STScI | SPACE TELESCOPE SCIENCE INSTITUTE

EXPANDING THE FRONTIERS OF SPACE ASTRONOMY

Maintenance and Refurbishment of ST

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“M&R”

The ~~Large~~ Space Telescope was radical in goals and design, esp. including being able to be serviced

- Matched to Shuttle in size and orbit
  - Large as possible to fit in bay
  - Highest possible orbit (320 nm, 600 km)
- Needed the shuttle to survive via maintenance and replacement
  - Solar arrays
  - Batteries (originally Ni-Cad)
  - Infrastructure (NSSC, recorders, gyros, …)
- Refurbishment could update and augment capabilities

1983 Weiler white paper

Ed Weiler wrote a brief white paper in 1983 that outlined a way to make the concept of M&R into a more concrete plan:

- Solicit designs for new instruments
- Always have a back-up camera
- Inventory and maintain spare parts

Riccardo wanted insight into this, and so in January 1984…

- I get hired as Advanced Instrument Studies Scientist
- M&R Working Group, MSFC-based
- Space Station Users Working Group
  - ST was about the only clearly identified potential customer for servicing

How M&R became real

AO for second-generation instruments

- Selection in 1987: STIS, NICMOS, HIMS
- Long delays

Engineering tasks

- Assessment of available parts, quality, longevity
- Estimates of failure rates (the “winner”: FGEs)

False starts

- Servicing ST from Space Station
- Orbital Transfer Vehicle

M&R comes to GSFC: the Ceppy era

ST's three great crises

Challenger

- NASA owned the telescope; would it ever fly?

The flawed mirror

- Astronomers and STScI owned the telescope and came up with a plan
- SM1: above expectations

SM4: Would we watch HST just die?

- The world owned HST
- May, 2009: Far above ever greater expectations

Assessing servicing

HST was designed for servicing and a central part of its success:

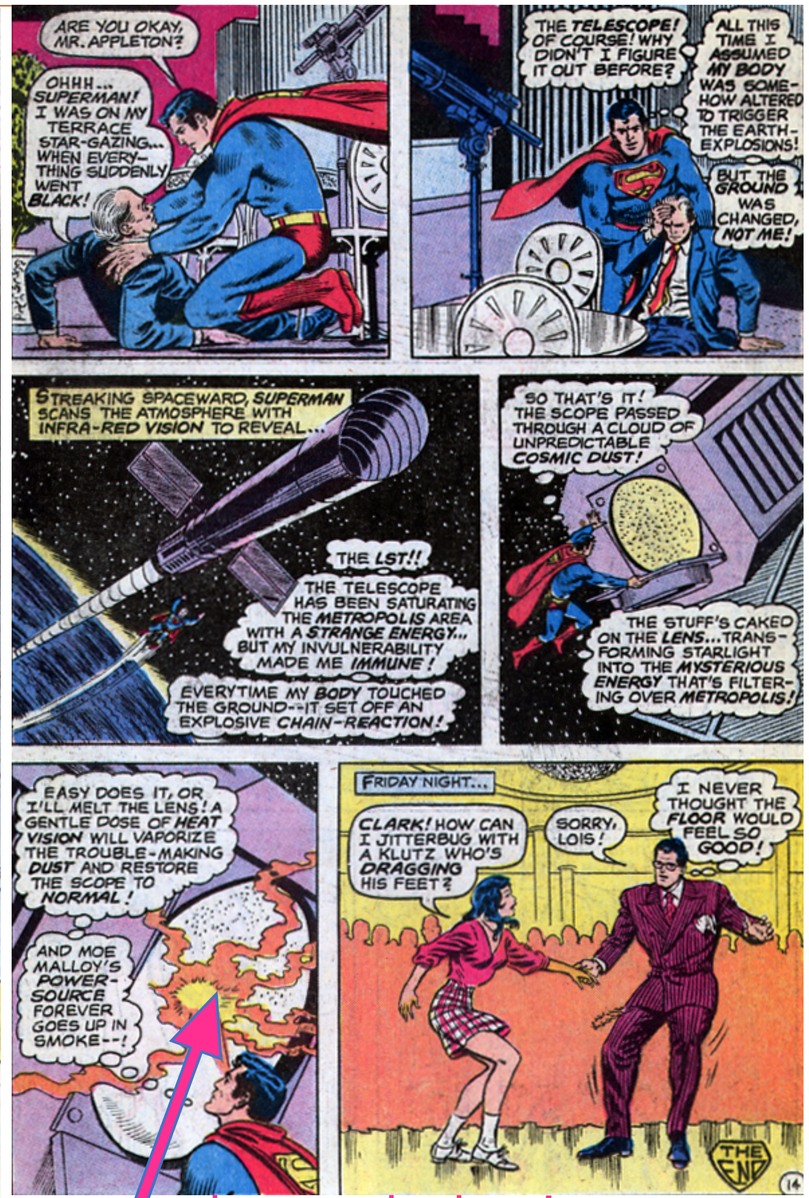
- Public visibility
- Continued enhanced science capabilities
- HST today shows how space technology has advanced in reliability

But why no others built to be serviced?

