ODYSSEY

THE DIFFERENCE IS STRIKING

The smudge of light seen in a smaller telescope now exhibits spiral arms with Odyssey I. No doubt about it, it is a spiral galaxy, M-51. Another object, M-3, appearing as a faint concentration of stars in lesser telescopes, is almost fiery with what seems to be thousands of stars in the field of view. The list goes on and on including objects not considered reachable with smaller aperture telescopes. One begins to realize that a whole new threshold of viewing is opening up. You find yourself observing until dawn, something you haven't done in a long time.

Hello. Coulter Optical is a small optical manufacturer located in the mountains of Southern California. I always get a chuckle when someone from Ohio or Michigan phones me in the dead of winter. There is usually a moan or two on the other side about how cold and miserable the winter is. Then, looking out my window I see two feet of snow and say we"ve got the same thing! Why, we are a mile high! is what I tell them, not the sunny warm lower elevations of California! Being in the snow of Southern California is not the only thing different about us. We have a reputation of being a Maverick in the optical business. Those things that characterize us as such are: having the lowest telescope prices in the World, not raising prices during the Comet, and in fact, not raising prices on telescopes for the last five years! I like that reputation because we are pleasing a lot of people who have seen too much of the other side of the coin.

We do not advise you to buy everything you can inorder to enjoy visual astronomy. All you need is an Odyssey, maybe an extra eyepiece (a 12mm Kellner is inexpensive and just fine), a star chart and a good night of seeing. What about buying one of those expensive eyepieces? We would be foolish recommending an eyepiece costing more than an Odyssey telescope! What about a finder? I don't use one - got used to sighting down the tube. You might try this and save some money. By the way, I didn't use a finder on the 29". So, sit back, relax and enjoy visual astronomy that is fun and exciting. The visual approach will save you a lot of fuss, worry, and bucks with an added plus no other media can deliver - you"ll see the <u>real</u> Universe the way it really looks!

Good observing,

James A. Braginton

ODYSSEY TELESCOPE PERFORMANCE GUARANTEE

All Odyssey telescopes are guaranteed to outperform telescopes of smaller sizes, with similar configurations and similar coatings - regardless of price. Any Odyssey telescope will equal or exceed the performance of any similar size telescope with a similar configuration and similar coatings - regardless of price. All Odyssey telescopes are guaranteed to show color in the Orion Nebula. As a purchaser of an Odyssey telescope, you may return it within 30 days of receipt for a full and immediate refund, if not completely satisified. To exercise this refund, Coulter Optical must receive the telescope in it's original condition with freight prepaid.

ODYSSEY TELESCOPE TWO YEAR LIMITED WARRANTY

All Odyssey telescopes are warranted against defects in materials and workmanship for a period of two years from the date of purchase. If during this period the warranty is exercised, Coulter Optical will at their option repair or replace any part or product found to be defective. Any part or product must be returned to us prepaid for adjustment under this warranty. Excluded in this warranty are cases where the product has been misused or abused. Your rights under this warranty are specific and may vary in different states.

Coulter Optical Company

ODYSSEY TELESCOPES
Seeing the real Universe

ODYSSEY

8 inch

ODYSSEY 8

The Odyssey 8 was built to evoke one question. Why pay the same amount or more for a smaller telescope and get poorer performance? This telescope's performance is frequently compared by its owners on an equal basis to the much more expensive 8" Schmidt-Cassegrain. Odyssey 8 is the ideal first telescope because it is easy-to-use, is of medium aperture to hold one's attention, and is of such low cost that it is difficult to make a mistake by buying it. Imagine the error in buying a telescope, losing your interest, having spent over $1000.00! Avoid asking yourself why you spent so much when you could have had an Odyssey 8.

8" f/4.5 paraboloidal mirrror with matching elliptical flat, both 1/8th wave, aluminized and overcoated. Dobsonian mount with U.H.M.W. bearings. Stubby mount 1-1/4" focuser. Coated 27mm eyepiece. Red tube, black mount. Ready-to-use.

Tube assembly-10" dia.x 36"L.
Mount-12"x 13"x 19"H.
Total weight-39 lbs.
SHIPPED FREIGHT COLLECT

ODYSSEY TELESCOPES
Seeing the real Universe

ODYSSEY

10.1 inch

ODYSSEY COMPACT

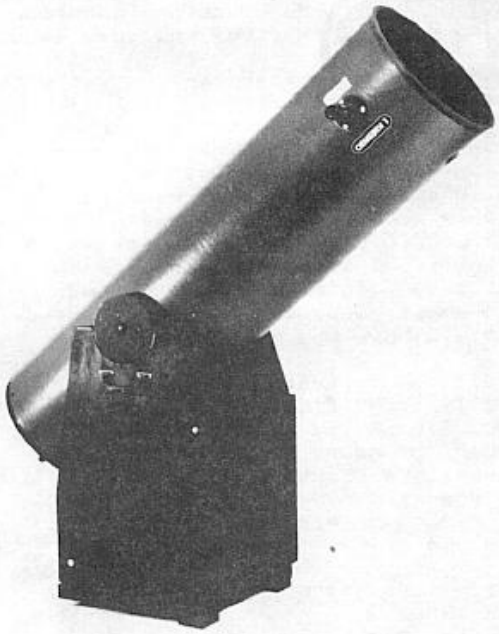
Seeing a demand for a smaller version of Odyssey 1, Coulter Optical produced the 10.1" Odyssey Compact. It is an unusual telescope if for only one feature, you can do most of your observing from a chair! Smaller and lighter than the Odyssey 1, it offers only a slight reduction in performance. The most noticeable difference would be how it performs on globular clusters. This telescope is the choice of many who like its size and ease of transport. It is a telescope that evokes a owner loyality. Those who own them swear by them. The Compact is a lot of telescope for the money when compared to what else is available.

10.1" f/4.5 paraboloidal mirrror with matching elliptical flat, both 1/8th wave, aluminized and overcoated. Dobsonian mount with U.H.M.W. bearings. Stubby mount 1-1/4" focuser. Coated 27mm eyepiece. Red tube, black mount. Ready-to-use.

Tube assembly-12" dia.x 46"L.
Mount-15"x 16"x 24"H.
Total weight-65 lbs.
SHIPPED FREIGHT COLLECT

ODYSSEY TELESCOPES
Seeing the real Universe

ODYSSEY



13.1 inch

ODYSSEY 1

The first Odyssey, introduced in the spring of 1980, started a revolution in seeing the Universe that continues today. When you consider that a 13.1" mirror delivers 477% more light than a 6 inch, 268% more light than an 8 inch, and 72% more light than a 10 inch. the performance advantage is obvious. But there is more to this performance advantage than just mathematically greater light gathering power. It involves a new dimension in observing. It is as if you increase the number and enjoyment of deep sky objects by a factor of ten. The sum result is what others have expressed after using Odyssey 1-observing is incredibly exciting and fun.

13.1" f/4.5 paraboloidal mirrror with matching elliptical flat, both 1/8th wave, aluminized and overcoated. Dobsonian mount with U.H.M.W. bearings. Stubby mount 1-1/4" focuser. Coated 27mm eyepiece. Red tube, black mount. Ready-to-use.

Tube assembly-16" dia.x 58"L.
Mount-18"x 19"x 30"H.
Total weight-100 lbs.
SHIPPED FREIGHT COLLECT

ODYSSEY TELESCOPES
Seeing the real Universe

ODYSSEY

17.5 inch

ODYSSEY 2

Coulter Optical created and introduced the 17.5" f/4.5 mirror and with it brought into being the next addition to the Odyssey line, Odyssey 2. First introduced at $1195.00, the present price is $995.00. Known as almost an 18", it is a powerful performer. Globular clusters are its main course when compared with other smaller telescopes. This is the instrument that observers gravitate toward to get that special glimpse of their favorite object. Experienced observers judge the Odyssey 2 as giving the best views of galaxies, nebulae, star clusters and globulars. This is the big one, so be sure you can handle it.

