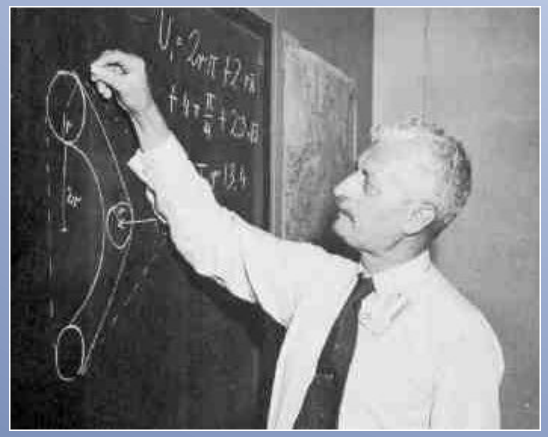
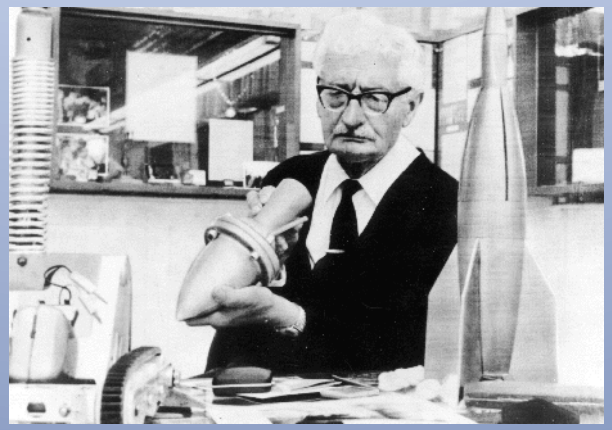
# A BRIEF HISTORY OF HST: INCEPTION TO LAUNCH

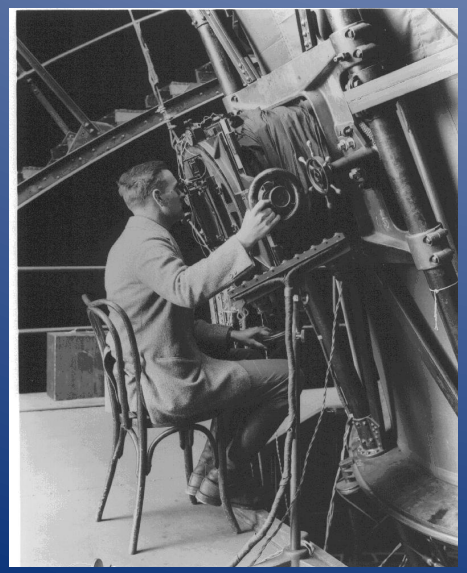
David Leckrone

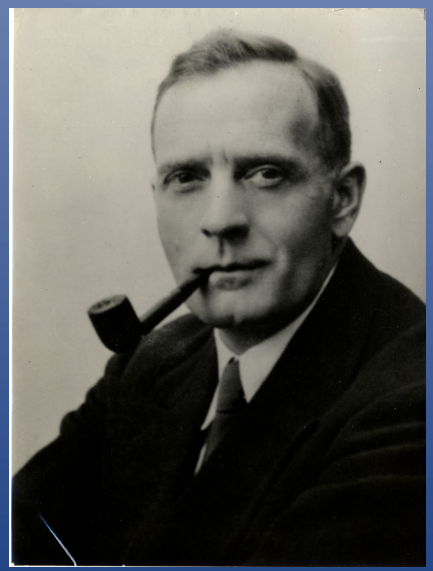
October 11, 2010



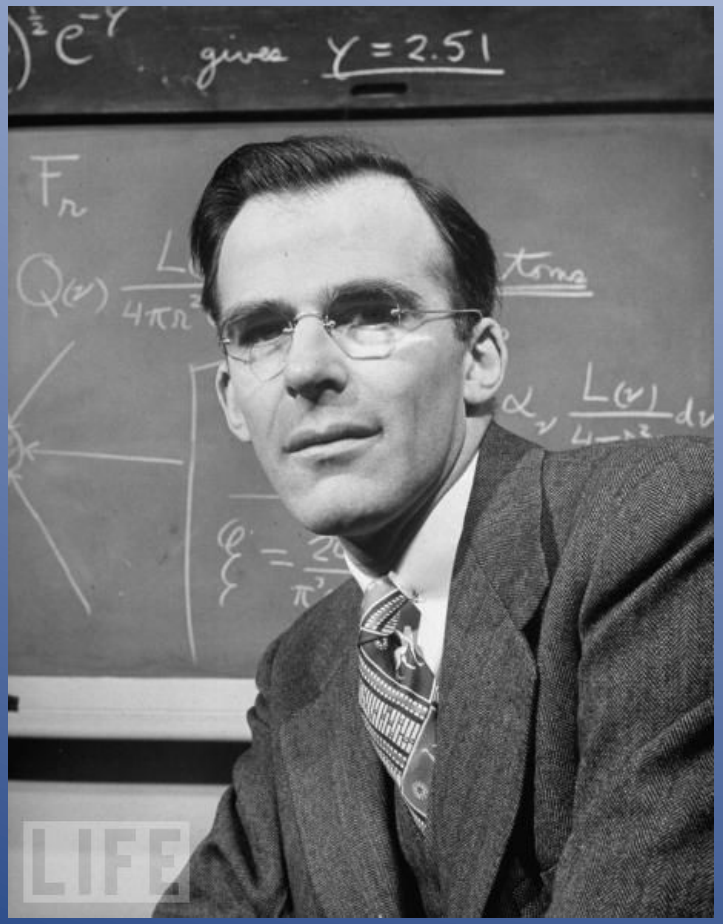


1923, 1929 – Hermann Oberth described practical and scientific applications of space travel, including a space station and space telescopes; 1929 – Hermann Noordung expanded Oberth's ideas with a detailed description of an orbiting manned observatory, including large-aperture telescopes.





