once the base is tilted over so the RA axis points at the celestial pole, however, it becomes impossible to point the scope at fairly large portions of the Southern Celestial Hemisphere (or Northern Hemisphere if you're Down Under). The tube runs into the base.

An OTA needs a mount and a mount needs a tripod. What's the 3.5 got goin' on here? Those famous table top legs are cute, damned cute. Unfortunately, they are *useless* for serious observing. If the scope is to be used for astronomical observing, a sturdy, full-sized tripod is a must. The Questar ain't heavy, but at about 7-pounds good support is critical given the high power nature of an f/14+ scope. What to use? Questar sells an attractive pier-cum-tripod, but that costs 1200 bucks. Luckily the scope can be used on a sturdy video/camera tripod.

Accessories? In addition to the two Brandons and the tabletop legs, what's included is a Solar filter (really cool), and, if the scope is ordered with the Powerguide DC drive system instead of the AC motor, a small hand control paddle. Case? Oh, *yeah*. Questar has always advertised the scope as an "Observatory in a Box," and they have always included a case with the Standard 3.5. One bringdown? The case is still velvet-lined, but it is now vinyl rather than leather. It's still possible to order leather as an option, and I would. If you're gonna go first class, *go first class!* In its case, the scope/accessory package comes in at a wee bit over 14 pounds weight-wise.

What's really cool? The Q3.5 is still delivered in a custom shipping "drum," same way it always has been.



This all *sounds* great, but looks are one thing, observing is another. How does the Questar *perform*? If you want to *see* how one performs without investing the 4Gs admission price (for a new one), grab your buddy's 500 buck ETX 90, and trot outside. No, I'm serious. OK, *maybe* the 3.5's images might be a *little* better (though, as I say in the ETX writeup, I've never been able to tell the difference), but they are not *much* different than those produced by the Meade. The Moon looks astoundingly wonderful, there's detail on the planets that's commensurate with what any high quality 3.5-inch telescope (including the ETX 90) can show, and the brighter deep sky objects are, well, "visible."

Certainly, the total experience of observing with a Questar is in a whole 'nother league than the ETX experience. The scope is stable, the slow motion controls are smooth, and the buttery focusing displays little or no shift. Just don't expect that expensive little Q to compete with even a C5 image-wise or—as many people hope—violate the laws of physics when it comes to light gathering and resolving power. An oft' made and valid analogy has been made between the Q3.5 and a Rolex watch. A Rolex won't tell time much better than a Timex, but it does it with *style* and it will last forever. The same things apply in a comparison between the Questar and the ETX.

Where do you get a 3.5? You *could* pony up for a new one to the tune of $4200.00 for the basic Standard. Options like the pier-tripod, enhanced coatings, and the DC drive will drive the price ever higher. Well over 6 grand "with everything on it." If you opt for the duplex model, which features a removable OTA that can be used as a spotting scope or on another astronomical mount, you'll pay even *more*.

The good thing? You can make the Questar 3.5 a realistic dream by buying used. Make no mistake, even used, these scopes don't go cheap. They hold their prices very well. You can snag a very good condition Standard scope for around 2500 – 3000 without much trouble, however. Don't think you can live with 3.5-inches? Questar has, as previously noted, produced a 7-inch model (very similar to the 3.5) off and on over the years. Plan to pay *at least*—at a minimum—twice what you'll pay for an excellent 3.5. A 12-inch? If you could find one? Don't ask.

What should the used shopper look for or out for? Not much. If you want enhanced coatings, hold out of them. Especially the "Broadband" coatings Questar offers. These will run up the price of a used scope, but, believe you me; a 3-and-a-half-inch aperture telescope needs all the help it can get. How about the fancy Zerodur and quartz primaries? For most of us this is not a huge concern. The scope is small enough that its cool down time is not outrageous. Do try to get one with the DC drive option—unless you want to go back to the good old days of inverters and drive correctors. Service and repair? Questar will gladly service and upgrade your used scope if needed, making it as good—or better—than ever.