17.5" f/4.5 paraboloidal mirrror with matching elliptical flat, both 1/8th wave, aluminized and overcoated. Dobsonian mount with U.H.M.W. bearings. Stubby mount 1-1/4" focuser. Coated 27mm eyepiece. Red tube, black mount. Ready-to-use.

Tube assembly-21" dia.x 76"L.
Mount-24"x 24"x 35"H.
Total weight-206 lbs.
SHIPPED FREIGHT COLLECT

Coulter Optical, Inc.
P.O. BOX K, IDYLLWILD, CA 92349
Hours Mon.-Fri. 8 to 4:30
VISA and Master Card accepted
(714) 659-4621

TELESCOPES • OPTICS • ACCESSORIES

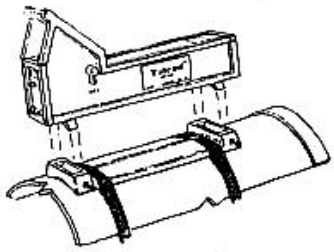
AFFORDABLE ASTRONOMY!

To see objects through a telescope it must be pointed to exactly the right spot. The Telrad® is a sight for pointing telescopes to that "right spot".

Through a Telrad® you see the sky the way the star charts show it. Not a small upside-down and magnified portion of it, but the "real sky" with three lighted target rings set against it. The large ring is 4 degrees across. It outlines the area covered by a finderscope. The small ring is ½ degree across and outlines the area seen in the telescope.

Select an object on the chart and note its position among the visible stars. Then set the Telrad® rings on that spot in the sky. A quick rough setting will put the object in the field of a finderscope. With no finder, or a faint object that won't show, use a more careful setting to put the object in the field of the telescope.

The Telrad® is 8 inches long, weighs 11 ounces and mounts on any telescope without drilling holes. It unlocks from its base for separate storage.



Telrad® with mounting base..
(2AA cells not included)

DOBSONIAN MIRRORS Figured to 1/8th wave or better.

Mirror Diameter	f-ratio
10.1"	f/4.5
10"	f/5.6
12.5"	f/6
13.1"	f/4.5
17.5"	f/4.5

ELLIPTICAL DIAGONAL FLATS Figured to 1/10th wave or better.

(minor-axis)
1.83"
2.14"
2.60"
3.10"
4.25"

DOBSONIAN MIRROR BLANKS Fine-annealed Pyrex.	Thickness
10 or 10.1"	1-1/8"
12.5"	1-1/8"
13.1"	1-1/8"
17.5"	1-5/8"

EYEPIECES Recommended for use with ODYSSEY telescopes.

ORTHOSCOPIC 6, 12.5, F.L.

KELLNER 6, 12 , 27mm F.L.

BOOKS

BURNHAM'S CELESTIAL HANDBOOKS, Vol.I, II, III, An observers guide to the universe beyond the solar system. Illustrations, descriptions and positions of thousands of objects.Vol. I: Andromeda through Cetus; Vol.II: Chamaeleon through Orion; Vol.III: Pavo thru Vulpecula. Robert Burnham, Lowell Observatory.

FINEST DEEP SKY OBJECTS, 31 page pictorial with charts.

STAR CHARTS

THE MESSIER CARD, Chart of 109 Messier objects.

SKY ATLAS 2000 For detailed observing charts we offer the field edition (white on black) of 26 charts covering both hemispheres. A must for serious observing.

The items listed are shipped postpaid where applicable in the contiguous U.S. Please write for information on shipping and insurance charges outside of the U.S. California residents please add state sales tax. We will accept Master Card or Visa Card.

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QUANTITY	DESCRIPTION	UNIT COST	TOTAL

QUANTITY	DESCRIPTION	UNIT COST	TOTAL

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Shipping Costs _____

Total Amount Enclosed _____

☐ Money Order
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☐ Visa or Master Charge

Credit Card No. _____

California Residents be sure to add Sales Tax

SIGNATURE _____

Expiration Date _____

As of 10-17-90

IMPORTANT NOTICE

The large demand for Coulter products has created thefollowing delays in shipment from the time of placement of order

Odyssey 8"	2 to 4 weeks
Odyssey Compact	5 to 6 months
Odyssey 1	8 to 9 months
Odyssey 11	1 month

MIRROR DELAYS

10.1 F/4.5	3 to 4 months
13.1 F/4.5	6 to 7 months
17.5 F/4.5	3 to 4 months
10 F/5.6	3 to 4 months
12 F/6	3 to 4 months

We suggest 1/3 down and balance on completion of order

PRICE LIST

COULTER OPTICAL, INC. EFFECTIVE 6/1/90

Item	Price
Odyssey 8" Telescope	$275.00
Odyssey Compact Telescope	345.00
Odyssey I Telescope	575.00
Odyssey II Telescope	1150.00

All Telescopes shipped freight collect

Dobsonian Mirrors

10.1"f/4.5	155.00
10" f/5.6	150.00
12.5"f/6	287.50
13.1"f/4.5	295.00
17.5"f/4.5	675.00

Elliptical Diagonal Flats

1.83"	17.95
2.14"	21.95
2.60"	25.95
3.10"	39.95
4.25"	79.95
6.25"	200.00

Dobsonian Mirror Blanks

10.1"	56.95
12.5"	91.45
13.1"	102.92
17.5"	286.95

Mirrors and mirror blanks sent post paid in contiguous U.S.

Eyepieces

6mm Orthoscopic	49.95
12.5mm Orthoscopic	49.95
6mm Kellner	33.95
12mm Kellner	33.95

Eyepieces shipped postpaid in contiguous U.S.

Telrad Finder 49.95
Shipped postpaid in contiguous U.S.

Books

Burnham's Celestial Handbooks, Vol.1,11,111	17.95 each
Finest Deep Sky Objects	4.95
The Messier Card	1.50
Sky Atlas 2000 Field Edition	35.95

VHF SCOPE

THE VISUAL HIGH FIDELITY NEWSLETTER

COULTER OPTICAL, INC. * BOX K * IDYLLWILD * CA 92349-1107

ATMOSPHERIC RESEARCH MIRROR

COULTER MAKES WORLD'S LARGEST ATMOSPHERIC TELESCOPE MIRROR
The new National Administration of Oceanic and Atmospheric's telescope sited on Mauna Loa volcano, Hawaii, at an elevation of 13680', will be using a 29" mirror supplied by Coulter Optical. This instrument, operated by the University of Hawaii, will gather important data concerning our atmosphere. Scientists are very interested to find out if the increased pollution of the air caused by the results of the Industrial Revolution spells disaster for mankind and life on Earth.

IMPROVEMENTS TO ODYSSEY TELESCOPES The latest design of Odyssey telescopes have many improvements. No longer is it necessary to insert and remove the main mirror for observation. A new special mirror mount provides a slingless semi-permanent arrangement that permits tilting the telescope in any attitude. An improved stronger mount has radically reduced shipping damages by at least 98%. Special reinforcements accomplish this. A new stubby-mount focuser with a combination stop and variable friction feature provide a more efficient focuser with greater durability. Heavy-duty Sonotubes eliminate the need for the classic Dobsonian tube box thus providing for greater adaptability and a noticeable reduction in weight.

AVOID DISTORTING STAR IMAGES By keeping your magnification below 13 power per-inch of aperture you will not be able to see those image distorting Airy disks. The Airy disk is an optical phenomenon that produces disks of light from a star instead of a point source of light that all stars, except the Sun, should look like. To see them right, avoid powers over 13 per-inch of aperture.

THOSE DISTORTED ASTROPHOTOS, WHAT ARE THEY TRYING TO SAY?
What are astronomers trying to tell us when they release photos of galaxies and nebulae that are grossly over-exposed and saturated with false color? Is this the way the Universe really looks? Is this abstract art? Or, is this promotional photography used to increase interest in astronomy? We do not know, do they? It can not be the way the Universe looks! Someday they will be able to tell us and the public. Until then, don"t hold your breath.