1922-1931 – Edwin Hubble and colleagues established the existence of external galaxies and demonstrated that the Universe is expanding.

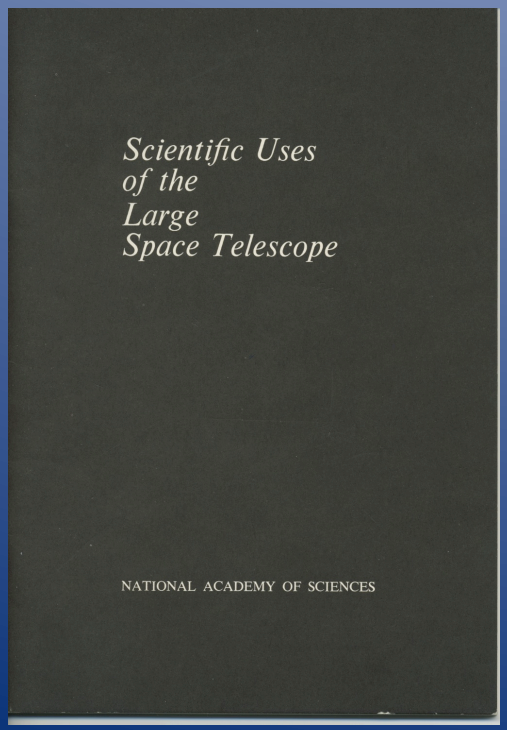



1946 – Lyman Spitzer wrote a report for the RAND Corporation entitled, "Astronomical Advantages of an Extra-Terrestrial Observatory."

He discussed advantages of space telescopes of aperture 5 – 15 meters. He discussed two main advantages of observing above the Earth's atmosphere –
1. unlimited access to ultraviolet and infrared wavelengths, and
2. dramatic improvement in the sharpness of images in the absence of atmospheric turbulence.

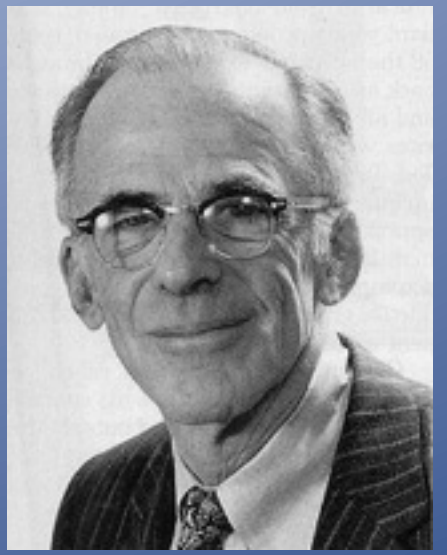
Spitzer gave as the best reason to build space telescopes "[to] uncover new phenomena not yet imagined, and perhaps to modify profoundly our basic concepts of space and time."

