Gleanings for ATM's

Conducted by Roger W. Sinnott

A FOLD-UP EQUATORIAL MOUNTING

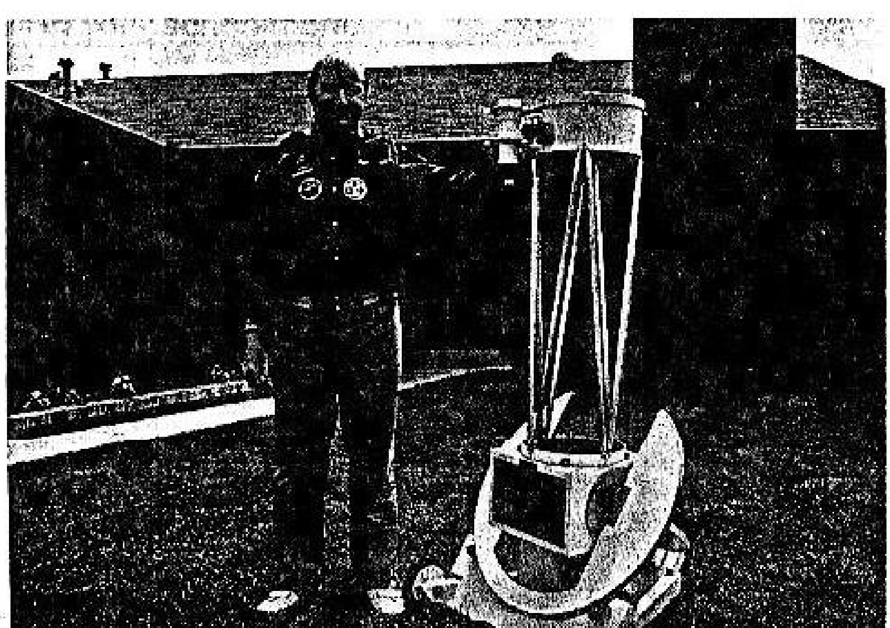
WOOD-BOX construction and the successful use of large, thin primary mirrors are two important innovations by John Dobson and the San Francisco Sidewalk Astronomers. Their ideas have caught on among amateurs around the world. But now many owners of Dobsonian telescopes feel they've had to forego the advantages of an equatorial mounting in order to get more aperture for less cost? Most instruments of this type can only move in elevation and azimuth; they cannot smoothly follow the arcs that stars make across the sky.

Well, here is a simple and elegant solution that has been around for over 60 years. It is Russell W. Porter's split-ring mounting, first employed in the small garden telescopes that he marketed in the early 1920's. Porter explains how this form of equatorial mounting is related to the fork type in *Amateur Telescope Making — Book One,* page 133.

In the split-ring design, the polar bearing is a large, nearly complete ring or disk that carries the declination bearings. Some medium-size examples I've seen have not been very successful because the disk was too flimsy to support the heavy load. These mountings also occupy a large volume, making them cumbersome.

To avoid such problems, I made my disk and polar-axis yoke out of $\frac{1}{4}$-inch plywood. These large sections are braced with perpendicular wooden supports and joined together with 6-inch sections of piano hinge. This leads to a very sturdy assembly that can fold down flat for travel. It is important to note that there are no fork arms in my construction. Since the declination bearings are located at the intersection of the yoke and disk, all the tube's weight is borne through the edge of the plywood rather than its face. Almost any weight can be carried in this way. No wonder a similar mounting style is used on some of the world's largest telescopes.

My disk serves as both a bearing and a drive surface. Its accurately circular outer edge rides on two roller-skate wheels, which provide smooth movement. When a motor turns one of these wheels at the proper diurnal rate, the telescope tracks the stars. I use a $\frac{1}{2}$-r.p.m. synchronous motor and a 30-tooth window crank (both acquired for about $4 from a surplus store) to turn the drive wheel once per hour. Since I sized this wheel to have exactly $\frac{1}{24}$ the circumference of the polar disk, the disk and telescope make one rev-



