OPTICAL ENGINEERING NOTE #64
THE RADIOMETER

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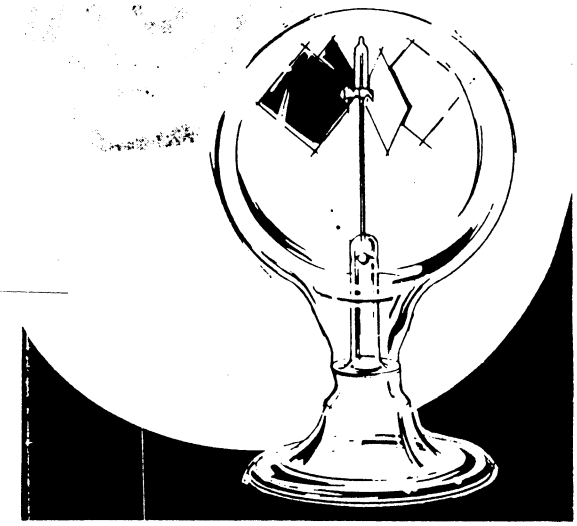


The RADIOMETER is a glass product and should be handled with the same reasonable care as one would handle an ordinary lightbulb.

What Makes It Work?

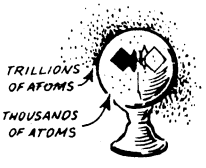
The light from the sun controls our very existence. Without it, the world would be a lifeless sphere. Because of it, life abounds, and we enjoy the marvels of a modern civilization.

In his search to **control** light, man has uncovered many of its wondrous properties. Among them . . . .

Light releases its energy in the form of heat, called infrared radiation.

You feel this energy, for example, from the heat of a lighted match, or from the warmth of the sun. This same radiation is the key to movement in the Radiometer. (The Radiometer does not work under fluorescent lamps, since there is no heat developed by this kind of bulb).

atoms and infrared radiation

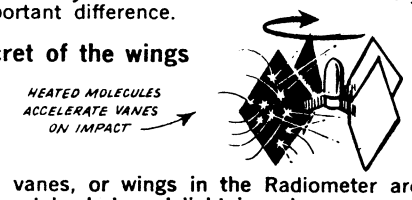


Outside the Radiometer, the air is filled with trillions of small bits of air. When light's energy—infrared radiation—strikes these atoms, they take on heat and move faster. But because the atmosphere is filled so completely with other atoms, the warmer ones quickly bump into others and stay in the same relative position.

However, the atmosphere inside the Radiometer is a nearly perfect vacuum. More than 99% of the air has been removed, leaving only **thousands** of atoms inside the Radiometer in comparison with the **trillions** in the atmosphere outside the Radiometer.

This means that each particle of air inside the Radiometer is able to move around much more freely than those outside . . . a very important difference.

secret of the wings



The vanes, or wings in the Radiometer are alternately dark and light in color.

When the light strikes these wings, it transfers heat to each one—but not to the same degree. The lighter wing **reflects** the rays, and the dark wing absorbs the rays.

Now, when the freely moving particles of air inside the Radiometer strike the light reflective vanes, they take on very little energy and do not bounce off very fast.

However, when the atoms strike the dark vanes, they take on a great deal of energy . . . and "kick" away at terrific speed.

Result: the vane begins to move, and continues to move as the bits of air continue to "kick" away from the dark-sided vane.

Naturally, the stronger the light, the more energy there is to "heat up" the dark wing . . . keeping the bits of air bouncing away at a faster and faster rate as the light gets brighter.