

B. The Arecibo Message



In November 1974, a team of radio astronomers at the National Astronomy and Ionosphere Center at Arecibo, Puerto Rico broadcast the first ever interstellar message directed to alien intelligence. The Arecibo message is on the right.

The three-minute message was thoughtfully and carefully crafted by scientists and intellectuals. It contained, in a very few characters, a large amount of data and information about Earth and the humans who occupy this planet. But there were no opportunities for the rest of us to join in this historic attempt. In contrast, Encounter's "Cosmic Call" will allow anyone who wishes to participate to send a message to another star! Furthermore, the Encounter transmission, utilizing a sophisticated mathematical alphabet, will include a special preamble message that will contain much more information than the Arecibo message.

The Arecibo message was transmitted to M13, a globular cluster of stars about 25,000 light-years from Earth. (The Encounter message will be transmitted to a star only 50 to 70 light-years from Earth.) The Arecibo message consisted of 1,679 bits of data in the form of on/off pulses. 1,679 is the product of two prime numbers, 73 and 23. The reasoning is that extraterrestrials receiving the message 25,000 years from now will take the clue and arrange the 1,679 bits in a table of 73 rows and 23 columns. If the on and off pulses in the message are represented by dark and blank squares in the table, respectively, then the table will illustrate information about Earth, ourselves, and our solar system.

Using high school algebra, we have created a relatively simple puzzle that illustrates the basic concepts used in the Arecibo transmission. The example uses the concepts of square root, prime numbers and the Cartesian coordinate system to produce a "smiley face" plotted on graph paper.

