# HF Propagation

For more reliable long-distance communications, amateurs use the HF frequencies. The reason for this is that HF signals bounce off the ionosphere. The ionosphere is the part of the atmosphere that enables the propagation of radio signals around the world. (T3A11) It contains a high concentration of ions and free electrons and is able to reflect radio waves. It extends from about 50 to 600 miles above the earth's surface.

One interesting phenomenon that is related to HF propagation is the sunspot cycle. Generally, the number of sunspots increases and decrease over an 11-year cycle, and HF propagation is best at times when there are many sunspots. Because of this, six or ten meters may provide long distance communications during the peak of the sunspot cycle. (T3C12)

Because of the way that the ionosphere changes throughout the day, propagation is best on the higher frequency bands, such as 10m, 15m and 20m, during the day while propagation is best on the lower frequency bands (160m, 80m, and 40m) at night. Consequently, the best time for long-distance 10 meter band propagation via the F layer is from dawn to shortly after sunset during periods of high sunspot activity. (T3C09)

A common phenomenon of HF signal propagation is fading. The cause of irregular fading of signals from distant stations during times of generally good reception is random combining of signals arriving via different path lengths. (T3A08)

Unlike VHF/UHF communications, antenna polarization is not quite so important. This is because signals “skip” off the ionosphere and become elliptically polarized. Because skip signals refracted from the ionosphere are elliptically polarized, either vertically or horizontally polarized antennas may be used for transmission or reception. (T3A09)

**REVIEW QUESTIONS: (5)**

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