Russia's military satellites

Status and prospects

Russia's military satellite programme has diminished greatly since the break-up of the Soviet Union. During the 1980s, the Soviet space programme typically made 90–100 launch attempts annually, the majority being dedicated military satellites. The rate has since dropped by more than half, with military payloads in the minority: during 2000, just seven of 39 launches had primarily military payloads. Although budgets started to decline in the mid-to-late 1980s, many programmes could continue because of the Soviet 'production-line' approach. Because Soviet technology could not match the longevity of Western satellites, it had been decided to manufacture shorter-lifetime satellites in great numbers, ensuring that unit cost would remain low. The same approach was applied to launch vehicles. Most programmes continued by drawing on such stockpiles. It was only when funds were needed to finance new satellites and launchers that the launch rate fell. Although there have recently been signs of a consolidation, the decline in capabilities has been sharp and comprehensive, even given Russia's altered strategic circumstances.

Communication satellites

Russia operates two levels of communications satellites for purely military applications. *Strela*-3 payloads were originally launched in clusters of six, but recent launches have tended to carry three *Strela*-3s and three commercial derivatives called *Gonets*-D1. The *Strela*-3 satellites allow messages to be received from remote locations within the Commonwealth of Independent States (CIS) or overseas. These messages are stored and transmitted to control centres when the satellite passes within range. In the Soviet era, this type of satellite was used both by military commanders in the field and espionage agents located overseas. The number of launches has fallen, with the most recent, in late 2000, failing to reach orbit.

Two series of satellites are deployed in geosynchronous (24–hour) orbits for dedicated military and government communications, with the aim of permitting a more reliable service across the CIS than other real-time communications systems. The original series comprises *Raduga* satellites, which are now being replaced by *Raduga*-1. However, the constellation has been depleted as older satellites have 'died' on-station and new launches have not matched this decline. At the end of 1994, there were 13 *Raduga* and *Raduga*-1 satellites operating over nine locations; by the end of 2000, this had dropped to five satellites over five locations, and one of those satellites (*Raduga* 32) had either died on-station or was about to expire. Meanwhile, in the early 1980s, Russia started deploying the *Potok* system of military data-relay satellites. These allowed communication with reconnaissance and electronic intelligence (ELINT) satellites when they would otherwise be out of radio contact. Normally, three satellites would be operating, but since 1996 only one has been active.

Operating military satellites, as of 1 July 2001

Class	Series	Satellite	Launch date
Communications	***Strela*-3**	*Cosmos* 2337–9	14 Feb 1997
		Cosmos 2352–7	15 Jun 1998
	Geizer	*Cosmos* 2319	30 Aug 1995
		Cosmos 2371	4 Jul 2000
	Raduga	*Raduga* 29	25 Mar 1993
		Raduga 30	30 Sept 1993
		Raduga-1 4	28 Feb 1999
		Raduga-1 5	28 Aug 2000
Early warning	***Oko***	*Cosmos* 2340	9 Apr 1997
		Cosmos 2342	14 May 1997
		Cosmos 2351	7 May 1998
		Cosmos 2368	27 Dec 1999
ELINT/worldwide	***Tselina*-2**	*Cosmos* 2369	3 Feb 2000
ELINT/EORSAT	**US–P**	*Cosmos* 2367	26 Dec 1999
Navigation	***Parus***	*Cosmos* 2336	20 Dec 1996
		Cosmos 2341	17 Apr 1997
		Cosmos 2346	23 Sept 1997
		Cosmos 2361	24 Dec 1998
		Cosmos 2366	26 Aug 1999
		Cosmos 2378	8 Jun 2001
Photo-reconnaissance	***Kobalt***	*Cosmos* 2377	29 May 2001

Source Molniya Space Consultancy

Missile early warning

Early-warning satellites carry infra-red detectors that seek out the heat from a missile in flight. They warn of possible attack before missiles rise above the Russian horizon and can be tracked by ground-based systems. All launches are monitored to establish whether a satellite or missile is being launched, and if a missile, to distinguish between test flights and offensive launches. Two systems of satellites have been deployed for early-warning purposes. The original system, designated *Oko*, should have a full constellation of nine satellites, operating in eccentric orbits. During the 1990s, this constellation was depleted, as new launches did not match the retirement of old satellites. By the end of 2000, only the four most recently launched satellites in the constellation were still operating. On 10 May 2001, *Oko* operations broke down after a fire destroyed the primary control centre, located 35 kilometres north-east of Serpukhov. The satellites were in 'dormant' mode for a short time while control was transferred to an unspecified back-up centre. A second series of early-warning satellites, designated *Prognoz* and deployed in geosynchronous orbit, has been plagued with problems. Satellites have regularly failed to operate for longer

than two years, and since *Cosmos* 2224 drifted off-station in May 1999, there have been no satellites operating in this constellation. It is believed that a new *Prognoz* satellite is scheduled for launch during the third quarter of 2001, and it is possible that the opportunity has been taken to fix the problems that made earlier satellites so unreliable.

