

## Science & Technology

Edited by Gary Slutsker

*You don't have to be Hughes Aircraft to make it in the space business. Look at inventor Ernie Schaeffer.*

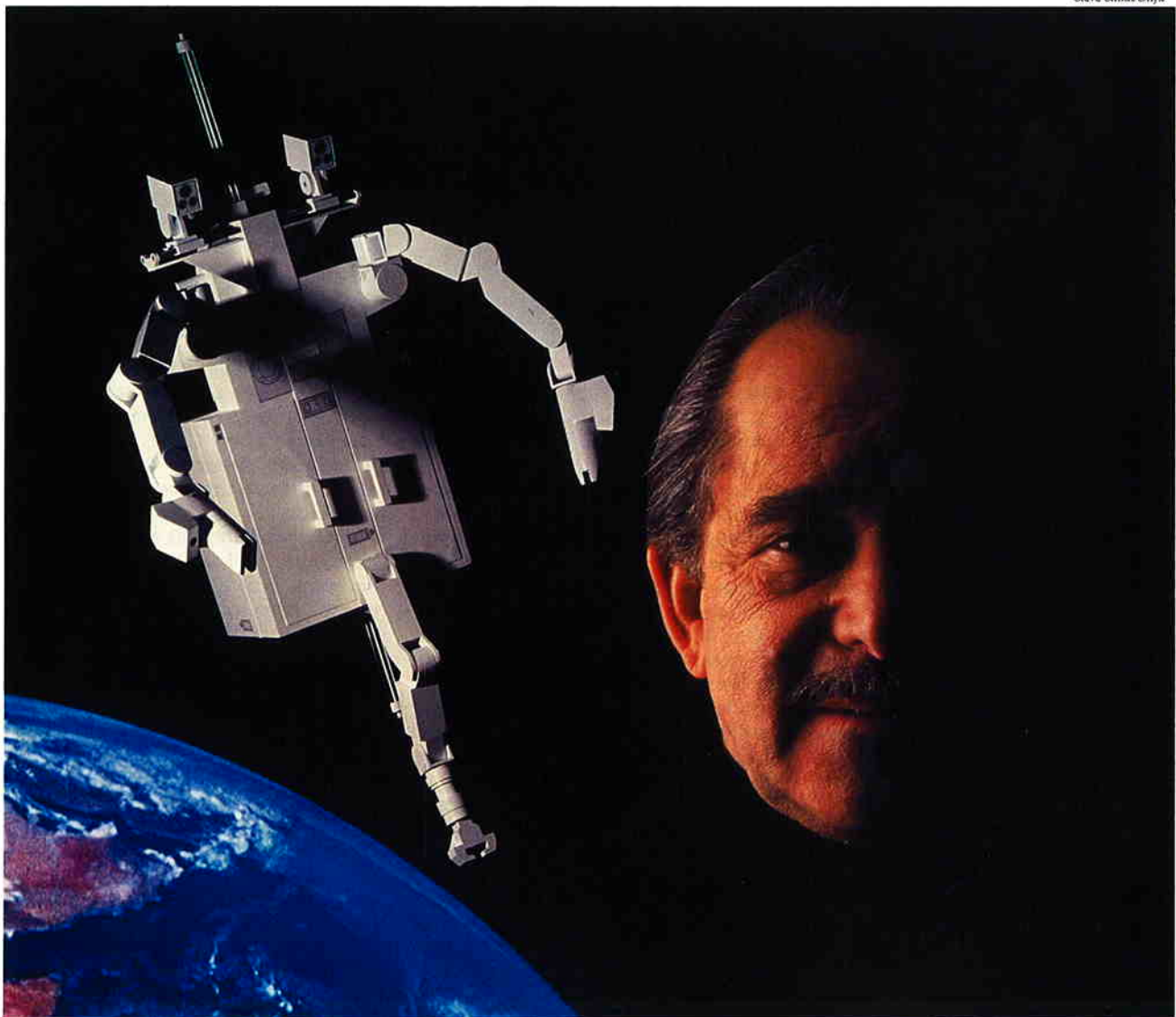
# Don't leave earth without him

By Kathleen K. Wiegner

SOON AFTER THE Hubble Space Telescope is delivered into orbit following its scheduled launch on Apr. 18, an electric door will roll open, exposing an 8-foot polished mirror to the mysteries of the cosmos. With the mirror's help, scientists expect to be able to peer 14 billion light years into space, almost to the very beginning of the universe. If that door does not open properly, the entire \$2 billion effort by the National Aeronautics & Space Administration will have been in vain.

Ernest Schaeffer, a small, energetic 65-year-old inventor, has a lot riding on seeing the door open. His company, Schaeffer Magnetics, of Chatsworth, Calif., supplied 57 motors and actuators for NASA's Hubble launch. Schaeffer's products will be responsi-

Steve Smith/Onyx



Schaeffer Magnetics' Ernest Schaeffer, with NASA's Flight Telerobotic Servicer  
**"I am connected by a gossamer thread to the universe."**

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ble for such tasks as unlatching the door and deploying the telescope's communications antennas and solar panels. Schaeffer motors will control the primary and secondary mirrors of the telescope as they focus on various parts of distant space.