HOW COULTER OPTICAL GOT ITS NAME

The name Coulter was choosen in the fall of 1966 as a name that related to Nature. Coulter was a botanist who during the 19th century studied the plants of the Western United States. A pine tree bears his name.

The Coulter Pine is an unusual tree. It is found in the coastal mountain ranges of Southern California at elevations of 3000' to 7000'. Its shape is irregular when young-much like a new business when it is just getting started. At maturity it has a well defined triangular shape, seldom getting over 75' high. Although a relatively smallish tree when compared with other trees it competes with, it bears an unusual cone. Unlike the Sequoia Redwood whose cone is barely 2" long, the Coulter Pine, a runt in comparison to the giant Sequoia, produces the largest cone of the conifers. It is not uncommon for a Coulter Pine cone to measure 12" or more in length. For this, the Coulter Pine is also known as the Big Cone Pine.

We at Coulter like to compare our business with the Coulter Pine and other trees. We are small, but purposeful in our work. We are not large like the big corporations, the Sequoias of the industry, but offer a lot for the money-much the same way the Coulter pine has a large cone in comparison to the small cone of the Sequoia. So, that is how we got our name and why we are proud of it.

THOSE IMPORTANT NUMBERS ON THE EDGE OF F/4.5 MIRRORS

You"ll see on the edges of all f/4.5 mirrors a number that is circled. That number is a highly accurate reading of that particular mirror's curve with an instrument called a comparator. If you ever damage that mirror so it needs replacement, or you need a matching mirror to make a binocular telescope, that number will come in very handy. Giving us that number when requesting a similar mirror from Coulter will enable use to reproduce that particular mirror with the exact same focal length.

24" PYREX MIRROR BLANK DONATED BY COULTER TO THE SAN FRANCISCO SIDEWALK ASTRONOMERS Coulter Optical recently sent to John Dobson a 24" Pyrex blank to replace the 24" porthole mirror that broke. The Sidewalk Astronomers are one of a few organizations who selflessly donate their time and energies to the understanding of the Universe. John Dobson's by words for beginning the understanding of the Universe is, "You first have to see it to understand it."

It's STABILITY that Counts!

by Bob Kestner

Dobsonian mountings give those people who wish to explore the heavens, with an eye much larger than their own, a problem-free telescope. They have the easiest-to-use, most trouble-free, and most transportable big telescope design available. Their performance has been tested in the field and the design has evolved through experience. Dobsonian mountings, and indeed the entire Dobsonian telescope concept, *are not* intended for long exposure astrophotography, micrometer measurements of double stars, photoelectric photometry, astrometric plates for parallax measurement, spectroscopy, or infrared radiometry. They *are* intended for looking, and seeing, with a telescope that helps you rather than hinders you.

The structural design of the mounting, called the rocker, is the key to the telescope's success. The rocker is an unusually stable method for carrying a very massive telescopes. It allows very little shake or vibration, uses simple materials, and responds with buttery smoothness. This is due mainly to the on-axis support, for unlike most equatorial mountings, the rocker carries the weight of the telescope directly over its own center of gravity. Equally important, the weight of the telescope is never borne through a single shaft to the ground.

The rocker carries a large box which in turn supports the telescope tube. The side bearings (disks on the sides of the box) rest on four teflon pads, two on either side of the rocker. The base of the rocker rotates on three pads of teflon against a smooth surface (such as Formica) called the bottom bearing. The simple gravity design of the two bearings makes play in the bearings impossible. The simplicity of these teflon bearings makes it possible to build them in unusually large sizes. You'll commonly find 8" to 12" side bearings and 16" to 20" bottom bearings for a 16" telescope. Bearing diameters of this size — and their advantages — are rare in portable telescopes.

The friction of the bearings is easily adjusted to satisfy personal taste. The large teflon bearings allow the telescope to move smoothly, while leaving enough friction so that the telescope, when bumped or in windy conditions, doesn't move without your wanting it to. These bearings, when properly constructed, don't suffer from backlash either: when you center a star in the field of view and release the telescope, the star remains centered. Backlash is a common and frustrating problem in many telescopes.

In the structural parts of the telescope, metal is almost always avoided. One of the worst enemies of the observer is telescope vibration. In some telescopes a momentary touch on the focusing knob can set off vibrations that seem to go on a lifetime. Getting the telescope in good focus becomes a chore at high power. This doesn't happen with Dobsonian telescopes because wood mountings and cardboard tubes are very effective in dampening out vibration. They don't make church bells out of wood!

Alt-azimuth designs offer an important, but seldom mentioned, advantage to you optical workers: it allows the use of thin glass for large mirrors. Because the mirror only has to be supported along one edge, you can support the mirrror the same way opticians do in the optical shop: with a sling around the bottom.

Supporting a thin mirror in an equatorial mount is difficult because the tube rolls. Providing support that works without warping the glass in any of the positions the mirror can get to is tricky. But an alt-azimuth telescope tilts in only one plane, hence it is possible to support the mirror's edge by means of hanging it in a sling. This gives an even support of the mirror's edge — almost impossible to obtain in a telescope where any part of the mirror's edge may be asked to support the weight of the mirror.

Supporting the back of a thin mirror is just a matter of a good flotation support, nine or eighteen points depending on just how thin the mirror is. And "just how thin" depends on how far you are willing to go. The San Francisco Sidewalk Astronomers' two largest telescopes are 24" diameter by 1" thick and 22" diameter by 1¼" thick. In large amateur telescopes, one inhibiting factor is the cost (and weight) of standard-thickness Pyrex blanks. Dobsonians make use of plate glass portholes and Pyrex sheet glass, good alternatives because they weigh and cost much less.

A 16" Dobsonian fits neatly into the back of a VW squareback for trips into dark sky country.

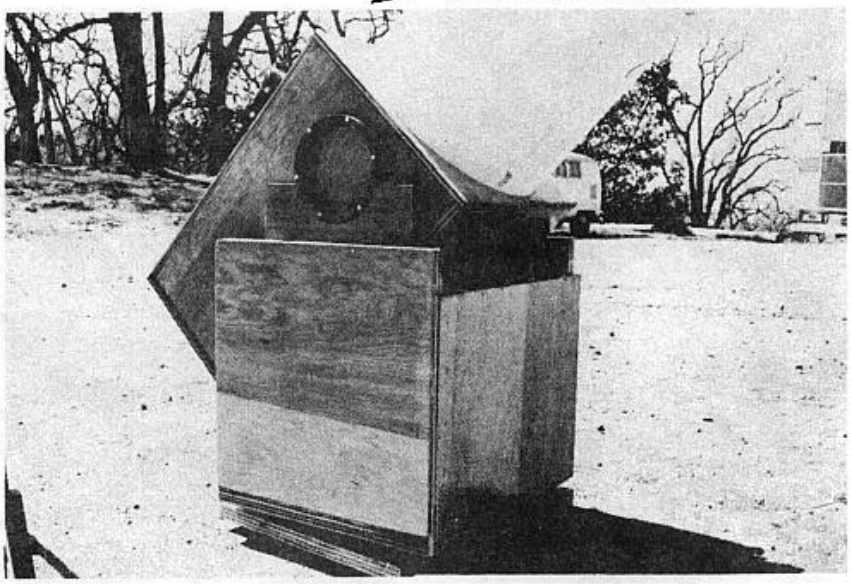
Eyebrows are raised, on occasion, at the idea of plate glass portholes: "Didn't plate glass go out after World War II?" Well, it did with conventional thickness mirrors, and for good reason: after all, it has three times the thermal coefficient of expansion of Pyrex. However, what counts is thermal equilibration; and a thin plate glass mirror, say a 16" diameter by 1" thick, equilibrates to temperature changes four times as fast as a standard thickness Pyrex mirror of the same diameter.

