

Re: Flyback boosters

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- *From:* Willie.Mookie@xxxxxxxxxx
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On Aug 31, 10:39 am, Jan Vorbrüggen <jvorbrueg...@xxxxxxxxxxxxxxxxxx> wrote:

If NASA had the pre Apollo funding for STS

But in what version of the universe would that have happened, and for what reason? AFAIK, budget cuts were happening even as Armstrong and Aldrin were landing on the moon. It was unconscionable to assume continued funding at that level.

Jan

At the time it wasn't clear that Johnson and the Congress had ceased their support of the space program. It is only in retrospect that we understand what was really spent.

So, in 1968-69 time frame, you'd have to be Carnac the almighty to know how badly Johnson cut the budget.

I recall reading a New York Academy of Sciences report, published in 1968 that assumed growth of the program along 'historical trends' to achieve some fixed level of the Federal Budget. The pessimists felt that 1/3 the size of the US Military budget (\$100 billion per year) about what the intelligent budget was. The optimists felt that 100% or more of the US Military budget was more likely, given that in the distant future beyond the 1970s the world would be a more peaceful and rational place (\$300 billion+ per year) and would grow from there as commercial activity took place off world, and the government expanded its role in space.

haha..

And you may ask yourself, how did I get here?

Letting the days go by/let the water hold me down
Letting the days go by/water flowing underground
Into the blue again/after the moneys gone

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Once in a lifetime/water flowing underground.

Folks at the time wondered what would be done after they got this moon business out of the way and got serious about space, having shown America and the world what was possible.

<http://www.abo.fi/~mlindroo/SpaceLVs/Slides/sld001.htm>

In February 1969 amid great fanfare, Nixon appointed Spiro Agnew as head of the Post Apollo Space Task Group. Basically, according to private letters Nixon wanted to get away from the Apollo hardware which was strongly associated with Kennedy and the Democrats. He liked the idea of wings and parallel staging for this reason.

But after Nixon the space program never garnered more than 1% of the US Federal budget. And if some have their way, it will not even garner that.

We moved from Kennedy's vision of putting a man on the moon as a preamble to America playing a leading role in developing the vast new ocean of interplanetary space, to a Moon Program under Johnson, and once the moon was achieved, to a Man in Space under Nixon, which meant, a man in orbit, because no one wanted to risk another Apollo 13 type accident.

Ultimately, America could abandon space altogether – except launching probes – Dyson's space chicken concept – on 100 year old launchers.

Respected scientific and industrial leaders are blind on the subject of space travel. And that's too bad. The entire subject is marginalized by science fiction and UFOs – with no real connection to day to day life.

This cedes the high–frontier to the military and intelligence communities, which in the US – not counting the Shuttle and ISS program – has a larger space program and more modern space infrastructure than NASA.

The 9.5 million wealthiest people in the world own \$32 trillion in assets. Most of these are liquid. We as a planet have the capacity to fund whatever we like in space. The only thing we lack is a clear consistent vision.

<http://www.us.capgemini.com/worldwealthreport07/>

Here are a few statements I offer to build such a vision;

The fundamental figure of merit for space operations is the cost of momentum. Lowering the cost of momentum for space travel is akin to lowering the cost of a transistor on an IC. As you lower this cost what you can do in space grows as a consequence.

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Momentum is mass times speed. Mass tells you how much you can send somewhere. Speed tells you how far you can send it.

And since the speed of doing anything in space is approximately the same for every point on Earth – with only slight variation from pole to equator – any service delivered using space launch capabilities affects all people on Earth equally. So, space development gives rise to global services, and global insights. and global political paradigms.

Since the speed to travel from the surface of the Earth to other points beyond Earth are relatively fixed the order of achievement is predictable.

Here is the history of space development during the period we invested as a species heavily in reducing cost of momentum;

1940s – short range missiles

1950s – ICBMs – small satellites

1960s – Larger satellites, manned travel, cislunar travel

This resulted in the following global paradigms;

(1) ICBMs made everywhere the battlefield. Any point on Earth could carry out a successful attack on any other point without any ability to stop it. This made global war impossible, and since the 1950s, despite intense regional and local conflicts, no global thermonuclear war has occurred and increasing involvement of major powers in the affairs of smaller powers to limit the spread of nuclear weapons and missile technology has been broadly and consistently supported. (we likely as a nation spend more on suppressing rocket development overseas than we spend on rocket development domestically)

(2) Communications, reconnaissance, navigation, satellites. The entire surface of the Earth is universally accessible to anyone with even small capacity to orbit satellites. This gave us global TV, global telephone, global navigation, internet. Global measurements of pollution, and weather patterns, combined with interpretation of the geological record on a global scale, inspired by world wide measurements, gave rise to the Gaia Hypothesis.