Do you want one? *Hell yes, you want one*, no matter **what** you say. Every amateur does, no matter how much she/he may protest. Do you *need* one? Hmmm… Maybe. If you want a very portable small aperture scope that's as good as good can be, especially a vacation/travel scope, don't want to fool with matching an APO OTA to a suitably portable mount, just want everything *in the box* (almost, anyway), *get the Questar*. If you can live with a small aperture narrow field scope, if that fits the way you observe and what you observe, you'll be happy as a little bird with the Questar. In fact, one of these scopes is *almost* "worth it" if only to look *at* rather than *through*.

Why don't *I* have a Questar, then? After 40 years of wanting one? Mr. Spock summed it up best: "After a time, you may find that **having** is not so pleasing a thing, after all, as **wanting**. It is not logical, but it is often true."

Uncle Rod's DOG Pound

Where We Separate the CATs from the Dogs

Criterion Dynamax 8

THe Criterion SCT, which came to market not long after the Celestron Orange Tube in the early 1970s, was the first competitor Celestron faced. How good a competitor? The Dynamax 8 is an *attractive* telescope, if obviously more cheaply made than Celestron's SCT. Reading the specs of the Dynamax, you might even think it might actually have been a better buy than the comparably priced Celestron (the Dynamax cost about $800.00 without tripod, just like the C8).

According to company literature, the Dynamax was equipped with "exquisite optics" that allow the lucky owner to "[Take] professional quality pictures with ease and reliability." The drive sounds good, too, being described as an "AC/DC manual drive" which is "Fully capable of long, 'locked on' exposures." Criterion didn't neglect accessories, either. The Dynamax purchaser would receive three eyepieces, a drive corrector, and an 8x50 finder scope as standard equipment. Sounded good, but the Criterion was never real competition for Celestron. Was the Dynamax 8 just a telescope that was ahead of its time?

Sadly, no. There's a lot bad about the Dynamax, starting with the optics. I don't doubt some good scopes were produced, but after 40 years I have yet to run into a Dynamax whose optics were any better than fair. Many of them were poor, *very poor*—some I've tried being nearly unusable. One reason for this may have been Criterion's approach to matching an SCT's optics set—primary, secondary and corrector.

Both Meade and Celestron take pains to put together a set of optical elements that perform well together (Meade tries different combinations of correctors, secondaries, and primaries 'til a "match" is found; Celestron applies some hand figuring to each scope's secondary as needed to ensure the three components match). Criterion, or so I've been told, apparently didn't think this was necessary, assembling optical sets from correctors, secondary mirrors, and primary mirrors in the order they came off the assembly line. If a combination of Dynascope optics worked well together, it was *luck*. Some of the quality problems also relate to changes that had to be made in Criterion's corrector fabrication process due to legal considerations apparently involving

infringement on Celestron's proprietary Master Block process for fabricating the all-important lens.

Criterion claimed that the scope's mounting and drive were perfect for astrophotography, but even a brief glance at one of these SCTs shows that was hardly the case. Start with the fork. It was a light and flimsy one powered by a single AC motor and spur gears. What of Criterion's claim that the scope had a DC drive? Spurious. The company felt justified in making this claim *because the included drive corrector could be powered by a 12 volt battery!* If that is the case, a C8 Orange-tube equipped with a standard drive corrector could be considered to have a DC drive too. The furnished drive corrector wasn't anything to get excited about either. It turned out to be a simple single-axis model that used a knob instead of push-buttons for guiding.

One thing the company was correct about in their advertisements was the sturdiness of the Dynamax's resin-impregnated tube. The CAT used what was basically a cardboard tube, there was no way around that fact, but despite fears of amateurs of the time, this tube was very durable. It really was, as Criterion claimed "strong enough to fire rockets out of." The main problem with the Criterion Dynamax 8 is what's *inside* the tube. The Dynamax was a valiant effort, but it was *just not a good telescope*, and is not a bargain at *any* price. Even a free Dynamax would likely lead to more frustration than observing pleasure.

The preceding is not meant to denigrate the efforts of the people who worked to bring the Dynamax SCT to life. Many are still proud of the work they did on this scope, and have told me so. Their SCT obviously just didn't quite come together, however. If it *had* come together for Criterion, there would be at least *some* examples of the Dynamax 8 with very good to excellent optics. *Where are these scopes?* The Dynamax was, at heart, an attempt to bolster a company that was famous for its fine Newtonian reflectors (the oft praised optics of these came from a 3rd party, incidentally) at a time when GEM Newtonians were declining precipitously in popularity due to the C8.

