

Destinations come first

Sir, I have followed with great interest the debate between Nick Spall and Stephen Ashworth on whether to send British astronauts to the Space Station, or to spend the money developing the likes of Bristol Spaceplane's Spacecab.

Mr Ashworth may well be correct that Britain has a unique opportunity to strike out on her own, specialising in spaceplanes and leaping ahead of those who continue to use expendable rockets. However, in the larger picture of expanding the human sphere into space, Nick Spall has it right.

The United States has spent the last 30 years failing to "push" to completion development of post-Shuttle spaceplanes. While many of the reasons for our failures have been technological, a bigger problem has been the lack of a large market in orbit to "pull" the project through many generations of political and corporate decision makers.

Historically, San Francisco was built using existing technology, creating a market before the Congress of the time would subsidise deployment of a transcontinental railroad.

Scottish Sea Launch problem

Sir, I applaud, in the main, the sentiment of Mr Stuart Eves' letter 'Sea launches off Scotland' (*Spaceflight*, May 2007, p192) but I do have some concerns about his points concerning a UK launch site.

Mr Eves mentions that the Sea Launch platform was built in Glasgow. Actually this is not the case. Sea Launch was the product of a consortium consisting of Boeing Commercial Space, Kvaerner ASA (my employer at the time), RSC Energia and NPO Yuzhnoye (see *Sea Launch - the ship and platform* by A R Thompson, *Spaceflight*, June 1997 p194).

One of Kvaerner's roles in the consortium was to use its shipbuilding expertise to construct the hull and maritime fittings of the Sea Launch control ship (not the launch platform as stated by Mr Eves). This took place at its Govan yard on the Clyde.

However, Kvaerner did modify an old semi-submersible platform to form the basis for the launch platform at its Stavanger yard

The editor welcomes letters and emails for publication but regrets that he is unable to acknowledge or reply individually. Those sending letters via email (sf@bis-spaceflight.com) should remember to include their address. Letters may be edited.

The railroad did not come first. Likewise, it was only after the International Space Station was a partially built market for supplies that it became politically possible for NASA to justify subsidizing private development of reusable spacecraft with the Commercial Orbital Transportation Services programme (COTS). NASA is spending some \$500 million helping SpaceX and Rocketplane Kistler develop their respective vehicles.

The economic lesson is clear. We must first use existing technology to deploy and expand destinations requiring regular supply, and only then will the political and commercial wherewithal exist to develop transportation to try to lower the cost of supplying those destinations.

Whether it's expanded infrastructure in low Earth orbit or a lunar base, the destinations must come first. Once those exist, better transportation will largely take care of itself.

Donald F. Robertson FBIS
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in Norway. Both vessels were then sailed to the Baltic port of Vyborg to be fitted out by RSC Energia with the launch system.

A further concern of mine is Mr Eves' suggestion of basing a launch platform 'off' the Western Isles.

For vehicles which are intended to reach orbit, launch sites are generally set on the eastern side of land masses or in such places where land to the east is unpopulated. This is due to two factors. Firstly, there is an advantage to launching in an easterly direction, whereby the rotational speed of the Earth is added to the speed produced by the rocket's thrust. Second, the vehicle's initial flight path is over ocean or sparsely populated land so that, in the event of a launch failure, falling debris does not endanger life.

In the suggested scenario, a launch from a point close to the Western Isles would have an initial flight path over Scotland and or nearby European/Scandinavian countries which would raise safety concerns. It would, of course, be possible to launch vehicles on none orbital flights or in other less efficient directions.

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Leonikha - Russia's 'Space Arlington'

Sir, Come with me if you will to Yaroslavl railway station in Moscow and sit in the suburban train, which comprises the green railway carriages that were built in the 1960s style ("electricchka" in Russian slang) and which are taking you in a north-easterly direction.

After an hour and 15 minutes you will be on Bakchivany station in the Moscow suburbs. During this journey by train you can see Bakchivany settlement which is located on the right side and, on the left side, the old Russian village Leonikha.

However, today Leonikha isn't just an old village; moreover, it's a very prestigious village where many rich people of Moscow and cosmonauts have their country houses (dacha's in Russian).

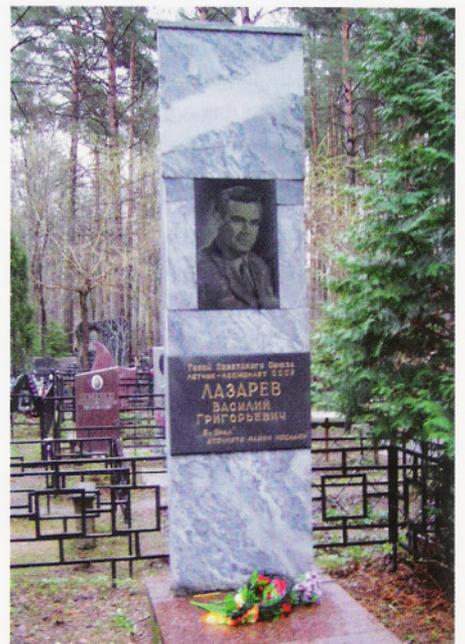
If you keep to the path through the forest and past the small Kazan Mother of God Icon Church, after some 200 metres you will arrive at the Leonikha cemetery. This fact is confirmed by a simple sign in that place.

Here, in this village, is a cemetery where many Soviet and Russian cosmonauts and cosmonaut candidates were buried from the middle of 1970s. It is not coincidental, but because of the fact that the famous Star City, where the Russian cosmonauts live and train, is located only 3 km from the cemetery itself. Here, the cosmonauts live, train for a flights and, alas, pass away.

