

nals should also enable as much as a 500 percent increase in the accuracy of measuring the planet's mass, which, says chief radio experimenter H. Taylor Howard of Stanford University, should make it known as well as the earth's.

Plotting the spacecraft's precise trajectory by means of the signals also revealed to Howard's team that Venus is shaped far more like the classic globe than is the earth, which is flattened by its spinning. Venus, they found, is about 100 times less oblate, or out of round, than the earth, almost certainly because of its slow rotation. If it ever did rotate more rapidly, either that was when the planet was still a plastic, molten mass, or else Venus is a much less rigid body than the earth, capable of returning to its more spherical shape as it slows down.

The slow rotation of the planet also affects the circulation of the atmosphere, since there is additional time for heat to accumulate. The result ought to be simple swirling of the upper levels, as the warmer atmosphere in the tropical equatorial regions moves away toward the cooler poles. Mariner 10's major advantage over its predecessors—its two television cameras—showed the expected symptoms, again by ultraviolet light. Roundish features in the top cloud layer suggest cells of convection heating below, but, says Verner E. Suomi of the University of Wisconsin, the source of the heating, whatever it is, is probably still somewhere above the surface. (A similar theory of a free-floating vertical cell has been suggested to account for the Great Red Spot of Jupiter.) The symmetry of the equatorial circulation, says Suomi, resembles that of the inter-tropical convergence zone on earth. The cameras, says TV team leader Bruce Murray of California Institute of Technology, clearly show at least three cloud layers, and possibly a fourth.

Despite the answers provided by Mariner 10, there are a vastly greater number of questions about earth's mysterious sister with her layers of concealing veils. "Anybody with that much on," says Howard, "must have a lot to hide."

The spacecraft's main objective, however, is a March 29 flyby of Mercury, possibly as close as 621 miles. Plans call for Mariner 10 to be sent, in a prodigious feat of navigation, through a pyramid-shaped zone of Mercury's shadow, in which the planet hides the spacecraft from both earth and the sun. This is the only way, officials say, that Mariner would be in a position to detect possible tenuous traces of an atmosphere, ionosphere, or trapped radiation or charged particles from the solar wind. On the sunlit side of the planet, they would be invisibly scarce. □

A successful end to the longest space mission



NASA

Home at last, Skylab's last crew showed no nausea, little shakiness or vertigo.

TELEM TM OFF

The last command. At 2:10 p.m. EDT on Feb. 9, Skylab received its final instruction, to turn off its telemetry transmitter, from the Houston mission control center that had monitored the space station night and day for more than eight months. After 3,897 trips around the earth, a distance of more than 100 million miles, Skylab was officially dead.

The crew were far from it. Astronauts Gerald Carr, William Pogue and Edward Gibson, space rookies all, had returned to earth some 22 hours before, bearing an estimated two tons of scientific data and feeling, said Carr, "prettty damn good." NASA medical officials, in fact, proclaimed that this third and final crew was in better shape than either of its predecessors, adapting readily to the gravity that they had deserted 84 days, one hour and 17 minutes before.

Before leaving their orbiting home, the astronauts left behind them a "revisit bag," containing samples of food, film, paper, clothing, electronic components and other gear, just in case crewmen from the 1975 Apollo-Soyuz flight or the space shuttle in 1979 or beyond should drop in at the lifeless station and retrieve the bag. Studies of the bag's contents could yield valuable data on possible long-term degradation caused by factors such as radiation in the space environment.

Just before leaving the station, the astronauts fired its motors once more to raise its orbit slightly, to ensure that it will still be aloft at shuttle time. Under consideration is a plan to have shuttle-borne astronauts deliberately send Skylab earthward, to make sure that it will not land in a populated area.

The three Skylab crews together spent more than 171 days in space, took almost 230,000 frames of film of the earth, sun and stars, and recorded more than 45 miles of data-crammed magnetic tape.

One of Skylab's most important contributions toward long-term flights such as a manned mission to Mars was the discovery that there seems to be a

leveling-off point, after about a month, beyond which weight loss and other deconditioning effects of weightlessness reach a plateau. Carr's crew, with the world's longest space flight behind it, showed little strain back on earth. It bodes well for spacemen to come. □

Experiment confirms laser-fusion idea

It could be said that the idea of laser-induced thermonuclear fusion was born in a computer. The basic scheme is to take a pellet of deuterium and tritium (or other appropriate fuel) and irradiate it from all sides with laser light. The belief that the energy deposited by the light would cause a symmetric implosion, compressing and confining the pellet and thus preparing the way for the ignition of fusion, was based on a model generated by a computer. At last week's meeting of the American Physical Society in Chicago came news of experimental confirmation of the computer model.

The news was brought by Keith A. Brueckner of KMS Industries, one of a small number of organizations working on the concept. Two days before Brueckner addressed the meeting, the U.S. Atomic Energy Commission obligingly declassified the results. (Most branches of thermonuclear fusion research are not classified, but laser fusion has potential military applications, so it is.)

The implosion, described as "significant reduction in volume," was observed in a series of low-power laser shots designed to test the performance of what KMS calls its stacker, a device that shapes and times laser pulses to get optimum energy delivery to the target. The pulses were not at a high-enough power level to produce fusion and were not intended to be.

The observations were made by X-ray pinhole photography. This is a technique that uses X-rays emitted by the fuel pellet and the principle of the pinhole camera to form an image of the pellet as it is compressed.

