

## Laboratory Application Assignment

In this lab application assignment you will experimentally determine the internal resistance,  $r_i$ , of a dc voltage source. You will measure the no-load and full-load voltages and use Ohm's law to determine the load current.

**Equipment:** Obtain the following items from your instructor.

- Variable dc voltage source
- SPDT switch
- Assortment of carbon-film resistors
- DMM
- Black electrical tape

### Internal Resistance, $r_i$

Have either your instructor or another student select a resistor whose value lies between  $50\ \Omega$  and  $500\ \Omega$ . You should not be allowed to see what its value is. The person who selected the resistor should cover it with black electrical tape so its value cannot be seen.

Construct the circuit in Fig. 12–37. The internal resistance,  $r_i$  is the resistor covered with black electrical tape. Note that the DMM is connected between points A and B.

With the switch in position 1, record the voltage indicated by the DMM. This value is the no-load voltage,  $V_{NL}$ .  $V_{NL} =$  \_\_\_\_\_

Move the switch to position 2, and record the voltage indicated by the DMM. This value is the full-load voltage,  $V_{FL}$ .  $V_{FL} =$  \_\_\_\_\_.

Calculate and record the load current,  $I_L$  as  $V_{FL}/R_L$ .  $I_L =$  \_\_\_\_\_

Based on your values of  $V_{NL}$ ,  $V_{FL}$ , and  $I_L$ , calculate and record the internal resistance,  $r_i$ .  $r_i =$  \_\_\_\_\_

Remove the resistor,  $r_i$ , from the circuit, and measure its value with a DMM. Record the measured value.  $r_i =$  \_\_\_\_\_

How does the measured value of  $r_i$  compare to the value determined experimentally? \_\_\_\_\_

Can the internal resistance of a generator be measured directly with an ohmmeter? \_\_\_\_\_ If not, why? \_\_\_\_\_

Describe another experimental procedure that could be used to determine the internal resistance,  $r_i$ , in Fig. 12–37. \_\_\_\_\_

Figure 12–37