What happened to Criterion? They hung on until the 80s came in. Despite the failure of the Dynamax SCT, their good reputation, earned from twenty years of producing superb Newtonian reflectors like the famous RV-6, kept 'em going. For a while. Despite the approach of Comet Halley, which quite a few scope makers thought would pave the streets with gold, the owners of Criterion had had enough and sold out to Bausch and Lomb.

Bausch and Lomb 8000/8001 8 Inch SCTs

Bausch and Lomb, America's optical giant, was sold on the idea that EVERYBODY would want a telescope for Halley's Comet, and after buying Criterion promptly re-released the somewhat restyled Dynamax 8 as the "8000." This telescope *looks* better than the original Dynamax, but the optical problems remained. I have *never* seen an 8000 with really good optics, and some suffer from mechanical problems in addition to optical deficiencies. One example I tested recently could not be collimated no matter how I adjusted the secondary mirror, resulting in poor planetary images. According to the owner, the SCT had been like that since day one, when he purchased it to view Halley's Comet (*natch*). The fork mount is a little sturdier than the Criterion version, but the drive is no better than that found on the earlier telescopes.

Bausch and Lomb did not intend to rest on Criterion's laurels, though. The company aimed to improve the 8000, and felt it could establish itself as a major player in the SCT game following Halley-mania. To this end, B&L opened a state-of-the-art plant to replace the by-now seedy Criterion facility. The product of this drive for quality was the **Bausch and Lomb 8001**.

The scope is rare, having been produced for less than two years (1986 – 1987). Rare, but *good*. In fact, it really *shouldn't be in this "bad CAT" section at all*. The 8001 may not be equal to the Celestron and Meade scopes of the day mechanically—the 8001 used the same too-light tripod that Meade was to later buy from B&L for use on the revived 2080. The 8001's fork is also still a mite spindly. The drive was much better than the finicky one on the 8000 and the Criterions, however, and featured dual "balanced" motors like some Celestrons. Most importantly, the telescope was *impressive* optically.

B&L actually offered *two* 8001 one models, the standard unit and the "Pro." The Pro model added an 8x50 finder; and enhanced coatings for the primary mirror, secondary mirror (silver, like Meade's MCSOG secondaries), and corrector plate. Unfortunately, it was all for naught. When telescope sales plummeted (that may be too mild a word), after Halley's Comet, Bausch and Lomb got cold feet and shut everything down by the end of 1987. Ironically, B&L apparently eventually had a change of heart when it came to SCTs. A little over a decade later,

the company tried to buy Celestron, but lost out to imported optics giant Tasco, who proceeded to go down in flames themselves a few years later.

Unlike the Dynamax, the B&L telescopes turn up fairly frequently on the used market. B&L apparently produced a rather substantial number of them during the early-mid 1980s. My opinion is that most are not worth bothering with unless the seller is practically giving them away. The exception is the 8001 SCT, which you're not too likely to find.

The Celestron Compustar

I waffled for a long time before consigning the Compustars to the Dog Pound. The Compustar C8, when it was introduced in 1987, seemed like an observer's dream come true. Premium SCT optics on a high-quality fork mount were part of the attraction of the Compustar. What really got amateurs' attention way back when, though, was the scope's *computer*. Yes, as the name implies, the Compustar came with a built-in computer system. Not just a Computer Aided Telescope Accessory, digital setting circles, which told you where the scope was pointed in right ascension and declination. **The Compustar was a goto scope.** That's right; Celestron premiered a goto telescope *a good five years before the Meade LX-200 came along*.

So why is the Compustar almost completely forgotten? There are several reasons. One very big one was the price. The Compustar 8's list price was nearly $6500.00. The scope's actual *selling* price from dealers, around $3500.00, was more reasonable, but still *far* out of reach of most late 1980s SCT buyers, who thought 2K for an Ultima 8 or LX5 was A LOT.

Another problem with the Compustar 8 was that it happened to hit the market as Comet Halley madness had started to wane. Just about everybody who'd planned on buying a new telescope had bought one by the time the Compustar came on the scene. The serious amateurs who might have formed a market for this luxurious and technically unparalleled telescope had been hearing about a lot of Halley related problems with Meade and Celestron optics and demurred.