# The 1960's and '70's – Building Support, Laying the Scientific/Technical Foundation




# Advocating a (Large) Space Telescope to the Federal Government

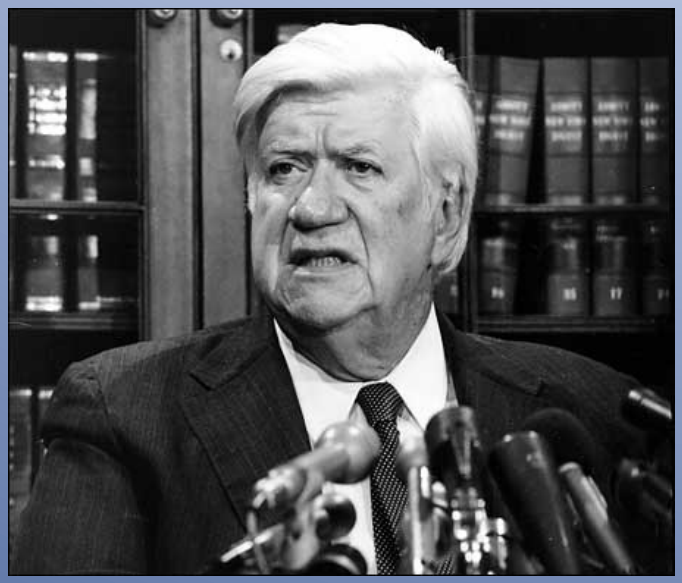
John Bahcall



Lyman Spitzer

George Field

# Political Support for a (Large) Space Telescope



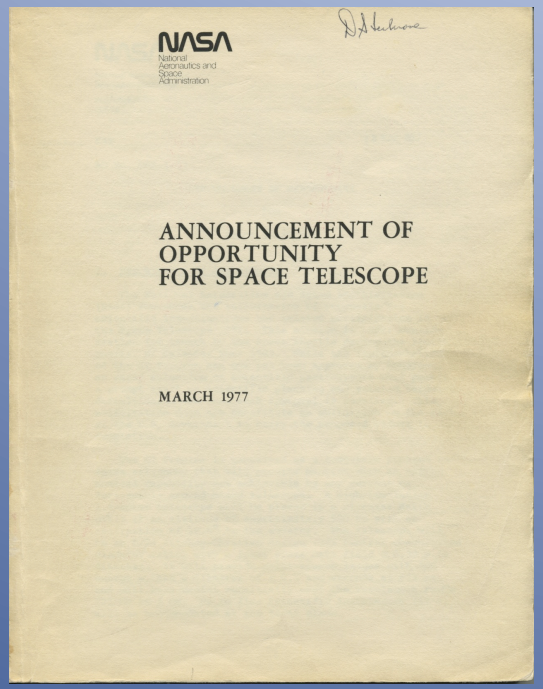
Congressman Tip O'Neill, D-Ma

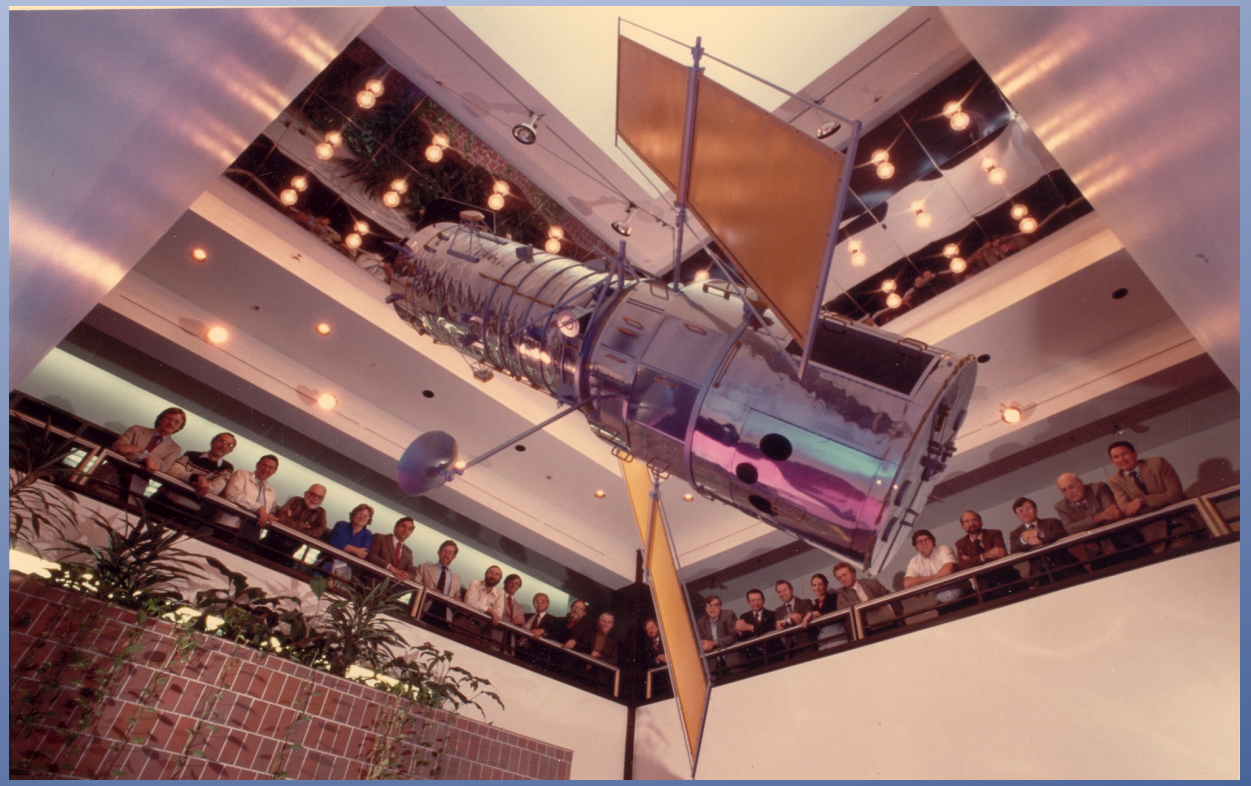
Congresswoman Lindy Boggs, D-La

Senator Charles ('Mac') Mathias, R-Md

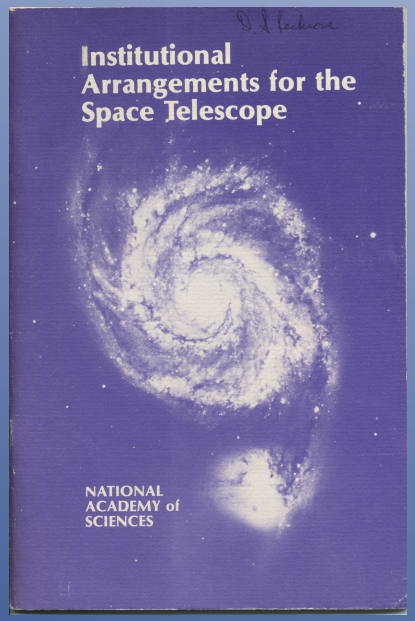
Presidents Jimmy Carter (D) and Gerald Ford (R)

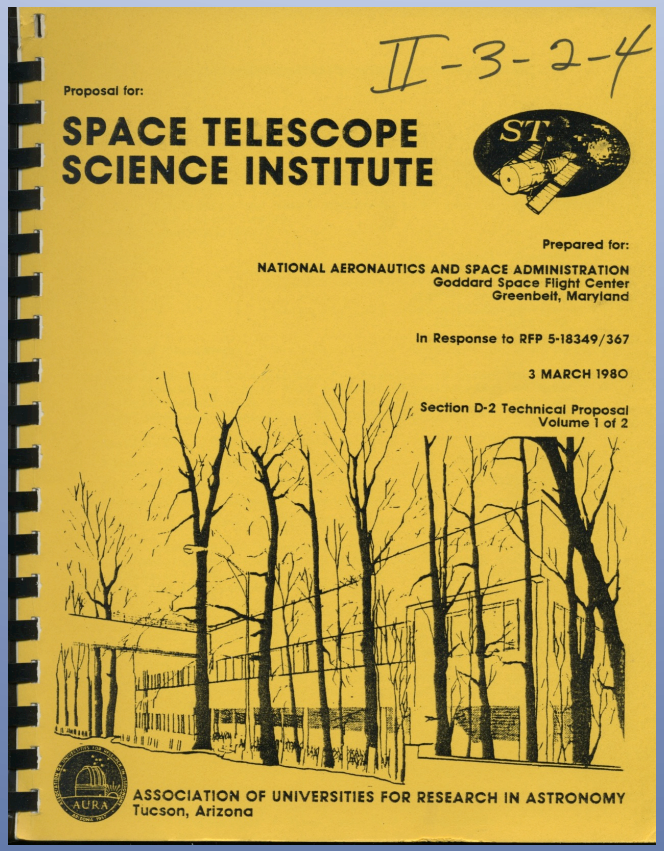
# Scientific Instruments and the Phase C/D Science Working Group

