

Space Shuttle-related Satellites

By Don Hillger and Garry Toth

This article features Space Shuttle-related satellites (un-manned satellites related to the Shuttle). Many of these satellites are found on postal items by themselves, but this article includes *only* those postal items that show *both* the Shuttle *and* an un-manned satellite. The idea is to explore the Shuttle/un-manned satellite relationship in philately. Other Shuttle missions, including those for building or servicing the International Space Station, are not included.

There are three categories of Space Shuttle-related satellites: 1) those launched from the Shuttle; 2) those retrieved and repaired and re-deployed by the Shuttle; and 3) those recovered by the Shuttle.

The Space Shuttle fleet is also known as the Space Transportation System (STS). It consisted of five reusable vehicles which flew 135 missions from 1981. Shuttles *Challenger* and *Columbia* were destroyed in major accidents in 1985 and 2003, respectively. The first was STS-51L* (lost on takeoff), and the second was STS-107 (lost on re-entry). The three remaining Shuttles have now been retired and relocated in various museums.

The Shuttle by itself has been featured on numerous postal items, but again this article treats only those postal items in which both the Shuttle and un-manned satellites are pictured on the same stamp (or on a souvenir sheet that contains only one stamp; sheets with multiple stamps are excluded from the discussion).

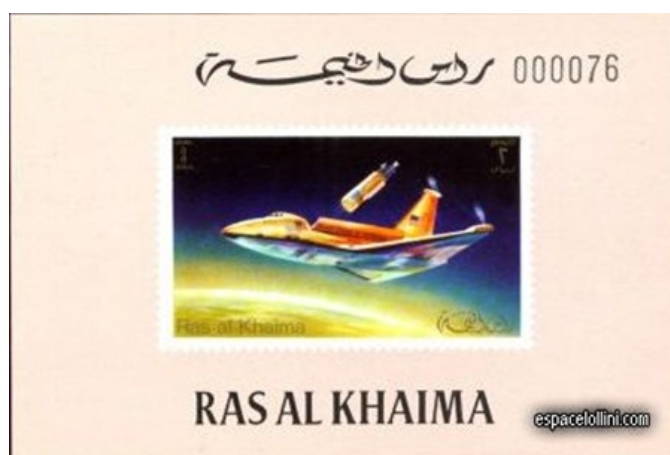
Only non-launch-cover postal items are included in this article. A follow-on article may feature launch covers for these same Shuttle missions.

Postal Items Issued Prior to the First STS Mission

Many postal items were issued before the first Shuttle mission (in 1981) to show the Space Shuttle and its satellite-launching capabilities. On nearly all of these early postal items the Shuttle-related satellites were of speculative or fantasy design, since their final designs were often not known at the time of issue.



The earliest postal items known to show the Space Shuttle and a satellite were issued by Ras al Khaima (*Michel* 757) in 1972, nine years before the first



Shuttle mission. Both the stamp and a deluxe sheet (as well as imperforate and foil versions, not shown) have an image of the Shuttle and a satellite that was largely re-used by Lesotho in 1981 (as noted later in this article).

Togo *Scott* C326 and C327 were issued in 1977, four years before the first Shuttle mission. The first stamp shows a satellite apparently being retrieved into the Shuttle cargo bay by a remote manipulator arm. This arm presages the Shuttle Remote Manipulator System (SRMS), or Canadarm, that was first installed on STS-2. Likewise, many of the pre-first-Shuttle postal items show an early version of the Canadarm.

The satellite on the first stamp has some similarities to the Hubble Space Telescope (HST), which was launched from the Space Shuttle in 1990 (13 years later). However, the solar panels are shorter and wider than those of the HST and consist of three parts rather than the two parts of the HST solar panels. The second stamp shows a satellite being released into orbit, possibly after being repaired. It is attached to a booster which would be used to place the satellite into an orbit higher than the Shuttle's nominal 300 km altitude. Launching un-manned satellites was a regular Shuttle-related activity in the early years of the programme.

