



Galileo To Jupiter: A rough beginning

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John Casani, Galileo Project Manager, 1977-1988

Prehistory

NASA sponsored numerous studies of follow-ons to Grand Tour/Voyager
Jupiter Orbiter with Probe was Galileo's forebear
Concept supported desires of 3 different outer planets communities

JOP

- Both ARC and JPL sought leadership of JOP
- Fall 1975, NASA chose JPL with ARC managing Probe
- Goal was a “New Start” in FY 1978 budget
- Same year as Hubble Space Telescope!
- NASA typically didn’t seek multiple new starts for space science projects in a single budget year
- Ford administration allowed it

First fight: approval

- 1970s were inflationary, austerity drove political conversation
- Space Shuttle continuing overruns impacted NASA's reputation on Capitol Hill
- House Appropriations subcommittee supported HST over JOP and struck from FY78 budget
- Getting it revived was Act I of Casani's Washington struggles
- Key early decision: fight for *both* HST and JOP



“

Rarely have I ever seen such a
successful lobbying campaign. . .
.It was masterfully done.

”

Dick Malow, House Appropriations staff director

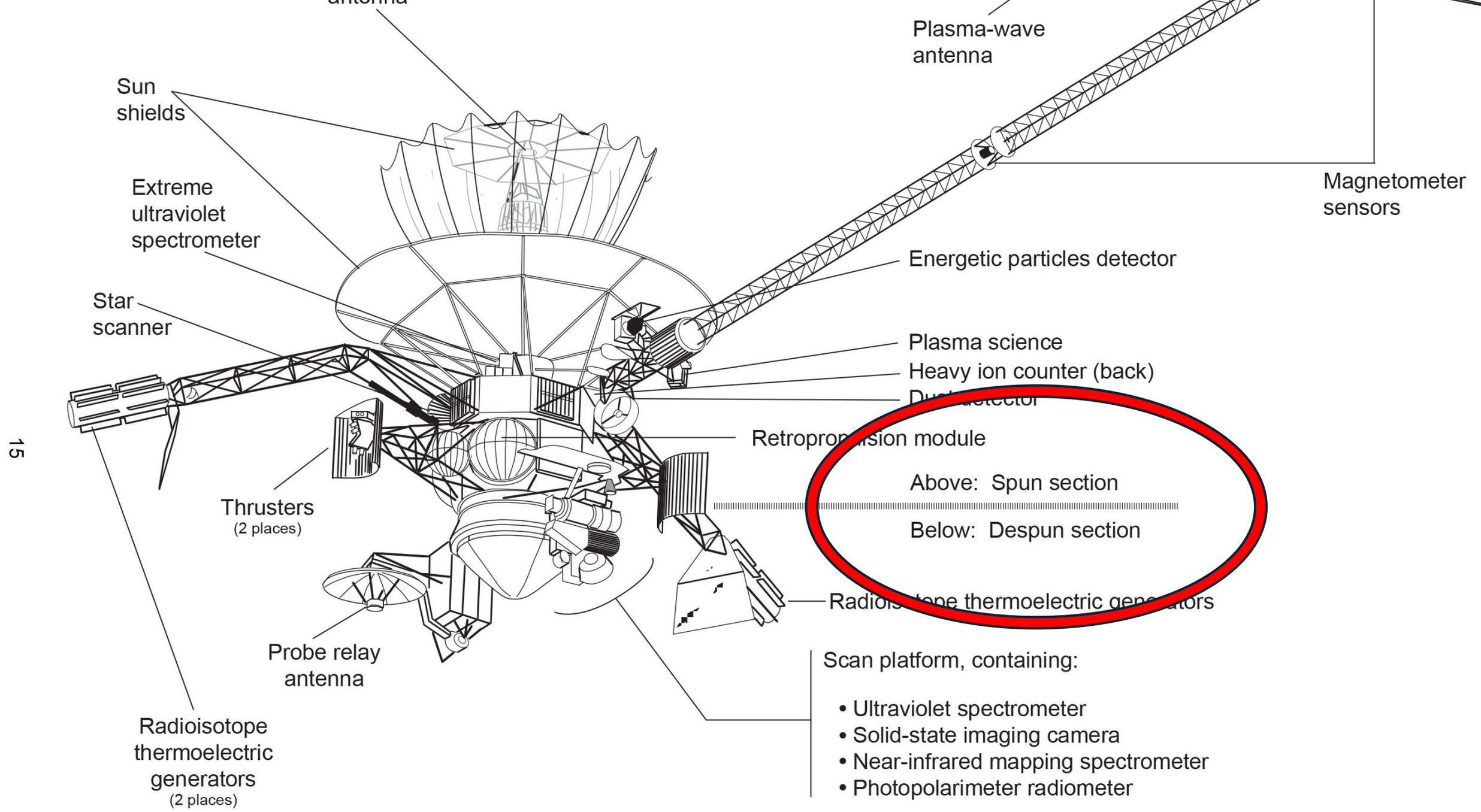
Becoming Galileo





Upper stage drama

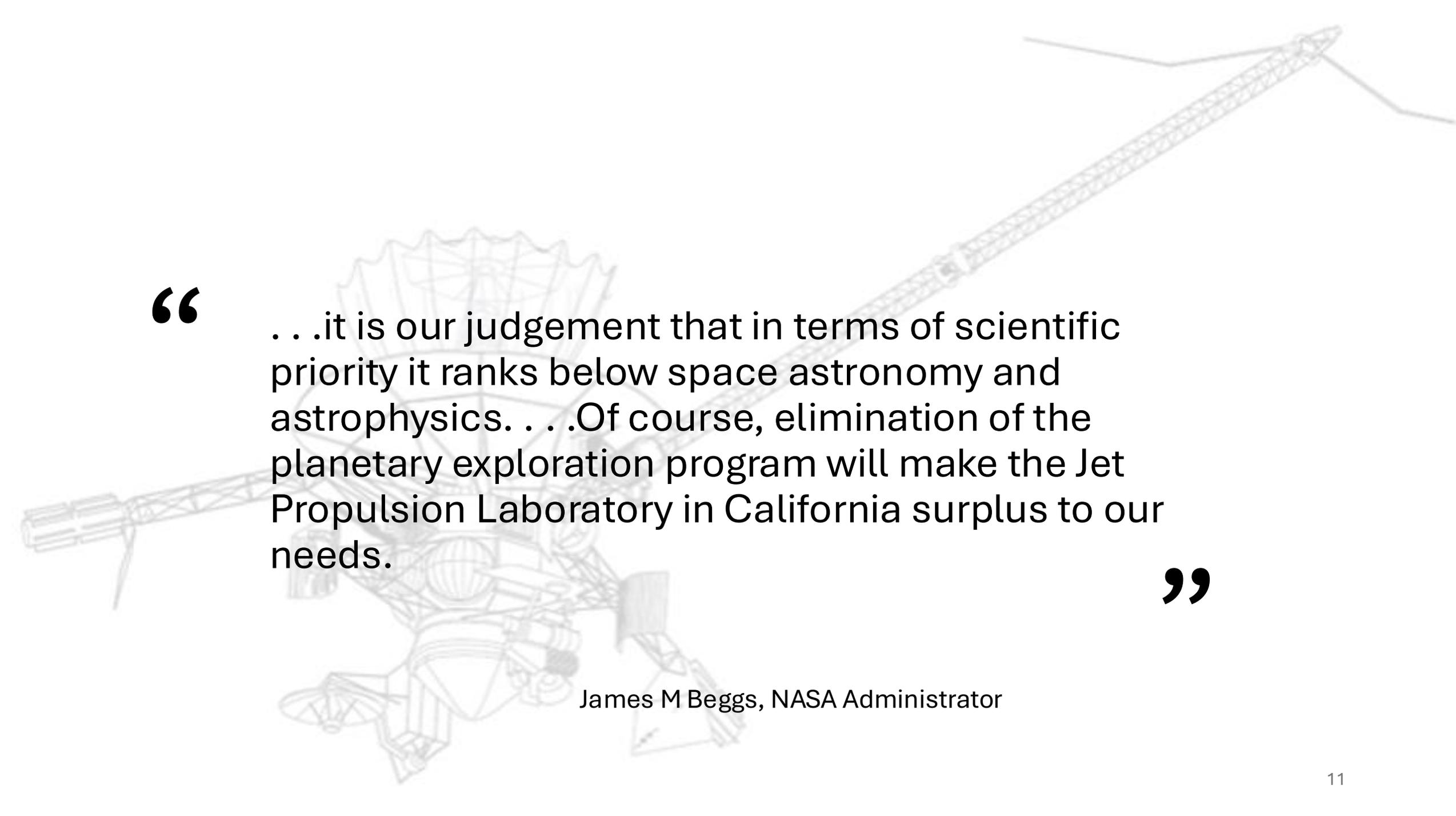
- Played out from 1975-1986
- Centaur mandated by Congress
- Abandoned after Challenger



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Planetary Near-Death





“

...it is our judgement that in terms of scientific priority it ranks below space astronomy and astrophysics. . . .Of course, elimination of the planetary exploration program will make the Jet Propulsion Laboratory in California surplus to our needs.

