The SOFIA telescope weights about 17 metric tons and is supported by a hydrostatic bearing in order to be decoupled from the rotation of the aircraft. The left photo shows the floating bearing, that has a diameter of 1.2 m and a mass of 600 kg. On the right photo the oil cases are shown that have been milled into both of the bearing rings. Oil is pressed into these cases and hence a 50 µm thin fill will form between the bearing sphere and the ring. With this kind of bearing a telescope rotation of ±3° at all three axes is feasible. 12 equally spaced drives will align and track the telescope and correct for any external disturbance during observation. The elevation angle of the telescope may vary from 15 to 70°.

The so called Vibration Isolation System decouples the telescope from the vibration of the aircraft. The picture shows 2 of the 24 symmetrically attached pneumatic springs. Half of these springs are acting in axial the other half in tangential direction.

The primary mirror has a diameter of 2.7 m and is a lightweighted ZERODUR structure with a final mass of about 800 kg. It was milled out of an almost 4 metric tons heavy blank ending up with a honeycomb structure in the back (marginally visible in the photo). The mirror characterizes by a low coefficient of thermal expansion and a high coefficient of elasticity. In order to ensure the high reflectivity and low thermal emission of the telescope the mirror will be aluminized twice a year (not done yet).

The secondary mirror has a diameter of 35 cm, is made out of SiC and can be tilted on both axes at a frequency of 20 Hz with a maximum angle of 0.35°. For infrared astronomy this is essential in order to detect and subtract the background radiation from the scientific object. In addition to the rotational corrections translative corrections are also feasible to center and focus the collected light beam. Moreover the secondary mirror will be used for the so called Flexible Body Compensation during observation. Hence the natural oscillations introduced by the wind load onto the telescope can be compensated.

This scheme indicates the path of rays and the position of the mirrors and the bearing. From the primary mirror the light will be reflected to the secondary mirror that relays the beam to the tertiary mirrors. Latter one will split the light beam. The infrared signal will be forwarded to the scientific instrument while the visible light will be sent to a guiding camera. With this arrangement the scientific instruments can be modified from the passenger cabins during the observational flight.