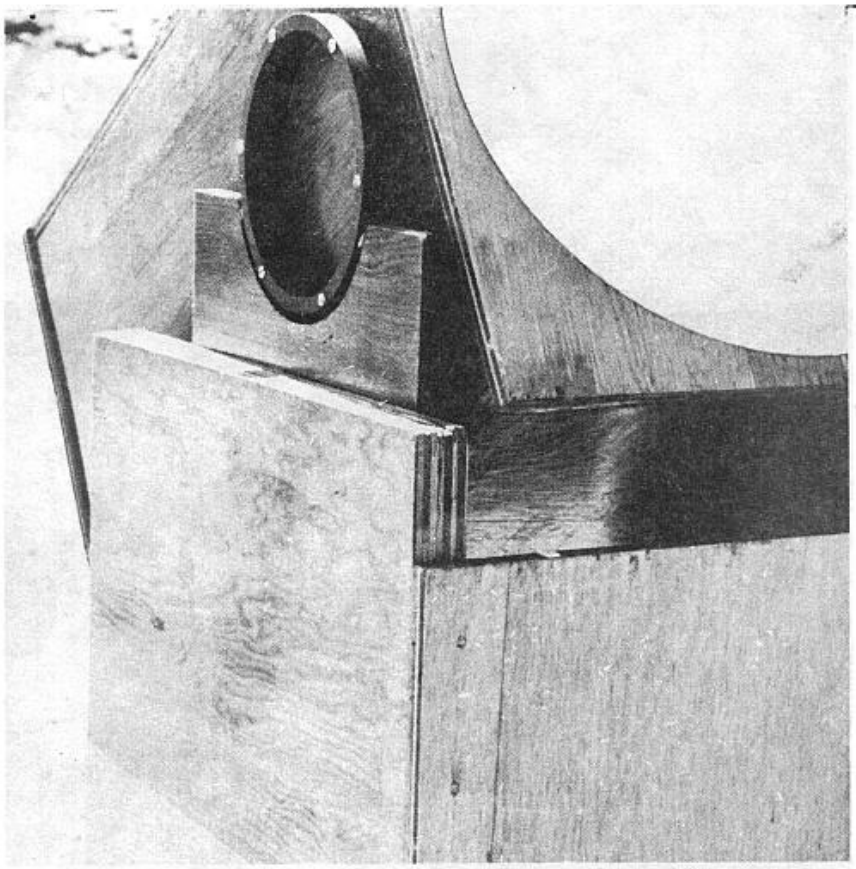
On the basis of my own experience with telescopes, especially with the bigger ones up to 24 inches, the whole question of the mirror changing its figure while the telescope is cooling off in the early evening is moot. Turbulence, inside the tube and around the telescope, is always the overwhelming problem, and it affects all large telescopes. By the time the air in and around the telescope has settled down, the mirror has equilibrated sufficiently. In wood and cardboard-tubed instruments, where the mirror is a major source of heated air, the speedy equilibration of the thin mirror means you're ready to observe sooner. (And if it still bothers you, there's always sheet Pyrex glass, still a lot cheaper than molded blanks.)

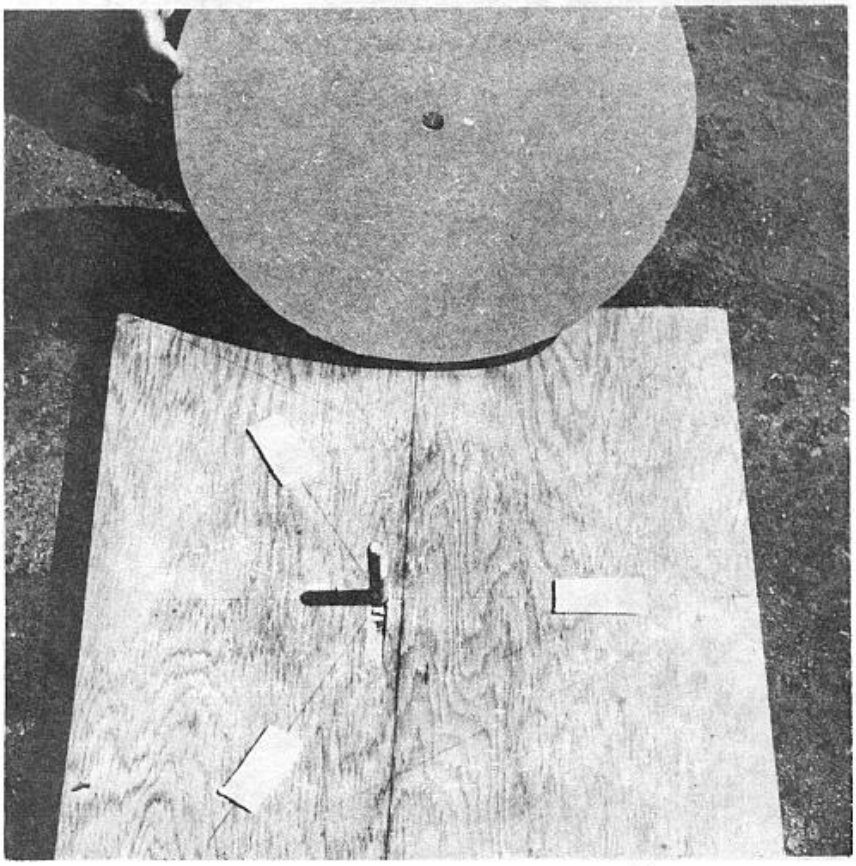
What do we have when we step back and look at a Dobsonian telescope? There is nothing to make a machinist ecstacise — no knurled knobs, gears, or precision metal parts. For the electronically-minded there are no wires, switches, power requirements, or converters. For the opticians, there is only one parabolic mirror and one secondary flat — no correctors or erectors — just a simple Newtonian reflector.

For the observer, proof of an instrument's

Above: After the two-hour drive to Fremont State Park, everybody wants to take a look through the telescope. Dobsonians are ideal at star-parties. Below: This telescope's mounting is unpainted; it is therefore ideal for observing construction details. The side bearings are made from a short piece of PVC tubing riding on teflon pads.







Stability

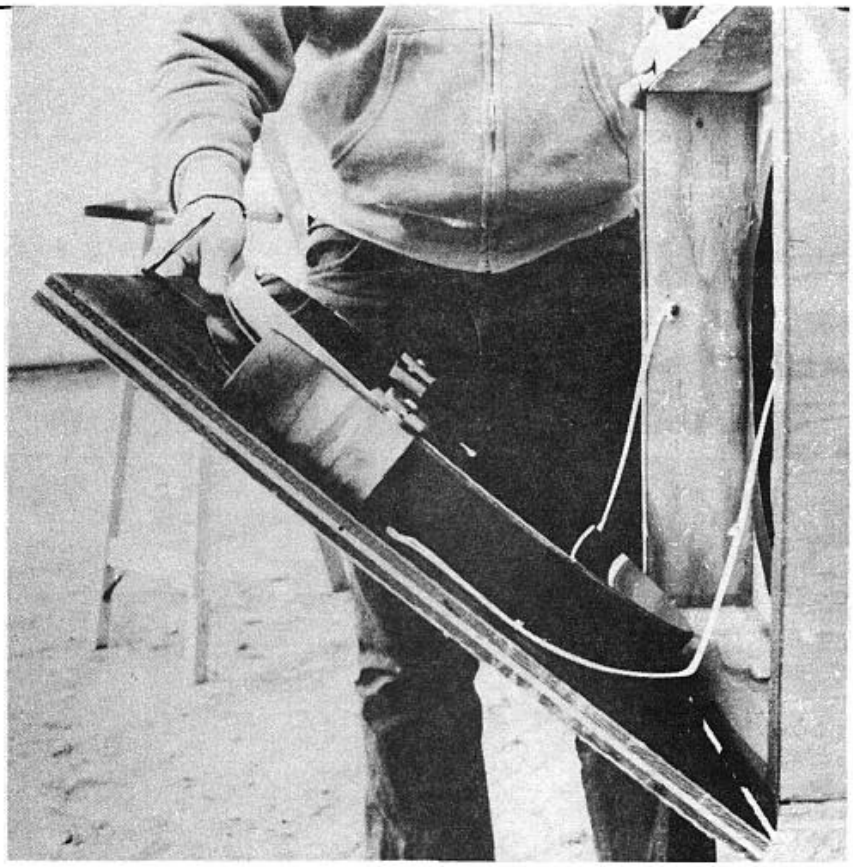
worth comes only when the telescope is hidden under the dark of night, so let's take a test run on a 16" f/5. (By the way, the mounting doesn't have to be used on big telescopes; it works with smaller ones just as well.) Imagine yourself standing next to it still wondering how a 16-incher could have come out of a Volkswagen Square Back so easily and quickly. You're in the mountains, one of the marvels of portable aperture, and after twilight your remote observing site reveals its pitch black sky.