”

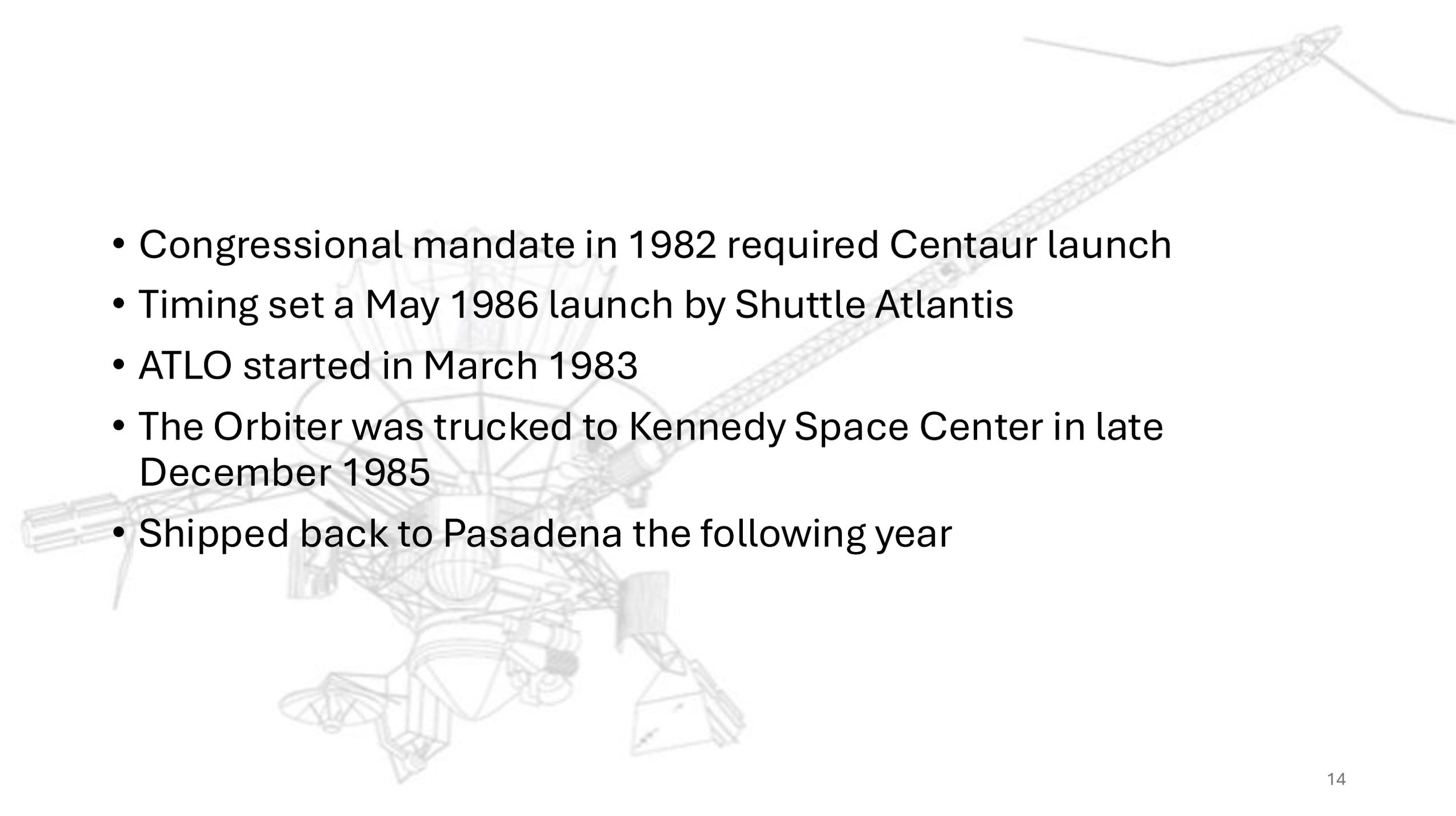
James M Beggs, NASA Administrator

Saving Galileo Again

- JPL Director Bruce Murray and Casani set off on another influence campaign to save Galileo and planetary exploration
- Involved key Caltech Trustees to persuade Members of both major political parties
- Saved Galileo
- Took to FY 1984 to gain another planetary new start

