Unmanned Satellites on Postage Stamps: 40. The Hubble Space Telescope

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This is the fortieth (40th) in a series of articles about un-manned satellites on postage stamps. This article features the Hubble Space Telescope (HST), named after astronomer Edwin Hubble. HST is one of NASA's "Great Observatories", along with 3 other space telescopes, the Compton Gamma Ray Observatory, the Chandra X-ray Observatory, and the Spitzer Space Telescope.

The launch of HST, originally scheduled for 1986, was delayed due to the Challenger (STS-51L) accident. HST was finally launched by Space Shuttle Discovery (STS-31R) on 25 April 1990, and subsequently repaired/serviced five times by Space Shuttle missions, the last repair mission on 11 May 2009, spanning nearly 20 years since launch.

HST was designed to operate above the earth's turbulent and obscuring atmosphere. As a result, HST has a resolving power about 10 times better than telescopes on Earth, providing some of the most detailed visible light images ever recorded. With a 2.4 m diameter main mirror, the telescope makes observations in not only in the visible, but also in the near-UV and near-IR. HST is operated 24x7 from the Space Telescope Science Institute at John Hopkins University in Baltimore MD.

Roughly cylindrical in shape, HST is 13.1 m long and 4.3 m in diameter at the widest point, but small enough to fit in the Space Shuttle cargo bay. It was designed to be modular, so that it could be recovered and repaired by the Space Shuttle crew, and re-released into low-earth orbit. Communications with HST is through the TDRS (Tracking and Data Relay Satellite) system.

Shortly after being deployed by the Space Shuttle Discovery (STS-31R) and becoming operational, the primary mirror was found to be spherically aberrated, due to a design flaw. Work then went into determining the source of the problem and designing and building the equipment to fix HST. The first (unscheduled) repair mission by Space Shuttle Endeavour (STS-61), in December 1993, installed corrective optics for all the instruments, updated other instruments, and replaced malfunctioning solar panels.

A second (first scheduled) service mission by Space Shuttle Discovery (STS-82), in February 1997, replaced several other instruments or components of the HST. A third service mission, again by Space Shuttle Discovery (STS-103), in December 1999, repaired a non-operational HST that had been shut down for over a month, as well as replaced several other components/

instruments. The fourth service mission by Space Shuttle Columbia (STS-109), in March 2002, installed new solar panels, as well as upgraded several instruments or components.

A fifth and final service mission by Space Shuttle Atlantis (STS-125) occurred in May 2009 after being cancelled initially because no more HST repair missions were being allowed due to the limited number of remaining Shuttle missions at the time. That decision was made partly in light of the second Shuttle disaster and the need to focus remaining missions to complete and service the International Space Station (ISS). The final repair mission installed a replacement data handling unit, repaired other systems, installed improved batteries, and replaced other components. These changes will allow HST to be fully functional, possibly until 2020. A new Soft Capture and Rendezvous system will enable the future rendezvous, capture, and safe disposal of HST by either a crewed or robotic mission.

Because of its popularity, HST appears on a large number of postal items. An interesting note is that a small subset of those items, from different countries, incorrectly show HST with solar panels positioned perpendicular to the HST body, whereas in reality the solar panels are parallel to the spacecraft body. That error is most likely due to the early, pre-launch date of those items, when the final HST design was probably not determined. A sample of items showing HST is presented with this article. Some of those items show HST during its various repair missions. See the accompanying table for a list of HST on postal items from more than 60 countries.

HST images of space objects also appear on several postage stamps, most notably from Great Britain, Palau, and the United States. However, those items are not the primary focus of this article; nor are postal covers for the HST launch and its repair missions included with this article.

A checklist of postal items showing the HST satellite (http://rammb.cira.colostate.edu/dev/hillger/hst.htm) is available on the Website developed by the authors for the un-manned satellites featured in this series of articles (http://rammb.cira.colostate.edu/dev/hillger/). E-mail correspondence is welcome. Don Hillger can be reached at don.hillger@colostate.edu and Garry Toth at gmt.varia@gmail.com.