SOLUTION TO THE DRAKE PUZZLE

The remarkable result of Drake's experiment was that every person the puzzle was sent to was able to decode it. At first glance, it might appear that there is some type of binary numbering or lettering system in use akin to that used in modern digital computers), but that would not be information that could readily be deciphered by and EBE, since it is highly unlikely that they have a written alphabet similar to ours.

But there are certain fundamental concepts that exist in mathematics, of which it is assumed any civilization technical enough to receive radio information will understand. One such concept is the relationship of the area of a circle to the square of the radius (the proportionality constant being the number π). Another such concept, and the one Drake employed in his experiment, is the idea of *prime numbers*. Every number can be factored into a unique set of non-factorable numbers, which are called its prime factors. By carefully choosing the grid size of his message, Drake created a quantity of characters for which there were precisely two prime factors. By arranging the number string in a grid of characters, the length of each side being one of the prime factors, an image was formed (color in squares with 1's and leave 0's blank, or vice versa).

The image formed by the Arecibo Message in 1974 contained a picture of DNA, the molecular structure of several molecules essential to life, a picture of a human being, a picture of the solar system, and a picture of the Arecibo Telescope. Other information was encoded as well, like the first ten binary numbers, which were used to indicate the size of the various objects depicted in the message.

The puzzle you have just seen has several clues built into it, just in case you did not decipher the prime factor information. For instance, it starts and ends with a string of 35 0's and two 1's, thereby pointing you right at one of the prime factors and encouraging you to break the string up into groups of 37 numbers[1].

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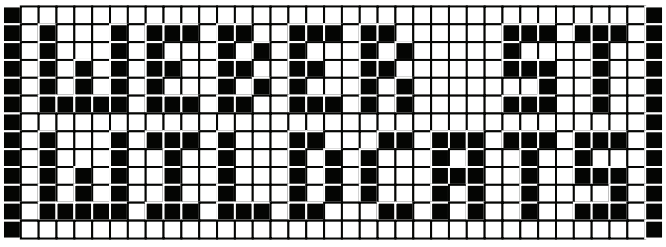
10000000000000000000000000000000001
10100010111011001110110000011101110 1
10100010100010101000101000001000010 01
10101010110011001100110000001110010 01
10101010100010101000101000000010010 01
10111110111011001110101000001110010 01
10000000000000000000000000000000001
10100010111010001100011011101110111 01
10100010010010001010100010100100100 01
10101010010010001010100011100100111 01
10101010010010001010100010100100001 01
10111110111011101100011010100100111 01
10000000000000000000000000000000001
```

The solution picture is often easier to envision if it is plotted on a regular grid, as shown below. Here, all the 1's have been colored in black.



This message was geared toward communications between me and you (two aliens who happen to speak the same language). In all likelyhood, aliens who receive messages from Earth will probably not recognize English letters or words! The method (binary digits making an image) is a good one for communication, but the content of the image in this case (English words) is probably not effective.

[1] If I had wanted to make the puzzle *really* easy, I would have made the first and last strings all 1's, without intervening 0's, but what's the fun in that? I'm not trying to talk to aliens right now!