

FEATURES

- Complete Log Ratio Module
- Provides Log Ratio of Current
- Provides Log Ratio of Voltage
- Dynamic Range of 7 Decades of Ratio

APPLICATIONS

- Log Ratio or Antilog Ratio of Voltages
- Log Ratio or Antilog Ratio of Currents
- Absorbance Measurements



GENERAL DESCRIPTION

Model 756 is a complete temperature compensated DC log ratio module, containing two channels for processing input variables. Channel 1 features a high quality FET amplifier with bias current of only 10pA. Using this input, signals spanning 4 decades can be processed with less than 1% error. By applying signals spanning up to 3 decades to channel 2, overall performance of 1% can be achieved for ratios covering a dynamic range of 10 million to 1 (7 decades).

Designed primarily for photometer applications, model 756 replaces two log modules, a subtractor, and associated circuitry. The signal sources for these applications are usually photo diodes which should be operated in the zero-volt mode (short circuit current). When connected as shown in Figure 2, the summing junctions provide virtual grounds, thereby forcing the input currents to be the short circuit current of the photo diodes.

PRINCIPLES OF OPERATION

CURRENT LOG RATIO

Current log ratio is accomplished by model 756 when two currents, I_{SIG} and I_{REF} , are applied directly to the input terminals (see Figure 1). The two log amps process these signals providing voltages which are proportional to the log of their respective inputs. These voltages are then subtracted and applied to an output amplifier. The scale factor, when connected as shown, is 1V/dec. However, other scale factors may be achieved by using an external/feedback resistor for A_3 instead of the internal 15kΩ. The governing equation for this optional adjustment is:

$$R \approx \left(\frac{15k\Omega}{V} \right) K_{DES}$$

where R represents the total feedback resistance of A_3 , and K_{DES} is desired scale factor.

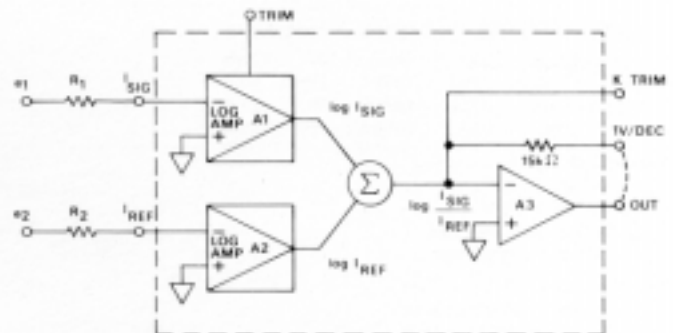


Figure 1. Functional Block Diagram of Model 756

VOLTAGE LOG RATIO

The principle of operation for voltage log ratio is identical to that of current log ratio after the voltage signal has been converted to a current. To accomplish this conversion, an external resistor is attached from the voltage signal to the appropriate input current terminal of the 756. Input currents are then determined by:

$$I_{sig} = \frac{e_1}{R_1}, I_{ref} = \frac{e_2}{R_2}$$