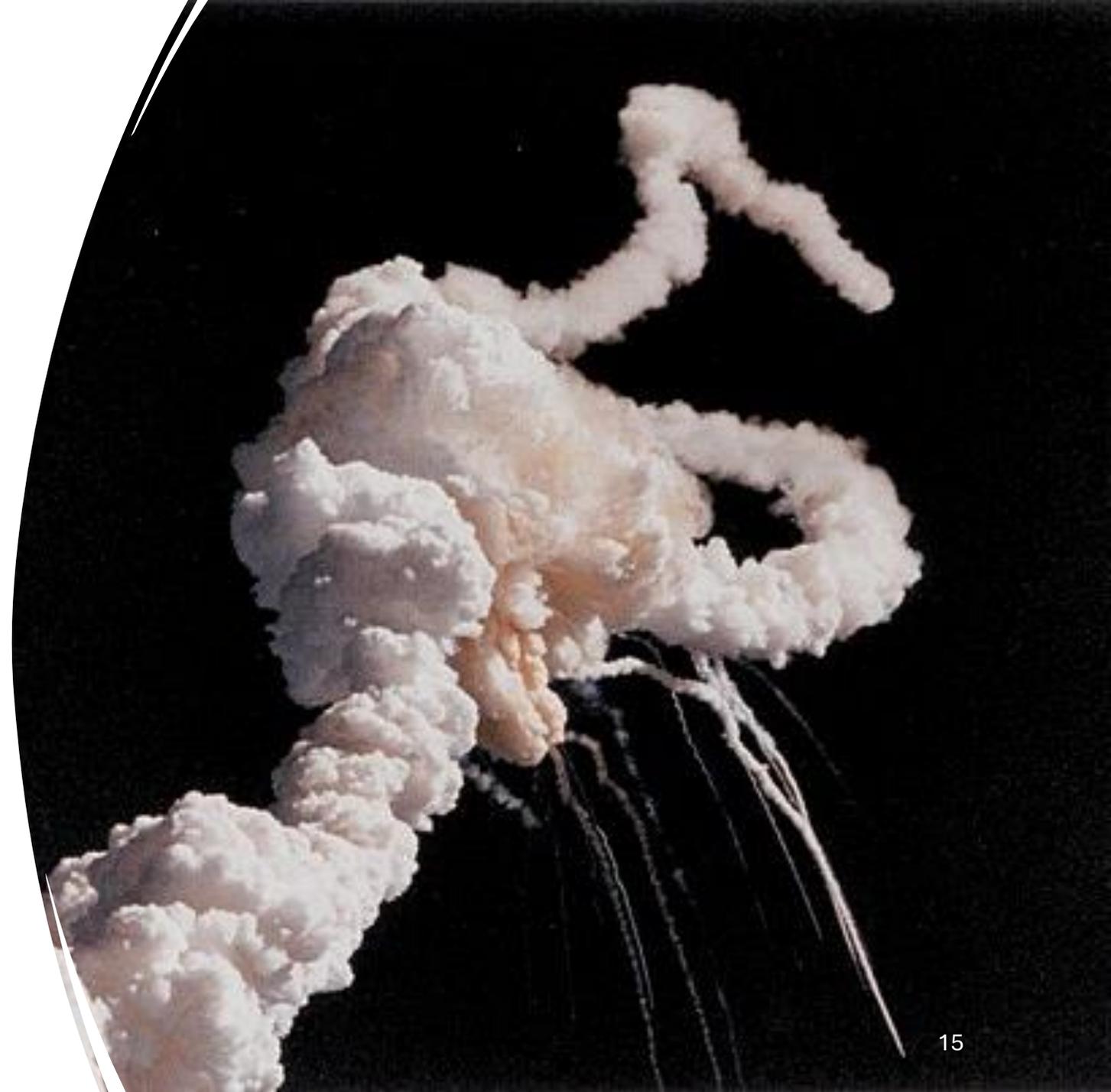
Aborted Voyage



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- Congressional mandate in 1982 required Centaur launch
 - Timing set a May 1986 launch by Shuttle Atlantis
 - ATLO started in March 1983
 - The Orbiter was trucked to Kennedy Space Center in late December 1985
 - Shipped back to Pasadena the following year