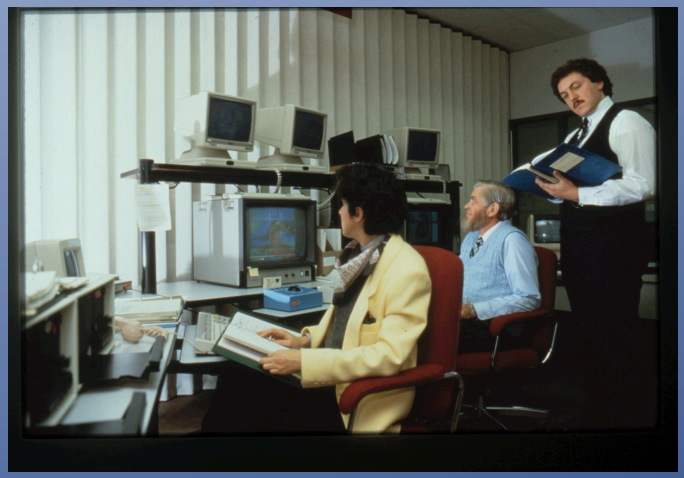


# A New Paradigm For Science Operations

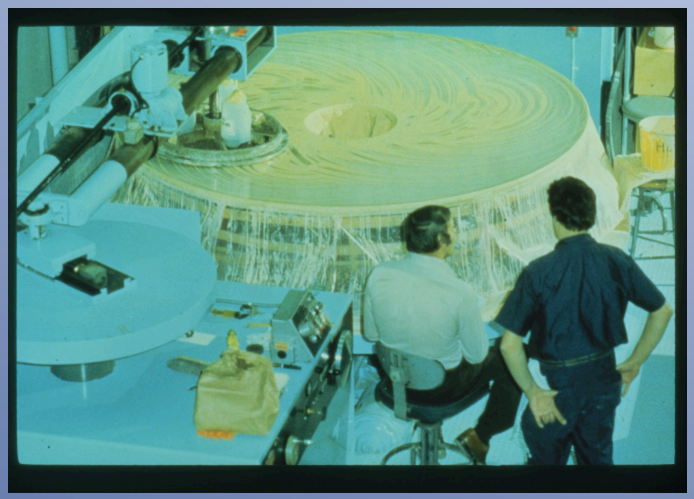


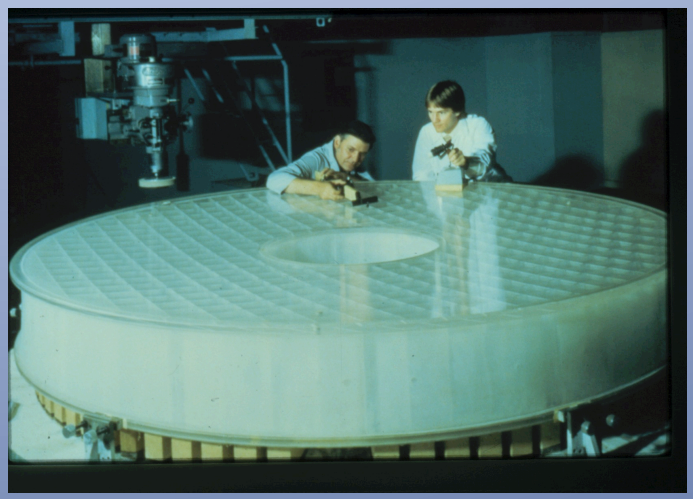



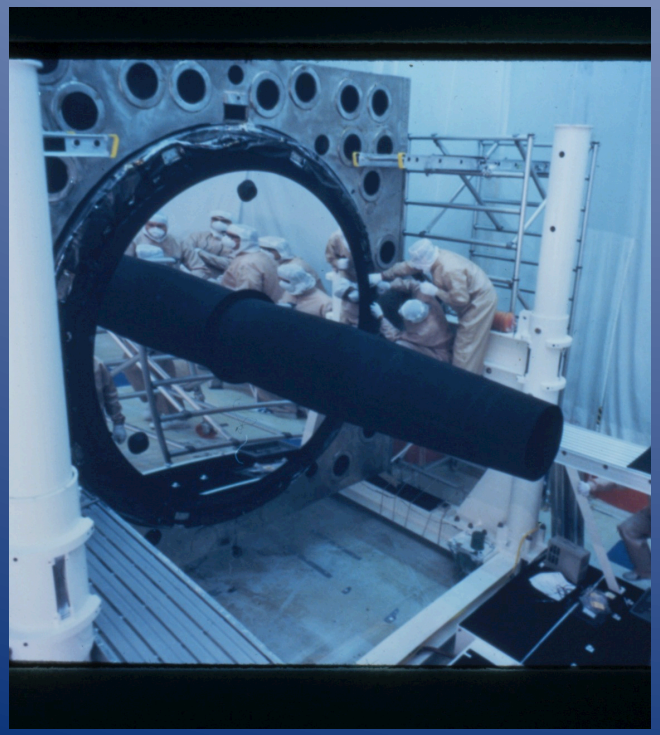



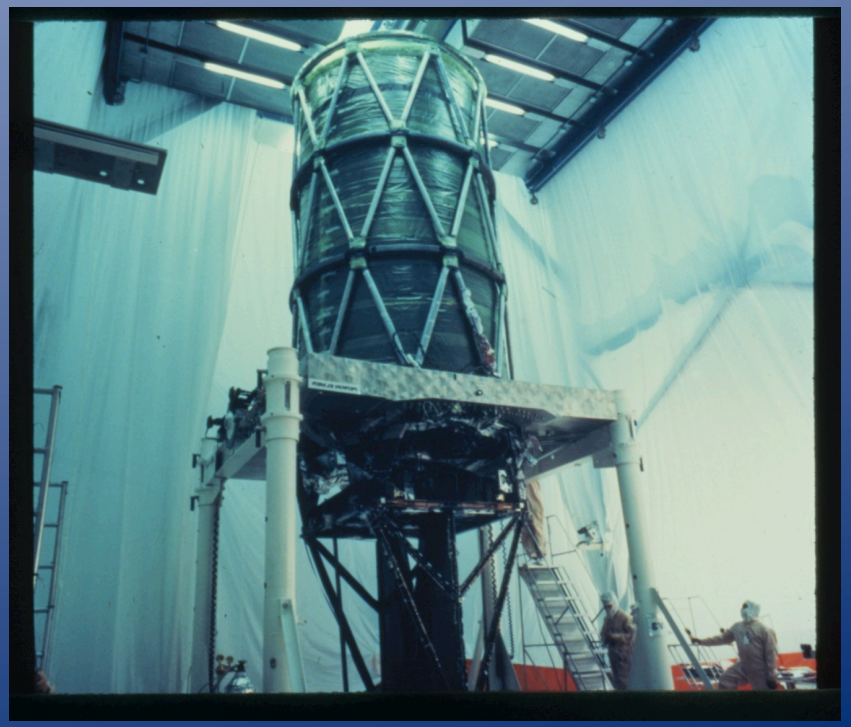
SPACE TELESCOPE SCIENCE INSTITUTE
Operated for NASA by AURA