The compression was obtained with

Physicists on the phone: International science and Soviet dissidents

"*Moskovskaya telefonista?*"

"*Da.*"

It was the only thing Soviet officialdom said yes to in the whole proceeding. Boris Ainbinder, a scientist who recently emigrated from the Soviet Union to Israel, was trying to get the Moscow telephone operator to reconnect a call to the home of Soviet activist Pyotr Yakir in an attempt to contact some dissident scientists. The operator insisted the line didn't answer. How could that be, Ainbinder responded—the group gathered around the telephone in Chicago had just spoken to Yakir. The connection had broken in midsentence. Please try the line again. "Don't tell me how to do my job," the operator responded angrily.

In a tone familiar to those who have had problems with operators of AT&T, Ainbinder asked to speak with her supervisor. But he was dealing with the KGB not AT&T, and he was told that since it was late (after 11:00 p.m.) in Moscow, everybody had gone home.

The scene was the press room for last week's meeting of the American Physical Society and the American Association of Physics Teachers in Chicago's Palmer House. The idea was to contact the Soviet dissidents, especially physicists Mark Ya. Azbel and Aleksander Voronel, by long-distance telephone and let American reporters interview them.

Past experience has shown that a phone call is a way to get uncensored contact with residents of the Soviet Union since it can sometimes catch the KGB off guard. Of course when the KGB finds out that such a call has been made, it yanks out the telephone that received it. But by leap-frogging Moscow from the home of one willing person to another, contact can be maintained. For this attempt Yakir's phone was chosen.

A ruse was played in hopes of getting past the KGB. A call to Moscow must be placed in advance to clear circuits for the appointed time. The appointed time for this call was 1:30 p.m. Chicago time on Tuesday. Early that day the call had been set up with the overseas operator by representatives of the Committee of Concerned Scientists, who are concerned to get the dissidents out of the Soviet Union. In doing so, they gave the operator a false number, a Moscow number they knew was not working. When the operator called back at 1:30 to tell them that, they asked her to try 129-2630, Yakir's real number. The hope was that the call would go through before the KGB's tracking apparatus caught on. The call went through. Yakir answered and responded to a request for Azbel by saying, "Azbel will be later." As the American side tried to get him to explain what he meant, the line went dead. That was when Ainbinder took the phone and tried unsuccessfully for a reconnection.

Apparently the major offense of Azbel and Voronel and two other scientists the Committee of Concerned Scientists

is particularly concerned about, mathematicians Aleksander Luntz and Viktor Brailovsky, was to apply for permission to emigrate to Israel. For that they were kicked out of their jobs. Now the Soviet state seems to be moving toward prosecuting them as parasites under a provision that says those who will not work can be sent to jail. Thus, after firing them from their jobs and making it impossible for them to get others, the Soviet government proposes to proceed against them for being out of work. The committee wants to raise international opinion and pressure in the hope of getting them out before that happens.

While the plight of would-be emigrants is a matter of general humanitarian concern, an incident involving Azbel, Voronel and a third physicist in the same trouble for the same reason, Moshe Gitterman, is of narrower interest to the scientific community. It concerns the integrity of scientific meetings and scientists' access to them.

In August 1973 an international meeting on magnetism was held in Moscow. Azbel, Voronel and Gitterman, who are specialists in magnetism, wanted to attend. In no way could they gain admission as members of the Soviet delegation. An attempt by the Israelis to include them in the Israeli delegation was likewise rebuffed. The conference was held at Moscow State University where the doors were guarded by armed, uniformed men who scrutinized the badges of all who entered. In the end a special informal session was held in Voronel's apartment to give the three excluded ones a chance to read their papers.

A number of members of the conference were incensed by these proceedings and tried to bring up the matter on the floor with little success. One of them, Earl Callen of American University, was so disturbed that he gave a paper at this APS-AAPT meeting describing what had happened. Attempts to get the International Union of Pure and Applied Physics, one of the sponsors of the Moscow meeting, to intervene with the Soviet authorities likewise failed. IUPAP has passed resolutions demanding freedom of travel for scientists and free access to meetings, but these were interpreted as not referring to travel within one country and of no legal force anyhow. Callen says American and Canadian representatives on IUPAP went along with the Soviet interpretation of the resolutions.

Callen calls for a change in the method of appointing U.S. representatives. They are now appointed by the National Academy of Sciences. Callen regards the NAS as a self-selected elite and calls it "a guru club," unrepresentative of American scientists generally.

Callen also points out that there is some strange politics going on in the United States, a "strange inversion of right and left." "The left has gone and looked," he says, and been dismayed. The right, under "Nixon, the arch-anticommunist of all time" makes trade agreements with Soviet officials. "So you're in business to make a profit," he concedes, "but do you have to sell . . . the United States?"

only 30 joules of energy absorbed in the target. This will permit the gathering of abundant data about the implosion process, which is essential to laser-induced fusion, while physicists are still awaiting development of lasers powerful enough to induce actual fusion. No instabilities have shown up in the implosion measurements, and this too is considered important verification of the theory developed by a group led by Brueckner. □

Interferon: Promise against serious infections

In 1957 British researchers identified interferon as the body's natural defense against viruses. Scientists throughout the world predicted that by giving or inducing natural production of this protein, they could immunize persons against invading viruses.

But from the beginning, interferon

studies have yielded conflicting results. Preparations of interferon often have been impure, and it has been hard to tell whether interferon or a chemical inducer causes any particular reaction. Nevertheless, more is now known about the actions of interferon in animals and more human interferon is now available for clinical trials. So there is renewed interest in interferon and fresh evidence for its effectiveness.

Last spring Thomas C. Merigan of