

Millivolt Meter - Theory of Operation and Use

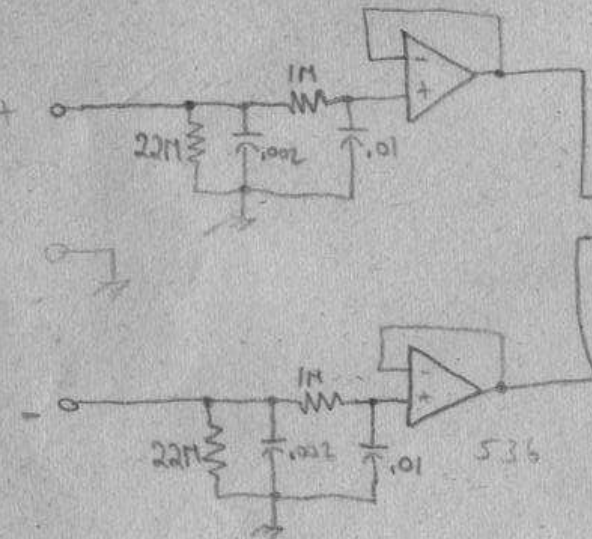
The device will measure plus and minus 100 millivolts full scale. It has both single ended inputs and differential inputs. The DC input impedance is 44 megohms in the differential mode and 22 megohms in the single ended mode. It has filters to eliminate unwanted AC signals. Additionally, there are two threshold voltages which may be set anywhere between minus 100 mv and plus 100 mv. Each threshold voltage has an associated light emitting diode which will be on, if in the first case, the read voltage is above the threshold voltage, and in the other, if the read voltage is below the other threshold, so that any interval in the range of the instrument can be bracketed by the lights. The unit has an output terminal to facilitate the recording of the voltages on other devices - an input of minus 100 mv to plus 100 mv corresponds to the range of minus 5 v to plus 5 v at the output port. The millivolt meter is powered by two nine volt batteries, whose condition can be measured under load on the front panel. There are also terminals on the back panel for an external power source.

The meter utilizes five integrated circuit chips and two transistors. There are two identical input stages which are wired as voltage followers. This stage gives unity voltage gain with very high input impedance. The IC is an JET op amp. The input to this stage is filtered through an RC low pass filter. The next stage is a differential amplifier with a gain of one. The output of this stage is the difference of the two inputs. The stage following this is an active low pass filter with an approximate cutoff frequency of 5 Hz. The subsequent stage provides a gain of 50, to convert 100 mv to 5 v. After this is a buffer stage

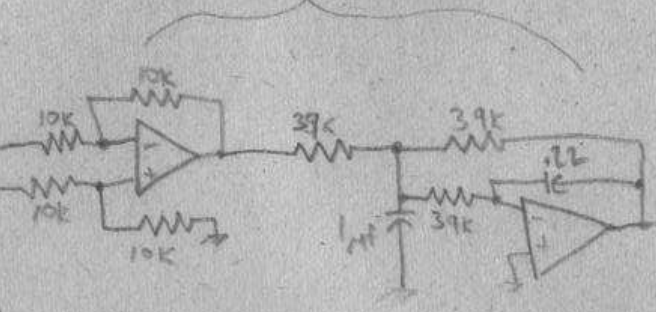
with zero adjust. The output of this stage is fed to the panel meter, the output, and two comparators. The comparators compare the actual output voltage with a variable voltage set by the threshold adjust control. The output of the comparators drive switching transistors for the LEDs.

To operate the instrument, place the function switch in the operate position. Set the zero adjust to the voltage above which it is desired for the above LED to light. Turn the threshold adjust until that light just barely goes out. Do likewise for the below indicator. Now zero adjust for a reading of zero. To operate in the differential mode, connect the probes to the black(minus) and red(plus) input jacks. A ground may be connected to the green(ground) jack if desired. To operate in the single ended mode, the ground terminal and either the minus or the plus input should be used. The internal battery voltages may be read by placing the function switch in the plus battery or minus battery positions. The panel meter will then read full scale plus 10 v to minus 10 v. The battery voltages should be fairly close in value, and should be replaced if below 8 volts. In the battery test position the zero adjust has no control.

