Hiding from the spies in the sky

India's nuclear tests, followed last week by Pakistan's retaliatory explosions, surprised the spooks running the world's most sophisticated spy satellites. Images from space used to provide advance warnings, but not anymore.

By Duncan Campbell

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THIS WEEK, in Washington, White House specialists and intelligence insiders with "stratospheric" security clearances are poring over a top secret report that analyses how and why the huge US intelligence machine failed to notice that the Indian government was conducting nuclear weapons tests — until they read the press release from New Delhi. A team led by Admiral David Jeremiah, formerly vice chairman of the US Joint Chiefs of Staff and now a consultant to weapons contractors in the US, has just reported to the President and the Director of the CIA, George Tenet, on how and why the CIA's multi-billion dollar spy network in space simply didn't notice what India was up to. But the Jeremiah report hardly needs any security classification at all because what it says is already well known — the Internet has made tracking and evading spy satellites child's play.

India's gambit last month combined political deception with a careful plan for hiding its nuclear test site preparations from orbiting US satellites. This was far from being a complicated intelligence exercise. Data and programs downloaded from the Net enable anyone to track the satellites and work out when the spies in the sky are overhead.

An analysis of satellite orbits for last month shows that, in the five days before India detonated its nuclear devices, there were at least 10 periods of up to almost eight hours in which US intelligence was blind to what Indian technicians were doing at the Pokhran test site, close to the Pakistani border. During these lapses, preparations for the tests continued; and then every time a satellite appeared on the horizon, work stopped until it had passed overhead and disappeared again.

But the incident should not have been such a surprise. In January 1993, former CIA analyst and defence scientist Allen Thomson, who retired last year to Texas, wrote a detailed study showing how the US strategy of depending on a few, expensive satellites for reconnaissance was flawed. With 13 years' experience in the CIA, Thomson warned that "the presumption that reconnaissance satellites can operate covertly is obsolete".

It was unwelcome news, and the US government tried to suppress the report, telling him that any discussion of reconnaissance satellites "had to occur in classified channels only". Not until two years later, and after a long legal struggle, was Thomson's report published.

"Tracking US reconnaissance satellites can provide valuable support to a hostile country's concealment and deception programmes," says Thomson, echoing his words of five years ago. His warnings have now been spectacularly vindicated. A week after the first wave of Indian tests, he prepared a comprehensive analysis of what had occurred.

Although the US currently operates more than 100 military satellites, only five are providing low altitude, close-up reconnaissance pictures. Three of the satellites, known as KH-11 or KH-12, observe using normal light or infra-red light. They are positioned in special orbits to try to stay in daylight over their targets as much as possible. Two more, codenamed Lacrosse, scan the ground using radar that can penetrate clouds and storms. They can also "see" at night.

Because satellite orbits follow predictable patterns, the position of a satellite at any time can be known precisely from "orbital elements", a series of numbers that identify the maximum and minimum height of a satellite's orbit, its inclination to the poles, and when it crosses a given part of the sky.

Most orbital elements for objects in the sky are published by the US government; spy satellites are an exception. However, this secrecy has merely led a growing international community of professional and amateur astronomers, linked on the Net, to spot the satellites and pass round the missing numbers. Using this information, Thomson has shown that it would have been a trivial job for India to duck for cover

when a satellite was coming, and so ensure that nothing untoward seemed to be happening on the ground.

At 8.27am GMT on the morning of Monday 11 May, the last KH-11 satellite to look at Pokhran before the bombs went off flew overhead for seven minutes. Operating from a range of 285 kilometres, the satellite reportedly did record suspicious movements at the test site. Via a tracking and data relay satellite in a much higher orbit, the images were flashed to the US National Imagery and Mapping Agency in Fairfax, Virginia, close to Washington and the CIA HQ. But Washington was asleep. Lulled into a false sense of security by the previous week's apparent inactivity, checking pictures from Pokhran was not a priority for CIA's night shift.

Less than two hours later, at 10.14 am GMT, India detonated its nuclear devices. During the following eight hours, spy satellites crossed the area six times as usual — it's a fact of life that satellite coverage is bunched, creating many useful "windows" for the spied-upon to exploit. But by the time anyone in the CIA had looked at the pictures, the Indian government had already announced the deed.

On Monday this week, Thomson prepared a second analysis showing that Pakistan, too, had carried out its tests during predictable gaps in satellite coverage — although this event was much less of a surprise because of the Pakistani government's blatant determination to respond to the Indian tests. At 8am GMT last Thursday (again, while most of Washington was asleep), a KH-11 optical satellite could snatch some shots. Two hours later, and before the next satellite (a radar-equipped Lacrosse) was in view, the Islamic bomb became reality.

Even if amateurs and astronomers were not tracking spy satellites, the job would be easy even for a small country. Satellites like Lacrosse, which are in low orbits, can be seen and even identified with the naked eye. Thomson has also pointed out that the main US system for spotting satellites can be imitated or exploited by others to gather information. The US Navy's Space Surveillance System, Navspasur, uses radio arrays in Alaska, Texas and Arizona to spread fan beams into space above the US. Satellites moving through this electronic fence reflect signals back to Earth, identifying themselves to the radio listeners. But Navspasur's technology is more than 20 years old, and easy to replicate. Some sophisticated radar amateurs in or

near America even hijack Navspasur signals to do their own satellite tracking. Cuba would be near enough to listen in.

Since writing his controversial report, says Thomson, it's become clear that the US has tried to hide some of its satellites. Starting in 1990, four satellites have "disappeared" from the view of amateur trackers. Thomson suspects that the satellites use stealth technology, and have been moved to higher orbits.

