

## Chapter 1

Use with Section 3

## ENRICHMENT

## ● Science and Technology

**Telemetry**

Telemetry is an automated communication process that people use in industry, medicine, oceanography, meteorology, wildlife biology, and broadcast journalism. Data is collected at a remote or inaccessible location, such as the ocean floor, and transmitted to receiving equipment. Receiving equipment can perform a variety of functions. It may monitor the data, display it, record it, or perform all three functions.

The first telemetry system was installed in an electric power office in Chicago in 1912. The system used telephone lines to transmit data to tell workers in the office how well electric-power plants were operating. Because such systems were used to monitor performance, they were called *supervisory systems*.

In the 1930s, aerospace telemetry was developed to be used with a balloon-borne telemetry system called the *radiosonde*. From about 50 000 m up in the atmosphere, the radiosonde measures meteorological data. Using radio waves, it sends information, such as temperature, barometric pressure, and humidity to receivers on Earth. Nearly all aerospace telemetry systems that are used in space rely on computers to analyze the large amount of data they collect.

By the 1960s, scientists developed a telemetry system that required a signal before it would transmit its information. Today, this system is used throughout the world to monitor oil pipelines. It is also used in oceanography. Oceanographers use them to record salinity, water temperature, and surface meteorological information from all the oceans of the world. Data from these buoys enabled scientists to anticipate the arrival of the El Niño.

Radio telemetry, also called aerospace telemetry, has proven to be very flexible and has proven its

worth in a wide variety of areas. It can transmit data from inside internal-combustion engines and steam turbines. Microminiature transmitters can be surgically implanted or swallowed by patients. The transmitters send information that can be used to monitor a specific condition or regulate a function in the body. In wildlife biology, scientists attach transmitters to animals, then use the radio signal to learn more about the individual's habitat, territorial boundaries, den locations, and even predator-prey interactions. This information can provide insight about whole groups of animals. Grizzly bears were among the first animals that biologists studied using radio telemetry. These animals were good test subjects for a very non-technological reason. They were strong enough to carry those early transmitters, which were large and weighed about one kg. The transmitters were attached to breakaway collars around the bears' necks. Technology has advanced since then. More recent projects have tracked garter snakes and tortoises with transmitters weighing less than 100 g.

In more advanced radio telemetry, satellites receive an initial signal, then transmit it to the main receiver. This is how television and radio stations can broadcast live from locations around the world, or just across town from the main station. Wildlife biologists also use this newer technology. In the old system, the scientist had to be in the field, rather close to the animal. The strongest transmitters may have ranges of several km. Using satellite transmitters, a biologist can track the migration routes of animals that are hundreds and even thousands of m long, without ever leaving the office. Manatees, whales, and cranes are just a few of the animals that have been studied using satellite telemetry.

1. List three ways that telemetry plays a role in people's lives.

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2. What are the advantages of satellite telemetry over the original radio telemetry?

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