The biggest problem with the Compustar was that it was genuinely ahead of its time *and showed it*. Its electronics were *almost* there, but the telescope's goto technology was not *quite* ready for prime time.

What could a Compustar do, and how well could it do it? The heart of this Celestron is the computerized hand box. This 7"x9" controller contained an LED readout display for the computer, a keypad for entering commands and a set of directional pushbuttons for making drive corrections. The built in object-library of the Compustar is respectable, even by today's standards. The scope could, at the touch of a button, be pointed at any one of nearly 8,000 objects. The computer is even capable of displaying limited data about each object.

So what's the problem? *One* of the problems was the scope's slewing speed—12 to 15 degrees per second. This is faster than modern goto scopes like the LX200 ACF and tends to be a problem rather than an advantage. Due to this high speed and various other hardware and software issues, the scope tended to overshoot targets (you'll note that Celestron's next goto scope, the Ultima 2000, slowed down dramatically when it approached an object). Celestron did attempt to "ramp down" the speed of the Compustar motors as it neared its destination, but the software implementation didn't work exactly right. The scope would often pause briefly (all the while believing it was still moving) before slowing down or attempting to slow down. Which didn't do much for accuracy.

Another difficulty is that the inherent precision of the Compustar is limited. This is in part due to the gears Celestron used. Unfortunately, the company chose to purchase drilled rather than solid worm gears for the C-star, and this lead to *flexure*, reducing the scope's goto accuracy considerably. Solid-shaft gears would have improved the pointing capability of the scopes–a lot. Some Compustar fans believe the Celestron could have gained as much as 10 arc minutes of accuracy, which would have made a considerable difference. This gearing misstep is somewhat understandable, though. Amateur goto scopes were a completely new deal. Who knew what worked and what didn't? Because of this and other issues, the Compustar, like many of the digital setting circle computers of the time, required a fairly precise polar alignment in order to reliably find objects. Even with a good alignment, performance could be hit and miss.

This limited goto accuracy is hinted at by the 2 inch star diagonals and big 50mm focal length eyepiece that came in the box with a Compustar. **A 50mm eyepiece?** *Get out!* Yep. If the target were to be placed in the field of view of the telescope, this f/10 OTA needed to be operated at the very lowest power possible. The Compustar *could* be an adequate performer if it were drift aligned in a permanent observatory, however.

Use in the field at remote dark sites was problematical both because of the need for precise polar alignment and the telescope's power requirements. This made the Compustar less than ideal for most amateurs of the time, since the need to travel to dark sites was a common

feature of amateur life by the late 80s. If you *did* feel like dragging that lovely Compustar out to your club's dark site to show off you'd need some hefty batteries. The motors used in the Compustars, and the power hungry nature of its computer resulted in a peak current draw of nearly 12 amps!

Might the Compustar be a good buy on the used market? It is possible to find used Compustar 8s reasonably priced. These telescopes are not exactly in high demand, and the new price of the 8-inch had fallen to about $2700.00 just before the Compustar was completely phased out by Celestron in the mid 90s. So, you'll find some Compustar owners willing to let their scopes go for well under a grand. Maybe even about half that. But it still might not be a great buy. You are definitely on your own when it comes to support for this complex telescope. I'd bet few people at Celestron have even *heard* of the Compustar (there *are* a few enthusiasts around, who've turned this semi-sows-ear into a silk purse, and who would no doubt be willing to help you).

Celestron contracted with a third party to write the software and build the electronics used in the telescope's computer, so even if you could find a technician at Celestron who remembers the telescope, he or she would probably know very little—if anything—about the all-important computer's workings. Another strike against the scope is that the Compustar computer suffers from the once-dreaded Year 2000 (**Y2K**) computer bug. The telescope computer can't handle dates after 1999, and this means it is unable to accurately point at the Moon or planets now. There are, fortunately, a few workarounds that can help alleviate this problem. Also, in September 2002, it was announced that a 3rd party, Starchron Solutions, was offering a set of replacement PROMs for the Compustar ($125.00 U.S.) that eradicate the Y2K bug. I don't know if that fix ever really materialized or whether it is still available, though.

The Compustar 8 has some nice features—in some ways, I think the hand control is the best one Celestron has ever made—but in most respects, buying a Compustar and expecting it to perform like a NexStar CPC is like buying an eighties vintage Apple II computer and expecting it to perform like a current PC. The reasonable advice is to leave this one alone and look upon it as a mere historical curiosity. A CAT that almost, but not quite, brought the high-tech future of astronomy to amateurs.