Schaeffer is solid evidence that an inventor with a good idea and a lot of patience can prosper in a business dominated by giants. Schaeffer Magnetics is small—the privately held outfit expects revenues of about \$9.5 million this year—but its customers are such leading space contractors as Hughes, Martin Marietta, Lockheed, General Electric and TRW. Schaeffer equipment has been aboard a list of missions that reads like the history of space exploration: Apollo, Viking, Explorer, Voyager 2, Mariner and others. "If anything moves on a spacecraft, we're the people who can do it," says Schaeffer.

As a kid growing up in the Bronx, Ernie Schaeffer was an airplane fanatic. He and his younger brother carved airplanes out of balsa wood. Their idols were Wiley Post, a popular aviator of the 1930s, and Buck Rogers.

Schaeffer was a gifted science student at New York City's elite Stuyvesant public high school. After his graduation in 1942 he was selected to work at the National Advisory Committee on Aeronautics (the forerunner of NASA) at Langley Field, Va. to help design military aircraft.

After the war, in which he served in the Navy as a radar and countermeasures electronics specialist, Schaeffer wanted to go to college on the GI Bill. But his Russian-born father needed him in the family lumber mill in upstate New York. The mill failed and, after marrying in 1951, Schaeffer opened a TV repair shop in the Bronx. In 1956 he moved to southern California and had a series of jobs designing electric motors, first for scientific-instrument maker Beckman Instruments, next for Skurka Engineering, and finally for defense contractor Whittaker Corp., where he worked on motors for gyroscopes.

In 1960, after a year on the job,

Schaeffer convinced Whittaker to take on a subcontract with nearby defense contractor Aerojet General. Schaeffer designed a specialized motor for a classified space project. Soon Schaeffer's innovative motors were bringing in \$750,000 a year.

But by 1966 Whittaker, as part of a corporate restructuring, decided to dump Schaeffer's operation. "By this time I felt like an entrepreneur," says Schaeffer. "This was my baby." So he talked Whittaker into letting him license all of his motor designs so he could start his own company.

"There I was with no financing, no plant, my designs and some referrals from Whittaker," says Schaeffer. "By the end of 1967 I was still working out of one room of my house. I'd buy



*The Hubble Space Telescope*  
**\$2 billion riding on Schaeffer parts.**

machined parts and I had one woman winding coils in the kitchen of her home part time." General Motors considered Schaeffer when it was building the inertial guidance system for the Boeing 747, but decided against trusting such an important product to a one-man operation.

One of the referrals from Whittaker, however, turned into a job designing the solenoids (electromagnets that function as switches) that activated the tape recorders used by the Apollo 11 astronauts on the first moon walk. Then Schaeffer was selected by Hughes to provide a device known as an actuator for the Pioneer 10 unmanned spacecraft. The actuator moved the telescope that took the first close-up pictures of Jupiter.

Electric actuators have plenty of uses here on earth, in everything from refinery valves to the electric windows on your car. But Schaeffer has focused on just one actuator niche—outer space. "We staked out a very

specialized market, and decided we would stick with it and become the best there was," he says.

That kind of reliability doesn't come cheap. Schaeffer's custom products can run from thousands of dollars up to hundreds of thousands of dollars. He once built a single motor for \$800,000. Why so costly? Schaeffer's motors are made in small quantities and to very demanding specifications. Oftentimes, says Schaeffer, the documentation weighs far more than the part itself. A hyperperfectionist, Schaeffer still monitors every step of production, from design to vibration and temperature testing.

These days, Schaeffer's prospects are growing. He has no salesmen: Customers come to him, with enough work to keep 100 employees busy in a 40,000-square-foot plant. NASA wants him to supply actuators to control the movement of wrist joints, elbows and shoulders for NASA's Flight Telerobotic Servicer, the robot that will be used to help astronauts assemble and maintain the planned orbiting space station, *Freedom*.

The space industry is global. Schaeffer has sold actuators to both the French Telecom and Italian Italsat satellite companies, and is working with the Japanese. "Japan, France, Italy, even Spain, are creating their own space programs," says Schaeffer. "Then there is the Earth Observation System to study the earth's climate that NASA and TRW are teamed on."

Lately Schaeffer has been acquiring the trappings of success. He drives a Mercedes with USSPACE on its license plates, and he recently spent \$500,000 on a lot for a new home. But he has something else that few entrepreneurs have—a form of immortality. When Pioneer 10 became the first man-made object to leave the solar system, in June 1983, it did so equipped with an electric motor with the Schaeffer Magnetics name and logo engraved on it. Pioneer is drifting off and will fly by the star Altair in some 227,000 years.

"When I go out at night and look at the sky I know that products of my mind are out there," says Schaeffer. "It closes a loop around my childhood. I am connected by a gossamer thread to the universe."

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