STS-51L

- Challenger tragedy changed Galileo again
- New risk posture eliminated Centaur
- Reduced flight rate put launch off to 1989



IUS replacement for Centaur required multiple planetary flybys to gain velocity

Extended mission duration by many years

Required thermal modifications for inner solar system heating; launch mods to adapt to IUS; software changes; materials testing for lifetimes

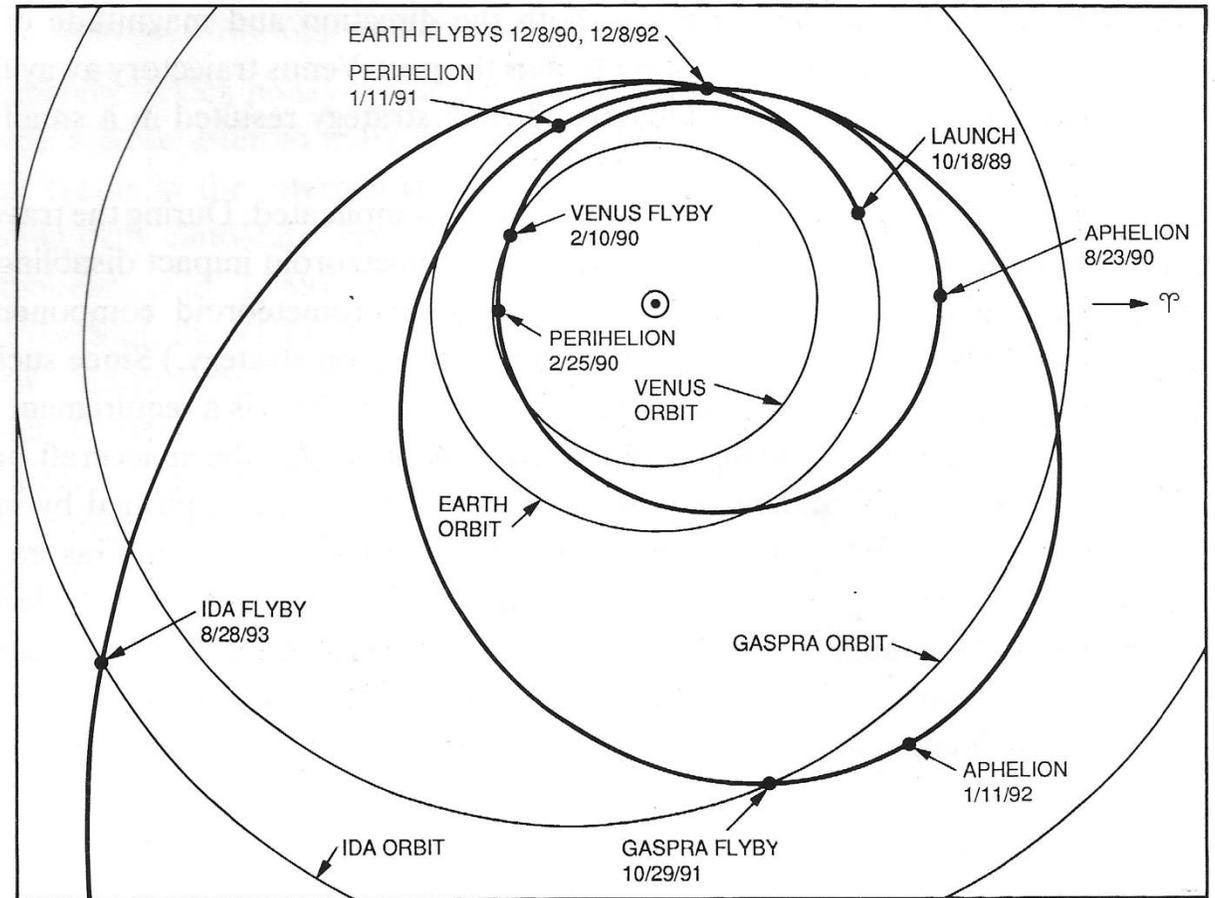


Fig. 1. Galileo 1989 VEEGA interplanetary trajectory: launch through Ida flyby.

