



A Philatelic History

by Don Hillger, Garry Toth, and Sig Bette

Telstar-1 made history fifty years ago on July 11, 1962, one day after its launch, when it transmitted the first television signals across the Atlantic Ocean,¹ between the U.S. and France. Although not the first active communications satellite,² it became a popular and recognizable name in the relatively new world of artificial satellites.

Telstar even spawned a musical composition titled "Telstar," performed by The Tornados. Their instrumental recording was the first single by a British band to reach number one in the United States, and later it became a number

one hit in the United Kingdom as well. Written and produced by Joel Meek, the space-like sounds of the recording were produced by a clavioline, a keyboard instrument with distinctive electronic sounds. The song was later recorded by numerous groups, including The Ventures.

Telstar's first television relay by satellite was commemorated not only by France (Scott 1048), but also by two other countries, with common-design stamps. Mali issued two stamps (Scott 40 and 41) and Reunion overprinted the French stamp (Scott 344).

A second set of common-design stamps was issued to



Telstar common design, France (Scott 1048, 1962). APS Reference Collection.

commemorate the same event, but the event is noted as the first television transmission between Europe and America. On all these stamps the cities of Andover (Maine) and Pleumeur-Bodou are identified, with Telstar shown in orbit, relaying signals between the two locations. This series of common-design stamps includes single items from eight French-speaking countries: French Andorra (Scott 154), Comoro Islands (Scott C7), French Polynesia (Scott C29), French Southern and Antarctic Territories (Scott C29), New Caledonia (Scott C33), St. Pierre and Miquelon (Scott C26), Somali Coast (Scott C31), and Wallis and Futuna (Scott C17). All were issued in 1962, except the Somali Coast stamp, which was issued in 1963.

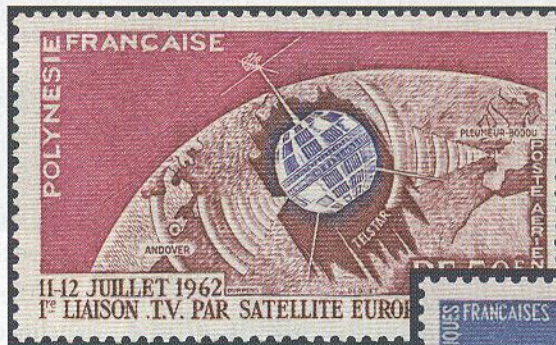
Building Telstar

Telstar, short for “Telecommunications and Star,” was a privately-sponsored satellite built by Bell Telephone Laboratories, which was part of American Telephone and Telegraph (AT&T). Telstar was designed to relay not only telephone but also television and telegraph messages. Bell arranged for NASA to launch the satellites, paying the \$3 million cost of launching each of the first two Telstar satellites. Other communications satellites, such as Relay (built by RCA) and Syncom (built by Hughes) soon followed. However, the international competition ended shortly thereafter with the passage of the Satellite Communications Act, an agreement to give control of international satellite communications exclusively to a newly formed Communications Satellite Corporation (COMSAT), which later became better known as the International Telecommunications Satellite Consortium (INTELSAT).