# Building the Optical Telescope Assembly at Perkin-Elmer









# The Source of Spherical Aberration

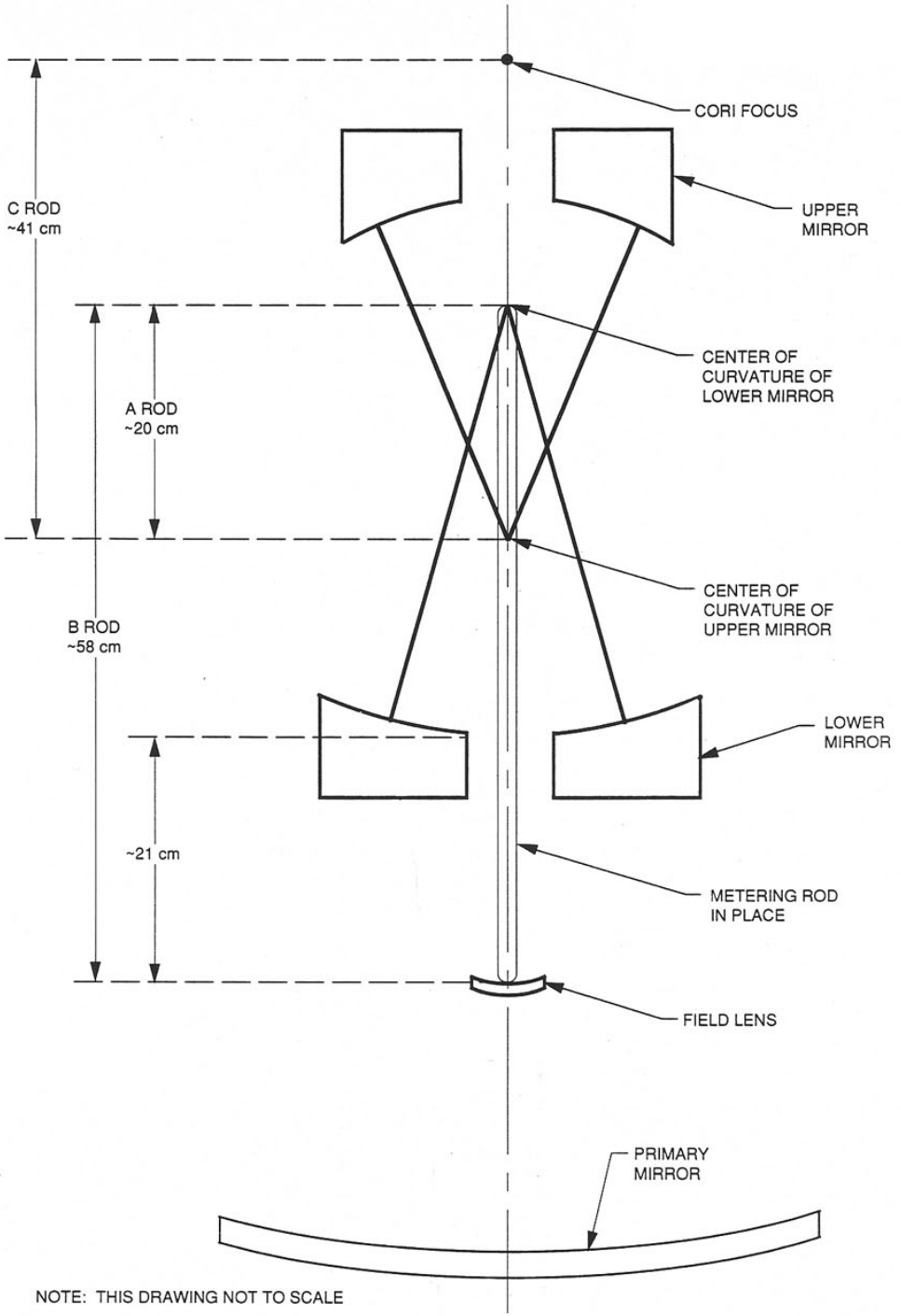



**Figure 7-1. Position of metering rods used to space optical elements in the reflective null corrector.**

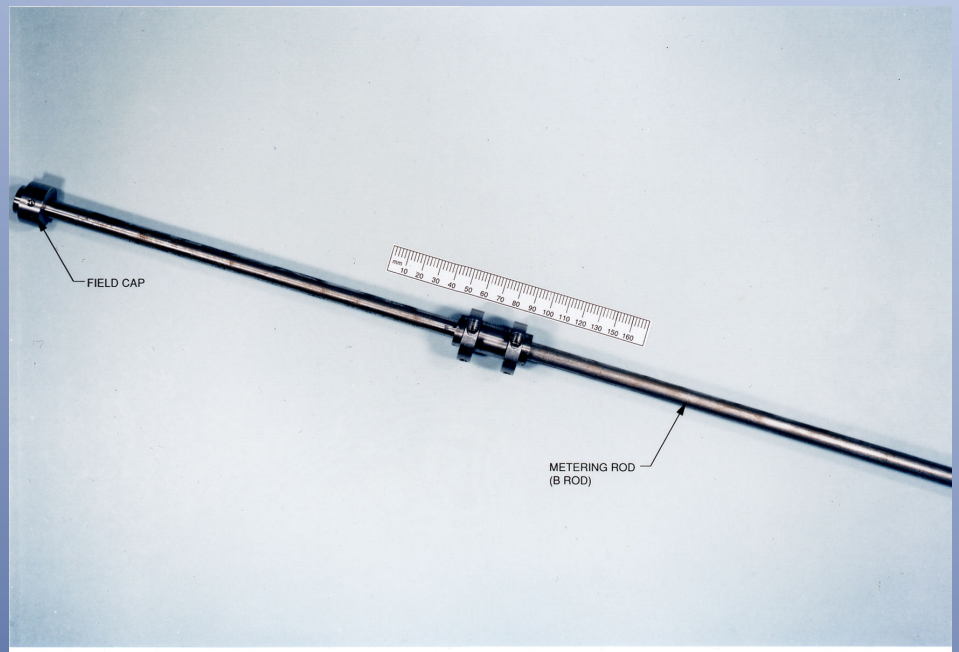



Figure 7-2. Metering rod (B rod) used to space the field lens and the center of curvature