Two more examples of proposed Shuttle missions are found on two stamps issued by Grenada (*Scott* 846 and 1074) in 1978 and 1981, respectively. Both



* The numbering of Space Transportation System (STS) flights has evolved over time. An excellent explanation can be found at <http://enterfiringroom.ksc.nasa.gov/funFactsSTSNumbers.htm>



have speculative elements including fantasy satellites rather than recognizable ones.

Similarly, Mauritania issued two stamps (*Scott C203 and C204* above) in 1981 showing the Space Shuttle and speculative satellites or payloads.

Lesotho *Scott 319d* and Niger *Scott C308* (above right) were



both issued in 1981, the same year as the first Shuttle mission, STS-1. However, the first Shuttle-related satellite wasn't launched until 1982 (by STS-5).



Other early examples of the Shuttle with satellites are found on two stamps (*Scott 587 and 588*) from Ivory Coast. They were also issued in 1981, the same year as the launch of STS-1. They again show what looks

like a Hubble/HST-design satellite. In the first stamp the satellite appears to be standing in the Shuttle cargo bay, while in the second stamp the satellite is being held by the remote manipulator arm in an image nearly identical to the one in Togo *Scott C326* (already mentioned).



Saudi Arabia *Scott 936*, issued in 1985, shows a small satellite like the Hubble/HST-like design already seen. Also, the United States issued a stamp (*Scott 1914*) showing both the Space Shuttle and a fantasy satellite attached to the remote manipulator arm. This stamp was

part of a sheet of 8 space stamps from 1981 honoring both manned and unmanned space exploration and their benefits to mankind.



Two more early examples of Shuttle-related satellites are found on stamps issued by Chad (*Scott 435*) in 1983 and by Congo People's Republic (*Scott 582*) in 1981. Both appear to show astronomical telescopes with their aperture lids in the open position.



These satellites have some similarities to the Hubble Space Telescope (HST), but these stamps were issued long before the 1990 HST launch. Also, on both stamps the satellites have solar panels with their long dimension pointing away from the telescope body. When HST was built, the long dimension of the solar panels was next to the telescope body.



All but two of the items already mentioned were issued in 1981 or earlier, *before* the first Shuttle-related satellite was launched in 1982. The designs of the satellites on all of those items are speculative rather than accurate. Do postal items exist that show the Shuttle and recognizable satellites? Certainly! They are found mostly in postal items issued after 1981. Some of these Shuttle and satellite items will be examined next.

The Hubble Space Telescope (HST)

Among the satellites launched and repaired by the Space Shuttle are several astronomical satellites, the most famous of which is the Hubble Space Telescope (HST) launched from STS-31R in 1990. Hubble/HST was later repaired on five separate Shuttle missions (STS-61 in 1993, STS-82 in 1997, STS-103 in 1999, STS-109 in 2002, and STS-125 in 2009), each of which was a major endeavor, including capture, repair, and re-deployment.

Of all the Shuttle-related satellites, the Hubble/HST is the one seen most often on postal items either by itself or together with the Shuttle. Most of the latter items include nice HST depictions, while the Shuttle may be detailed, or rather small, or even partially shown. The following images show these variations; some show the Canadarm as well, or astronauts making repairs. Such postal items come from a wide variety of countries, most of which had nothing to do



Hubble/HST and the Shuttle from Belize (Scott 813b, 1986); Bulgaria (Scott 3624, 1991); Comoro Islands (Scott 737, 1990)

with the Space Shuttle programme (other than featuring it on their postage stamps!)

