

# 6c Use the Electronic Snap Circuits Kit to design several electronic projects

How do Petroleum Engineers use electronics to help them find oil and monitor drilling sites?

**Electrical Engineering in Petroleum careers:** Work in teams of two or three to complete these electrical circuit projects and determine what function each piece has on the system.

## Materials

- Engineering Workbook, one per scout
- Electronic Snap Kit, one per two scouts

## Activities

1. **Complete projects 3 and 4.** Sound is an important component to petroleum and geological engineers, particularly when trying to find deposits of crude oil and natural gas. Sound waves are transmitted through the ground to determine the type of rock formations that are in an area. Sound waves are interpreted by seismologists. A typical application for resistors might be in seismic exploration for petroleum and in down-hole oil well data logging. This activity needs to be recorded to determine the exact location of the drill and the rock formations that the drill bit is drilling through.

- What happened to the sound when you compare project 3 to project 4?

- How do resistors act on the circuit?

2. **Complete projects 5 and 6.** These projects use a series to transmit current. In rural areas, oil and gas fields, have long runs of distribution lines which can lead to voltage sag issues. This can cause lapses in power to the pumps, slowing the amount of oil pumped from the well. These projects show that difference in current. Voltage regulators can help to adjust system voltages.

- What do you notice about the difference in the lamp between project 5 and project 6?

- Project 6 has the lamp and fan in a parallel series. How do you explain the effect that has on the voltage?

- How might a petroleum engineer regulate the voltage to a pump jack at a well site?

3. **Complete projects 11 and 12**, applying a change in voltage.

- What is the difference in the result of project 11 and 12?

- What made the difference?

4. **Complete projects 47–50**. Different circuits are used in crude oil and natural gas monitoring of the well bore itself during drilling and can be monitored at the surface while the drill rig is working.

47: A this OR that circuit (two switches that turn on the same light),

48: A this AND that circuit (used to add numbers together in modern computers),

49: A neither this NOR that circuit (an important building block in computers) and

50: A not this AND that circuit (NAND)

- Describe one thing in your house that might work using one of the types of circuits or gates.

- *Bonus challenge: Digital circuits use a variety of these “gates.” Brainstorm a pathway or flowchart, using one or more of these circuits/gates that shows how a computer might report on the location of the drill bit in an oil well.*