Voyager's Golden Records: The Message has been Sent.

Introduction

Imagine if we had the opportunity to send a single message into the vast expanse of space, a message that would represent our Earth and potentially be the first impression we make on an extraterrestrial civilization. This very idea was contemplated during the planning of the Voyager missions. While the primary objective of the Voyager spacecraft was to study the gas giants, there was a profound understanding that, once their mission concluded, they would drift endlessly through space, possibly reaching realms of the cosmos that humanity may never be able to explore. The decision to include a message aboard such a spacecraft, accessible to any civilization, was a thoughtful gesture to communicate a simple yet powerful statement: "You are not alone." This blog will delve into the creation of this precious message, encapsulated within the Voyager Golden Records. It was the message's intrinsic value, the assurance of "You are not alone," that inspired the mission's pioneers to bestow upon it the title of "Golden Record."

Image of the Golden Records sent in the Voyager Spacecraft
Image Credit: NASA/JPL

Embarking on a journey beyond the confines of our solar system, the Voyager spacecrafts carry with them a message from Earth to the cosmos: the Voyager Golden Records. These phonograph records, identical twins, were launched in 1977, serving as a galactic greeting card and a time capsule of humanity's presence. The visionary physicist Frank Drake proposed the inclusion of these records, fuelled by his lifelong belief in the existence of extraterrestrial life. The records' contents, a curated collection by a committee led by the renowned Carl Sagan, encapsulate the rich tapestry of life and culture on Earth through sounds and images. They are not mere recordings but an ambitious attempt to communicate the story of our world to distant civilizations and future times. As we gaze up at the stars, the Golden Records voyage through space, a testament to our curiosity and our desire to connect with the vast, unknown universe.

The Disc was placed in Middle Bottom of the Spacecraft

Manufacturing

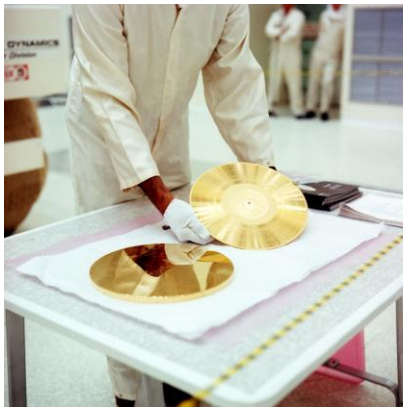
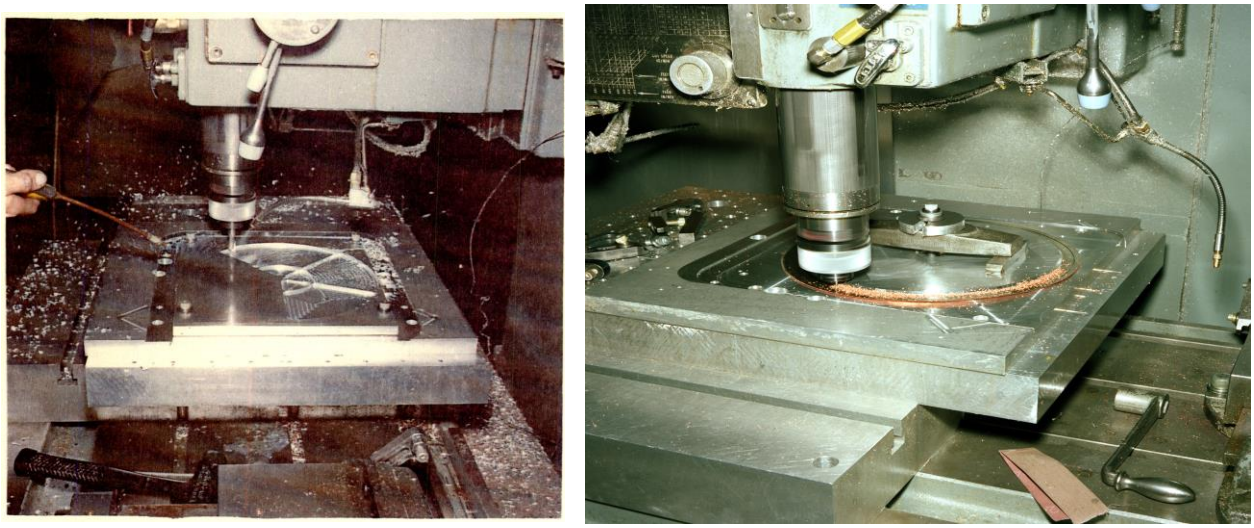


