**Microwave History**

Microwave detection and communications systems have come to play a major, but little appreciated, role in American life since 1940. Perhaps the application best known to the public is the [microwave oven](http://www.answers.com/topic/microwave-oven), but microwaves have also made possible live television from space and between continents. Microwave technology is also essential for safe all weather operation of commercial and military aircraft as well as for intercity telephone traffic. Before the 1970s the high cost of microwave systems tended to limit their use for mass-produced consumer products. This situation changed with the introduction of comparatively inexpensive solid-state microwave sources suitable for such applications as counter-top ovens, collision-avoidance devices for automobiles, burglar alarms, mobile telephones, and health-data [telemetry](http://www.answers.com/topic/telemetry).

Microwave technology has gone through several stages. European physicists did some theoretical and experimental work in the late nineteenth century, but interest languished because of the dominance of long waves in early radio communication. George C. Southworth, John R. Carson, and others at the Bell Telephone Laboratories made some fundamental advances in the transmission of microwaves during the 1930s. Researchers at Stanford University in 1939 developed an important new microwave generator known as the [klystron](http://www.answers.com/topic/klystron). The wave-guide, klystron, and [cavity magnetron](http://www.answers.com/topic/cavity-magnetron), brought to the United States in a famous "black box" by a British team in 1940, became key elements in a wide variety of radar systems developed by several groups, including the Radiation Laboratories formed at the Massachusetts Institute of Technology in 1941.

Bell System installed the prototype for a major microwave communications system by means of repeating stations separated by distances of about thirty miles between New York and Boston in 1947. By 1960, microwave chains carried about 40 percent of Bell's intercity traffic; the proportion of domestic communications handled through microwave networks increased steadily thereafter. Similar apparatus was adapted for use in satellite repeating stations, beginning with the launch of *Pioneer 3* in 1958. Further innovations and the increasing [congestion](http://www.answers.com/topic/congestion) of the electromagnetic spectrum aroused renewed interest in the use of Southworth's hollow pipes for communications by 1970. (A single circular pipe is believed capable of carrying 250,000 simultaneous conversations over long distances.) The discovery in the 1960s by J. B. Gunn of IBM and others that semiconductor devices such as the [Gunn oscillator](http://www.answers.com/topic/gunn-oscillator) and [IMPATT diode](http://www.answers.com/topic/impatt-diode) can generate and [amplify](http://www.answers.com/topic/amplify) microwave signals [stimulated](http://www.answers.com/topic/stimulate) a variety of consumer and industrial applications of microwave technology.

In the 1940s Dr. Percy Spencer, an engineer with the Raytheon Corporation researching radars, noticed that microwaves emitted by a new vacuum tube called a [magnetron](http://www.answers.com/topic/magnetron) caused food sitting nearby to heat up. The first commercial microwave oven—weighing more than 750 pounds and standing over five feet tall—hit the market in 1947. In the late 1960s, microwave ovens began appearing in stores as domestic appliances, and by 1975 their sales surpassed those of gas ranges. Although culinary purists avoided them, microwave ovens spurred a new industry in frozen prepared foods and [vastly](http://www.answers.com/topic/vastly" \t "_top) reduced the amount of time needed to cook food, further reducing Americans' dependence on a primary domestic laborer.