



## Transformer Buck or Boost Lab

**Program:** Electrical Technician

**Course:** EL150 – Commercial Application

**Objectives:** At the completion of this experiment, you will be able to:

- Identify specialty transformer applications
- Size and select buck-and-boost transformers.
- Connect a buck-and-boost transformer to a single-phase circuit so that it will first be in the boost mode and then in the buck mode. Record the voltage increase and decrease for each configuration

**Lab Equipment:**

- 1 – 120V/24V control transformer
- 1 – 120-V pigtail
- 1 – In-line fuse holder with fuse (250V, 1 amp fuse)

**Required Tools:**

- 1 – Pair of Wire strippers
- 1 – Pair of Wire cutters
- 1 – Terminal crimping tool
- 1 – Flathead Screwdriver
- 1 – Digital voltmeter (or multimeter)
- 1 – Pair of Voltage-rated gloves (500 volts minimum rating)

**Materials:**

- 4 – Yellow wire nuts (may or may not be needed)
- 4 – Insulated crimp splices (sized for lamp cord)
- 1 – Roll of vinyl electrical tape

**Safety (PPE):**

- Safety glasses

**Resources:** N/A

**Required Time:** 3 Hours



**Shop Maintenance:**

- All work will cease 20 minutes prior to the end of class.
- All work areas must be cleaned.
- Tools and equipment must be cleaned and returned to the designated areas (cage, tool room, cabinets etc.)
- Any broken or missing tools must be reported immediately.
- Tools and equipment are students' responsibility

**Procedures:** *(Eye protection must always be worn)*

This performance project requires the trainee to connect an isolation transformer as a buck and a boost autotransformer and take voltage measurements.

1. Review the drawing in Figure 1 carefully. Do not energize anything at this point.
2. Connect the fuse holder in line with the ungrounded circuit conductor. The ungrounded circuit conductor is the wire that connects to the shorter slot of the 120V receptacle. Make sure that a good fuse (1 amp max) is installed in the fuse holder.
3. Prepare the wire ends and connect the wiring as shown in Figure 1.
4. Have your instructor check and approve your wiring.
5. Prepare your voltmeter to measure AC voltage in the range of 250 volts.
6. Put on your voltage-rated lineman gloves. Your safety glasses should still be in place.

**Safety Note:**

The following steps must be performed in the presence of your instructor.

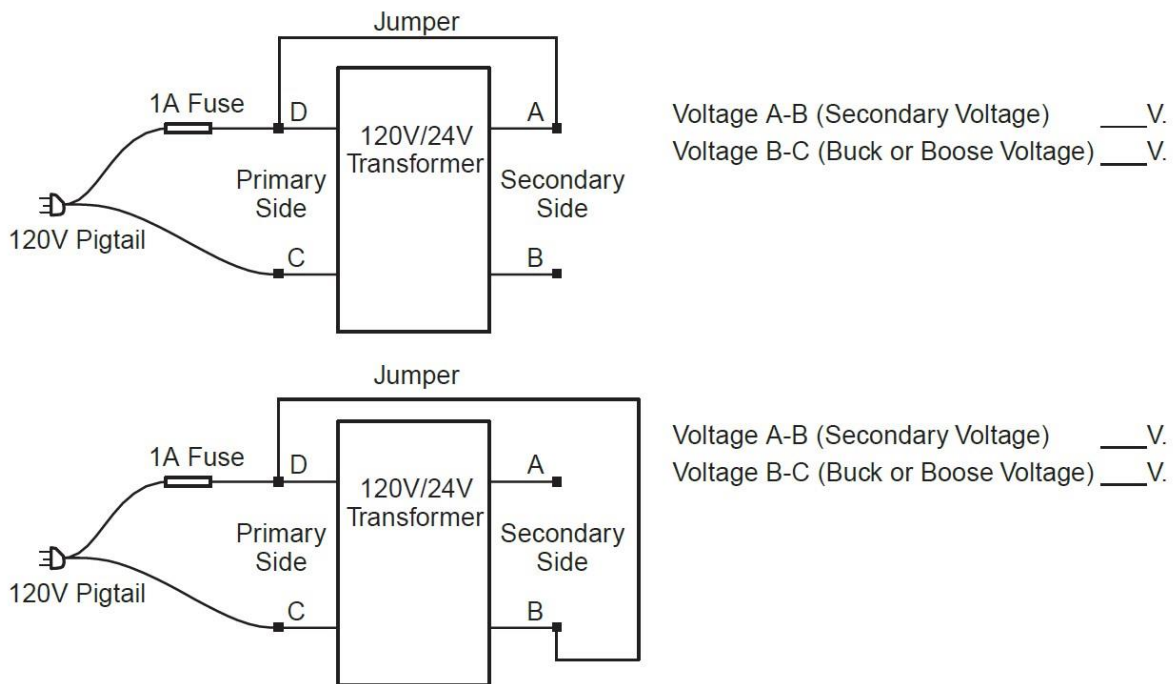
7. Measure the supply voltage, either at the transformer's primary terminals or at the receptacle.
8. Measure the voltage between points A and B. This is the normal secondary voltage of the transformer. Record the voltage on the space provided in Figure 1.
9. Measure the voltage between points B and C. The voltage should equal the supply voltage, plus or minus the voltage recorded in Step 8. Record this voltage.
10. If the voltage is higher than the supply voltage by the amount of the secondary voltage, the transformer is connected as a boost transformer.
11. If the voltage is lower than the supply voltage by the amount of the secondary voltage, the transformer is connected as a buck transformer.
12. Once these measurements have been taken and recorded, unplug your project.

13. You may remove your voltage-rated gloves once the project is deenergized.



14. Disconnect the jumper connection at the secondary terminal A only, and reconnect it to the secondary terminal B.
15. Repeat Steps 4 through 13, except now measure the voltages between A and B, and A and C. Record all voltages in the spaces provided on Figure 1.

Figure 1



**Figure 1** ■ Wiring Diagram for Buck or Boost Autotransformer