Image Credit: JPL

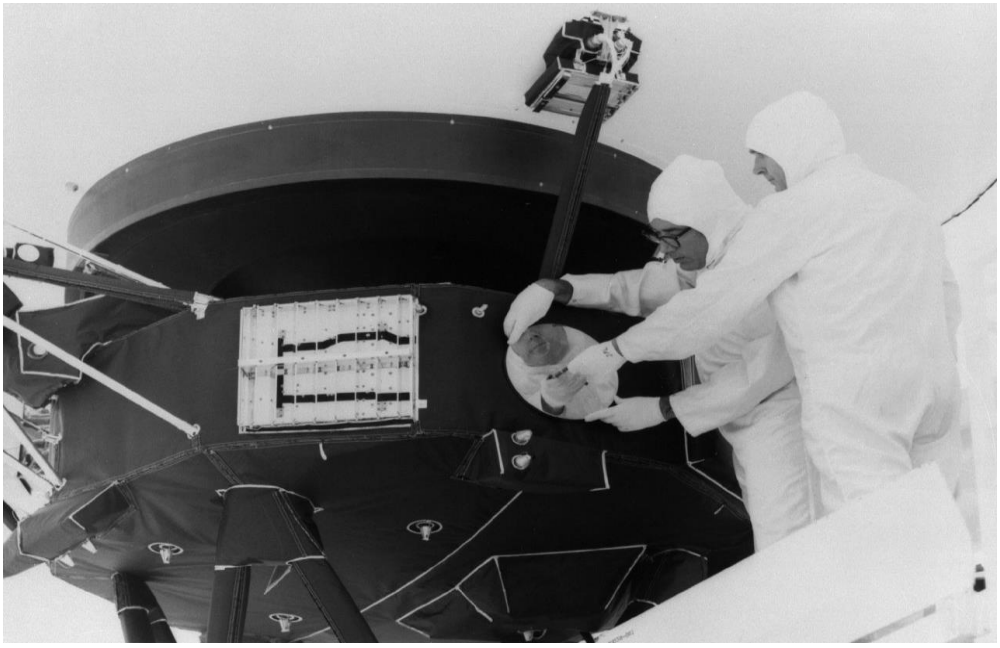
The Voyager Golden Records are not only marvels of human ambition but also masterpieces of meticulous craftsmanship. The journey of their creation began with blank records provided by Pyral S.A. of Creteil, France. The expertise of CBS Records was enlisted to entrust the JVC Cutting Centre in Boulder, Colorado, with the task of cutting the lacquer masters. These masters were then transported to the James G. Lee Record Processing centre in Gardena, California, where eight Voyager records were cut and adorned with gold plating on August 23, 1977, each 30 cm in diameter.

The choice of gold was deliberate, selected for its enduring durability and inertness, qualities essential for withstanding the harsh environment of space. Its ability to reflect infrared radiation also meant that gold had superior thermal properties, ensuring the records would be shielded and maintained at a stable temperature. Beneath the golden sheen lay a copper disk, providing an ideal surface for etching the grooves that held the data.



