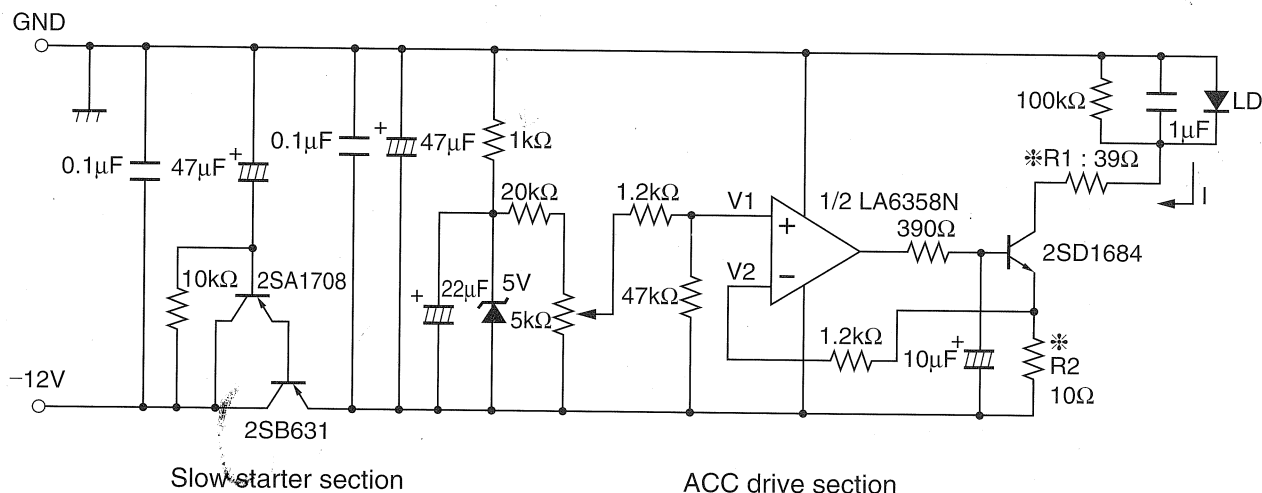


# Laser Drive System

Drive circuits for laser diodes are either automatic current control (ACC) circuit that maintain a constant current, or automatic power control (APC) circuits that maintain a constant light output power.

ACC circuit is only used in specialized situations such as for measuring the characteristics of laser diodes. Even with constant current drive, light output power of laser diodes varies tremendously with ambient temperature, so APC circuits are more commonly used, since they provide a constant light output power despite variations in ambient temperature.

## (1) ACC Circuit



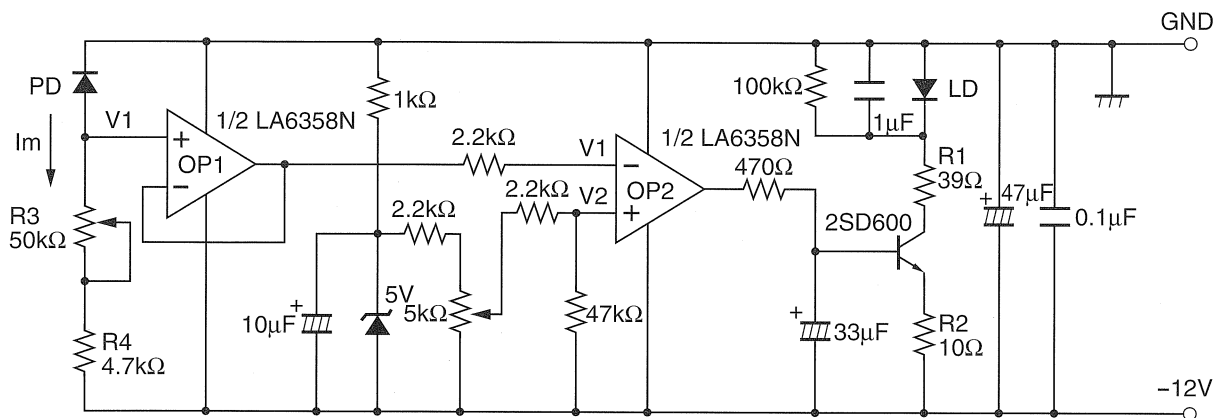
ACC circuit is comprised of a slow starter section and an ACC drive section. Current  $I$  to a laser diode (LD) flows to resistor  $R2$  through a transistor to generate an electric potential  $V2 = I \times R2$ . An op amp compares electric potential  $V2$  with reference electric potential  $V1$  to drive the transistor so that  $V1 = V2$  is constantly maintained. As the result, current  $I = V2/R2 = V1/R2 = \text{constant}$ . Current is set with a  $5k\Omega$  volume switch.

Resistance  $R1$  and  $R2$  vary with operating current, so be sure to use the values in the following table.

Table1 : Settings for resistance  $R1$  and  $R2$

| Operating current range | 0–100mA | 0–200mA |
|-------------------------|---------|---------|
| R1                      | 39Ω     | 18Ω     |
| R2                      | 10Ω     | 5Ω      |

### a. APC Circuit 1



This APC drive circuit is used for type I pin connecting diagram.

When a laser diode (LD) emits light, light current ( $I_m$ ) proportionated to light output power flows to a monitoring photodiode (PD) and a voltage  $V_1 = I_m (R_3 + R_4)$  generates. This voltage is sent by the op amp OP1 through a buffer to the op amp OP2.

Reference voltage V2 obtained from constant-voltage diode and volume switch is also sent to the op amp OP2.

The op amp OP2 compares two voltages and then varies base current of output transistor while controlling the current flowing to laser diode so that  $V_1 = V_2$  is constantly maintained. This is how constant light output power is obtained.

**< Adjustment >**

- (1) Turn volume switch R3 as high as it will go, and set 5k $\Omega$  volume switch so that  $V_2 = 0$ .
- (2) Mount laser diode with power turned off.
- (3) Turn power on, and turn 5K $\Omega$  volume switch to the center point while measuring light output power with a light power meter. Here, light output power should be 1/2 of the setting level. If difference from the setting level is significant, then turn off power and adjust R3 and R4.
- (4) Turn volume switch R3 until light output power matches the setting level.