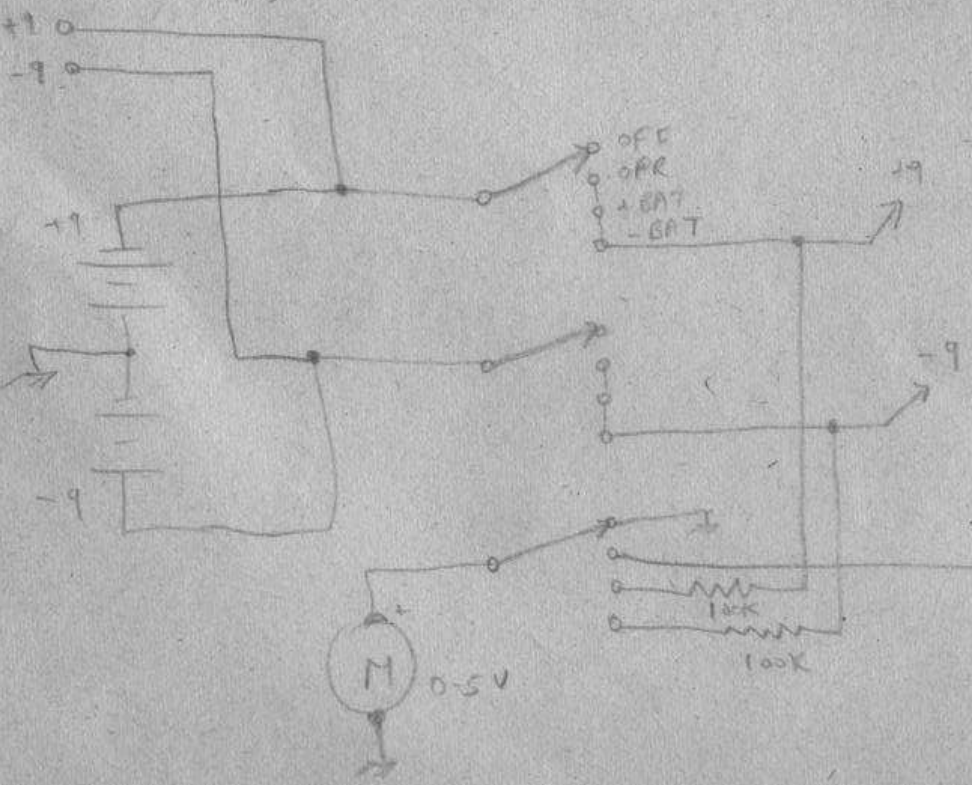
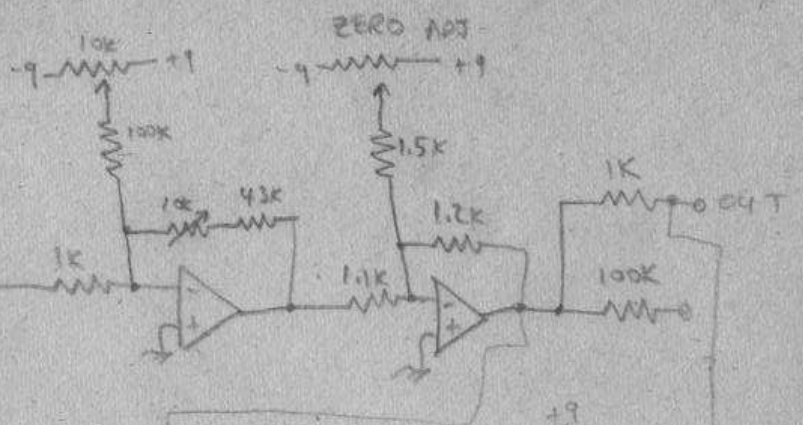
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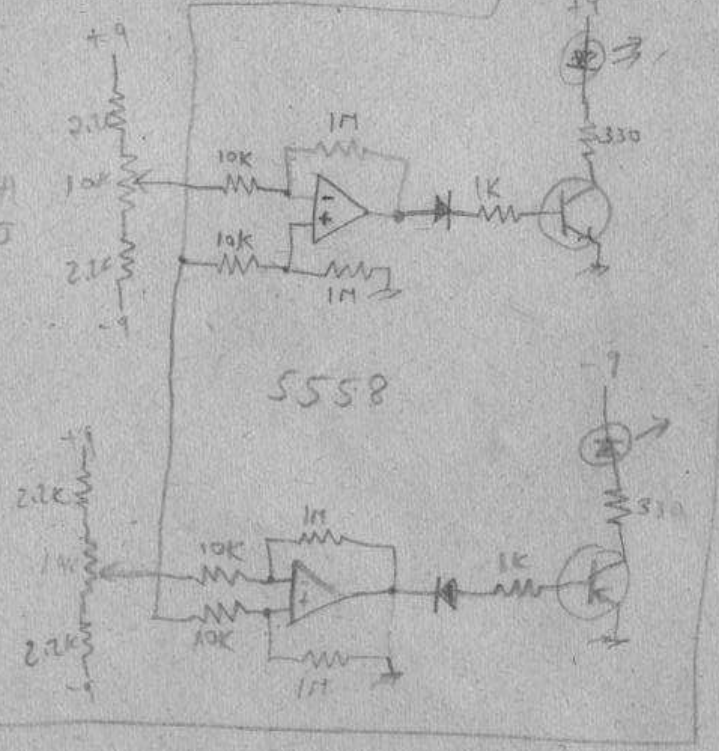
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