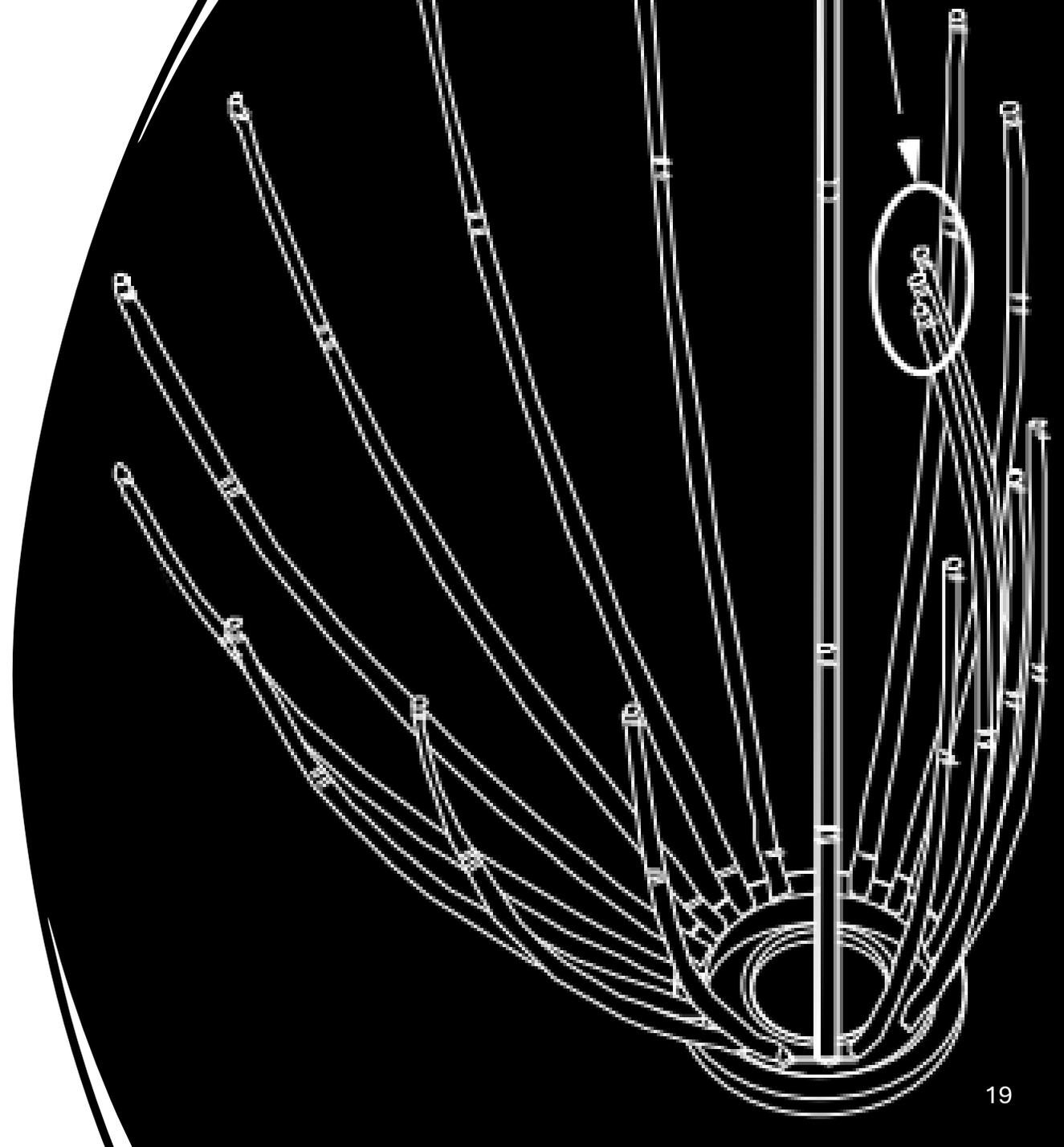
Launch, and After



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- STS-34 finally put Galileo in space
 - 18 October 1989
 - Astronaut Shannon Lucid initiated deployment



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- Not out of the woods yet
 - 1991 antenna deployment failure required creative software engineering to recover
 - Tape recorder troubles starting in 1995 required same
 - Engineering creativity was key to ultimate success



ORANGE COUNTY NEWSWATCH

A MIGHTY ASSIST: Mighty Duck player Milos Holan, diagnosed recently with leukemia, will get support from fellow players and others Saturday at a bone marrow donor drive at the National Sports Grill in Orange. Holan has yet to find a matching marrow donor. . . . Says Disney Sports Enterprises President Tony Tavares: "We encourage all of our loyal fans to come out and participate." The event begins at 10 a.m.

