(it is on the opposite side of Saturn from Fountain-Larson), but to the gravitational influence of the satellite Enceladus, two moons farther out. Enceladus circles Saturn exactly half as fast as Fountain-Larson, creating a strong gravitational "resonance" that could preserve the relationship. □

Radio signals show length of Saturn day

The length of a day on a hardrock world such as Mars can be measured by simply timing successive appearances of a convenient surface feature as the planet rotates. Jupiter, without a solid surface, shows brilliant features in its cloud tops, but they rotate at widely varying rates. It was not until scientists found that Jupiter was emitting powerful radio signals that they could, by timing peaks in the signals, measure that planet's true rotational period — in effect the period of its magnetic field. Saturn, too, lacks a solid surface, and its haze-topped clouds offer far fewer visible details to follow. Furthermore, its radio signals are far weaker than Jupiter's, and a tentative detection of them from an earth-orbiting spacecraft has been considered unreliable.

The Saturn-bound Voyager 1 and 2 spacecraft, however, have done the trick. Michael L. Kaiser of the NASA Goddard Space Flight Center and colleagues have been able to identify Saturn's signals in their data since January ("the first conclusive evidence" for nonthermal emissions from that planet, the researchers report), and peaks in the data indicate a true ("internal") period for Saturn of 16 hours 39.9 minutes ± 0.3 minutes.

In Jupiter's case (or earth's), the modulations are caused by the tilt of the magnetic field's axis relative to the planet's own axis of rotation. Saturn's magnetic and rotational axes, however, are almost aligned, suggesting that the radio peaks are caused by magnetic-field regions of different strengths. □

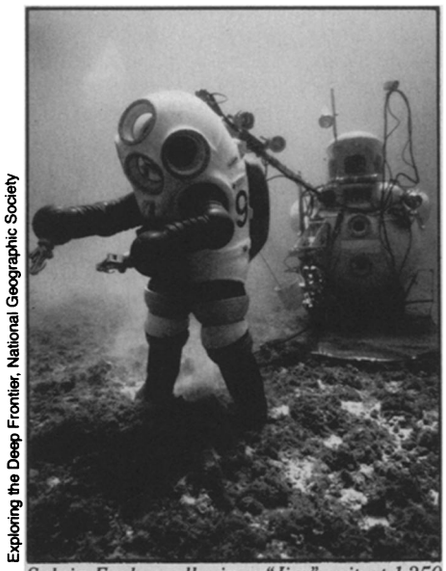
Ariane 2 in the drink

The second of the European Space Agency's Ariane rockets ever to be launched—and the first to carry a payload of scientific satellites — ended up on the floor of the South Atlantic May 23 when all four of its first-stage engines stopped firing prematurely. Lost with the rocket were a Max Planck Institute satellite called Firewheel, designed to study earth's magnetic field with high-altitude injections of barium and lithium, and an amateur radio satellite known as OSCAR 9. The previous launching, carrying only an instrumented test capsule, was successfully carried out last Dec. 24. The cause of last week's mishap is being investigated. □

Deep walk in a one-atmosphere suit

In the future everyone should have ready, easy, comfortable, safe access to the sea, says Sylvia Earle, a botanist who has spent more than 4,000 hours underwater. She says this goal requires learning how to go deeper, stay longer and do more exploring of the oceans — links to our destiny.

An armored suit that looks like an astronaut's gear recently allowed Earle to lumber along the Pacific Ocean floor off the coast of Hawaii, more than 1,250 feet below the surface. It was the first dive in such a suit without a line to the surface and the deepest solo exploratory dive in the open sea.



Exploring the Deep Frontier, National Geographic Society

Sylvia Earle walks in a "Jim" suit at 1,250 feet tethered to another submersible.

The suit has a self-contained supply of air, from which carbon dioxide is continuously removed. The metal shell protects the diver from the water pressure—at that depth 600 pounds of water press on each square inch. A diver breathing compressed gas, as with an aqua-lung, would have to spend at least a week in a decompression chamber before returning to the surface from such a depth. "Sylvia went down to 1,260 feet, stayed two and a half hours, got out and had lunch," recounts Al Giddings, colleague and underwater photographer.

More flexibility should be the key to future "Jim" suits, named after the diver early in the century who wore an 800-pound predecessor called the Iron Man. Earle says that already a newer model, named Sam, has more articulated rings to allow the diver enough flexibility to swim. Other "personal immersibles" being developed depend on motors and propellers for propulsion. But Earle says she abides by the engineering principle KISS — "keep it simple, stupid" — and has the greatest confidence in an immersible with no machine except a human being propelling it. Engineers, for example, envision for the future glass or titanium suits that might allow a person to step into the ocean and dive freely to any depth.

In addition to armored, or 1-atmosphere (pressure) diving suits, Earle predicts more use of unmanned vehicles that are controlled from the surface for ocean exploration, she told reporters last week at the National Geographic Society in Washington. Another exciting development, she says, is the mixture of gases that Peter Bennett at Duke University has found that allows divers to simulate a dive to depths of more than 2,000 feet (SN: 4/12/80, p. 232).

Earle feels a sense of urgency about attempts to explore the sea. She cites a strong sense of curiosity toward the many unknown creatures the oceans contain. "It's the age of exploration all over again," she says. But she also sees ocean exploration as a requirement for continuing human survival on this planet. "We have to become more aware of our dependence on the sea as a life support system," she says. "We have to know the sea so we can take care of ourselves." □

New bedfellows: Freedom & infertility

The 1970s may have brought progress toward equality of the sexes and perhaps even a greater "sensitivity" to the needs of a person's spouse. But the decade also brought an apparent increase in infertility among married couples in the United States. Currently, about one in six couples of childbearing age experiences difficulty in conceiving or carrying a pregnancy to term, estimates Harvard University psychiatrist Miriam Mazor. She and others discussed the trend recently in San Francisco at the annual meeting of the American Psychiatric Association.

Factors contributing to the fertility decrease, Mazor says, include postponement of childbearing into the person's thirties and forties (statistically, both men and women are maximally fertile in their mid-twenties); increased prevalence of venereal disease and consequent scarring of the reproductive tract; the use of certain contraceptive methods that may lead to scarring or infections (IUD's) or problems in ovulation after use (birth control pills); and environmental factors—drugs, chemicals, radiation, etc. — that may have a delayed effect on fertility.

Although at least one study has reported that physical causes are responsible for about nine of 10 infertility cases, the problem of infertility remains fraught with psychological consequences for both men and women. (It is estimated that about 50 percent of all infertility problems are related to women and 30 percent are related