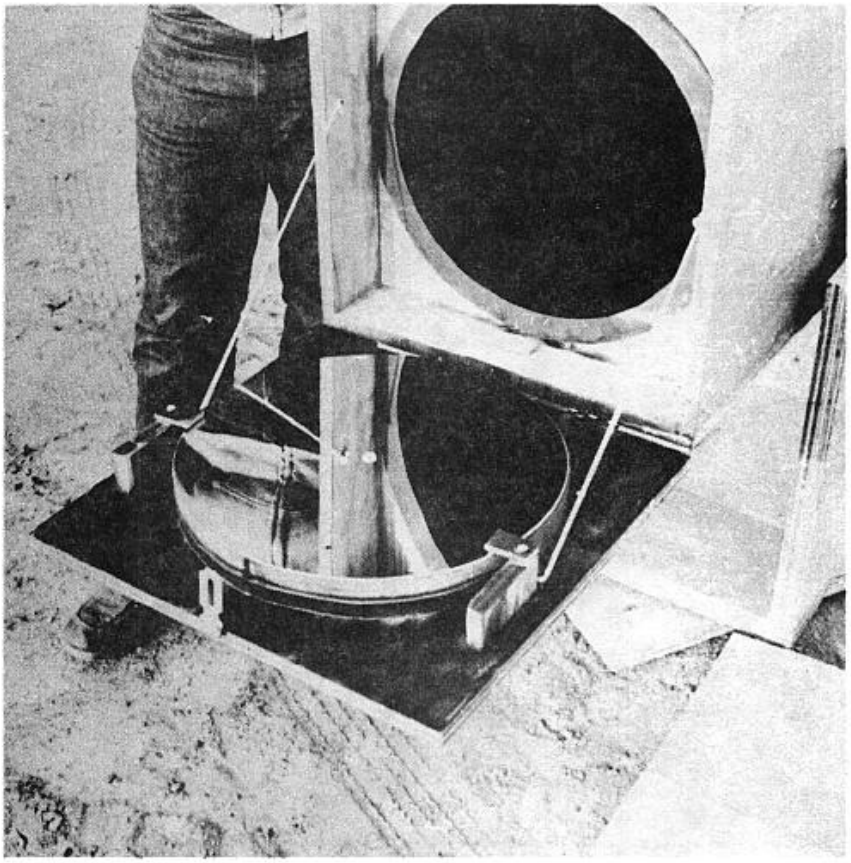
Your head tips up, you mumble "Where's M-13?", then you spot Hercules nearing the zenith. You grab the telescope and begin moving it; right away you feel just how smooth a telescope can move. Without any fuss at all the telescope is pointing in the right direction and you put your eye to the finder's eyepiece and center the little fuzzy spot on the cross hair. You pull away and notice that the finder, no matter where you point the telescope, always remains on the top of the telescope. "How convenient!", you think. Two steps up the ladder and your eye goes to the eyepiece; you give the telescope a little nudge, centering the cluster in the field. Next you focus. No shake. "It's really steady!" And M-13: you can hardly believe it. The cluster almost fills the eyepiece field; you can resolve right across it with absolutely no effort whatsoever. You stare for awhile, so excited you don't even notice your hand nudge the telescope re-centering the cluster in the field.

You think to yourself, "If this is 100 power what must 200 look like?" In goes the high power eyepiece; you focus and stare for awhile. "I can see right through it," you say to some friends anxiously waiting a turn at the eyepiece. Again the scope gets a nudge re-centering the object. Then you realize at 200 power you can nudge the telescope and M-13 moves into the center and just sits there. There's no vibrating or wiggling — you don't have to wait for it to subside. Then you think again, "How smoothly it moves!" Quickly you come to understand how simply the telescope operates without a clock drive. It just doesn't need one! After a couple hours of observing, the nudging of the telescope becomes second nature. You don't even realize you're doing it even at high powers for observing the planets. After awhile you stop and notice that the eyepiece is always pointing in the same direction — horizontal. It never ends up at the top or the bottom of the tube where you can't reach it, but always out to the side, perfectly comfortable, and the eyepiece never falls out.

Bob Kestner
1261 Davis Ave.
Concord, CA 94518

Above: The rocker, made almost entirely of plywood, is part of the secret of the Dobsonian's stability. Below: The bottom bearing is extremely simple. Teflon is nailed to the ground board; the formica sink cut-out rides face-down on the teflon. The rocker rides on the back of the sink cut-out.





Top: The 16" x 1" plate glass mirror resting on a 9-point flotation and hanging in its sling. "The night this picture was taken," says Bob Kestner, "the turbulence was as absent as I've ever seen it. At 600x the Airy disk was clearly seen with perfectly round star disks just on either side of focus denoting the absence of any problems with astigmatism." Bottom: The mirror sitting face-up on the telescope's "tailgate." A combination lock keeps the mirror safe from curious fingers while it's in the telescope. The mirror is transported in the plywood box seen on the ground.

Editor's Note: Bob Kestner, in his letter accompanying this article, says: "I now have more respect for authors of magazine articles. The article was rewritten over ten times with several people giving advice. I hope dividing the article into two parts is acceptable. First we want to give you reasons to build a sturdy alt-azimuth telescope; then we'll show you how." That's fair enough, but I'll bet a lot of people besides me will sit on the edges of their chairs until TM#5 comes out! Bob points out that even though the design looks simple, "it's the little things that make or break it. For instance, the teflon on the bottom bearing has to be face up. This seems trivial, but if you face the Teflon down and the formica up, dirt settles on the formica and then the teflon runs over the dirt. You can imagine what this does; it makes the bottom bearing feel like the R.A. axis of ta certain brand-name telescope1. In Part II, I'll outline these little things plus give advice on construction. It would take several articles to do this right, but I feel in one more article I can get the TM started in the right direction."

At the Riverside meeting, I saw a number of Dobsonians in action, and as you will realize from reading my article, I rather enjoyed using them. They are everything that Bob Kestner claims them to be, and more. I used a largish number of more conventionally-mounted instruments, including one 16-incher that must have weighed a ton or more, and can only remark that the stability of the Dobsonians is exceptional. He's right about the optical quality too; it's superb in those I saw.

In case you're wondering where the term "Dobsonian" comes from, it's the adjectival form of John Dobson's name. John Dobson is a key member of the San Francisco Sidewalk Astronomers, a group that has put on hundreds of star parties for people all over the western states. (Watch for an article in **Sky and Telescope** *about their activities.)*

This nomenclature should be applied only to instruments closely related to the instruments Bob Kestner describe. Mike Hatcher's 22-inch alt-az, for example, is not a Dobsonian, but belongs to a class sometimes called "Big Box" telescopes. *R.L.B.*

DSM EQUIPMENT REVIEW: COULTER OPTICAL'S 13.1" f/4.5 *ODYSSEY 1*

by Gerald D. Duhon

Most deep-sky enthusiasts know that they've never had it so good. We live in an exciting time in the history of amateur astronomy -- a time of progress and growing sophistication in observers and equipment. Our understanding of what we see, its nature and development, is much more complete than ever before. Observers have honed their techniques to a fine edge, successfully tracking down faint puffs of light at the limits of their instruments.