Celestron produced 11-inch and 14-inch Compustars, too. The C14 Compustar has the dubious distinction of being the most expensive mass-produced SCT ever made, with a list price of $22,000.00. It isn't likely the company sold too many (if any) 14s for this price, however. With almost no demand for the scope, by the time the 14 went out of production it was selling for the "bargain" price of $9500.00.

But…still…a good Compustar in the hands of someone who understands its quirks and who has the skills to maintain—and possibly modify—it, can be an impressive telescope. I had the opportunity to see a perfectly preserved and maintained Compustar 14 in action at the 2001 Texas Star Party, and was mightily impressed. The scope purred like the great, big CAT she was and landed on targets with seeming ease, more than holding her own with her more modern

goto descendants. The real shame is that Celestron chose to abandon the Compustar rather than build on and improve upon the technology.

Uncle Rod's Used CAT Buyer's Checklist

These are checks anyone can and should conduct in the daytime:

☐ Mechanical. Is the scope—OTA, mount, and tripod—in reasonable physical condition, only showing normal wear for its age? A little rust is permissible on some scopes (Meade, for example, has utilized hardware that has a tendency to rust right away). Does the mount move easily and smoothly in both axes?

☐ Electronics checks (daytime). Does the CAT appear to power up and react normally to the hand control? Does a goto scope respond correctly during a "fake" alignment?

☐ Optical check (daytime). Does the telescope present clear/normal images of distant terrestrial objects (taking into consideration that "seeing" is always a problem in the daytime)?

☐ Is everything that will be needed to run the scope in place? Tripod? Wedge (for non goto telescopes)? Visual back?

The wise used buyer will undertake nighttime checks of the scope if at all possible:

☐ When polar aligned, does a non-goto CAT track and slew (if it has that ability) smoothly and normally? If you are an imager, you want to check/quantify periodic error to the extent possible. A goto scope should align properly and display good accuracy when slewing to objects.

☐ When slewing, the noise produced by the scope's gears/motors should be "normal" (with the caveat that some scopes are noisier when slewing at full power than others).

☐ If possible, a prospective buyer should check all electronic functions important to her/him (RS-232 interface, for example).

☐ How about the optics? Does the star test reveal well-figured optics (with the understanding that compound scopes rarely show identical diffraction patterns on both sides of focus)? If this is a moving mirror focusing scope, is "focus shift" reasonable—for newer scopes no more than 45-arcseconds – 1-arcminute (this can often be improved on disused scopes by racking the mirror in and out a few times)? For many older SCTs, substantial amounts of mirror flop and focus shift were "normal." You must ask yourself in these cases whether you will be able to live with the scope *as it i*s.

☐ Is the scope collimated? If not, be sure it *can* be collimated (I've seen a few Halley-era scopes that could not be precisely collimated due to alignment issues).

☐ If this is a goto telescope (i.e., complex mechanically and electronically), is service still available? How about parts?

Then there are some often-overlooked but vital considerations:

☐ Are all normally supplied items present? Especially, critical and hard to find items like hand controllers and power supplies. If it's an AC drive scope and you want to image with it, be sure a drive corrector is included. If not, you'll have a hard time finding one these days.

☐ If it's a goto scope, is the firmware the latest and the greatest? If not, is the scope user-updateable?

☐ Is the manual present/available?

☐ If the scope is under warranty and the warranty is transferable, is needed documentation included?

I'll leave it to you and the seller to haggle over the price, but the best guide to current prices of used scopes is the Cloudy Nights classified pages and Astromart. A cruise through the ads should clue you into what is "fair and reasonable."

And, finally, what's the best thing you can do to ensure a good used buy? Educate yourself. Read the material on the prospective scope in this Guide. Ask your online and non-virtual astro-buddies about the scope. Seek out a Yahoogroup/mailing list devoted to the scope. See if you can find a manual posted online somewhere.

But don't worry too much…depending on your goals a CAT need not be "perfect" to provide years, and years, and years of pleasure. I use a so-so C8 "Halley-scope" frequently, and it never fails to show me something WONDERFUL.


You Are Here
Evolution of the Cat