Etching and Coating of Gold on the Blank Discs.
Image Credit: JPL

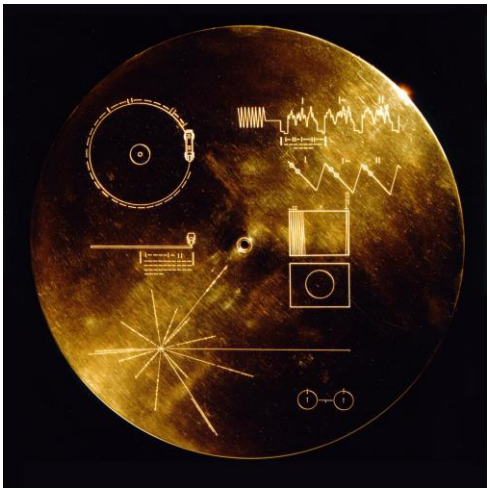
The final touch in the manufacturing process saw these records sent to Jet Propulsion Laboratory (JPL), where they were mounted in aluminium containers. In a final act of precision, they were electroplated with an ultra-pure sample of the isotope Uranium-238. This radioactive isotope serves as a cosmic clock; by measuring the decay products relative to the remaining uranium-238, an extraterrestrial recipient could deduce the time elapsed since these records were sent from Earth, carrying the message of our existence into the unknown. Once the Discs were ready, they were mounted at the middle bottom part of the spacecraft.



Picture of Disc being Mount on the Spacecraft
Image Credit: JPL

Cover Picture

The cover of the Voyager Golden Records is a marvel of scientific communication, encapsulating complex information in a series of intricate diagrams. In the upper left corner, a drawing of the phonograph record and its accompanying stylus is surrounded by binary arithmetic code, signifying that the record completes one rotation in 3.6 seconds. This diagram serves as a guide, indicating that the record should be played from the outside in. Below it, a side view of the record and stylus is presented, with a binary number denoting the playback time for one side of the record—approximately an hour.



Cover Image of the Disc
Image Credit: JPL

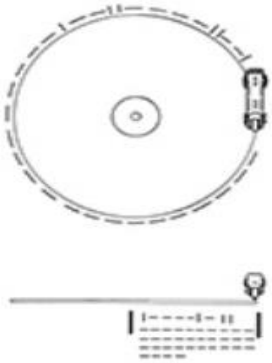


Image of Disc present at the Upper left Corner
Image Credit: JPL

In the upper right corner, a wave-like image illustrates the method for constructing pictures from the recorded signals. The duration of one “picture line,” roughly 8 milliseconds, is specified, and the lines are numbered in binary. The subsequent diagram details the vertical, staggered “interlace” method required for accurate picture rendering. Directly beneath this, a replica of the first picture on the record allows recipients to confirm the correctness of their signal decoding, with a circle ensuring the proper aspect ratio for image reconstruction.

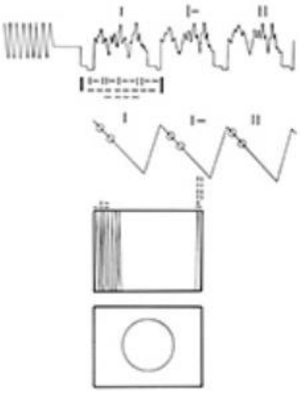


Image of present in upper right corner
Image Credit: JPL

The lower left-hand corner of the cover features a map pinpointing the solar system’s location relative to 14 pulsars, with their precise periods provided. This celestial map offers a potential means for extraterrestrial intelligences to locate the origin of the record. Finally, the lower right-hand corner displays a representation of the hydrogen atom in its two lowest states, connected by a line and marked with the digit 1, indicating the time interval associated with the transition between these states. This fundamental measurement serves as a universal constant, potentially allowing extraterrestrial beings to understand the scale of time encoded within the Golden Records.

Image present in the Bottom of the Disc
Image Credit: JPL

Contents in the Records

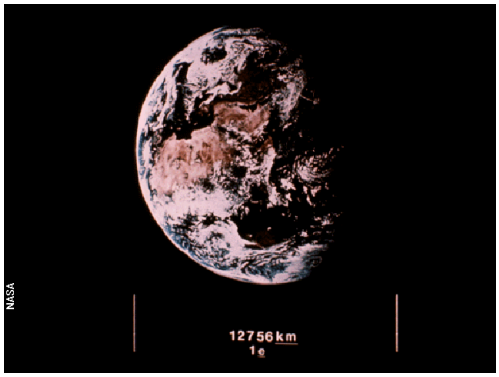


Image of Earth included in Voyager Spacecraft
Credit: JPL

The Voyager Golden Records are a testament to the diversity and richness of life on Earth, meticulously curated by Carl Sagan and his committee over the course of a year. These records encapsulate an array of 116 images—115 to represent Earth, plus one for calibration. The images are a symphony of natural sounds from our planet, including the surf, wind, thunder, and the distinctive call of whales, specifically chosen for their unique representation of Earth’s biosphere.