But it hasn't done the US any good, he notes: "If they were there and were taking pictures [while India got its bombs ready], then no-one was paying attention." However, the future may be brighter. There are an increasingly large number of civilian and commercial satellites watching too. "In the future, anyone who wants to conduct a concealment and deception programme is going to have to realise that the sky is fairly full of satellites."

WHEN THE AGE OF THE SPACE SNOOPERS DAWNED

The first US satellites were unreliable, hit-and-miss affairs that depended on the satellites firing their film capsules back to Earth. The capsules were supposed to be caught in mid-air by specially equipped transport aircraft. But firing and catching operations often went wrong, as depicted fictionally in the film Ice Station Zebra.

The first major US spy satellite programme was codenamed Corona, or KH-4. Corona satellites and their successors, up to KH-8, operated until the early 1970s. "KH" stood for "Keyhole". Pictures taken by Corona and its early sister satellites have been declassified, and can now be browsed on the Web, and a full-scale photograph ordered.

Corona was replaced by "Big Bird", or KH-9. Each Big Bird satellite carried four film return capsules. At best, Big Bird could take pictures with a resolution of 150 centimetres, but it could take days or even weeks to get the images back to Earth.

The next spy project, KH-10, aimed to solve the problems by orbiting a spy satellite with astronauts on board to push the shutter. KH-10 was announced to the public as the Nasa Manned Orbiting Laboratory (MOL), a scientific lab that would advance

civilisation. In fact, it was a Cold War project to snoop better and closer, later cancelled as too costly.

In 1976, the first “video” satellite went into orbit. The early KH-11 or Kennan satellites pioneered the technology now familiar from the Hubble space telescope — only they looked the other way, with a resolution thought to be better than 10 centimetres.

In 1988, the US launched the first of three Lacrosse satellites that could see through clouds and in darkness (two now operate), with a resolution better than one metre and real-time transmission.

IS BIG BIRD WATCHING YOUR BACKYARD?

Whether you’re skinny-dipping in Somerset, or harvesting dope plants in the Sierra Nevada, or just want a reason to take up watching the sky at night, programs and data about satellites of every kind can be taken from the Net.

Among the programs that predict when and where satellites will pass overhead are Traksat and Winsat (at http://www.hsv.tis.net:80/~wintrak/index.html). Winsat, for Windows 95 (and Traksat, for Dos), costs $75. Both programs were used in the recent James Bond film, Goldeneye. Another popular programme is Skymap (available from ftp://ftp.satellite.eu.org/pub/sat/programs/ibmpc/sky62.zip).

Tracking data for individual satellites, called “two line elements” or TLEs, are available at many locations on the Web; the official Nasa site at the Goddard Space Flight Center (at http://oigsysop.atsc. allied.com/scripts/foxweb.dll/app01) and the Celestial bulletin board (at http://www.celestrak.com) are two good places to start.

If you particularly wish to conceal your local weapons test programme, you’ll need to visit another site (at ftp://kilroy.jpl.nasa.gov.pub/ space/molczan), which contains extensive catalogues of more than 40,000 space objects, which can be downloaded, including the satellites that the US doesn’t like to talk about.

The visual satellite observer’s home page (at http: //www2.plasma.mpe-garching.mpg.de/sat/vsohp/satintro.htm) contains many international links, including predictions for when satellites will be brightly visible from European cities.

PASS WORDS

HIDE AND SEEK

I thought the US could see everything from space? It can. That's how they predicted the invasion of Kuwait. Tracked Scud missiles and stopped them being launched at Israel. Found all Sadaam Hussein's biological weapons factories, etc.

Can we see them back? The best time to look is twilight, just after sunset, and when the sky is clear. Satellites move slowly across the background of stars. If you know where to look, the naked eye is enough on a clear night. The Lacrosse radar spy satellites are in fact the brightest and largest orbiting objects visible, save only for the Mir space station and the US space shuttle. They have a characteristic orange hue. KH-11 photographic spy satellites are darker, but can easily be seen on a clear night in the countryside.

Can anyone play? It's beginning to look like that. Apart from the superpowers, France and Israel were early into the spysat field. Now even tiddly nations want their very own spy systems. Before the recent economic slump, Thailand was seeking tenders for a two-satellite "Star of Siam" snooping system. The United Arab Emirates want some, too.

What about Britain? In the mid-1980s, Margaret Thatcher decided to spend £500 million on an all-British bird called Zircon. She was less than pleased when this plan was uncovered by the makers of a BBC television programme (produced by . . . err, modesty forbids). So the Special Branch were sent to Glasgow to take away all the BBC's tapes. In the end, Zircon never orbited (though the programme went out). Since then, Britain has relied on buying into a share of American satellite information.

You mean the French have won this one? Yup. They have Helios, their photographic satellites, and Zenon, a listening satellite. There was talk of British-French collaboration, but that would have been an entente-too-cordiale for the old spy chiefs. Last we heard, when MI6 want to snoop around French nuclear submarines at Brest, they go by car.

Can anyone stop the satellites from spying? The Iraqis had a novel take on this. According to their intelligence chief (now defected), General Hussein al-Majeed, the real purpose of Iraq's notorious "supergun" was to fire glue bombs at US spy satellites as they passed overhead, leaving them engulfed in sticky slime.

But could they have hit them? A sticky question, that. But with over 40,000 catalogued items of space junk in orbit, including bits that have fallen off Mir, they could have had plenty of practice.

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