Ireland (Scott 833, 1991); Malagasy Republic (Scott 1045, 1992); Marshall Islands (Scott 864b, 2005)



Congo Democratic Republic (Scott unlisted, 2006)



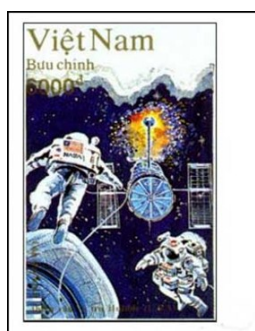
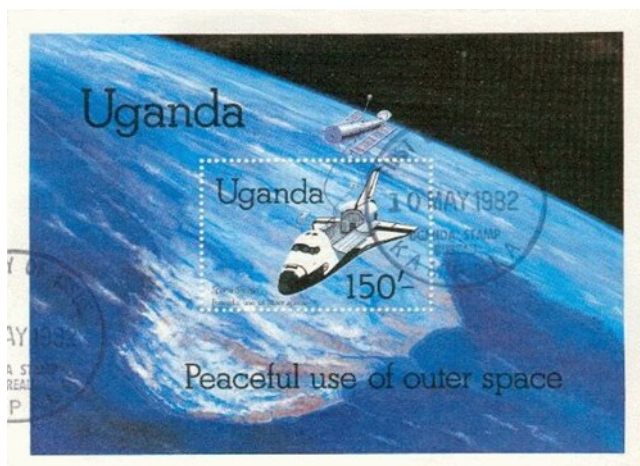
Micronesia (Scott 346, 1999); Niger (Scott 962, 1997)

Djibouti (Scott C149, 1981); Guinea-Bissau (Scott 413Cd, 1981)





Palau (Scott 453b+e, 453f, 456, 1998)
Sierra Leone (Scott 1974i, 1996); St. Vincent
Grenadines (Scott 804, 1991)



Uganda (Scott 341, 1982); Vietnam (Scott 2361, 1992)

seven SPAS were launched and retrieved between 1983 and 1997.

Magellan (from STS-30R) and Galileo (from STS-34) were two major planetary exploration satellites launched from the Shuttle, both in 1989. The Shuttle and Galileo are found together on stamps issued by Bulgaria (Scott 3627) in 1991 and Nevis (Scott 1542b) in 2008. In each, Galileo is shown with an attached booster that was used to send it to Jupiter and its moons. Magellan is found with the Shuttle on Bulgaria (Scott 3625) from 1991.

Other Space Shuttle-related Satellites

Numerous other satellites were launched from the Shuttle, including several astronomical satellites in addition to the HST. Major Shuttle-launched astronomical satellites include the Compton Gamma Ray Observatory (CGRO), launched from STS-37 in 1991, and the Chandra X-ray Observatory (CXO), launched from STS-93 in 1999. Both are found by themselves on postal items, but to the authors' knowledge neither is found together with the Space Shuttle.

Several smaller astronomical satellites were launched and later recovered by various Shuttle missions. For example, several SPARTAN (Shuttle Pointed Autonomous Research Tool for Astronomy) satellites were launched, including one (aboard the ill-fate Shuttle *Challenger* in 1986) intended for monitoring Comet 1P/Halley. No images of SPARTAN have been found on postal items, either with or without the Shuttle.

Similarly, several Shuttle PAllet Satellites (SPAS) provided by Germany were both launched and retrieved one the same Shuttle missions. Two postal items show them. Guinea Republic (Scott 930a right) issued in 1985 shows *Challenger* and SPAS and astronaut Sally Ride; St. Vincent (Scott 1165 far right) issued in 1989 shows a Shuttle and SPAS. A total of



A solar-observing satellite, Ulysses, was launched from STS-41 in 1990. No postal items have been found showing both Ulysses and the Shuttle. Numerous items show Ulysses alone.

Other Shuttle-launched satellites included several Tracking and Data Relay Satellites (TDRS), which formed a network of satellites used by NASA for space communications. The TDRS constellation replaced an older network of ground stations set up during early manned spaceflights. Six TDRS were successfully launched on STS-6 (in 1983), STS-26R (in 1988), STS-29R (in 1989), STS-43 (in 1991), STS-54 (in 1993), and STS-70 (in 1995). A seventh TDRS, aboard STS-51L *Challenger*, was the only one lost. No images of TDRS and the Space Shuttle together have been found on postal items, other than on launch covers.

Communications satellites launched from the Shuttle, most under contract to NASA, included two Telstar-3 series satellites, five Syncom/Leasat satellites, four Anik/Telesat satellites, Westar-6, two Palapa-B satellites, two Aussat/Optus satellites, two Morelos satellites, Arabsat-1B, ASC-1, two Satellite Business Systems (SBS) satellites, three U.S. Air Force (USAF) Satellite Data System (SDS) satellites, two Satcom-Ku satellites, a pair of USAF Defense Satellite Communications System (DSCS) satellites, and an Advanced Communications Test Satellite (ACTS). In spite of the large number of these satellites, very few of them are pictured along with the Space Shuttle on postal items. However, a relatively uncommon example of these types of missions is found on Angola (Scott 1115) from 1999, showing the Shuttle and SBS-4.



Among the first satellites launched from the Shuttle was Insat-1B, a weather and communications satellite owned by India. Insat-1B was launched on STS-8 in 1983. No known postal items show Insat-1B and the Shuttle, but other items showing Insat alone can be found.



UARS (at lower-left) and the Shuttle (upper-right) from Central Africa (Scott 663, 1984); Explorer-66/COBE (at upper-left) from Comoro Islands (Scott 737a, 1990).



Two other weather or environmental-related satellites were launched from the Shuttle. The Earth Radiation Budget Satellite (ERBS) was launched from STS-41G in 1984 and the Upper Atmosphere Research Satellite (UARS) was launched from STS-48 in 1991. Both can be found on postal items by themselves. UARS is found along with the Space Shuttle on a souvenir sheet (of 1) issued by Central Africa (Scott 663) in 1984, long before its actual release from Shuttle. Also in the sheet margin is the Hubble/HST, at the upper right, just below the Shuttle.

All the satellites in the margins of the Central African stamp just noted appear to be related to the Space Shuttle. Even the version of the COsmic Background Explorer (COBE), or Explorer-66, (in the lower-right) was initially intended to fit into the Shuttle cargo bay. However, before COBE could be launched, *Challenger* was lost. Subsequent Shuttle launches were delayed or cancelled. As a result, COBE was redesigned to be small enough to be launched on a Delta-1 rocket. After an extensive and lengthy effort, COBE was rocket launched in late 1989, the same year it would have been launched from the Shuttle. An image of the

redesigned COBE is found in the upper-left margin of a souvenir sheet (of one stamp) issued by Comoro Islands (Scott 737a) in 1990.

Several Shuttle missions were devoted to military reconnaissance satellites, with names such as Magnum, Lacrosse, and Misty. In 1991, STS-44 was used to launch one of the DSP (Defense Support Program) satellites, likely used for missile defence warnings. No images of any of these satellites and the Space Shuttle have been found on postal items.

The Tethered Satellite System (TSS) was a unique Shuttle-launched experiment. The plan was that the Shuttle would tow a satellite on a tether deployed to a distance of 20 km from a reel in the orbiter payload bay. Two TSS launches were attempted, one from STS-46 in 1992 and the other from STS-75 in 1996. During the first mission, the tether jammed and could be extended only a short distance. In the second mission, the tether was extended to nearly full length, but the tether then snapped near the top of the deployment boom. This unintended release placed the satellite into orbit where it produced some scientific data until its battery died three days later. An Italian aerogramme from 1992 is the only item known to show the TSS and the Shuttle (on its printed stamp).

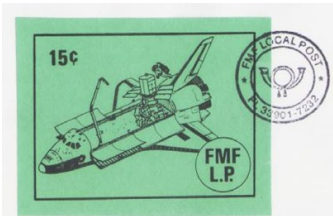


Satellites retrieved, repaired, and re-deployed by the Space Shuttle

The Hubble/HST was not the only satellite to be repaired during a Shuttle mission. In fact, the Solar Maximum Mission (SMM) was the first satellite to be repaired in space. SMM was launched using a conventional rocket in 1980. It was retrieved by STS-13 in 1984. Some instruments and the altitude control system were repaired while the satellite was in the payload bay, after which it was re-deployed. Several postal items show various aspects of this mission. Particularly good examples include this stamp issued by Central Africa (Scott 659) in 1984, the margin of a souvenir sheet (of one stamp, Scott 761a) from 1985 (also from Central



Africa), another souvenir sheet (of one stamp) issued by Guyana (Scott 3506) in 2000, and a Fort Meyers Florida local post stamp from 1986.



Another conventionally-launched satellite, Intelsat-6-F3, was retrieved and repaired and re-deployed by STS-49 in 1992. The satellite had been stuck in an unusable orbit in 1990 due to the failure of one of the stages of its rocket launch sequence. Intelsat-6 and the Shuttle are found on a souvenir sheet (of one stamp) issued by Central Africa (Scott 663) in 1984 (already shown). This item was issued long before the actual launch of Intelsat-6! Another example is Isle of Man Scott 471, issued in 1991. It shows both Intelsat-6 and the Shuttle, but not the repair. A third item, a stamp issued by Guinea Republic (Scott 1212) in 1992 shows the actual repair of Intelsat-6.



Satellites recovered by the Space Shuttle

The first satellites to be recovered and brought back to Earth by the Space Shuttle were Palapa-B2 and Westar-6 in 1984. Both had been launched by STS-41B earlier that year, but both suffered failures of the launch mechanisms or payload assist modules. Both were recovered by STS-51A and returned to Earth where they were refurbished and later re-launched using conventional rockets. Palapa-B2 was re-launched 6 years later at Cape Kennedy, while Westar-6



ended up as AsiaSat-1, launched by China in 1990.

Images of the recovery of Palapa-B2 are found on a stamp issued by Central Africa Republic (Scott 761) in 1985, as well as a souvenir sheet

(of one stamp) issued by Guinea Republic (Scott 931) also in 1985. No images of both Westar-6 and the Space Shuttle have been found on postal items.



The Shuttle both launched and recovered the Long Duration Exposure Facility (LDEF). LDEF was launched from STS-41C in 1984 and was to be recovered in 1985,

but its stay in space was extended because of the tragic loss of *Challenger*, which delayed all Shuttle missions for over two years. LDEF was not returned to Earth until 1990, by STS-32R. LDEF is shown on two



stamps along with the Space Shuttle: a 1982 issue from Surinam (Scott 589) and a 1991 issue from Marshall Islands (Scott 392). They depict the LDEF launch and recovery, respectively.

In addition, several much smaller payloads have been recovered by the Space Shuttle, many of which were also launched from the Shuttle. EURECA (EUropean REtrievable CArrier) was carried aloft by STS-46 in 1992 and recovered by STS-57 in 1993. The Space Flyer Unit (SFU), an infrared telescope, launched by a Japanese rocket in 1985, was recovered by STS-72 in 1986. The SFU recovery is shown in a stamp from the Maldivive Islands (Scott 1580) issued in 1991.



Three Wake Shield Facility (WSF) missions were also planned, but only the third one was successful. During the STS-60 mission (in 1994) the WSF could not be deployed; the STS-69 mission (in 1995) had to be cut short; but the STS-80 mission (in 1996) was finally successful. All three were attempts to create a nearly perfect vacuum behind the 4 m WSF disk, for the growth of ever-slimmer thin-film semiconductors. No postal items are known to show the WSF, either with or without the Shuttle.

The Space Shuttle and Non-related or Unknown Satellites

There exist some postal items that contain both the Space Shuttle and an un-manned satellite, with an implied relationship between the two, but in which the satellite is in reality *not* related to the Shuttle. There are also postal items, in addition to the pre-Shuttle items discussed in the beginning of this article, that show Shuttle payloads that have not been identified or may not be real.