In addition to these sounds, the records carry the essence of humanity through spoken greetings in 55 languages, both ancient and modern, with notable messages from U.N. Secretary-General Kurt Waldheim and a touching greeting from Sagan's young son, Nick. The records also resonate with the hopeful message "Per aspera ad astra" encoded in Morse code, alongside a selection of music that spans cultures and epochs, featuring the works of legendary composers such as J.S. Bach, Mozart, and Beethoven. From India, the haunting melody of "Bhairavi: Jaat Kahan Ho" sung by Kesarbai Kerkar adds to this interstellar concert.

The visual content is equally diverse, with photographs and diagrams in both black and white, and colour. These images cover a wide range of subjects, from scientific concepts like mathematical and physical quantities, the solar system, DNA, to human anatomy and reproduction. They also depict various animals and birds, scenes of human daily life, culinary traditions, and architectural marvels, providing a snapshot of Earth's inhabitants and their activities.

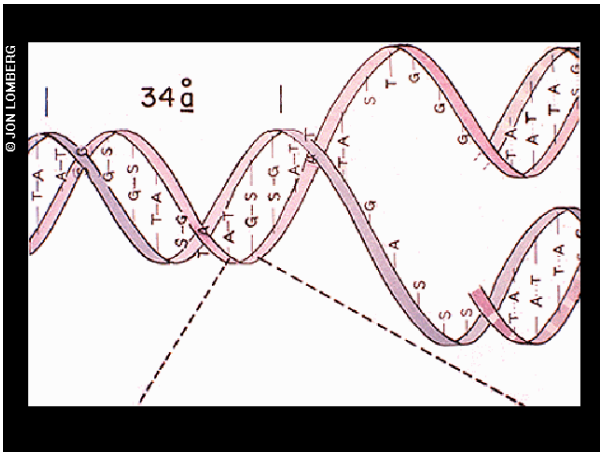
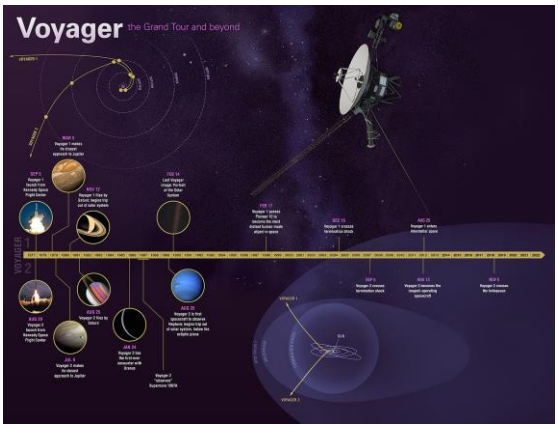


Image of the DNA Structure
Image Credit: JPL

Each of these 116 images was encoded in analogue form, composed of 512 vertical lines, ensuring that they could be interpreted by any civilization that might encounter the Voyager spacecraft. These records stand as a beacon of Earth's legacy, a golden hello from humanity to the universe, inviting any extraterrestrial discoverers to learn about the small, vibrant blue planet we call home.

Conclusion



Carl Sagan once remarked, "The spacecraft will be encountered and the record played only if there are advanced space-faring civilizations in interstellar space, but the launching of this 'bottle' into the cosmic 'ocean' says something very hopeful about life on this planet." This statement, though simple, captures the profound hope and curiosity we humans harbour regarding extraterrestrial life. The Voyager missions epitomize "persistence"—scientists initially believed that after their primary mission of studying the gas giants, the spacecraft would simply be lost in space. Yet, even after 46-47 years, their continued operation and =ability to communicate with Earth is a testament to never losing hope. To me, this space mission stands as one of humanity's greatest achievements. These two probes are the only ones to have collected information from interstellar space. In another 40,000 years, Voyager 1 will approach our nearest star, Proxima Centauri. By then, we will have lost all communication with it from Earth. However, if life exists in that star system and they are sufficiently advanced, the age-old question— "Are we truly alone in the universe?"—may finally be answered.