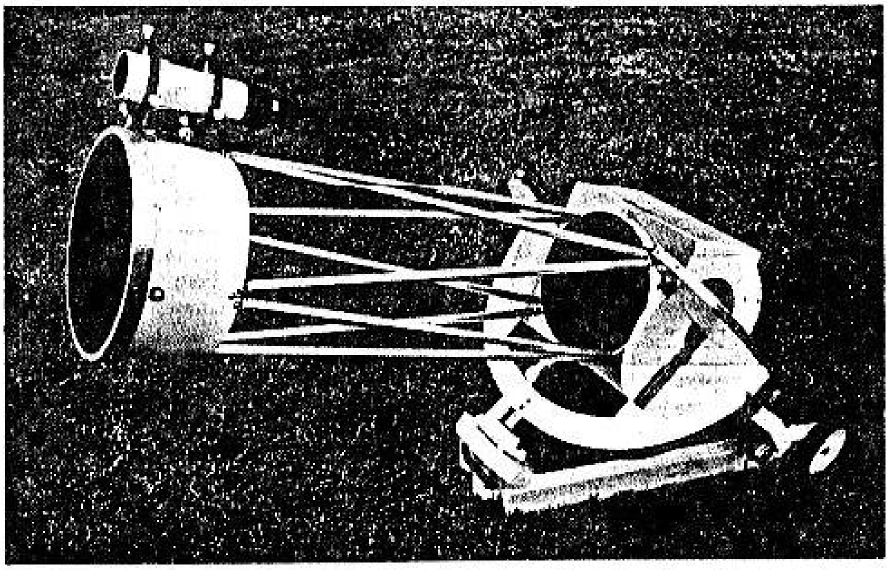
Oklahoma amateur Joe Pearson and the motor-driven split-ring mounting he made for his 10-inch reflector. A similar type of mounting is used for the 4-meter Kitt Peak reflector, where the split ring is over 40 feet across.

olution per day. Any homemade or commercial drive corrector (variable-frequency oscillator) can then fine-tune the motor's rate to near perfection for photography.

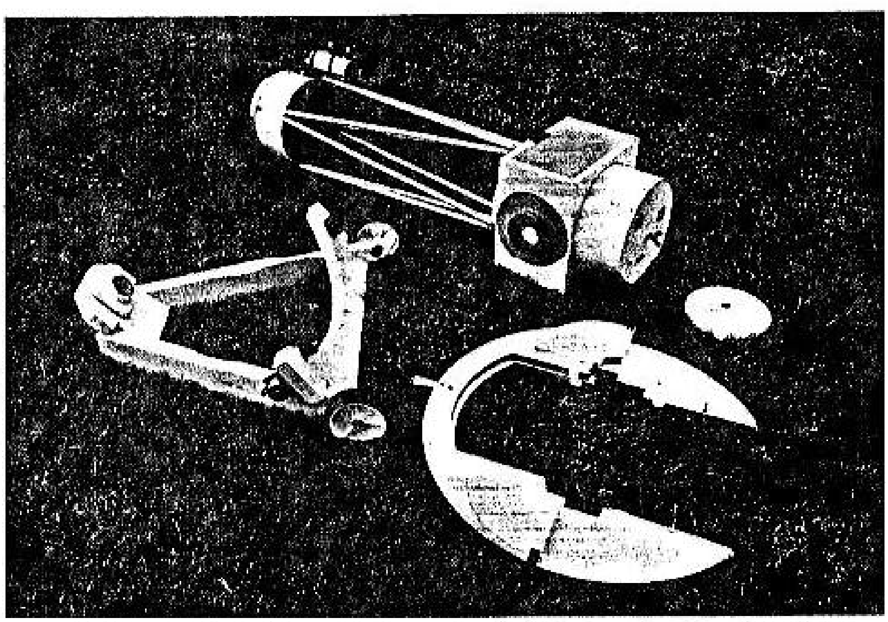
A slip clutch, consisting of a Teflon washer, is tightened against the drive wheel until slight friction is achieved. The result is the velvet-smooth feel of a Dobsonian when you slew the telescope from one part of the sky to another. But once you let go, the object you're looking at stays in the field and doesn't drift!

It's all so simple that the pictures can speak for themselves. But I want to stress the following aspects of construction:

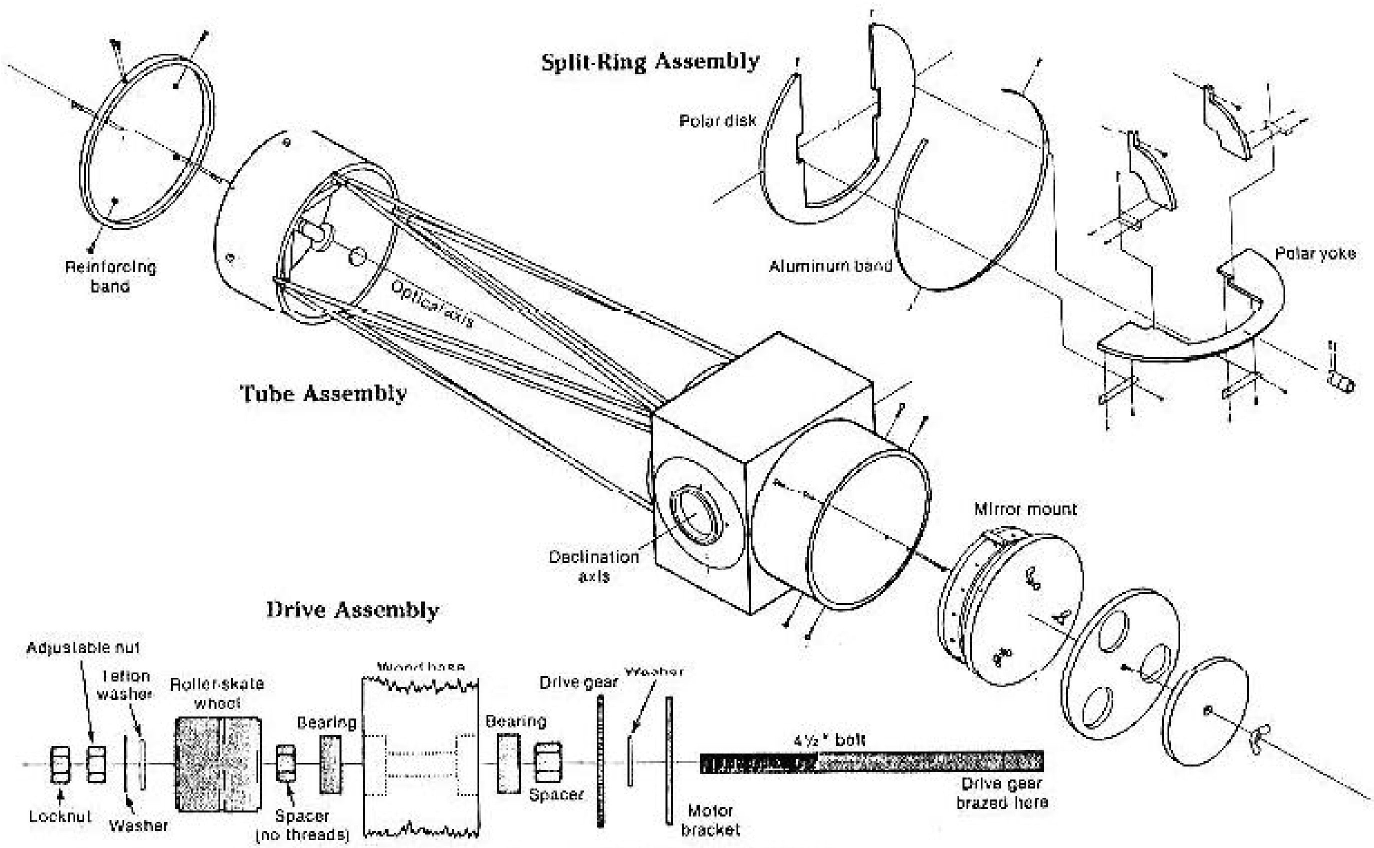
- The balance point of the telescope tube must lie very near the primary mirror. This means that the tube should be as light as possible; you'll probably even have to add weight under the mirror.
- Large flanges on the declination shafts are a must. The flanges carry the weight when the tube points east-west.
- An adjustable foot on the south end of the base is also advisable — I have yet to find an observing site that is truly level.
- Roller-skate wheels and their bearings are great for friction drives!
- Start construction with the eyepiece end of the telescope tube and proceed to the mirror end, then to the mounting and base, rather than the reverse. Otherwise,



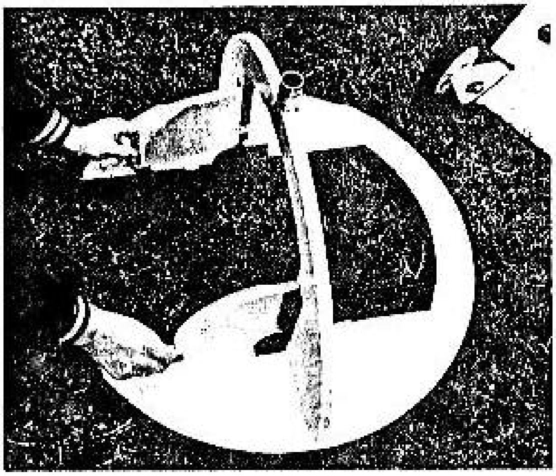
The assembled instrument is here aimed toward the southern sky. But the tube swings easily up through zenith and over to the north circumpolar regions.