So our avocation is healthy, vibrant, and is moving forward. And as is the case in any field of enthusiastic human endeavor, along with growth comes diversification, and within that diversification comes specialization. The magazine you are holding in your hands is proof enough of that. *DSM* is diversified; serving the needs of both the observer and photographer. Every facet of interest within those broad catagories are catered to; detailed descriptions of double stars, galaxies, nebulae, and clusters -- all are here, side-by-side, along with practical information on building a photographic library of these objects. *DSM*, then, is the response and verification of astronomy's growing specialization — the fulfillment of our needs.

As our interest and level of expertise grow from the general into the specific, so too must our equipment. Necessity really is the mother of invention — most often our dreams exist prior to our abilities to fulfill them. A sort-of "high technology" must be formed so that we may further refine our devices. Sometimes such improvements are created by the culmination of small, numerous random improvements of existing equipment. Sometimes techniques from an unrelated field are grafted onto ours, and that results in better ways of doing things. And in still other cases it is the sheer force of genius that propels us forward.

How can we then recognize and define the products of our high technology when we see them? The resulting product, obviously and by definition, must be a real improvement -- it must perfectly satisfy or fill an otherwise unfilled requirement, or do so more than other products or techniques currently at hand.

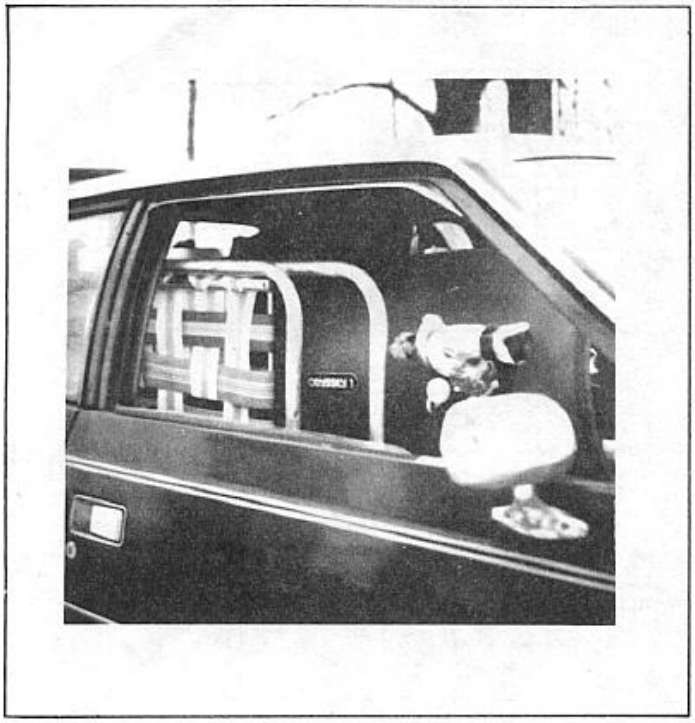
If it is of a specialized nature, it often very closely corresponds to the real, basic, distilled-down needs of the user. If it becomes a classic, it will come to symbolize that need, defining its parameters for years. Thus, because it locks perfectly into that empty or poorly-filled space, it may be simpler — limited in its use. The development of a deep-sky cold camera is certainly the result of high technology, but you can't see M31 through it. More recently, the advent of gas-hypersensitized films goes a step further, and is considered by many a real improvement; a better, simpler response to the basic needs of the astrophotographer. We have, then, suggested another factor; perhaps the most important of all. Those improvements must be available at a nominal cost to the majority of those desiring them. This can be the "litmus test" of such efforts.

Yet we must consider the other side of the coin as well. The ability to satisfy a wide range of unrelated needs certainly qualifies that product as the result of applied high technology. After all, by sampling a fair range of specialized experiences we find the one that most pleases us, and only then can we pursue it. The arrival of an affordable, compact Schmidt Cassegrain telescope, so suited to the needs of the visual as well as the photographic astronomer, marked a new era for our hobby. With it, many of us became absorbed by photography; as our interest grew, so did our demand for better, specialized aids. This, in turn, led to further growth. On the other hand, many amateurs using the Catadioptrics began to become interested in just looking. We could easily transport them to magnificient dark sky sites, and the glories we saw only whetted our appetite for more; our enjoyment and skill increased exponentially in relation to the size of our mirrors.

Some of us, in a quiet moment on a cloudy night, even wished we were rock stars, or wealthy tycoons, or whatever -- simply so we could direct that a fine 60" scope be built for our own private use, atop some splended mountain -- yet few of us could afford even a 12½", at $1500+. But the constituents of our desires are beginning to take concrete form, even as you read these pages. A high technology is being developed by skilled craftsmen who share that need, so that it may be fulfilled for all of us. And so the day may soon arrive when every serious amateur of even modest means who wants one, may have that 60" scope.

It is the large, commercially-produced alt-azimuth Newtonian, probably in the so-called "Dobsonian" configuration, that will mark the next leap forward for visual astronomy. We must, of course, credit John Dobson and the San Francisco Sidewalk Astronomers for creating, and to a large extent perfecting, this new generation instrument. But the real turning point comes, as it has so often in the past, when a business organization with the financial wherewithal picks up the banner and begins to offer, at a reasonable cost, a given modification. In short, to be beneficial to many, such improvements must be mass-produced. We will undoubtedly look back in a few years and recognize Coulter Optical's *Odyssey 1* as the turning point.

The *Odyssey 1* retails for $395* plus $75 crating charges; a total of $470. Shipping charges must be paid by the purchaser and may run as high as $80 for delivery by motor freight to the east coast. The total tag, therefore, will be about $550, or ¼ to 1/3 the cost of an equatorially-mounted Newtonian of similar aperture. Coulter will accept a 1/3-down payment plus crating costs to begin an *Odyssey*, with the bal-



ance due upon notification that the packages are ready to be shipped. Since this is really a two man telescope, why not split the cost with an astronomically-inclined friend? In this manner the author, who has always had trouble saving anything (except maybe his strength), actually saved enough quarters in a plastic tube bank to finance the purchase of this superb telescope. Delivery time was a very reasonable twelve weeks, precisely as Coulter had informed us.

The unit now being produced has been refined and modified from the earlier version illustrated in Coulter's advertisements. The cosmetic appearance has been upgraded and some other structural changes have been made, most notably the shortening of the excess tube length near the focuser -- this makes for a more compact design.

As we uncrated the *Odyssey I* the most striking thing was its extreme compactness. The maximum height of the eyepiece when the scope is aimed at the zenith is only about 5'2"; the total tube length is approximately 5'6" -- you're probably taller than the fully-assembled telescope (save for young *DSM* readers). This is a design feature you'll really appreciate, especially if you've ever found yourself perched halfway up some step ladder, swaying gently, while trying to see a faint nebula. The *Odyssey* has a superb finish; there are no nail holes, no uneven joints, no painted-over glue beads. In fact, the board fittings are so flush that no seams could even be detected. Whether one deals in telescopes, automobiles, or anything else, this concern for final appearance often reveals the manufacturer's care and skill in dealing with other, unseen components. The paint, called "Zolatone", is a very attractive, medium bluish-purple, with a textured, somewhat plastic feel to it. We found the telescope to be carefully packed. A circular wooden plug, attached to a piece of fiberboard and placed inside the Sonotube opening, served to protect the scope. The mirror is shipped separately via United Parcel Service.