of the lower mirror in the reflective null corrector.

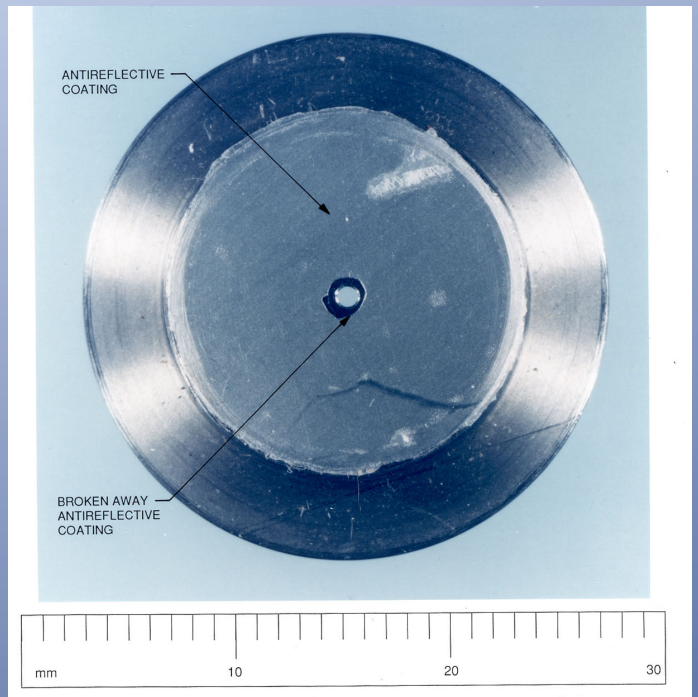
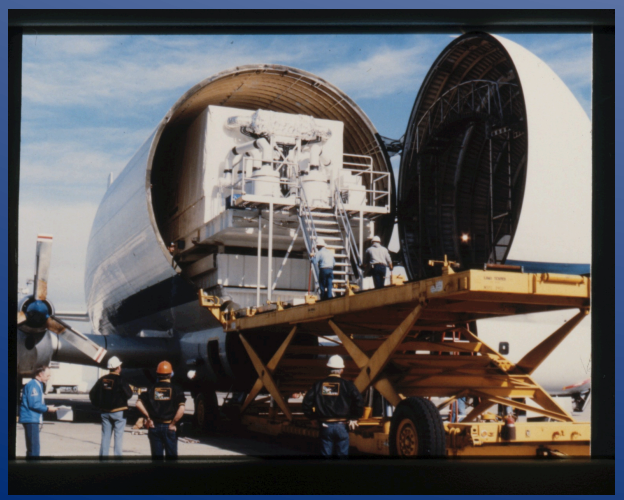



Figure 7-5. Top view of the field cap, showing the aperture and the area where the antireflective coating had broken away.

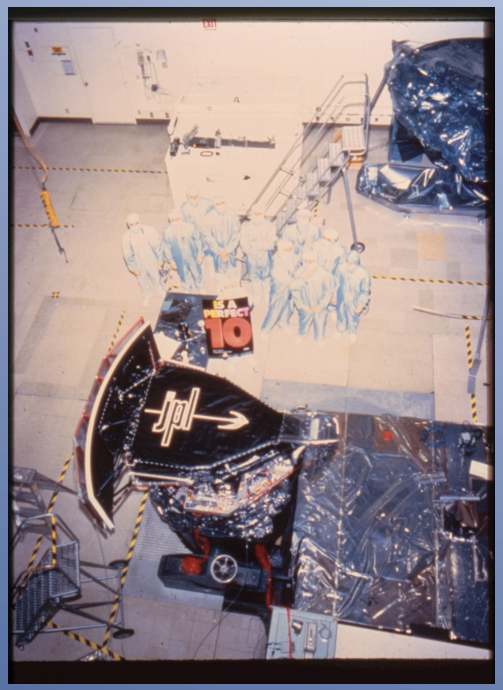

Figure D-1. RNC interferogram of the primary mirror, taken in February 1982.

