Secret Shuttle Mission Revealed

For the first time, the US Air Force has declassified a secret space shuttle mission and released photos of the payload.

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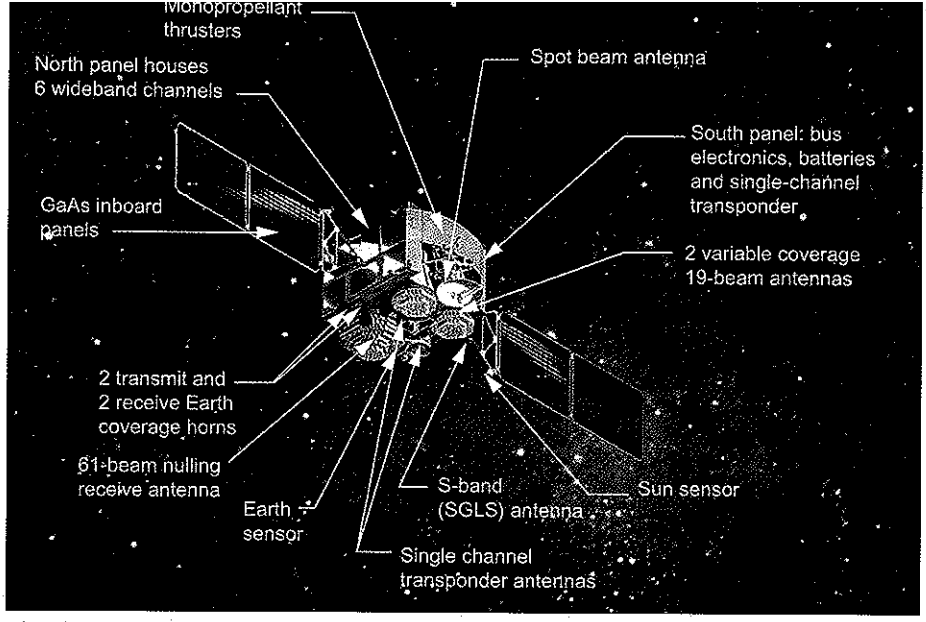


The third-generation Defense Satellite Communications System (DSCS III).
LOCKHEED MARTIN

Introduction

In the history of the space shuttle programme, there have only been eight classified missions. These were conducted by the US Department of Defense which had signed an agreement with NASA in the early 1970s to share the space shuttle. Despite the secrecy in which the missions were conducted - exact launch times were kept secret until only a few minutes before launch, communications with the ground were encrypted, and no information was released on the missions - reporters and independent observers speculated openly on the payloads. Several years ago the Air Force did release information on some secondary payloads carried on these flights, but until now no information was released on any of the primary payloads of these flights.

In January, the United States Air Force, responding to a Freedom of Information Act request, finally released photographs from the second of these classified space shuttle missions. These photos depict the deployment of two Defense Satellite Communications System III (DSCS, pronounced "discus") satellites aboard shuttle mission STS-51J. The mission, launched on 3 October 1985, was the maiden flight of the new orbiter Atlantis. The crew consisted of mission commander Colonel Karol Bobko, pilot Lieutenant Colonel Ronald Grabe, mission specialists Major David Hilmers and Lieutenant Colonel Lee Stewart, and payload specialist Major William Pailes. Stewart was an Army officer; all other crew members were from the Air Force.

Atlantis' mission was singularly uneventful. The orbiter reached the highest orbit flown for a shuttle at that time. This was dictated by the weight of the dual-satellite payload and the performance of its Inertial Upper Stage. The mission also included NASA's Bios experiment designed to study the effect of high-energy cosmic rays on biological materials. The mission lasted slightly more than four days and Atlantis landed at Edwards Air Force Base in California after a mission that the Air Force would only acknowledge had been "successful."

DSCS III Operational and Physical Characteristics.

ACS stabilisation capability	< 0.1° roll and pitch < 0.25° yaw with gyro
Orbit	Geosynchronous
Survivability	Natural and nuclear radiation, communications jamming
Mission design life	10 years
Thermal control	Passive with heaters
Dry weight	1980 lb (typical satellite)
On-orbit weight	2550 lb
Power	1700 W BOL; 1230 W EOL with SLEP mods
Power system	(3) 32-Ah NiCad batteries; 1262 ft² solar array
Attitude control system	3-axis stabilisation; 4 reaction wheels; redundant thrusters and tanks; hydrazine propellant
Body	6.8 ft long, 6.3 ft wide, 6.4 ft deep
Overall array span	38.1 ft
Structure	Ultra lightweight chem-milled aluminium and magnesium structure with more than 80 advanced composite components.

Not So Secret Payload

In the years since the 1985 DSCS launch, the identity of the primary payload was gradually acknowledged by the Air Force. The primary reason was the customer. Of the eight classified shuttle missions, the other seven are all most likely National Reconnaissance Office missions. STS-51J was for the Air Force and once the service acknowledged that it had launched DSCS satellites on other launchers, there was little reason for it to conceal the fact that it had also launched them aboard the shuttle. Initially the service only acknowledged that it had indeed launched two DSCS III satellites in 1985, although it did not indicate when, or on what rocket.

No expendable launch vehicle carried a dual-satellite payload during this time. There were three classified shuttle missions in 1985, but only one of them had launched a dual payload. Still, the Air Force did not connect the shuttle with the DSCS III satellites. Eventually, however, various unclassified and declassified Air Force histories acknowledged that a shuttle had launched the satellites, but did not state what mission this was. That information has been released only now, twelve years later.

The Origins of DSCS

The DSCS III satellites were developed by the US Air Force to replace its earlier DSCS II satellites. The first DSCS III was launched on 30 October 1982 atop a Titan 34D rocket along with DSCS II-16. DSCS III was intended to

Air Force and other users (primarily the Army), and to serve as a host for the AFSATCOM system.

The DSCS III series spacecraft have a six-channel SHF (Ka-band) transponder covering 500 MHz of bandwidth plus an AFSATCOM transponder used for strategic nuclear messages. Each channel operates through its own RF amplifier. Each satellite has three receive and five transmit antennas providing full Earth, narrow coverage and Rapid Selective Coverage Algorithm (an encrypted communications mode which dramatically reduces the amount of data that can be transmitted). They are redundant along all critical paths and have a ten year lifetime.

The satellite weighs 1,040 kg, of which 272 kg is hydrazine propellant. The satellite has two solar arrays which provide 1,240 watts at the beginning of operation and 980 watts at the end of the satellite's nominal lifetime. Each satellite costs approximately $100 million. They were manufactured by GE Astro Space, now part of Lockheed-Martin.

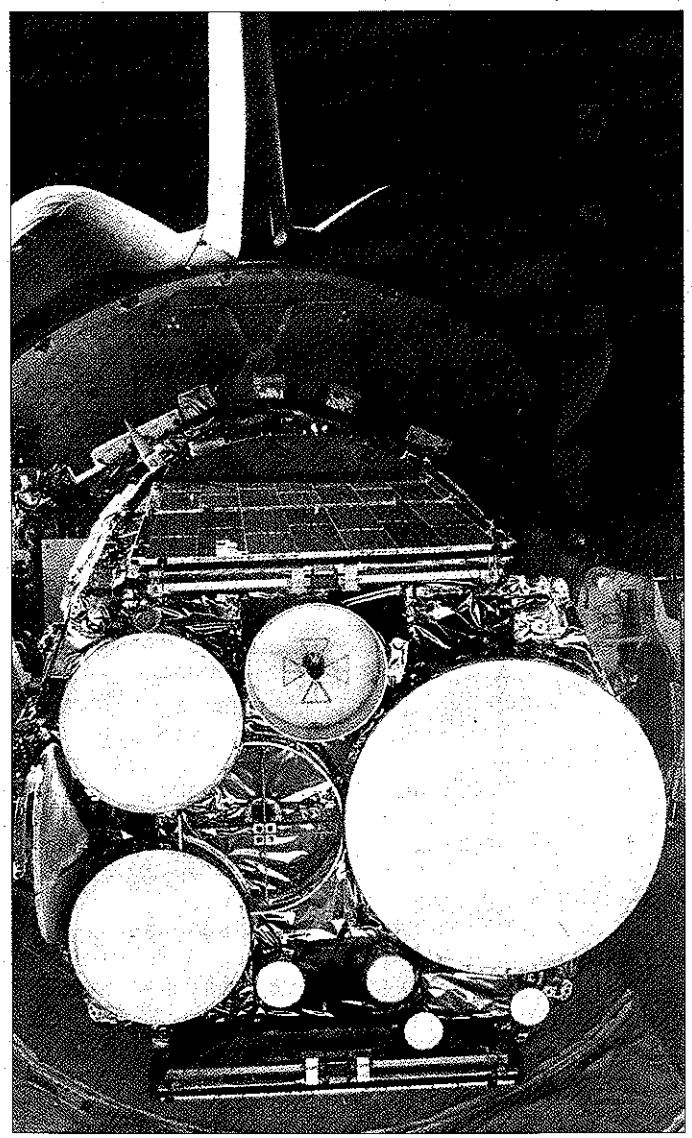
Date	Satellite	Launcher	Intl. Desig.	US Desig.
30 Oct 1982	DSCS III F-1/A-1	Titan 34D	1982-106B	N/A
03 Oct 1985	DSCS III F-2/B-4	STS-51J	1985-92B	USA-11
	DSCS III F-3/B-5	(Atlantis)	1985-92C	USA-12
04 Sep 1989	DSCS III F-4/A-2	Titan 34D	1989-069B	USA-44
10 Feb 1992	DSCS III F-5/B-14	Atlas II	1992-006A	USA-78
02 Jul 1992	DSCS III F-6/B-12	Atlas II	1992-037A	USA-82
19 Jul 1993	DSCS III F-7/B-9	Atlas II	1993-046A	USA-93
28 Nov 1993	DSCS III F-8/B-10	Atlas II	1993-074A	USA-97
31 Jul 1995	DSCS III F-9/B-7	Atlas II	1995-038A	USA-113
24 Oct 1997	DSCS III F-10/B-13	Atlas II	1997-065A	USA-134

Beginning with DSCS III-5, launched in February 1992, the satellites were equipped with improved amplifiers capable of handling up to 50% more traffic, better anti-jamming capabilities, and further redundancy. These satellites were equipped with the Integrated Apogee Boost Subsystem, which eliminated the need for the IUS.

The first and fourth DSCS III satellites were launched atop Titan 34D boosters along with a DSCS II satellite. DSCS III-5 was the first satellite to transition to the Atlas II booster and although Titan IV has been listed as a possible launcher for these satellites, the remaining launches will all be aboard Atlas IIs.

DSCS III has proven to be quite successful in Air Force service, although newer and more powerful satellites are now available commercially. The Air Force has begun searching for a "gapfiller" satellite to provide continued SHF-band coverage as the on-orbit constellation of satellites ages. But the current constellation of DSCS III satellites will serve well into the next decade. ■

Classified US Air Force payload aboard space shuttle Atlantis mission STS-51J in 1985. USAF (via the author)



Two DSCS III satellites atop their Inertial Upper Stage during deployment from the shuttle payload bay. USAF (via the author)