This careful crating paid off as it appeared that our unit had suffered a fall (or throw, or drop) of sufficient force to cause the focuser to become jammed into the holding tube. Also, the diagonal had rotated around its axis so it became grossly displaced. We succeeded in extracting the mount with little difficulty. Ordinarily, the position of the secondary is preset at the factory, and its adjustment is not necessary. It is mounted on a single strut, or metal band, passing through its wooden holding block. The mirror is glued to the block. Therefore, there is only one adjustment possible, that being the vertical up/down motion of the strut about ist holding screws. So our realignment was greatly simplified over conventional Newtonians, which often have vertical and horizontal tilt alignments. Once the jarred strut was recentered, we placed the mirror in its sling and just "eyeballed" it inside the house to attempt a rough collimation. This was done by adjusting three screws at the rear of the tailgate that press against three mirror pads, therefore moving the primary into the centered relationship. On the edge of the mirror is glued a small felt dot. A corresponding dot is placed at the top inside of the tailgate. When the mirror is dropped into its sling, the two dots should be placed on top of each other -- this action will ensure that the same areas of mirror always face the secondary. During our first session, we found the telescope to be in perfect collimation, after only roughly aligning it! Dumb luck probably, yet it emphasizes the ease of attaining proper collimation.

The *Odyssey I* consists of two segments -- the tube box unit and the "rocker" ground board unit. Set one inside the other, place the mirror inside, and you're ready. It takes about five minutes for two people to accomplish this, and the individual pieces weigh about 55 lbs. You may wish to replace the regular screws at the tailgate with "eyebolts", available at any hardware store; in this manner, you can leave your screwdriver at home, which often becomes something else to potentially lose in the dark. The *Odyssey* comes without a finder -- buy or build the best one you can.

Everything you've heard or read about Dobsonian performance is most happily true, and well-exemplified by this instrument. It moves with an uncanny, silent silken performance, uncharacteristic of any equatorially-mounted telescopes. Even at high power there is absolutely no vibration of the image; the wood dampens oscillations, whereas metal transmits them. To track an object, we simply grabbed the front end of the tube and it followed; no binding, shimmying, or backlash. And the image! Put to rest all concerns about fractional wavelengths of yellow-green light. The images are beautiful; easily the match for any highly-touted Catadioptric. The Newtonian design lacks the stray-light baffling of the compound designs, and this, some say, results in better contrast at the eyepiece. Be that as it may: contrast in emission nebulae is very high — stunning.

Now, on to the good stuff! The following are short excerpts from a very exciting first night out with the scope, from my notebook. The transparency was about 6/10. They represent general comparisons of objects as viewed with an 8" Schmidt-Cassegrain.

M42-43 and environs: A great tingle moved from the soles of our feet to the top of our heads as the great Orion Nebula exploded with color and displayed festoons of irregular dark patches and filaments never before detected. My co-owner, Harold Villarreal, said that it was like someone had walked over to the wall and turned on the light switch! All four stars of the Trapezium looked like Sirius. M43 appeared as an elongated, rotated comma, with a distinctly dark, wavy border on one side, mistily merging with the main nebular mass on the other. The "fish mouth" had

(eee COULTER REVIEW; p. 10)

STAR-HOPPING, (from p. 9)

Dobsonian owners must star-hop. There is an alternate method involving specially-fitted setting circles and a scientific pocket calculator (to figure polar offset error, then move the scope accordingly), but most observers will prefer to use asterisms and visual star chains as the primary means of target location. Incidentally, if you plan to purchase or construct your own Dobsonian or alt-azimuth telescope, you will probably want to build your own finderscope. If so, don't forget to use an "amichi" type prism for the diagonal instead of a regular one. This device renders a correct left-right image in addition to an upright one. Thus, it will perfectly match your star charts and greatly simplify your hopping.§

4535 Dallas Street
Beaumont, Texas 77703

COULTER REVIEW, (from p. 8)

"teeth", and the wings could be traced and connected in one giant sweep. NGC 1977 showed much elongated light and dark patchy detail, and NGC 2024 exhibited its two components and dark rift quite clearly. M42 was an unmistakable, no-question-about-it, lovely pale-lime color.

NGC 7789: We obtained a view of this object like we had never experienced before — hundreds of minute points of light against a very bright, brilliant granular backdrop of half-glimpsed suns. Intervening dark clouds were very evident and easy, like someone had taken giant scissors and randomly sliced through great patches of stars. Many other clusters were observed; among them M35 and M37 seemed to show these dark lanes quite clearly. Open clusters exhibit an entirely different appearance when the 14th and 15th magnitude suns burst into view. The reddish stars present were most striking; like stoplights.

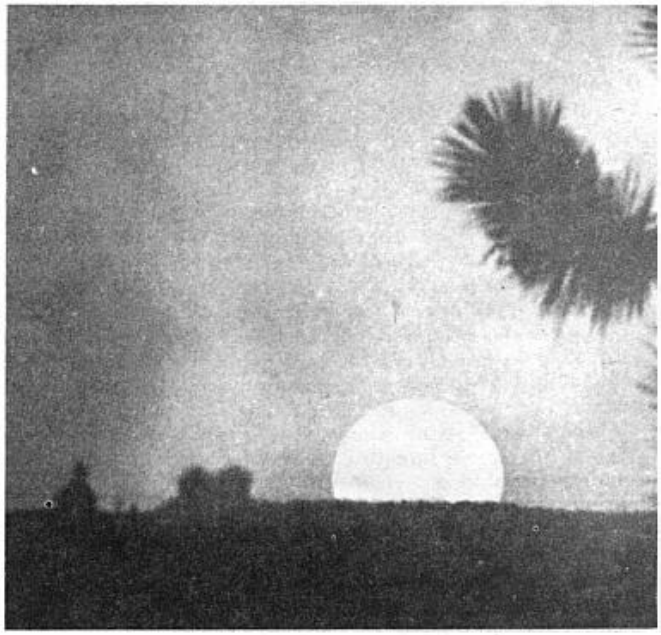
This instrument of the cosmos performed beyond all expectation. It is durable, easy to use, and magnificient in optical quality. It is in all respects the epitome of the current high technology as applied to visual astronomy. It might be said that we are on the verge of a "revolution" — the end result of which we now only dimly perceive. Jim Jacobson, a spokesman for Coulter Optical, stated that the prototype for a 28" instrument is under construction, and a 42" mirror is being considered. The 28" may become available in about a year, and may tip the scales at $2800, or $100 per inch! At present, there may be the real possibility of a 60" mirror on the horizon — it can be said with certainty that Coulter's 17.5" mirror will revolutionize the art of homemade Dobsonians.

Well, friends, there you have it; such are the things dreams are made of, and such is the nature of the high technology that is mobilized to fulfill them. It's not too early to start saving those quarters. And remember, dear readers, you read it first in *DSM*!§

4535 Dallas Street
Beaumont, Texas 77703

Cloudy Night Department

A picture of the moon in *Deep Sky Monthly*? Well, we thought we'd print this photo sent by Sketch Graphics photographer Bob Ferris of Littlerock, California, to give you a laugh on cloudy or moonlit nights. It's titled, "Here comes that ##%**@¢¢$!** moon again!."§



OBSERVING WITH 20", (from p. 6)

M78, faint at low power, showed up better at 160x.

M1 looked more amorphous and dimmer than I expected it would. The main bar of the nebula is softly S-shaped with H-like extensions.

IC 59 and IC 63, two nebulae near Gamma Casseopeiae were visible, though faint, from Ross Lake. IC 63 looks like a "stain on the sky" according to my notes.

NGC 1068, a Seyfert galaxy, has a very bright star-like nucleus. I was just doing lots of galaxies while waiting for M42 to rise at Ross Lake when I observed it — what a shock it was.

M11 comes into its own with the 20". The individual stars are bright enough to make this very tightly-packed cluster a showpiece.

I could not see the Horsehead Nebula, though I searched for it quite thoroughly in the correct area. I plan to try again with a good nebular filter from a dark site. The reflection nebula near Sigma Orionis was easy to see.§

AstroMedia Corporation
411 East Mason Street
Milwaukee, Wisconsin 53202

Bulletin: *DSM's* Small Telescope Project book is now under production. Watch for details in upcoming issues.

