Theory of operation

The optical part of the instrument produces two light sources, one (the longer wavelength) strong (more intense) – the other (the shorter) weaker. The primary reason for the difference is the absorption by atmospheric ozone of the shorter. The idea is to reduce the longer light intensity to that of the shorter, by the use of an optical attenuator. The position of the attenuator where the microammeter reads zero represents the amount of ozone through which the shorter wavelength passed.
The electronics compare the signals – if one signal is stronger, the meter reads above zero. If the other is stronger the meter reads below zero.
The PMT converts the light to an electrical signal the strength of which is directly proportional to the light intensity. The motor spins a shutter that allows only one of the sources to be seen by the PMT at a time. The amplifier is synchronized to the shutter, so the signal from one source is amplified with the sense opposite the other source. The signals are then summed in the microammeter. If the signals are the same strength, the meter reads zero.