Satellite Description

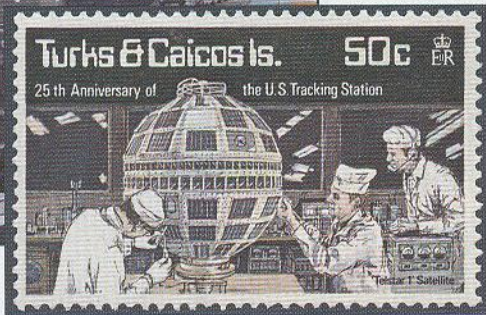
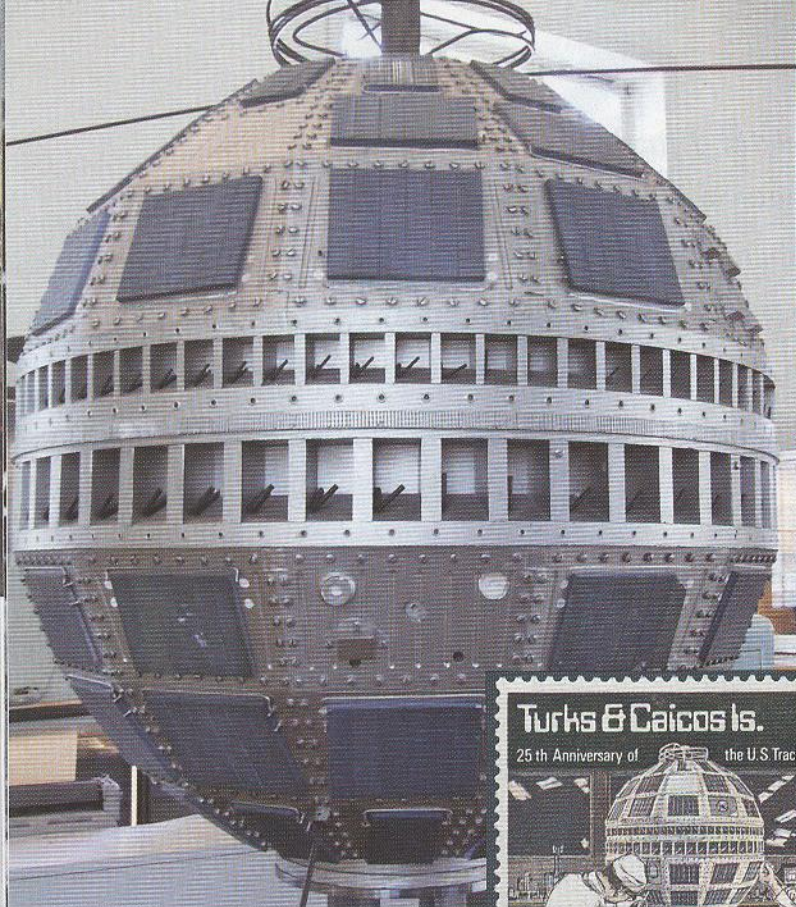
Telstar-1 and *Telstar-2* were spherical satellites, 0.85 meter in diameter, which were spin stabilized when in orbit. The diameter of Telstar was limited by the dimensions allowed by the capacity of NASA’s Delta rocket. The spacecraft surface was mostly covered with solar cells; however, in a ring around the circumference of the satellite were microwave receive and transmit antennas, necessarily operating at different frequencies. A single helical antenna, located on top, was used to com-

Telstar-1 made history fifty years ago on July 11, 1962, one day after its launch, when it transmitted the first television signals across the Atlantic Ocean, between the U.S. and France.



Telstar common-design items: French Polynesia (Scott C29), French Southern and Antarctic Territories (Scott C29); St. Pierre (Scott C26); all were issued in either 1962. APS Reference Collection.

Telstar was designed to relay not only telephone but also television and telegraph messages.



The image on this stamp from Turks and Caicos Islands (Scott 330) from 1977 is taken from a photograph of Bell Labs technicians in the process of assembling and testing the Telstar satellite. APS Reference Collection.

municate with ground stations. This design is seen in the Bell cachet on a *Telstar-1* launch cover. However, different antenna configurations are seen on the numerous postal items showing Telstar. (See the Sidebar at the end of the article for a discussion of the different types of antenna arrangements that are most commonly represented on postal items that show Telstar.)

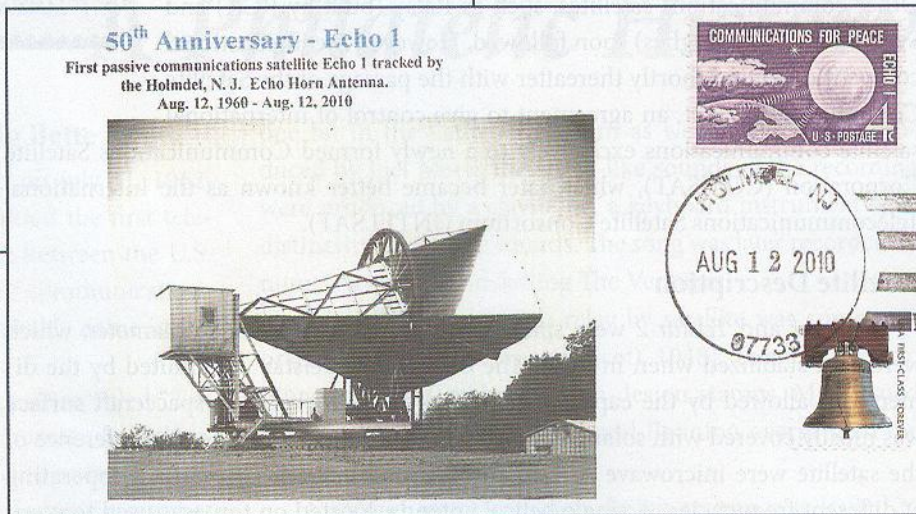
Telstar relayed signals by amplifying the small signals received from ground transmissions, but this amplification was limited because only fifteen watts of power were available from the solar cells. The Telstar signal was then received at the ground by huge steerable horn antennas designed to receive very weak signals. Similar antennas were first used for receiving signals from earlier Echo passive communications satellites, where signals were merely bounced off the large Echo balloons without any amplification. The received signals were then amplified by equipment specifically designed for receiving very weak signals, barely audible above the background noise.