ASTRONOMY REPORTS ON ODYSSEY

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ASTRONOMY REVIEWS

Odyssey 1 Telescope

Coulter Optical Co.
Dept. A, Box K
Idyllwild, CA 92349

My viewing location is heavily light-polluted: the Milky Way is always invisible, I have never seen M-33 in any instrument, and the naked eye limit is about magnitude 4. I usually restrict my viewing to nights of greatest transparency and least moonlight and often observe after midnight. Under these conditions, I found the 13.1-inch f/4.5 Odyssey 1 performed surprisingly well.

Jupiter and Saturn showed great detail, and some satellites of Saturn undetectable in a Dynamax 8 were visible. But on the whole, the shorter (59") focal length of the Odyssey 1 (as compared with that of an 8-inch f/10 catadioptric, say) did not do as well on Jupiter and Saturn as a good, high focal ratio lunar and planetary telescope would.

On the other hand, with galactic clusters, the low f-ratio and large aperture of the Odyssey guarantee outstanding viewing. NGC-2158 (the distant companion to M-35) resolved easily, and numerous small clusters showed far better than with a Dynamax 8. The fine performance of the Odyssey has made browsing through the Milky Way my favorite use for it.

The Crab Nebula (M-1) was visible even near Full Moon, though with no details. The Orion Nebula (M-42) was clearly green and had a long trail to the west. I couldn't see the central star in the Ring Nebula (M-57), but the Dumbbell (M-27) displayed some detail. The Lagoon and Trifid Nebulae (M-8 and M-20) revealed considerable features.

Polluted skies limit my viewing of galaxies, but in spring I can find more than 25 of them. M-51 shows off both parts. M-82 has a vertical rift, and M-64's "black-eye" stands out.

Because of their design, Dobsonians are significantly cheaper than other telescopes of the same aperture. Their simple, smooth-working alt-azimuth mountings consist of a tube in a box that turns on a rocker. (Unfortunately, this design also makes them unsuitable for photography.)

Despite its mechanical simplicity, the Odyssey 1 is large and heavy. You often hear Dobsonians called "portable," but be warned that this means transporting a box full of telescope weighing 150 pounds and measuring 60" x 22" x 22". "Movable" may be a better description.

Coulter has cut costs on the instrument by not including a finder and by providing only one eyepiece. Finders are readily available from many manufacturers, although with practice you easily become accustomed to sighting along the side of the box and following objects in the eyepiece by pushing on the tube. I recommend that you use at least two first-class eyepieces with an Odyssey, perhaps the Edmund 28 mm RKE and any 12 mm orthoscopic.

The best feature of a Dobsonian is its rock-solid stability: Nothing disturbs the view — absolutely nothing! I have used a 10-inch Newtonian and an 8-inch catadioptric, and the Odyssey 1 out-performs both at considerable savings. The ease of using a Dobsonian — together with its gratifyingly large aperture — will tempt you to spend more hours viewing the sky.

If my experience is typical, you can expect an eight-week wait after you send your order. Both primary mirror and telescope will then arrive in excellent shape. Coulter responds promptly and courteously to mail and phone queries, too.

Anyone considering the purchase of a large-aperture telescope ought to read the three part article "How to Build a Dobsonian Telescope" (ASTRONOMY, June, July, and August 1980) and then decide whether to build or buy. If you decide to buy, I recommend the Odyssey 1. *James Greenwald.*

2231 Southgate Square
Reston, Virginia 22091

December 5, 1986

Coulter Optical Company
P. O. Box K
Idyllwild, CA 92349

Gentlemen:

I received my new Odyssey "Compact" last week. Thank you VERY much.

I've been an amateur astronomer for the past 17 years and have always been hampered by lack of funds. I finally decided that this was the year to treat myself to something better than the 4½" Japanese reflector I'd been using since 1970, and was looking longingly at the 8" scopes in the magazine ads, when I suddenly noticed your ad. I couldn't believe I could get a 10" scope for less than what my 4½" Japanese reflector is selling for now. Although I was skeptical, I decided to give your firm a try. After all, I could stand to lose $300 if everything was a total disaster.

I tried to wait patiently from the time I placed my order in April. You informed me that there would be a 10 month wait, so I decided not to get antsy until February. That was before I got your note in October informing me that my scope was almost ready! - Then I began to feel like a little kid knowing that Christmas was just around the corner. Anyway, the months were well spent designing and building a finder to go with the scope.

The scope arrived intact, but I had to wait nearly a week before I could get out to a location with dark skies to put the thing through its paces. Needless to say, I was completely awestruck at the beauty of the heavens and all the things I'd been missing by being forced to use my puny Tasco for so many years. The Odyssey is truly an optical masterpiece, yielding superb bright images. What's more, I feel the scope has personality, and I somehow feel free to customize it as I wish; I always had the feeling that I couldn't do anything to my Tasco without destroying it. I've even given the scope a name. The raspberry color was a natural match for a nickname that I had in high school (the Big Red Raspberry, on account of my red hair), and I borrowed the term "light bucket" from Ken Fulton's "The Light-Hearted Astronomer". These two combined somehow to yield, "The Big Red Raspberry Memorial Light Bucket", also known as the BRRMLB. Somehow, though, it doesn't have quite the ring to it as does "Odyssey"... I also had the strange desire to get a vanity license plate for my car that says "10 INCH", although I think some people might misconstrue what I was referring to.

What I'm driving at in this inane babbling is that I'm VERY HAPPY with my scope. It was well worth twice the wait and ten times the price. I still can't believe you can sell such a quality product for so little money, but I'm definitely not complaining about that. You've given me new faith in the ability of companies to meet their advertising promises. I have the feeling the BRRMLB and I will be fast friends for quite a long time. Words alone cannot do justice to the refreshing feeling that a just a few hours with the Odyssey has given me so far. If I ever get the opportunity to pass through Idyllwild, I'll be passing by your shop to thank you in person.

I'm enclosing a few pages from my Astro Log to try to tell the story of my first few nights with the BRRMLB. I hope you find them amusing. Anyway, please feel free to use me as a reference; I'd be more than happy to gush to anyone interested in buying an Odyssey.

Thanks again,

Jonathan H. Ward

M42/M43 I'd been saving the best for last, and I wasn't disappointed. The longer I stared at M42 and M43, the more I saw, and the more it seemed that I was seeing different aspects of the nebula. Wisps of nebulosity extended over nearly the entire eyepiece field, and I could trace the delicate features that I had previously only seen in photos. By moving my eye around the field, my averted vision would pick up details in different areas of the nebula, almost making it seem as though there were motion in the clouds. At one point I got the strange impression that the dark dust clouds were shadows of something, and at another instant I had a very distinct feeling of depth in the nebula, as if the obscuring dust were a flat object held up in front of a ball of glowing gas. These impressions were quite strong and compelling, and I had the feeling that if I were to sit at the eyepiece long enough, I would discover even more aspects of this wondrous beast. I could see how someone could devote his entire life to staring at M42, waiting for something to happen, waiting for the REAL truth to be revealed. Tonight's brief look at the Orion Nebula was a philosophically moving experience, as corny as that may sound.

One thought crosses my mind as I write this. The star clouds and nebulae in Sagittarius, Ophiuchus, and Scorpius have always given me the impression of fires and great heat burning away in the center of the galaxy. The Orion Nebula, though, to me feels cold.

By the end of my experience with M42, the wind had picked up to nearly 30 mph which, on top of 25° temperatures, was not comfortable. With the prospect of a 6:00 a.m. wake-up for work, I found it unpleasant but prudent to pack the BRRMLB pack in the Toyota and head for home. On the drive back, I tried to search my limited vocabulary to find words to describe tonight's brief experience with my new friend. The word "stupend-fan-dabulous" somehow made its way into my consciousness, and it seemed as good a word as any.