

principal author of a 1988 report on indirect cost by an ad hoc committee of the Association of American Universities. Pings told the committee that the real problem lies in the complexity of the rules and the cost of implementing them. His solution: Split indirect costs into two components, administration and facilities, and let universities charge a fixed proportion of direct costs to administration without documentation—just like the standard deduction on an income tax form—or document that a higher rate was appropriate. For facilities, Pings said the government should allow faster depreciation to reflect more accurately the useful lifetime of buildings and scientific equipment. David Packard, chairman of the board of Hewlett Packard, also argued for a cap on administrative costs but suggested that universities should be paid directly for facilities, not via indirect charges to research grants.

Capping some fraction of indirect costs appears to offer a simple solution—the House and Senate agriculture appropriations subcommittees, in fact, have already capped indirect costs on some types of research grants. But, depending on how the caps are implemented, there could be problems (see box, p. 637). An even easier and politically appealing option could be to levy fines against universities that are found to have overcharged the government. Some, including Congressman Bliley, have gone so far as to suggest an extreme option: instituting “the death penalty”—a prohibition from receiving any federal funds—for universities that are chronic abusers of the reimbursement system.

The debate before Boucher’s subcommittee wasn’t the only venue on Capitol Hill where indirect costs were at issue. In fact, so many congressional committees are jumping into the indirect cost issue—in addition to Dingell’s and Boucher’s subcommittees, the health and environment subcommittee chaired by Henry A. Waxman (D-CA) has entered the fray—that it is hard to get a fix on which proposals are being taken seriously. The first sign of where Congress may end up could appear in the House appropriations bills, which may be ready as early as next month, although appropriation action—rumored to be a cap on administrative costs—would only be in effect for the 1-year duration of the appropriation bill.

As for the Administration, OMB is also expected to announce its proposals by early June. Meanwhile, the universities are batten down the hatches and hoping they can withstand the political whirlwind that is swirling above them. And scientists will be wondering what will be left for them when the storm subsides. ■ **JOSEPH PALCA**

Galileo Hits a Snag

Inside the Jet Propulsion Laboratory’s (JPL) towering Spacecraft Assembly Facility in Pasadena, a team of engineers is methodically furling and unfurling a fragile umbrella of gold-plated mesh stretched over graphite ribs, hoping to see it jam. They are trying to understand what has happened to the umbrella’s twin, now millions of kilometers beyond their grasp in interplanetary space.

The distant umbrella is the main antenna of the spacecraft Galileo, on its way to a 1995 rendezvous with Jupiter. Last month the antenna failed to deploy fully as the spacecraft swung out toward the asteroid belt on the second leg of its roundabout journey. Unless engineers can free the balky antenna, Galileo will arrive at the largest planet as alert and capable as ever, but nearly mute. The snag jeopardizes a \$1.3-billion mission at a time when a beleaguered NASA can ill afford any more embarrassments in space.

Trying to break one antenna in an attempt to fix another may seem perverse, but JPL engineers are baffled by the problem. After all, the same sort of antenna has worked perfectly six times on Earth-orbiting communication relay satellites. On 11 April, though, controllers at JPL commanded the spacecraft to open the 4.8-meter antenna, which had been kept folded out of harm’s way since the spacecraft was launched from the space shuttle in October 1989. Drive motors churned and the antenna began to unfurl, but it never clicked into its fully open position. Something apparently got stuck on one side of the antenna.

To interpret the distress signals coming from the distant spacecraft, JPL engineers are trying to get their groundbased antenna into a similar bind. Then they’ll have a better idea of what they are up against, and what the prospects are for a repair.

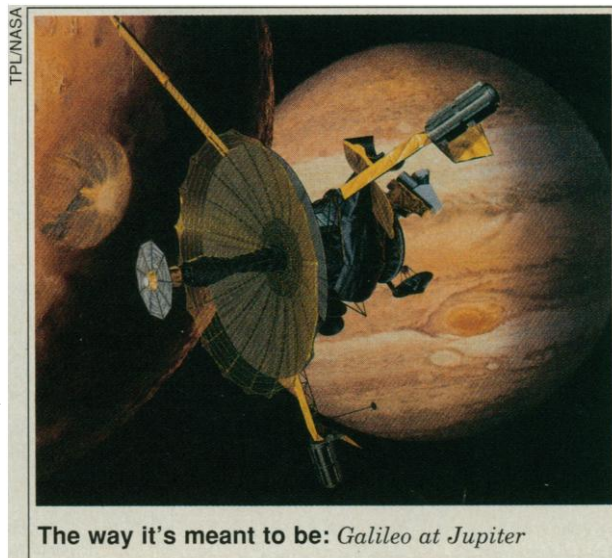
At stake is the bulk of the data Galileo was expected to gather at Jupiter. Properly deployed, Galileo’s main antenna could return 134,000 bits of data per second from the vicinity of Jupiter. At that rate, a complete image from Galileo’s camera could be sent home in 1 minute. And while sending pictures, the antenna would also be busy transmitting data from the other 12 experiments aboard.

In the absence of the main antenna, all these tasks would fall to Galileo’s two small antennas, which are now transmitting engineering and scientific data at 1200 bits per second. That would suffice to return observations from Galileo’s October flyby of the asteroid Gaspra—though the data would have to be recorded and then played back when Galileo swings by Earth in December 1992 for a final gravitational boost toward its destination.

At the great distance of Jupiter, though, the transmission rate of each small antenna will slow to a trickle—10 bits per second. That will do for relaying the 75 minutes of data from the probe Galileo will drop into Jupiter’s atmosphere but would rule out any long, leisurely inspection of the planet, its magnetosphere, or its satellites.

The extremes of temperature Galileo will experience on its circuitous journey present the current best hope to solve the problem, project manager William O’Neil says. Perhaps chilling the antenna in the cold of the asteroid belt or simply in the shadow of the spacecraft will unstuck it. If not, the sun’s greater warmth when Galileo swings in again toward Earth might do the trick. At least time is on JPL’s side—another 4 years, to be exact. “We can take our time to understand the problem,” says O’Neil. “I’m optimistic we can get it open.”

■ **RICHARD A. KERR**



The way it's meant to be: Galileo at Jupiter