The elliptical (5500 km apogee) and inclined (45° to the equator) orbit of the *Telstar-1* caused it to be useful for communication relay at a given location for only a short portion of each orbit. (Each orbit took about 2½ hours.) The Telstar communications concept was to launch a large number (up to fifty) of these satellites, so that one or two would be available at any time from any location for worldwide communications.

The proposed system also included about twenty-five ground stations in order to provide global coverage. However, only two of the original six Telstars were launched. (Because of their high altitude, both Telstars,



Telstar-1 launch cover with Bell cachet showing Telstar with a single helical antenna, as was the final design.



Horn antenna first used for reception of *Echo-1* signals.

To Saugied Bette
 270 Neill Director, Satellite Communications Laboratory



Thumbs-up photo of Telstar Project Director Eugene F. O'Neill, taken at AT&T's Andover earth station after first successful telecast via Telstar to the French ground station on July 10, 1962.

This *Telstar-1* launch cover with Clyde Sarzin cachet has additional attached photos of the first Telstar telecast.



THE WORLD'S FIRST PRIVATE ENTERPRISE COMMUNICATIONS SATELLITE IS NOW BEING USED FOR DRAMATIC EXPERIMENTS IN RELAYING TELEPHONE CALLS AND TELEVISION INTERNATIONALLY.

ITS NAME: TELSTAR. IT WAS LAUNCHED FROM CAPE CANAVERAL AT BELL SYSTEM EXPENSE BY THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION.

TELSTAR RECEIVES SIGNALS BEAMED TO IT FROM A GROUND STATION AMPLIFIES THEM AND TRANSMITS THEM TO ANOTHER STATION ON THE GROUND BELOW—PERHAPS AN OCEAN AWAY FROM THE FIRST ONE. THE NEW SATELLITE THIS ACTS AS A MICROWAVE RELAY STATION IN THE SKY, ENABLING VOICES, TV PICTURES AND DATA MESSAGES TO LEAP THOUSANDS OF MILES IN A NEW AND EXCITING WAY.

"TOWARD PEACEFUL USES OF OUTER SPACE"

1963



1963

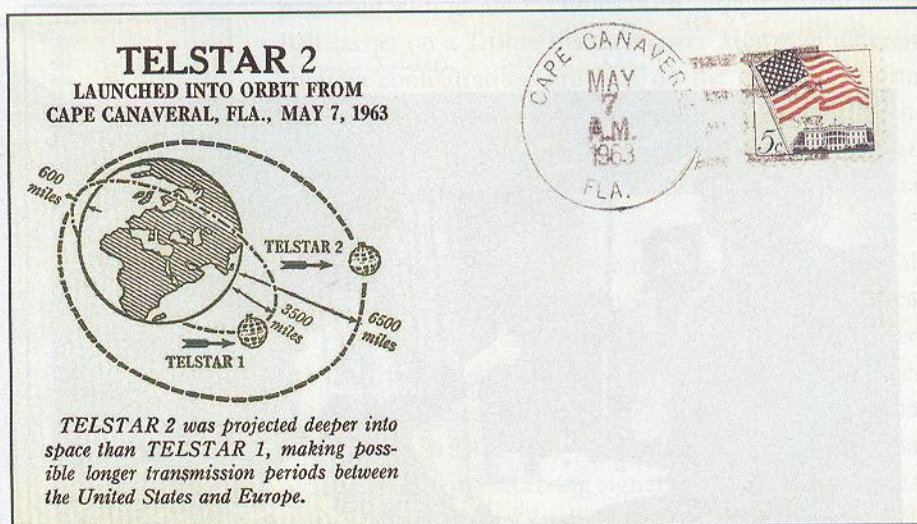
REPUBLIC OF LIBERIA

"Toward Peaceful Uses of Outer Space": Liberia (Scott C151, left, and C152, above, 1963).

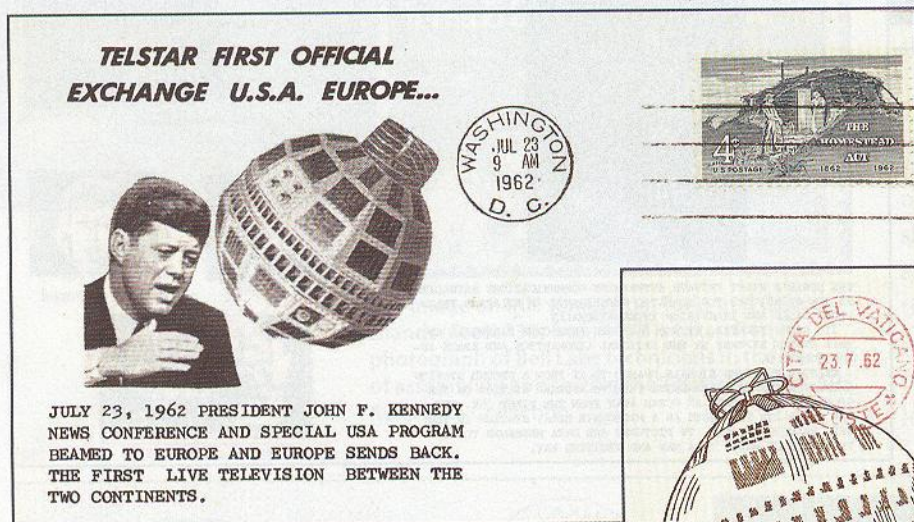




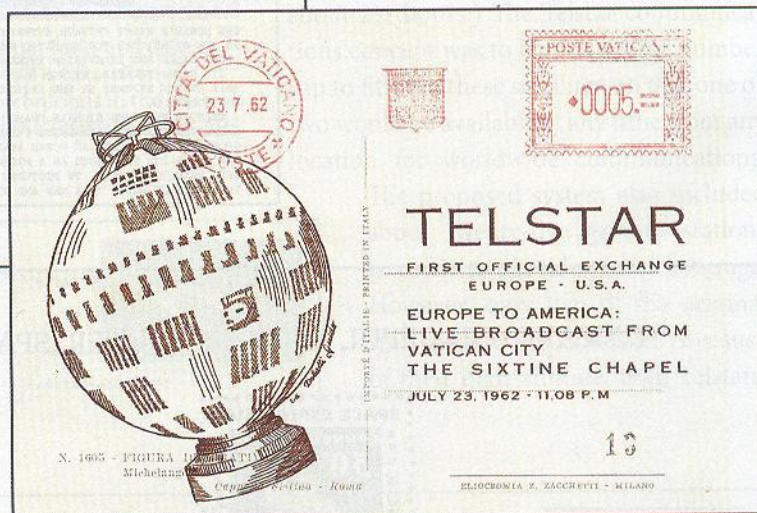
Qatar (Scott 101D, 1966) color variation, red on black.



Telstar-2 launch cover with Centennial cachet, in which the text mentions Telstar-2's higher orbit and longer transmission periods than Telstar-1.



Covers postmarked July 23, 1962: the first for President Kennedy's live press conference broadcast to Europe, and the second for a live return broadcast from Vatican City.



although no longer operating, will remain in orbit another 100 years.)

First Telstar Telecast

Shortly after the launch of Telstar, the first broadcasts through the satellite were pictures transmitted from Andover to Bell Labs in Holmdel, New Jersey, confirming the viability of the system. The very next day, on the sixth orbit of Telstar, pictures and sound were sent to American television networks. Transmissions from later orbits were received in France and England, but with varying success. The French then were the first to return signals from Pleumeur-Bodou to America.

Telstar-2

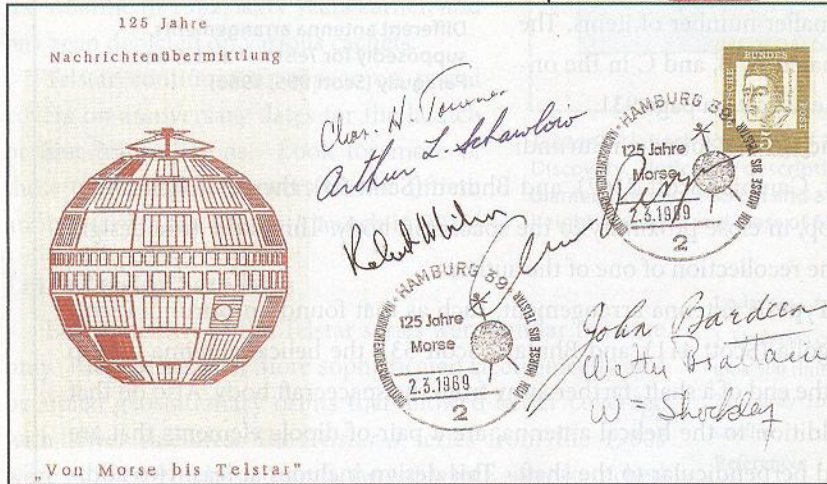
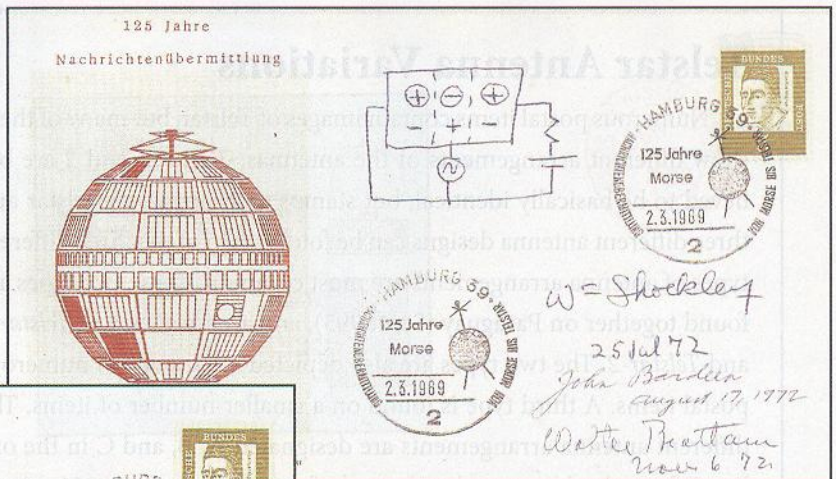
Telstar-1 lasted only seven months due to unexpected radiation damage from the inner Van Allen belt. Consequently, Telstar-2 was launched (on May 7, 1963) into a

much higher orbit to avoid radiation damage. It lasted two years and was turned off after all useful information had been obtained. Telstar-1 and 2 were research experiments. All the following Telstar satellites were intended strictly for commercial use.

The international cooperation made possible by Telstar was an example of the Peaceful Uses of Outer Space (PUOS), a theme still promoted by the United Nations. A large number of postal items were issued with the PUOS theme, starting in 1962, the same year the first Telstar was launched.

PUOS items featuring Telstar include a stamp and a souvenir sheet from Liberia (Scott C151 and C152). Oth-

These two cards with the same Telstar cachet are postmarked from Hamburg, Germany, commemorating 125 years of news transmissions — Morse to Telstar. Top cover is autographed by the three inventors of the transistor: J. Bardeen, W. Brattain, and W. Shockley. Bottom cover is autographed by seven Nobel Prize recipients: Laser inventors C. Townes and A. Shawlow; Discoverers of Cosmic Background Radiation R. Wilson and A. Penzias (their find supports the Big Bang origin of the Universe), and Transistor inventors J. Bardeen, W. Brattain, and W. Shockley. All were employees of Bell Laboratories.



Telstar's 1962 trans-Atlantic signals occurred only sixty years after Marconi's first wireless transmissions across the Atlantic.

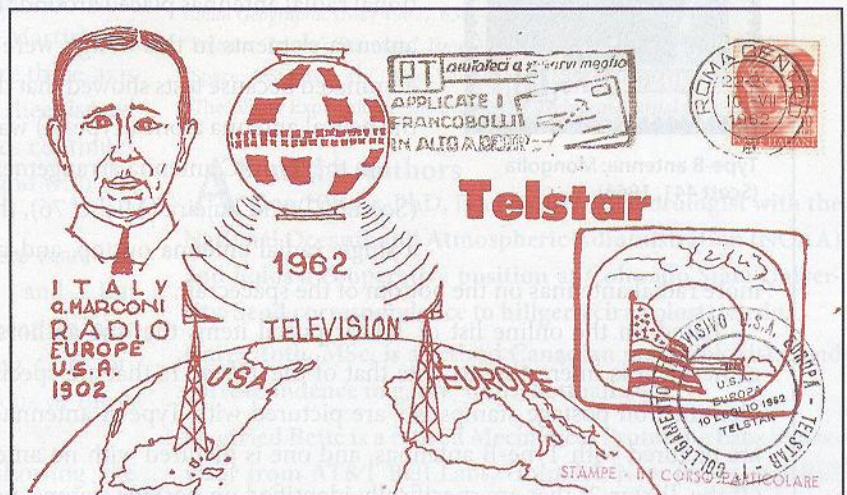
er PUOS items include a set of local post stamps from Satellite Beach, issued in 1964, and a second set of the same stamps overprinted and issued in 1965. Qatar also used the PUOS theme in 1966 on two stamps featuring Telstar (Scott 101D, and a color variation thereof).

Other Telstar Events and Anniversaries

Among the first publicly-available trans-Atlantic broadcasts was a live press conference with President John F. Kennedy held on July 23, 1962. That historic event has been featured on Telstar postal covers. Recordings of Kennedy's voice also can be found online. The press conference was followed by return broadcasts from Vatican City.

The development and implementation of Telstar required, or relied upon, the invention of many other devices, such as the transistor, the laser, the traveling-wave tube

Cover issued by the Bell System, postmarked at Andover Maine, site of the AT&T Telstar ground station, on the launch date for *Telstar-1*. It is also postmarked on the 25th anniversary of the *Telstar-1* launch from Holmdel, New Jersey, location of the Telstar receiving station.



Telstar Antenna Variations

Numerous postal items contain images of Telstar, but many of them show different arrangements of the antennas. *Telstar-1* and *2* are believed to be basically identical, but stamps with images of Telstar and three different antenna designs can be found. Two of the three different types of antenna arrangements are most common. These two types are found together on Paraguay (Scott 995), and are identified as *Telstar-1* and *Telstar-2*. The two types are also depicted separately on numerous postal items. A third type is found on a smaller number of items. The different antenna arrangements are designated A, B, and C in the online Telstar checklist noted at the end of the article on page 931.

In the **Type-A** antenna arrangement, such as that found on Burundi

(Scott 127), Gambia (Scott 2167), and Bhutan (Scott 54), there is a helical antenna on top, in close proximity to the spacecraft body. This is the true design, based on the recollection of one of the authors.



Type-B antenna: Mongolia (Scott 441, 1966).

In the **Type-B** antenna arrangement, such as that found on Burundi (Scott 130), Mongolia (Scott 411), and Bhutan (Scott 53), the helical antenna on top resides on the end of a shaft, farther away from the spacecraft body. Also on that shaft, in addition to the helical antenna, are a pair of dipole elements that are crossed and perpendicular to the shaft. This design includes at least two additional radial antennas placed around the bottom of the spacecraft. The additional antenna elements in this design were used for testing in the lab, but they were eliminated because tests showed that they were shading the solar cells. Therefore, the helical antenna alone (Type-A) was the chosen design.

Based on the online list of Telstar postal items that the authors have gathered, it is interesting to note that of the *Telstar-1*s that are specifically identified on postage stamps, six are pictured with Type-A antennas, two are pictured with Type-B antennas, and one is pictured with no antennas.

Of the *Telstar-2*s that are specifically identified on postage stamps, two are pictured with no antennas, one is pictured with Type-A antennas, and one is pictured with Type-B antennas. And, on one postal item indicating that it shows both *Telstar-1* and *Telstar-2*, either one could be Type-A or Type-B, as no distinction is made!

In the **Type-C** antenna arrangement, such as that found on Guinea Republic (Scott 607) and Fuceira (Michel 76), there is a single radial antenna on top, and two or more radial antennas on the bottom of the spacecraft.



