

Road to Jupiter, part 2 starring Pioneer 11



Pioneer 11 aims for the never-seen poles of Jupiter. . .

The invisible cloud whorls of Venus, strange Mercury with a center like the earth and a surface like the moon, Mars with a volcano the size of Rhode Island and a canyon that would span the United States. Yet among the wonders of the solar system visited by earthlings' space probes, giant Jupiter must surely head the list. Red spots, white plumes, orange stripes, 300-mile-an-hour winds, a 10-million-mile magnetic field, sizzling radiation belts that would kill a human being 1,000 times over—these were but a few of the phenomena probed late last year by Pioneer 10 as it sped past the fantastic planet, only narrowly escaping death from the millions upon millions of trapped protons that bombarded its delicate electronic components.

But even as Pioneer 10 passed within 82,000 miles of Jupiter, Pioneer 11 was already more than 300 million miles from earth on its way to a similar rendezvous—an appointment it will keep on Dec. 2.

It won't be an exact repeat, however. Unlike its predecessor, which swept past the side of the planet, Pioneer 11 will come diving in at an angle which will take it down to within 38 degrees of the Jovian south pole, a region that Pioneer 10 never saw, after which it will swoop up to the same distance from the north pole. This will give scientists an opportunity to study a whole new range of ques-

tions about this mysterious ball of hydrogen—a ball which may not even contain a solid core at all. What do the clouds look like over the poles? Do they still follow the maddeningly regular striped pattern that girdles the entire rest of the planet, or do they wind up in whorls, as they ought to on a world that spins its clouds along at 22,000 miles per hour? And what about that awesome magnetic field? Presumably the field lines bend right down into the planet near the poles as they do on earth. If so, it would mean that trapped radiation could be all but nonexistent there, making the polar regions potentially good bets as aiming points for future probes into the Jovian atmosphere.

For radiation, even to Pioneer 11, is a serious problem (SN: 11/24/73, p. 325). When the spacecraft passes through the plane of Jupiter's magnetic equator, where the radiation belts are strongest, it will be only slightly outside its closest distance from the planet, about 26,725 miles. This is less than a third the distance of Pioneer 10's 1973 flyby, and the radiation will be far more intense. The maximum electron flux is likely to be twice that encountered by Pioneer 10, says project manager Charles Hall, and the flux of protons—which would do most of the damage—may exceed Pioneer 10's by a devastating 15.7 times!

Fortunately, there is a saving grace, in that Pioneer 11 will be climbing on such a steep course from south to north pole (and at a spacecraft record speed of more than 100,000 miles per hour) that it will spend much less time in the intense part of the belts. While the maximum particle fluxes will be much higher, says Hall, the cumulative electron exposure should be only about a fifth that of Pioneer 10, while the total proton load is expected to be about two-thirds. Thus the overall chance of the spacecraft's survival, according to Hall, is somewhat better—and Pioneer 10 survived.

Following its 620-million-mile trip to Jupiter, Pioneer 11 will have a more distant, and possibly even more exciting, assignment: up over the top of the planet, back past the sun and beyond, toward a September 1979 trip inside the spectacular rings of Saturn. □



. . . and beyond.

Food conference: A status report

Open deliberations by representatives of the world's governments, meeting in Rome to solve a worsening food crisis, nearly ground to a halt. As the conference reached its halfway mark last weekend, bickering between industrialized and developing nations dominated selections of officers for various conference positions. Fortunately, activity behind the scenes showed more promise.

At the request of A. H. Boerma, director general of the United Nations Food and Agricultural Organization, delegates from the largest grain producing nations met informally to work out an agreement that could at least help starving countries during the next critical months before the next harvest. As expected the arrival of several senators, fresh from the campaign trail, stirred new action within the American delegation. Though Secretary of Agriculture Earl Butz has consistently fought stating any specific commitment of American aid, after meeting with the Congressional delegation he agreed to request such a commitment for emergency aid from President Ford. Canada and Australia have already offered specific amounts of aid.

At week's end many of the delegates heard Pope Paul call for an end to hunger, while French professor René Dumont suggested the delegates themselves pay a tax proportioned on their own obesity. But most continued to enjoy such Roman culinary delights as roast suckling pig—available a block from the conference site for about \$5—and move a typically diplomatic pace for solutions of the world's problems. □