A FET* OPERATIONAL AMPLIFIER CIRCUIT FOR PHOTOELECTRIC PHOTOMETRY

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Recent improvements in solid state semiconductor technology have resulted in a number of manufacturers (Intersil, Signetics, Fairchild)[1] offering low cost operational amplifiers with input resistances of the order of 10^{12} ohms and input currents of the order of a few picoamperes. These components are ideal for the low current measurements made in stellar photometry. Along with low cost, these components are very small and extremely stable.

A simple voltage follower amplifier circuit is shown in Fig. 1. A zener regulated 12 volt power supply was found adequate for good stability. Input bias voltage adjustment is provided by the 1K potentiometer. The 0.02 mfd capacitor and 33 megohm resistor determine the time constant which may be changed if other response times are desired.

Resistors R1 should be 1, 10 and 100 megohms of 1% accuracy. The feedback resistors R2 may be 300, 500, 1,000, 1,500, and 3,000 ohms or 119.4, 189.3, 300, 475, 753, 1194, 1893, and 3000 ohms. All values should be of 1% accuracy or better. The first set of resistors will give full scale readings of 0.3, 0.5, 1.0, 1.5, and 3.0 volts, whereas the second set of resistors will give 1/2 magnitude steps of sensitivity.

The 50 ohm resistor in the output circuit provides a recorder output for a 50 mv potentiometric recorder. This may be changed for other recorder sensitivities. A digital voltmeter may also be used to read the output and should be connected from point C to the moveable tap on the selector switch for R2. It should be noted that the two points marked G are the only points grounded to the chasis.

The amplifier constructed by the author was 2 1/2 x 3 x 5 inches in size and can be conveniently mounted on the telescope.

The recorder baseline stability and freedom from drift were found to be better with this simple circuit than with many other amplifiers used by the author.

NOTES

1. Addresses:
   Intersil, 10900 N. Tantau Ave., Cupertino, Cal. 95014
   Signetics, 811 E. Arques Ave., Sunnyvale, Cal.
   Fairchild Semiconductors, 464 Ellis St. Mountain View, Cal. 94040

*Field effect transistor.

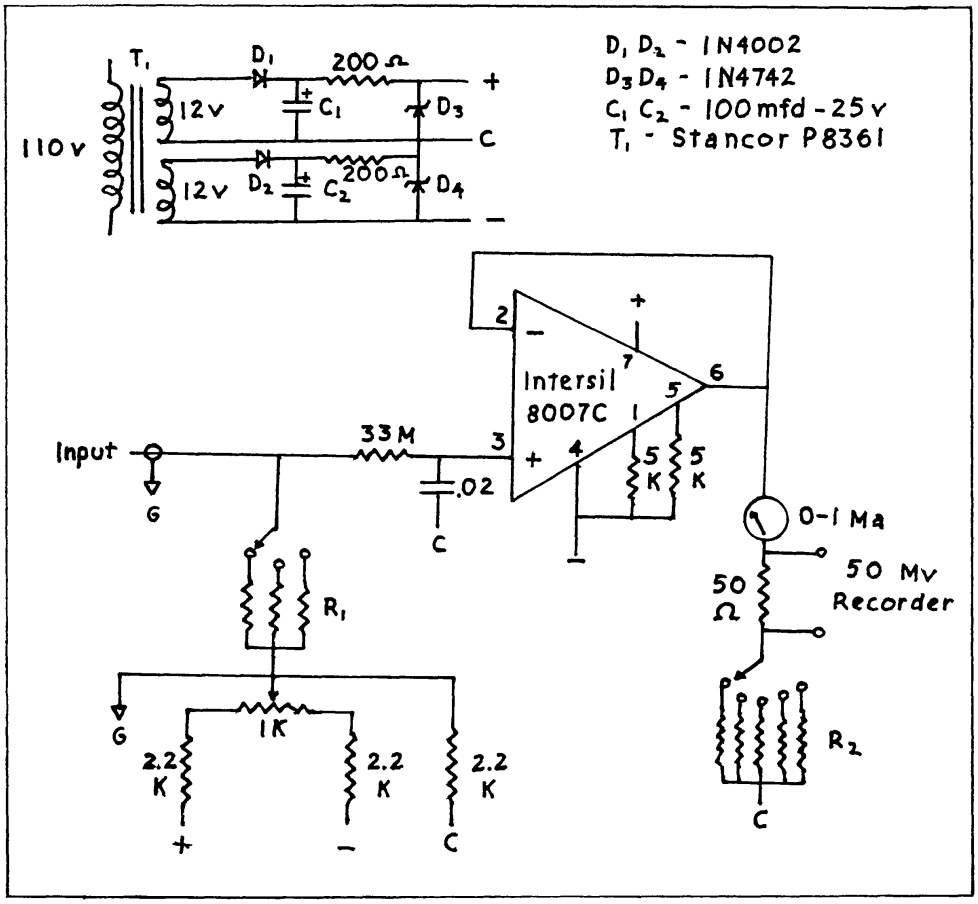

Figure 1. FET Amplifier Circuit