Type-C antenna: Guinea Republic (Scott 607, 1972). APS Reference Collection.

Additional minor variations in the antennas also are seen on postal items, indicating the confusion in philately about the real antenna configuration. Besides these three types, other design variations are found as well, such as on Hungary (Scott 1567), where both *Telstar-1* and *2* are also shown, but with no antennas at all.

However, since all the variations seen on postal items did not exist, some of them can be attributed to artistic license. This variability in antennas is a curiosity, presented for those interested in such details.



Different antenna arrangements, supposedly for *Telstar-1* and *2*, on Paraguay (Scott 995, 1966)



Telstar-1 and *2* with no visible antennas on Hungary (Scott 1567, 1964). APS Reference Collection.

amplifier, and solar cells. Working with weak signals from space also allowed the discovery of Cosmic Background Radiation, one of the major scientific discoveries of the century. The names of the inventors and Nobel Prize recipients can be found on postal covers related to Telstar.

The use of satellites for trans-Atlantic communications is in striking contrast to Marconi's first wireless transmission across the Atlantic in 1902, sixty years earlier, and has been depicted on various cachets.

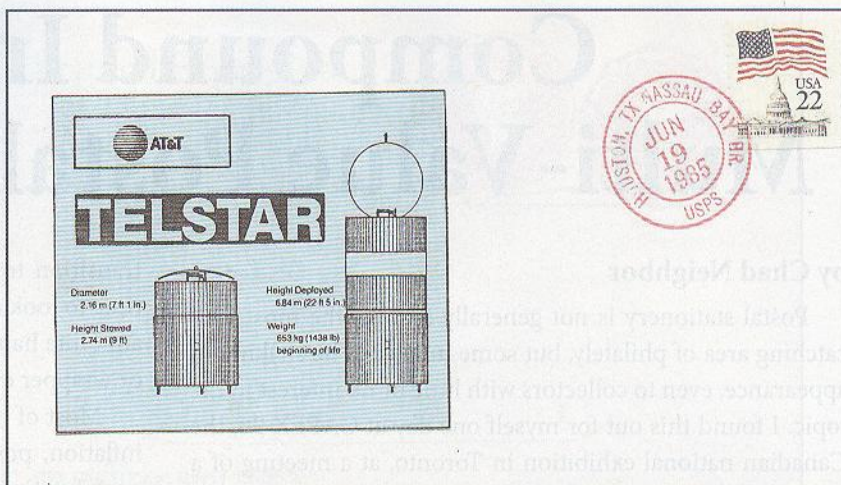
Telstar continues to appear on postal covers on anniversary dates for the launch or first transmissions. Look for more of these types of postal covers for the fiftieth anniversary of the *Telstar-1* launch in 2012!

Later Telstar Satellites

Later satellites in the Telstar series were similar in name only. They were much more sophisticated electronically and occupied geostationary orbits that allowed better coverage with fewer satellites. The *Telstar-3* series from the 1980s were built by Hughes Aircraft, two of which were launched as payloads on the U.S. Space Shuttle. Starting in 1993 with *Telstar-4* series, which was built by Lockheed Martin, the satellites were no longer spin-stabilized, but were three-axis oriented, such as *Telstar-402* seen on a souvenir sheet issued by Chad (Scott 676A) in 1996. The Telstar series continues with the most recent Telstar launched in 2009, and with additional Telstars to come.

Most of the postal items showing Telstar were issued in the 1960s, following the early success of *Telstar-1* and 2. But even after fifty years, Telstar continues to appear on new postal items, mostly on stamps commemorating early satellites, with Telstar being one of the more famous of those early missions.

An extensive checklist of postal items showing the Telstar-series satellites is available at <http://rammb.cira.colostate.edu/dev/hillger/Telstar.htm>, and e-mail correspondence with the authors is welcome.



Telstar-3D launch cover dated 19 June 1985, placed in orbit by the Space Shuttle Discovery. Notice the description of the satellite's size in the cachet. *Telstar-1* had a diameter of about 85 cm and a mass of about 75 kg, while *Telstar-3* had a deployed height of 6.84 m and mass of 653 kg.

Endnotes

1. Undersea cables at the time were not able to transmit television signals, which took 500 times the bandwidth of voice signals.
2. *Courier-1B*, launched in October 1960, was the world's first active repeater satellite.

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