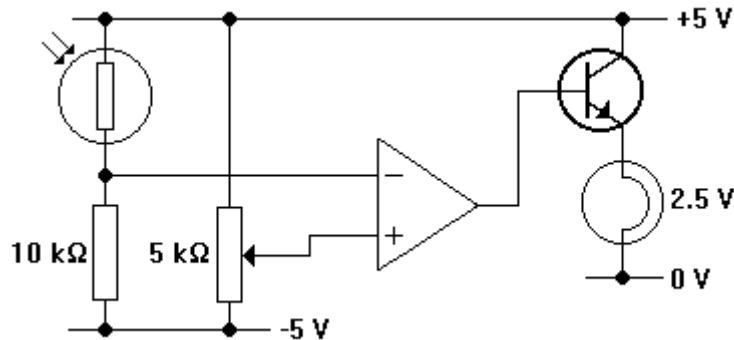


Light control

This experiment will help you to appreciate the finer points of servo control systems.

- 1 Assemble the on-off feedback system shown below. Use a power transistor to drive a bulb rated at 2.5 V. Arrange for the bulb to be close to the LDR.



- 2 If all is well, the brightness of the lamp should depend on the setting of the potentiometer.
- 3 Use an oscilloscope to look at the output of the op-amp. Notice how the signal changes as you adjust the potentiometer. Explain the shape of the signal.
- 4 Modify the circuit so that it becomes a proportional feedback system. Use 1 MΩ and 100 nF in the ramp generator. Four 47 kΩ resistors will be fine for the difference amplifier. Make sure that the feedback is negative and not positive!
- 5 Check that the brightness of the bulb follows the setting of the potentiometer.
- 6 Use a double-beam oscilloscope to look at the outputs of the difference amplifier and the ramp generator. Note what they do when the setting of the potentiometer is changed.
- 7 Speed up the response time of the system by altering the values of components in the ramp generator. See how short you can make the response time before the system starts to hunt.
- 8 Draw a circuit diagram for the fastest proportional feedback system which works properly. Explain how the circuit works.