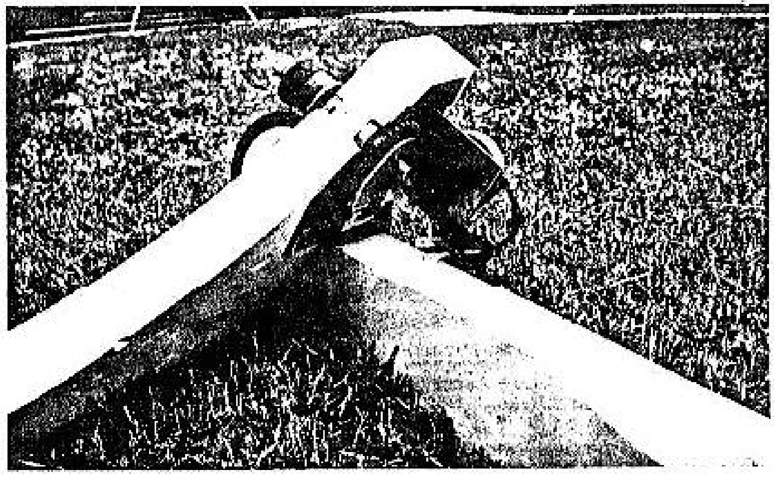


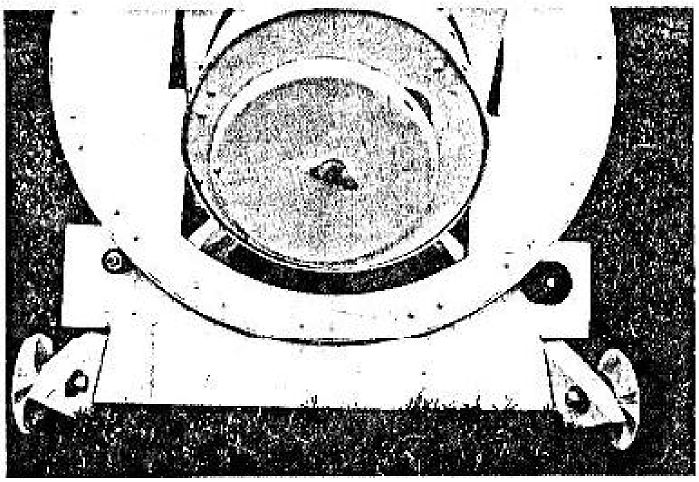
In the foreground is the large split ring, on top of which the polar yoke and quadrant-shaped braces have been folded flat for travel. Beyond the ring and lying next to the telescope tube is the precision counterweight that bolts behind the primary mirror.

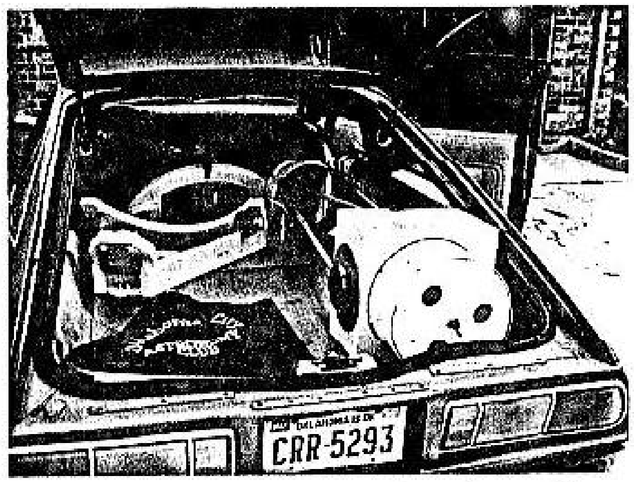


The author prepared detailed assembly drawings to guide all phases of construction.









Upper pair: At left the author bolts down the braces that hold the polar disk and yoke mutually perpendicular; at right is a close-up of the motor assembly and roller-skate drive. *Lower pair:* Note how the counterweight, pictured at left, is off center behind the primary mirror to balance the eyepiece and finder at the tube's other end. At right, the car is packed for an observing trip.

you may end up with a mounting that tracks well but is too big or too small for your optical system.

• Balance of the telescope tube around its longitudinal axis is just as important as balance on the declination axis. A friend, Eric Allen, assisted in figuring the offset of the counterweight behind the primary mirror. This compensates for the heavy finder and eyepiece at the sky end. He had encountered the same problem with his telescope, which also has a rotating tube (see the upper-left photograph on page 258 of the September, 1984, issue).

• Keep in mind that the optical axis, declination axis, and polar axis should all intersect at the center of the plywood disk. Each axis must be independently balanced. The point where the axes intersect becomes the center of gravity of all moving parts, and this point should lie over the middle of the triangular base. If you don't pay close attention to these details separately, you'll have a telescope that seems properly balanced in some parts of the sky but unstable in others.

My telescope is a 10-inch f/5.6 reflector, and I'm planning a 13- or 17-inch model. I'd be happy to correspond with readers who have further questions.

JOE PEARSON