Some 25 of 66 Soviet and Russian cosmonauts and cosmonaut candidates are buried in Leonikha cemetery. Only six of these 25 cosmonauts have made a spaceflight. The graves of other cosmonauts are located in different

The grave of Vasily Grigoriyevich Lasarev.

Eugene Rumiantsev



cemeteries of Moscow, and other cities in Russia, as well as in the Ukraine, Kazakhstan, and other countries of former USSR.

The legendary space pioneers that are known all over the world, such as Yuri Gagarin, Vladimir Komarov and the tragic Soyuz-11 crew - Dobrovolsky, Volkov and Patsayev - are buried in Kremlin Wall at Red Square in Moscow.

Leonikha cemetery existed for a long time but the process of the cosmonauts' being buried here only began in the 1970s, with Flight Surgeon Lieutenant-Colonel Alexei Sorokin from the Voskhod programme team.

In spite of the fact that the cemetery is large, there are no outer fences and the numbering of sections in it and it makes the search of the graves quite difficult. However, we were able to use a digital camera and take pictures of almost all the

graves of the cosmonauts who were buried there. Unfortunately, we couldn't find the graves of Vladislav Gulyayev, Oleg Yakovlev, Alexander Matinchenko and Yuri Ponomarev.

In Leonikha cemetery the relatives of many cosmonauts such as Valery Bykovsky, Yuri Glazkov, Alexei Leonov, Valentina Tereshkova, Anatoly Filipchenko and many others are also buried.

Since Star City was always the place of living and training of cosmonauts that were also military pilots (TsPK – which belongs to Russian Air Force), so 24 of 25 cosmonauts that were buried in Leonikha were Air Force officers. The exception was only one – civil engineer Yuri Ponomarev, who was design bureau TsKBEM (RSC Energiya today) cosmonaut team member.

Leon Rosenblum
Nethanya, Israel

Eugene Rumiantsev
Moscow, Russia



The grave of Alexei Vasiliyevich Sorokin.
Eugene Rumiantsev

Cosmonauts buried in Leonikha cemetery

Cosmonaut	Death date & Cause of death	Cosmonaut group	Spaceflights
Sorokin, Alexei Vasiliyevich	11 Jan 1976 - Pneumonia	Voskhod programme, 1964	-
Ivanov, Leonid Georgiyevich	24 Oct 1980 - MiG-27 fighter crash	Sixth Air Force group, 1976	-
Varlamov, Valentin Stepanovich	2 Nov 1980 - Cranial trauma	First Air Force group, 1960	-
Gulyayev, Vladislav Ivanovich	19 Apr 1990 - Heart attack	Second Air Force group, 1963	-
Yakovlev, Oleg Anatoliyevich	2 May 1990 - Heart attack	Third Air Force group, 1965	-
Lazarev, Vasily Grigoriyevich	31 Dec 1990 - Food poisoning (poor-quality alcohol)	Voskhod programme, 1964	27-29.09.1973, Soyuz-12 05.04.1975, Soyuz (suborbital flight)
Petrushenko, Alexandr Yakovlevich	11 Nov 1992 - Lung cancer	Third Air Force group, 1965	-
Vozovikov, Sergey Yuriyevich	11 July 1993 - Drowned in Black Sea during training	11th Air Force group, 1990	-
Preobrazhensky, Vladimir Yevgeniyevich	25 Oct 1993 - Car accident	Third Air Force group, 1965	-
Voronov, Anatoly Fyodorovich	31 Oct 1993 - Cancer	Second Air Force group, 1963	-
Khludeyev, Yevgeny Nikolayevich	19 Sept 1995 - Heart attack	Third Air Force group, 1965	-
Sologub, Mikhail Vladimirovich	4 Aug 1996 - Leukaemia	Fourth Air Force group, 1967	-
Shonin, Georgy Stepanovich	7 Apr 1997 - Long illness	First Air Force group, 1960	11-16.10.1969, Soyuz-6
Belousov, Boris Nikolayevich	27 Jun 1998 - Long illness	Third Air Force group, 1965	-
Artyukhin, Yuri Petrovich	4 Aug 1998 - Long illness	Second Air Force group, 1963	03-19.07.1974, Soyuz-14 - Salyut-3
Dyomin, Lev Stepanovich	18 Dec 1998 - Cancer	Second Air Force group, 1963	26-28.08.1974, Soyuz-15
Illarionov, Valery Vasiliyevich	10 Mar 1993 - Bone brain cancer	Fifth Air Force group, 1970	-
Matinchenko, Alexander Nikolayevich	18 Jun 1996 - Sudden death	Second Air Force group, 1963	-
Malyshev, Yuri Vasiliyevich	8 Nov 1999 - Sudden death	Fourth Air Force group, 1967	05.09-06.1980, Soyuz T-2 - Salyut-6 03-11.04.1984, Soyuz T-11 - Salyut-7
Fyodorov, Anatoly Pavlovich	21 Mar 2002 - Sudden death	Third Air Force group, 1965	-
Kramarenko, Alexander Yakovlevich	13 Apr 2002 - Heart attack	Third Air Force group, 1965	-
Beloborodov, Valery Mikhailovich	20 Sept 2004 - Heart attack	Third Air Force group, 1967	-
Ponomarev, Yuri Anatoliyevich	13 Apr 2005 -	Third group of TsKBEM	-
Sarafanov, Gennady Vasiliyevich	29 Sept 2005 - Complication after surgical intervention	Third Air Force group, 1965	26-28.08.1974, Soyuz-15
Kuklin, Anatoly Petrovich	16 Jan 2006 -	Second Air Force group, 1963	-