ELINT satellites

ELINT satellites are used to eavesdrop on foreign communications, as well as to probe electromagnetic emissions from defence systems such as radars. Two classes have operated since the 1970s: the non-manoeuvrable 'worldwide' ELINT series, which has the generic name *Tselina*; and the ELINT ocean reconnaissance satellite (EORSAT). The present worldwide ELINT series is designated *Tselina*-2. The satellites are believed to operate for 1–2 years. They were introduced at the start of the decline in the overall space programme. However, the *Zenit*-2 launch vehicle has proved unreliable, resulting in a low launch rate. The most recent *Tselina*-2 satellite was launched in 2000 and is probably the only one currently operating. The EORSAT programme used to have 3–4 satellites operating at any one time, but this number declined during the 1990s. The retirement of *Cosmos* 2335 in November 1998 reduced the system to just one satellite (*Cosmos* 2347). This continued to operate until mid-November 1999, when its orbital altitude was reduced, indicating mission termination. After a six-week break, *Cosmos* 2367 was launched and is still operating in orbit. EORSATs typically operated for about a year, but during the 1990s this period increased to 18–24 months. There are fewer than five *Tsyklon*-M vehicles available to launch these satellites, and it remains to be seen whether the programme will be switched to another launcher or simply retired when the supply of launch vehicles runs out.

Navigation satellites

One constellation of military navigation satellites has been operated since the 1970s. The *Parus* (also called *Tsikada*-M) system comprises one satellite operating in each of six orbital planes spaced 30 degrees apart. Launches fell during the 1990s, but, to compensate, the satellites have been operated for longer periods. In June 2001, *Cosmos* 2378 was launched to replace *Cosmos* 2279, which had operated for seven years and was not switched off until its replacement was in orbit. The dual-purpose military–civil GLONASS constellation – the Russian equivalent of Navstar/GPS (Global Positioning System) – has suffered greatly from the lack of new launches to replace old satellites as they retire. Although the constellation should comprise eight satellites in each of three orbital planes, making 24 in total, even including the three new satellites launched in October 2000, there were only eleven satellites available for operations at the end of 2000.

Photo-reconnaissance satellites

The greatest decline in the Russian military space programme has been in photo-reconnaissance flights. From the mid-1960s, Russia maintained at least one of these satellites in orbit at any time. The original satellites flew eight-day and later two-week missions, but in the mid-1970s a new class of satellite was introduced that remained in orbit for a month. In the early 1980s, a further class appeared, which returned data digitally and could remain in orbit for a year. Even with longer-lived satellites operating, in the mid-1980s it was usual to have 35–40 photo-reconnaissance launches annually.

A requirement for photo-reconnaissance satellites is to return data quickly. The satellites operating by the end of the 1980s used different approaches to achieve this. The two-week *Oblik* satellites carried a single descent craft, recovered at the end of the mission. The two-month *Kobalt* satellites – the latest version of the one-month satellite introduced in the 1970s – carried two film-return capsules, which re-entered while the main satellite remained in orbit. *Neman* satellites did not carry a descent craft but returned images digitally, either directly to control centres or via *Potok* satellites. Introduced in 1989, *Don* satellites carried 10–12 film-return capsules which would return to earth at 7–10 day intervals, while the main spacecraft was destroyed in orbit at the end of its mission. *Don* was apparently a (now-retired) interim step towards the 12-tonne *Yenissey* satellite, which first flew in 1994. *Yenissey* can reportedly carry 22 film-return capsules, but, unlike *Don*, it is not destroyed in orbit at the end of its mission – it is simply moved out of orbit, or 'de-orbited'.

The decline in photo-reconnaissance satellites reached a key point on 28 September 1996, with the de-orbiting of *Cosmos* 2320, a *Neman* satellite. For the next eight months, there were no Russian photo-reconnaissance satellites operating, representing the longest gap since the first successful photo-reconnaissance launch in 1962. It has since become usual for there to be a break in photo-reconnaissance satellite coverage. The latest *Neman* operated for a year until May 2001; after it was de-orbited, there was a short break before the launch of the current *Kobalt*-series craft, *Cosmos* 2377. To show that the Russians have new satellites available, in September 2000, the second *Yenissey* was launched, operating for seven months before being de-orbited. Additionally, there are occasional launches of *Kometa* cartographic satellites for primarily military missions lasting for up to 45 days. The last of these was launched in September 2000.

Halted decline?

With the ending of the Cold War and an accompanying reduction in the immediate threats (perceived or real) facing Russia, a scaling-down of its military satellite programme was to have been expected. Yet, the severe economic restrictions on the programme have made its decline more swift and obvious. Some satellite programmes – such as the *Parus* navigation satellites – have survived almost intact, albeit with satellites being forced to operate for much longer. By contrast, the ELINT and early-warning programmes have clearly been cut back sharply. However, this is not the disaster for Russia that it would have been considered during the Cold War. Similarly, there is a more limited need for photo-reconnaissance satellites.

It seems likely that the low point of the military satellite programme was reached in 1995–97. There are some indications that the situation will not be allowed to deteriorate further. Indeed, it is possible that the new *Yenissey* photo-reconnaissance platform is planned as a replacement for the 20-year-old *Kobalt*. With *Yenissey* a far larger and more capable satellite, it will be more expensive to manufacture and launch. Nonetheless, flying one of these satellites for 7–12 months alternately with digital *Neman* satellites would mean that Russia need only launch one satellite of each type each year, at the most. The *Yenissey* launch in 2000 indicated that new programmes can be introduced, and the imminent launch of a new *Prognoz* early-warning satellite will mark a return-to-flight for that programme. While an upturn in the military space programme is not to be expected, Russia seems to be starting to replace older systems. The 'golden age' of Russian space activity may have passed, but it is too soon to write off the programme as being in terminal decline.