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Military satellites keep both sides honest

Their tasks: reconnaissance, communications, navigation

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Last month, as the space shuttle Discovery blasted off from the Kennedy Space Center with a secret military reconnaissance satellite in its payload bay, another secret countdown was proceeding halfway around the world.

At the Tyuratam space center near the Black Sea, the USSR was preparing to send aloft an almost identical payload: an "elint" (electronic intelligence) satellite, designed to monitor US military radio communications. Both of these Jan. 24 launches were successful, and both satellites are now in orbit, busily spying on each other's nations.

While it may have been unusual timing for two such similar - and top secret - military payloads to be sent aloft within hours of each other, the payloads themselves were absolutely routine.

Last year alone, the United States launched a total of 15 military satellites and the Soviets sent up 114, according to the Congressional Research Service, a branch of the Library of Congress. The service says more than 1500 military satellites have been launched over the last two decades, about 75 percent of them by the USSR.

It has been estimated that about 250 of these are still functioning, but no one can be certain of this figure. Such information is never officially disclosed by either side; and Marcia Smith of the research service points out that such estimates are complicated, for example, by the fact that some satellites are left in a dormant state but can be reactivated at any time by beaming up a coded electronic signal.

While the superpowers are, of course, responsible for the vast majority of the "spy in the sky" satellites, six have also been launched by China, and one Indian satellite is also believed to have been a prototype surveillance device. And there are military communications satellites currently operated by both England and the NATO alliance.

Does this mean that space has already been "militarized," and that efforts to keep the arms race from spreading beyond this planet are already obsolete? Not according to many prominent arms-control advocates.

Stabilizing influence

Astronomer Carl Sagan, a vocal opponent of President Ronald Reagan's Star Wars plan, said at a symposium in Washington last month that in discussing whether weapons should ever be deployed in space, "militarization of space is the wrong term. We have had military reconnaissance satellites since the '60s, and they are worth their weight in gold. They are stabilizing, because they help us to avoid miscalculation."

While military satellites have been around since the beginning of space travel, so far the introduction of any weapons into space has been strictly forbidden by international treaty. So there is still time, many political analysts feel, to prevent the "weaponization" of space.

Reconnaissance satellites of various kinds are, in fact, one of the most reliable means available for verifying existing or prospective arms control agreements, military and arms-control experts agree. Without this dependable method of detecting missile launches, above-ground nuclear tests, and large-scale military construction projects (including missile silos), any kind of new arms control agreement would be almost impossible. The ban on above-ground nuclear weapons testing, in force since 1963, was largely made possible, and continues to be monitored, by reconnaissance satellites that can easily detect the telltale flashes of light and electromagnetic pulses from an atmospheric nuclear test. This de-

tection system is highly reliable: A recent book on arms control by physicist Dietrich Schroerer says American Vela satellites have detected 42 nuclear explosions since 1963, conducted by nations - primarily France - that had not signed the pact; only one of these blasts, over South Africa in 1979, has not been confirmed.

Variety of satellites

Photo reconnaissance is by no means the only function performed by present military satellites. There is also a variety of other satellite types being used, including:

- Electronic intelligence. The two January launches were just the latest in a long line of satellites designed to monitor a wide range of electronic signals. Different satellites, or in some cases different receivers on a single satellite, can monitor military radio communications between headquarters and troops in the field, ship-to-shore messages from navy vessels, tracking data from missile tests, and even some internal long-distance telephone conversations.

- Navigation. Military ships, submarines and planes as well as ground troops require a way to determine their positions quickly and accurately. This requirement is already being met in large part by a global network of navigational satellites, and starting next year the US Navstar military satellite network will provide much greater accuracy. This system of 18 satellites will send out continuous radio beacon signals, allowing a ship or plane to determine its position with an antenna connected to a computerized device that will automatically locate the signals from four of the satellites, compare them, and compute the vessel's position, course and speed. Though built for the military, these systems will also greatly benefit commercial shipping and aviation.

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• **Communications.** Among the earliest military applications of space was as a means of providing reliable, rapid communications from remote locations. Since the first US experimental military communications satellite was launched in 1960, there has been a steady progression toward a variety of more sophisticated and long-lasting systems.

Functioning just like the commercial communications satellites that handle most international phone conversations and television transmissions, these military satellites not only handle communications between headquarters and field troops, they also function as a central clearinghouse for data from the various electronic and photographic surveillance satellites. This allows the other types of satellites to avoid relaying their transmissions through a complicated and vulnerable series of ground station links or storing data onboard while overflying the USSR for later transmission when the satellite passes over the United States.

• **Early warning.** Ground-based radar systems can detect approaching missiles only when they appear over the horizon, but orbiting infrared telescopes can detect them almost immediately after launch by picking up the heat of their exhaust plumes. Since 1971, the United States has had at least three such satellites in orbit at all times (with new ones orbited as earlier ones wear out). They are spaced around the globe in geosynchronous orbits, allowing them to monitor a given area continuously. In 1984 alone, these US satellites detected about 100 Soviet rocket launches for putting satellites into orbit and 400 missile flight tests, as well as several Chinese missile and rocket test launches, according to Aviation Week.

While both the United States and the USSR constantly watch

each other's space activities and know in great detail the number and nature of each other's military satellites, both sides still go to great lengths to make it difficult to monitor their launches.

For the January shuttle launch, the exact time of launch was withheld until nine minutes before liftoff.

The intent, according to Defense statements, was to make it more difficult for the Soviets to track the launch; knowledge of the exact launch time and trajectory would have allowed them to station tracking ships and mobile Earth stations in the most advantageous positions. Yet everyone concedes that, at best, such secrecy just served to delay the acquisition of information that they would inevitably obtain anyway.

The Soviets employed even more dramatic countermeasures during a launch on Sept. 28, according to Aviation Week, and US monitoring stations had to pull out all the stops to keep track of the mysterious surveillance satellite sent up that day.

This satellite played a sort of orbital hide-and-seek, changing the shape, height and inclination of its orbit at least twice during its first two days aloft. But again, these tactics only served to delay an analysis of the satellite's characteristics.

Antisatellite weapons

The fancy maneuvering led US observers to think at first that the satellite might be a "hunter-killer" antisatellite (ASAT) weapon, such as the USSR has deployed and tested at least 10 times in the past decade.

Unlike surveillance satellites, ASATs are almost universally considered dangerous and destabilizing - even the USSR has implied as much in its more recent statements, and has apparently ceased such tests. These satellites, which change orbits to maneuver into position next to a target satellite, are actually nothing more than orbiting bombs, designed for a kamikaze-like mission in which they explode and the nearby satellite is destroyed by the flying debris.

The United States has tested a different kind of ASAT system, using ground-launched missiles that home in on orbiting satellites to destroy them. So far, tests of this system have been more successful than the Soviet version.

As the military forces of both nations have become more dependent on satellites, the threat of ASATs has been a growing concern on both sides. That concern, many analysts believe, may have been a factor in bringing the USSR back to the negotiating table this year.