- Weiler: “Too expensive”
- Really?

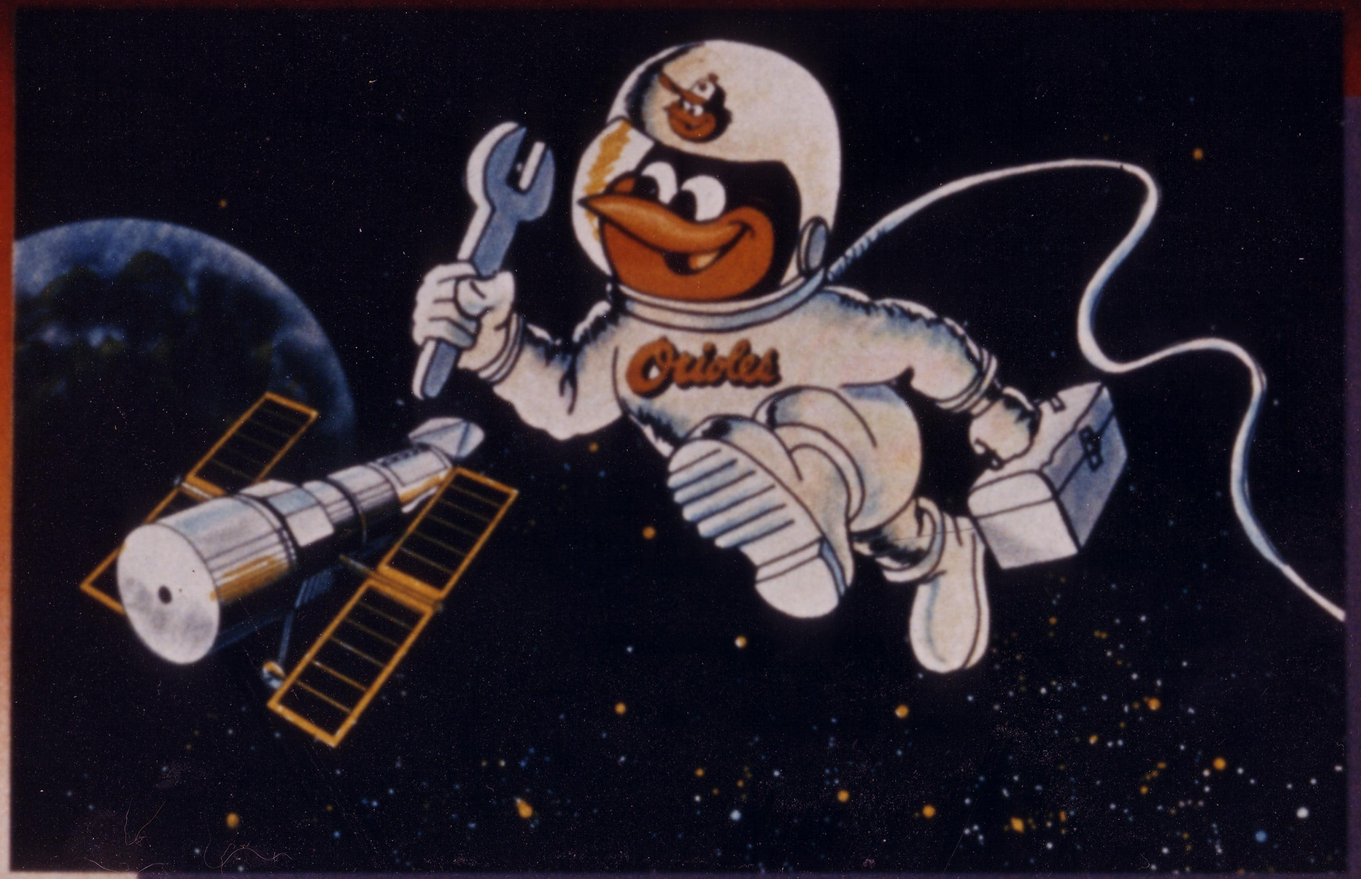
Superman saves (sells) the Large Space Telescope ("SM zero")

Bat-mo-shuttle



dust on the lens!

SATELLITE



PROBLEMS