FOUR MORE YEARS? In addition to their annual financial predictions (D1), economists at Chapman University are calling the 1996 presidential race. . . . In the last 24 elections, the Chapman model has correctly predicted 19 presidents. For 1996, Bill Clinton is forecast to win over any GOP challenger by a 5.17% margin. However, in the last election, they were off in predicting a win for George Bush. "The model is wrong when there is a strong third-party candidate," says Chapman economist and president James Doti. "Otherwise, it's pretty good."



Galileo Spacecraft Scores 2 Successes in Jupiter Mission

■ **Science:** Probe survives plunge into giant planet atmosphere. Mother ship achieves orbit and will two-year exploration of Jovian system.

By K.C. COLE, TIMES SCIENCE WRITER

After almost 20 years of nail-biting, a half-dozen pale Jet Propulsion Laboratory scientists finally realized their dream Thursday. The Galileo spacecraft successfully delivered its long-awaited one-ton probe to Jupiter, jabbing the giant planet's midsection with a parachuted probe and then powering its mother ship into Jovian orbit.

At precisely 3:10 p.m. the pint-sized probe signaled that it had sipped safely beneath the clouds of Jupiter, the first Earthly object to penetrate the foreboding atmosphere of the giant gaseous planet. And about two hours later, the Galileo itself fired its engines and settled into orbit around the solar system's largest planet.

"It's been a perfect day," said Project Manager William O'Neil. "Not only are we in orbit, we're in a very good orbit. We're ecstatic."

Watergate Figure Seeks O.C. Judges

By EVAN HENDERSON
SPECIAL TO THE TIMES

Rough Trip, Jubilant Arrival

Galileo mission to Jupiter is a case study in perseverance

Most of us are quickly reduced to two options if the car conks out on the daily commute: AAA or hoofing it. And if the traditional routes to a destination are unavailable, we'll often cancel the trip. Maybe that is the proper context for noting the successful delivery of a space probe deep into the turbulent atmosphere of Jupiter, the solar system's largest planet.

At about 3:12 p.m. Pacific Standard Time, the oft-maligned and incredibly resilient Galileo spacecraft began receiving transmissions from its atmospheric probe. That, Jet Propulsion Laboratory Director Ed Stone said, was almost

achieved orbit around the enormous planet.

But none of this even hints at the perseverance required to get this mission from the drawing board in 1974 and off along one of the trickiest and most convoluted routes ever attempted in space exploration. The Galileo mission, approved by Congress in 1977, was to be launched from the space shuttle by May 1986. But the Challenger shuttle explosion that year delayed subsequent flights, and the more powerful rockets needed to launch Galileo were no longer allowed on shuttle missions.

That meant launching Galileo in the wrong direction in

increase the force of his toss.

Early in the long voyage, in 1991, the main data transmission antenna failed, and JPL engineers had to jury-rig a secondary system. It was 1995 before new computer software could partially make up for the main antenna loss. Then a Galileo tape recorder failed, threatening a total loss of data. That too was solved.

Have you ever wondered what it was like for the folks who brought the crippled Apollo 13 spacecraft and its astronauts back to Earth? Have you wondered what it was like at Mission Control in Houston when the first person landed on the moon? Look at the faces at the Jet Propulsion Laboratory in Pasadena, and

References

- 1) Michael Meltzer, Mission to Jupiter: A History of the Galileo Project, NASA SP-2007-4231. 2007.
- 2) Logsdon, J.M. (2013). *The Survival Crisis of the US Solar System Exploration Program in the 1980s*. In: Launius, R.D. (eds) Exploring the Solar System. Palgrave Studies in the History of Science and Technology. Palgrave Macmillan, New York.
https://doi.org/10.1057/9781137273178_3
- 3) “The Flight of Project Galileo as Reported Annually to the IAF/AIAA,” May 1997.
- 4) Peter Westwick, Into the Black: JPL and the American Space Program, 1976-2004, Yale University Press, 2007.