Figure D-2. RvNC interferogram of the primary mirror, taken in May 1981.

**Transporting the OTA from Perkin-Elmer to Lockheed**
**Oct. 29 – Nov. 1, 1984**

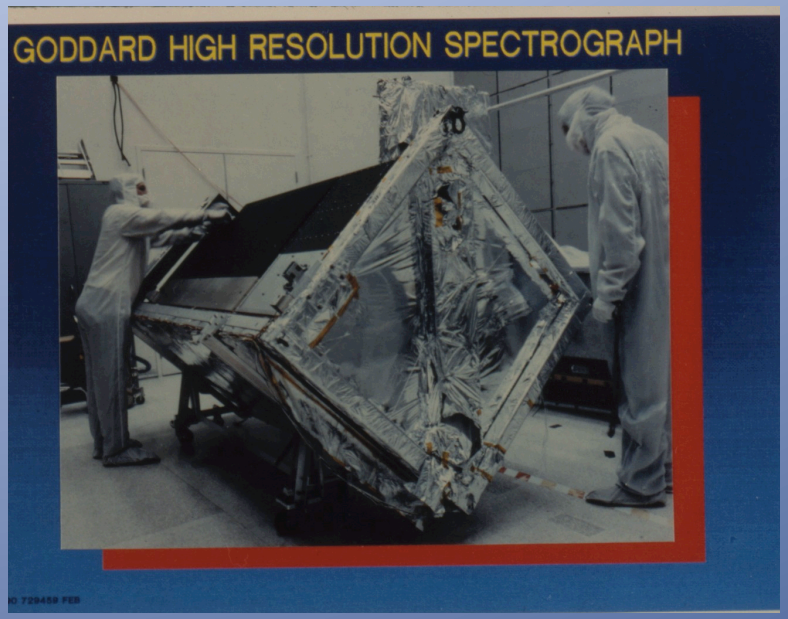


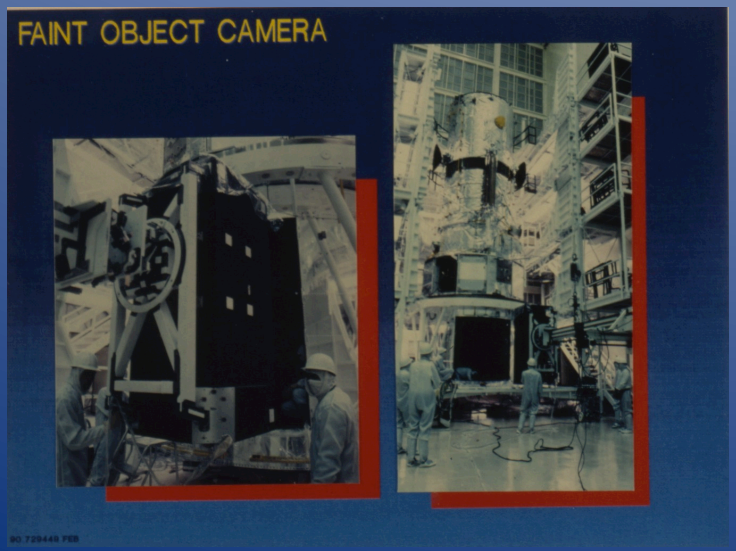
# First HST Scientific Instruments

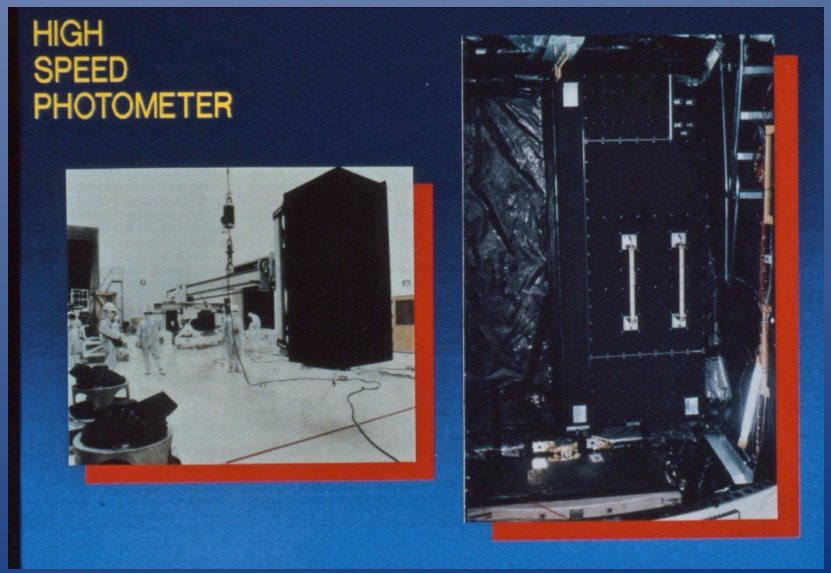


WFPC

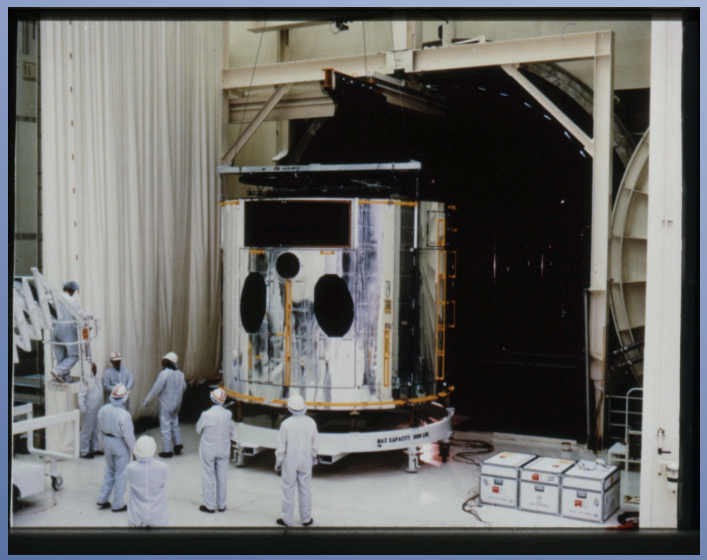
FOS in 1997

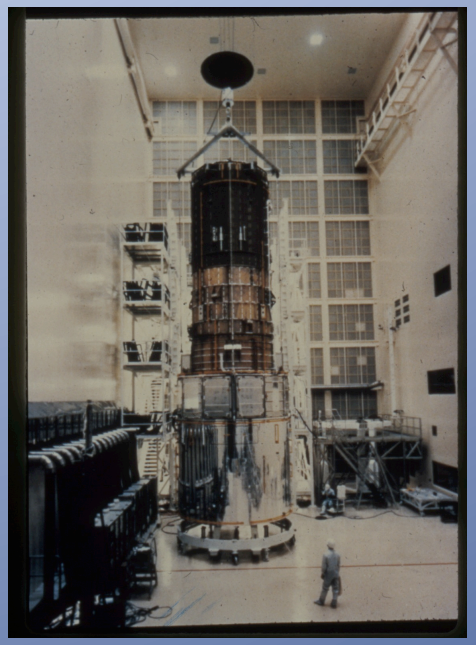


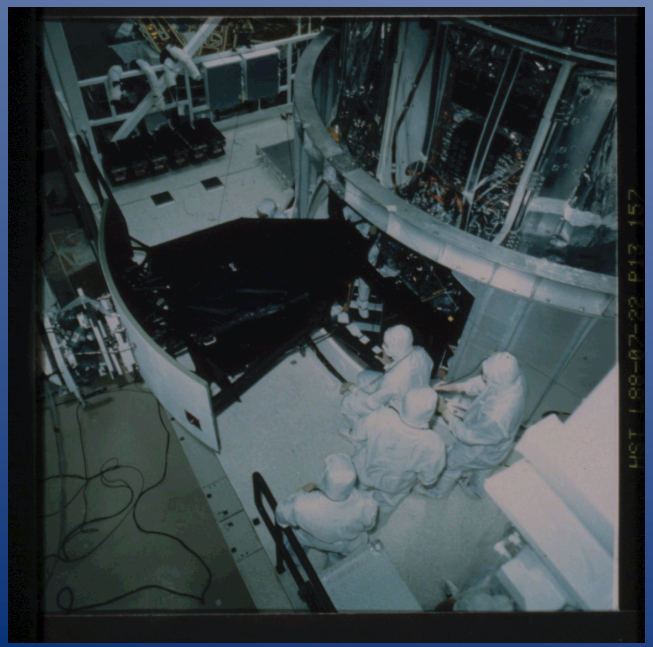



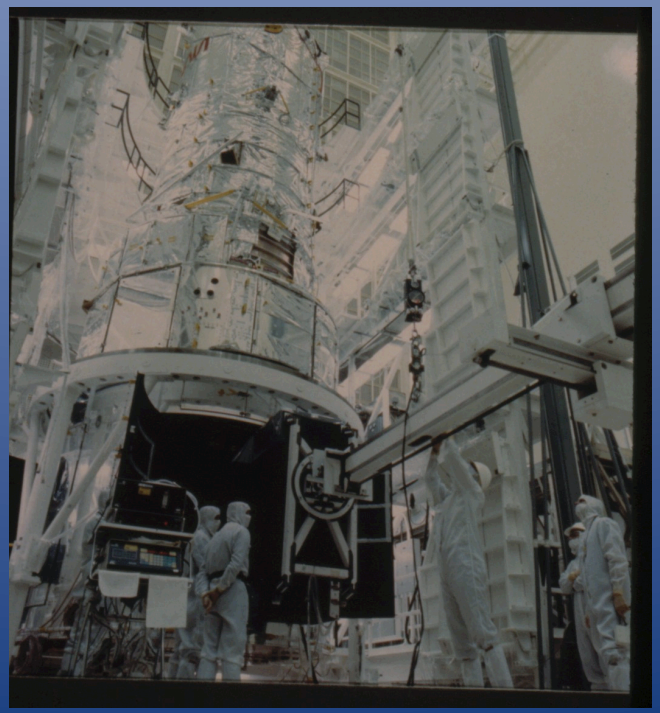



# Integration at Lockheed
# Completed Feb. 15, 1985

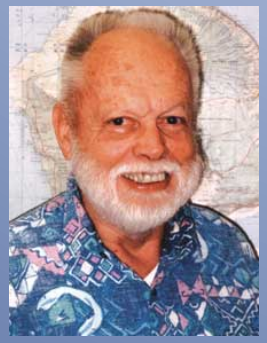




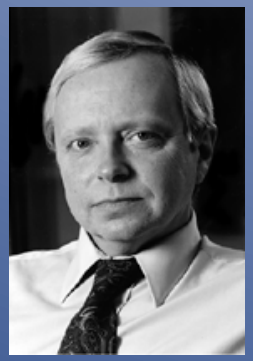




# Other Key Milestones of the 1980's



- The "Revolution" of 1983
  - Science Working Group and others concluded "we just can't get there from here."
  - Inadequate budget, schedule and systems engineering oversight
  - Headquarters' intervention infused Project with added funds, schedule relief and new management



- Initiation of development of a "clone" WFPC at JPL
  - Primary impetus came from HQ Program Scientist, Ed Weiler
  - Imaging was the "heart and soul" of HST science
  - Couldn't imagine HST "going blind"

- Challenger disaster in January, 1986 delayed HST launch indefinitely
  - Launch date in August, 1986 had been slipped to October
  - Four-year Delay allowed Project to complete work on ground system and to make needed "tweaks" to flight hardware

# STS-31, Discovery
# April 24, 1990