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Past Observing Campaigns: Arecibo, Puerto Rico

Pioneer 10 at Arecibo

With a system designed to pick up interstellar communication signals operating with the world's largest telescope, it's not surprising that we can detect our own technological civilization. In this page we will present some examples of terrestrial signals.

Our favorite signal (until we get the one from ET) is from the Pioneer 10 spacecraft. Launched in 1972, it now at a distance of roughly 10,000,000,000 kilometers. Its aging transmitter broadcasts with a power of only a few watts. The huge collecting area of the Arecibo antenna brings it in loud and clear.

Pioneer 10 is now at a distance of more than 11,000,000,000 km (about 6.9 billion miles). It takes more than 10 hours for its radio signal, travelling at the speed of light, to reach the Earth. After more than 10,000 days of continuous operation, the electronics in its transmitter are beginning to deteriorate. In spite of this, the signal from Pioneer 10 is still an excellent test for our system.



This plot shows the power in 924 channels over time. Each horizontal row of dots gives a snapshot of the amount of power in each of the channels at a specific time. The larger the dot, the more power in that channel. Every 0.7 seconds a new row of dots is added. Over about two minutes the picture shown to the left builds up. If a particular channel always had a signal in it, we would see a vertical line since that channel would always have a more power than the other channels, and so would tend to have larger than average dots.

The signal from Pioneer 10 drifts in frequency and so moves from channel to channel over time. The plot shows the "carrier wave" portion of the Pioneer signal as a narrow line to the left of center and beginning about a quarter of the way up from the bottom. After about a minute, we shifted to a different frequency to display one of the "side bands". This shows the data being transmitted by the spacecraft.

[more about Past Campaigns](#)

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