

Georgetown University Astronomical Observatory

Summary - A direct current amplifier has been designed for use with a Multiplier Phototube. Stability and simplicity are obtained by using balanced circuitry, silicon power rectifiers and transistors. Light filters and voltage control of the Multiplier Phototube are employed.

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The purpose for which this amplifier was developed is to provide a stable and relatively simple direct current amplifier for photoelectric observation and recording of the total solar eclipse in the field.

The assumption was made that the probability of a malfunction occurring in such an amplifier is directly proportional to the number of components employed. Therefore, the design specifications accentuates simplification which eliminates conventional components such as a plate and filament transformer, vacuum tube rectifier and a voltage regulated power supply.

Silicon power rectifiers are used in a voltage doubling circuit eliminating plate and filament transformers and a vacuum tube rectifier. The filament voltage is supplied at line voltage (117 a.c.) which is the required voltage for the series filament circuit employed. The plate voltage is sufficiently regulated with a gas discharge glow tube. Since all inputs and outputs, to that part of the circuit being supplied by line voltage, are balanced, the circuit is stable to normal line voltage fluctuations.

The output current of a photo multiplier tube is a linear function of the exciting illumination under normal operating conditions. To maintain these conditions and minimize fatigue conditions the use of light attenuating filters was adopted and provisions made for varying of the photo multiplier voltage to keep the anode current well within safe limits of 5×10^{-5} A. The amplifier has three sections: