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UN-MANNED SATELLITES ON POSTAGE STAMPS: THE NIMBUS AND LANDSAT SERIES

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This is the second in a series of articles about un-manned satellites on postage stamps. This article features two related satellite series: the Nimbus series of experimental weather satellites, and the Landsat series of earth-resources/remote-sensing satellites. The first three Landsats were also called Earth Resources Technology Satellites (ERTS).

Seven satellites in the Nimbus series were launched and operated by NASA, starting with Nimbus-1 on 28 Aug 64 and ending with Nimbus-7 on 24 Oct 78. Only one Nimbus failed to orbit, Nimbus-B, which would have been Nimbus-3. Nimbus-C was launched successfully as Nimbus-2, before Nimbus-B. The next satellite in the series, Nimbus-B2, was renamed Nimbus-3 upon its successful launch on 14 Apr 69.

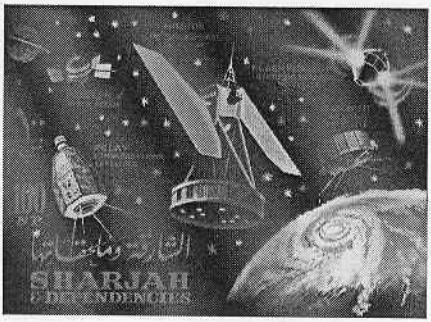
Seven satellites in the Landsat series were launched, starting with Landsat-1 on 23 July 72. Only Landsat-6 (1993) failed to achieve orbit. The series continued with Landsat-7, launched on 15 Apr 99. After starting as a DoD and NASA program, Landsat operation and data distribution are now handled by a commercial entity, the Earth Observation Satellite Company (EOSAT). Data are mainly used for studies of agriculture, geology, and the oceans.

(Continued on page 164)

(Continued from page 145) *Un-manned Satellites on Postage Stamps - D. Hillger/G. Toth*

All Nimbus satellites have a common design, with a thick circular base about 1.5 m in diameter, and a superstructure about 2 m tall that supports two large solar panels that look somewhat like squared-off ears. This same spacecraft design was used for the first three satellites in the Landsat series, Landsat-1 through Landsat-3. Most of the instruments on board the Nimbus series were attached to the bottom of the circular base. Instruments included scanning radiometers for imaging the Earth for weather analysis and forecasting, and solar and earth radiation budget instruments for climate study. Nimbus-7 also carried a Total Ozone Measuring Spectrometer (TOMS).

Nimbus satellites generally orbited between 900 and 1100 km altitude in near-polar sun-synchronous orbits that proceed at the same rate as the Earth's rotation. This orbit allowed the satellites to view all portions of the Earth underneath at the same local time, a feature that is important for many types of Earth measurements. The satellites were three-axis stabilized so that the instruments on board continually pointed toward the Earth, unlike two-axis satellites that spin on one axis.



Landsat orbits are typically at 700 to 900 km altitude. Like Nimbus, they occupy sun-synchronous near-polar orbits. But due to their lower altitude and a narrower swath for the instruments scanning the Earth, the repeat period for acquiring data for most locations is much longer than the 12 hour refresh rate available from Nimbus.

Since all Nimbus satellites appear similar to each other, there are a limited number of ways to distinguish one satellite in the series from another. Distinguishing features include two SNAP (Satellite Nuclear Auxiliary Power) -19 Radio-isotope Thermo-nuclear Generators (RTG's) on board Nimbus-B and Nimbus-3. Because of the failure of Nimbus-B, Nimbus-3 remains the only one with this distinct feature. The nuclear generators from Nimbus-B were recovered from the ocean and the fuel was reused in a later mission. These RTG's sit above the circular base ring and one is apparent on several of the images of Nimbus on stamps. These are identified as Nimbus-3 in the

checklist at the end of this article.

Nimbus-5, 6, and 7 each carried distinguishing features as well, with unique instruments affixed above the circular base ring, but none of these instruments can be identified on any of the stamps known to show Nimbus. A checklist of all postal items (stamps, souvenir sheets, and postal stationery) known to show Nimbus accompanies this article.

Because of the similarity between the Nimbus series and the early Landsats, a checklist of all postal items known to show Landsat also accompanies this article. In that checklist the early Landsat-1 through 3 are listed as "Nimbus-type". Sometimes these Nimbus-type Landsats are distinguished from Nimbus by more complex and larger instrumentation hanging from the circular base than normally found on most of the Nimbus series. Later Landsats (4 through 7) are of quite different design than the early Landsats. Landsats-4 and 5 are similar to each other, with a large slightly-bent rectangular solar panel and a dish antenna that extends about 3 m from the satellite body. Examples of these two satellites are available on several stamps. Landsat-6 and Landsat-7 are each of different design, for which only Landsat-6 is known to be shown on a stamp. This satellite, with one large rectangular solar panel and no dish antenna, is shown on two stamps (Ciskei and Mordovia).

Images of some of the postal items showing Nimbus and Landsat accompany this article. The checklist and other images of each series are available on a website developed by the authors. The website lists numerous un-manned scientific satellites, and concentrates on those featured in these articles. Look for both the Nimbus and the Landsat series under the polar-orbiting-weather and environmental-observing categories. These can be found along with other categories at:

http://www,cira.colostate.edu/RAMM/Hillger/satellites.htm.

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CHECKLIST OF POSTAL ITEMS SHOWING NIMBUS

Country	Catalog No.*	Type of Item**	Year	Notes ***
Central African Rep.	C27		1965	Nimbus
Central African Rep.	C208	In margin of S/S (1)	1979	Nimbus
China (Taiwan)	1652		1970	Nimbus
Comora Islands	Mi425		1978	Nimbus
Comoro Islands	474	Overprint on Mi425	1979	Nimbus
Dahomey	197		1964	Nimbus
Dominica	355		1973	Nimbus
Dominican Republic	711		1973	Nimbus-3
Dominican Republic	C208		1973	Nimbus-3
Faroe Islands	220		1991	Nimbus
Germany (West)	None	Cindarella	1977	Nimbus
Guinea Bissau	412D	In margin of S/S of 1	1979	Nimbus
Maldive Islands	147a	In margin of sheetlet of 9	1965	Nimbus
Maldive Islands	148a	In margin of sheetlet of 9	1965	Nimbus
Maldive Islands	149a	In margin of sheetlet of 9	1965	Nimbus
Maldive Islands	150a	In margin of sheetlet of 9	1965	Nimbus
Maldive Islands	465		1974	Nimbus
Maldive Islands	471	S/S of 1	1974	Nimbus
Mordovia	Local	Part of S/S of 6	1997-8	Nimbus-3
New Caledonia	C39		1965	Nimbus
Nigeria	173a	In margin - sheetlet of 12	1965	Nimbus
Nigeria	174a	In margin - sheetlet of 12	1965	Nimbus
Poland	2248a	In margin - S/S 6 & 2 labels	1977	Nimbus
Portulan	1115		1971	Nimbus
Qatar	352		1973	Nimbus-3

Sharjah	43		1964	Nimbus
Sharjah	43A	Overprint new currency	1967	Nimbus
Sharjah	48a	Imperforate S/S of 1	1964	Nimbus
Togo	502		1964	Nimbus
Togo	505		1964	Nimbus
Togo	505a	Imperforate S/S of 4	1964	Nimbus
Yemen Arab Republic	C89		1982	Nimbus
Yemen Arab Republic	C146	Overprint on C89	1993	Nimbus
Zambia	61		1970	Nimbus-3

Scott* number, unless indicated with Mi or BL for *Michel
****S/S # = souvenir sheet, where # = number of stamps in sheet**
*****Nimbus-3 can be identified by one of two SNAP-19 radioisotope thermonuclear generators located above the instrumented base of the satellite.**

CHECKLIST OF POSTAL ITEMS SHOWING LANDSAT

Country	Cat. No.*	Type of Item**	Year	Notes ***
Antigua & Barbuda	702	In margin of S/S of 1	1983	Landsat-4/5
Brazil	1292		1973	Landsat -Nimbus type
British Antarctic Terr.	84		1981	Landsat -Nimbus type
British Antarctic Terr.	256		1998	Landsat -Nimbus type
Central African Ref.	1177b	Part of S/S of 4	1997	Landsat-4
Chad	706a	Part of S/S of 6	1997	Landsat-4
Chad	709d	Part of S/S of 6	1997	Landsat -Nimbus type
Ciskei	194		1992	Landsat-6
Egypt	1199		1982	Landsat -Nimbus type
Great Britain (Jersey)	560		1991	Landsat-5
Maldive Islands	1817	S/S of 1	1992	Landsat-4/5
Mexico	1284		1982	Landsat-4/5

Mordovia	Local	Part of S/S of 6	1997-8	Landsat-6
Thailand	1002		1982	Landsat-Nimbus type
United States	UC38	Aerogramme	1985	Landsat-4/5
United States	2570	Part of booklet pane of 10	1991	Landsat-Nimbus type

**Scott* number, unless indicated with Mi or BL for *Michel*
**S/S# = souvenir sheet, where # = number of stamps in sheet
***Landsat - Nimbus type includes Landsat -1 through Landsat-3 []

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Jürgen P. Esders (SU 3032)

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Brig. Gen. (Ret.) **Gustav E. Lundquist,** (X 1-Pilot), 100 Holley Ridge Road, Aiken, SC 29803. Lundquist signs photos and covers sent to him. SASE.

Col. (Ret.) Peter C. Hoag, (HL-10 Lifting Body Pilot), 3655 Little Rock Dr., Provo, UT 84604. Hoag autographs photos and covers; SASE required. He no longer has photographs to send out; he suggests to download and print them from DFRC's website: http://www.dfrc.nasa.gov - then click on „Gallery" and „HL-10" and selected one or more of the three shots available: ECN-2314, ECN-2409, E-21539.

(Continued on page 179)