For example, a stamp issued by Chad (Scott 437) in 1983 shows the Shuttle *Columbia* and what looks like the French Symphonie communications satellite on the end of the Canadarm. The problem is that Symphonie was not launched by the Space Shuttle. However, since the solar panels on the satellite are not identical to those on Symphonie, this satellite is really an unknown. Drawings such as this probably include a certain amount of "artistic license", as is not uncommon on postage stamps.



Many other much smaller satellites were launched from the Space Shuttle. They are too numerous to mention here. Please see the authors' website, noted below, for a list of these satellites and the postal items showing them. In

addition, the Shuttle carried many payloads that were never set free. Since these payloads were not free-flying satellites, they are not covered by this article.

Most satellite launches from the Shuttle ended in 1988 when a U.S. presidential Executive Order was issued that banned further commercial launches. That ruling was a result of the 1986 *Challenger* accident. Up to that point, Shuttles had launched many satellites specifically designed to fit into the cargo bay. While most of those launches were successful, some of the Shuttle-launched satellites encountered problems that required subsequent retrieval, repair, and re-deployment, or recovery to Earth (as covered in this article).

Some Statistics on Space Shuttle-related Satellites

In total, there are 102 Shuttle-related satellites (those that were launched, repaired, or retrieved by the STS missions). These un-manned satellite events took place during 73 of the 135 shuttle launches mostly during the earlier Shuttle missions. More recent Shuttle missions have been primarily related to the construction and maintenance of the International Space Station.

The authors welcome any feedback, such as corrections or additions to the information provided in this article or in the accompanying checklist on the web. In particular, any information that could be used to explain any "unknowns" would be helpful.

A checklist of postal items to accompany this article is available online at <http://rammb.cira.colostate.edu/dev/hillger/shuttle+satellite.htm>. It is only a small part of the online information provided by the authors at <http://rammb.cira.colostate.edu/dev/hillger/satellites.htm>. E-mail correspondence is welcome. Don Hillger can be reached at hillger@cira.colostate.edu and Garry Toth at garry_toth@hotmail.com.

ASTEROIDS

Some Bits and Pieces

Forward Planning for STAMPEX 2015 and 2016

As reported in *STAMP Magazine* for July 2012, Specialist Societies have an opportunity to become a headline act at Stampex over the next few years.

"The organisers are inviting societies to be the keynote exhibitors for the Autumn events in 2015 and 2016. Exhibitors could either be judged in competitive classes or simply mount a non-competitive display".

Please consider what you can contribute to our plans to be part of the above.

Signature Spotting

Our Manchester based member **Andy Swanston** asks for help in deciphering the cosmonaut's signature (arrowed) beneath that of astronaut Edgar Mitchell on the specimen reproduced as best we can below left. If you have any ideas please let your Editor know and will pass on info to Andy.

Astrophilatelist Website

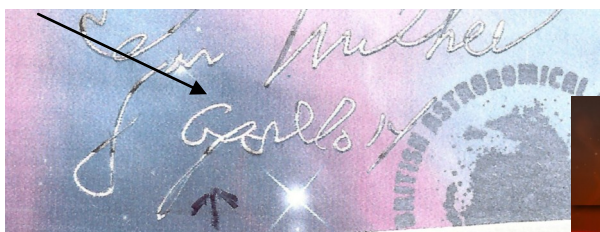
See information about the latest activities of our Russian member and well known European astrophilatelist **Igor Rodin** at the websites given below:

http://astrophilatelist.com/index/srbijafila_xv/0-1037

http://astrophilatelist.com/index/seminar_on_astrophilately_in_bremen_germany/0-1038

GB Science Stamps to be issued this month

The issue celebrates probes in which the UK has had input: five ESA probes and one NASA/ESA probe



Astrophilately Displays

Your editor showed a small part of his collection of Manned Spaceflight to members of Edinburgh P.S. on Tuesday 18th September and will reprise the display for Inverness P.S. on 8th November.

