mirror blank, and that the quality of the reference is beyond question. In a group of amateurs, one of the first obligations should be to acquire such a reference flat. The isolated worker may, if necessary, avoid at least the more serious errors by obtaining a set of three mirror plates (the backs of the plates being allowed to remain clear), and testing these against each other two at a time. Assuming that any errors present are purely errors of curvature, each test indicates the difference of curvature between two of the surfaces. In this way one may obtain three equations, containing three unknowns, that are easily solved to give the magnitude and sign (i.e., whether concave or convex) of the curvature of all three mirrors. Unfortunately, if the surface errors are more complex, as occurs often in plate glass, the method is inadequate. A better method in this case is the one described below.

III-5. Testing by Combination with a Spherical Mirror

We require a spherical concave mirror of diameter at least equal to the small axis of the mirror to be tested. Even for testing very small mirrors, however, the diameter may be 4 inches or larger, and the radius of curvature 80 inches or more. For the dedicated mirror maker, a sufficiently large, perfectly spherical mirror is a highly valued test piece. But for the amateur who will only once, or at rare intervals, construct a telescope, a special mirror is unnecessary. We recommend instead that he use his main telescope mirror, even if already parabolized. This is entirely satisfactory; the mirror need only be free of small, sharply localized defects near the center. An 8-inch mirror, of $f/8$ or even of $f/6$, may be checked in this respect by masking all but a central area 2 inches in diameter, and determining by a Foucault test whether this approximates a small sphere.

We then examine the mirror, covered with its mask, in the arrangement described in Section II-33 for detecting astigmatism in the main mirror. Using a strong eyepiece, we verify that no astigmatism (due, for example, to the positioning of the parts) is present. Next, using a special support, we alter the optical arrangement to introduce the flat into the beam. The support, as shown in Fig. 52, may comprise three boards. Three nails driven in the lower surface of the base provide a 3-point support. The two vertical boards form a niche of suitable angle, for example 45°.[3] Nails are driven in these upright boards also—three nails behind each mirror to form a back rest, two nails below each mirror to act as a support. The large mirror is, of course, accurately aimed at the center of the flat. To assure sufficient light despite the three reflections (note that the diagonal still lacks a reflective coat), the concave mirror should be silvered or aluminized.

If we should apply the Foucault test under these conditions, any zonal defects in the diagonal would at once be evident. A slight general convexity

[3] A. Couder has shown (thesis cited in Section II-3) that an optimum angle for testing flats is 54°45′. In practice, an angle of 60° is also often used.