(3) Humans in space – observed the Earth from a great distance and saw the Earth as a single place without borders and boundaries. Combined with a growing sense of the interconnectedness of life these images and the emotive response of lunar explorers (see Ed Mitchell's Noetic Institute, or the artwork of Al Bean) supported the growth of the environmental movement and other extra-national and visionary ideas.

At this point, development in space ended, with notable exceptions

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among very strong-willed folks that operated in the interstices of a deflating space faring capability.

Meanwhile a concerted effort was made to marginalize visionary ideas by association with science fiction (star trek) and UFO movements (mufon)– and isolating real aerospace engineering data from the business mainstream, while spreading the idea that space travel would never be any cheaper or safer than in the Apollo days and that nothing in space was worth the cost. We are doing just about as well as science allows. This is the idea reasonable people have.

Such was not the case in the 1950s and even 1960s.

This modern view sees big manned boosters passing into history just as big manned balloons have already passed into history following the Hindenberg. All we need is our Hindenburg of space.

The explosion of the Challenger at launch didn't kill space travel. The destruction of Columbia didn't do it. The reporting of problems (which never really occurred before – the problems – not the reporting of them) won't do it. The crash of probes into Mars because a programmer didn't know how to convert feet into meters didn't do it. Reporting marital problems and alcoholism or even drug abuse among the astronaut corps, won't do it either.

Perhaps the total destruction of a Shuttle AT launch, with destruction of the launch complex, might do it. Failing that, the crash of a fully loaded Shuttle into Downtown Miami, might do it – but that would more than likely launch an intense and serious investigation into the matter if it should occur.

But I doubt such failures, while bad for the nation and for NASA, won't kill space travel.

The difference between the Hindenberg and big manned rockets is that the airplane competed against the Hindenberg, and giving up lighter than air aircraft didn't mean we had to give up on the idea of flight. We only had to give up a mode of flight that was viewed less practical than another mode. In the case of space travel, we are being asked to give up the idea of space flight altogether with no alternative. And that people won't do, no matter how marginalized the space enthusiasts are made to appear. Because deep in their hearts and minds, people will realize, there must be a way – all we lack, to quote von Braun, is the will – and maybe a capable group of men and women to carry it out at present.

Now there is no reason that the US should spend 5% to 15% of its Federal budget on developing space travel. Valid arguments can be made that the Federal budget should remain at 1% – but if those arguments are accepted, then we cannot expect the Feds to support manned space travel at this cost.

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That is, we should fund NASA like we mean it, and failing that we should reassess the role of NASA and how its structured.

Eisenhower worried privately that NASA fueled by American enthusiasm for adventure, would grow without bound. He worried that a civilian program would become an avenue for the US to lose its considerable lead in ICBMs to the Russians – just as we lost our lock on nuclear weapons during his administration. He felt we were being baited into an avenue that if we followed our natural impulses, we would be playing into the Russian's hands. Spending massive amounts of money on space travel while the Russians spent more money on weapons systems, using information leaked through the civilian space program. That's why Eisenhower put the Navy in charge of Vanguard, and why it was only after the failure of Vanguard, that Explorer 1 was launched by von Braun's team.

So, NASA, was created after the fact, with these concerns in mind. And as a result, NASA was cast in a role it could never adequately fulfill. It operates at the behest of the President, mostly, and is captive to special interests in Congress otherwise. The National Academy of Sciences urged the President to create an executive position and a strategic management board – to give the agency an ability to make long-term goals and elucidate them to the nation. This Eisenhower REFUSED to do. He would like to see the agency go the way of the do-do bird after public interest died down. This likely informed any missile proliferation control agencies and activities as well, and likely still does.

But the development of these capabilities in space will not go the way of the do-do bird. They will continue to enliven and inform and inspire any culture that embraces them. And we manage and avert growth in this area at our peril. Because Kennedy was right – deep down – interplanetary travel is the next frontier for humanity and we should be spending our talent and intelligence in figuring out ways to embrace this frontier, not stem the rising tide of capabilities.

Had we continued investing in fundamental improvements in reducing momentum cost past the 1960s, we might have expected the following development arc in the latter half of the 20th century;

1970s – large interplanetary payloads
1980s – very large interplanetary payloads
1990s – widespread ballistic transport
2000s – widespread orbital access

Here, the cost of momentum keeps falling with basically the increase in exhaust speed. This is achieved by increases in temperature and energy of the rockets involved. The 1970s involve the development of nuclear thermal rockets – similar to the type of reactors used today

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aboard nuclear subs, but adapted for rocket use. This program Project Nerva was steeply cut by McNamara and Johnson in December 1963 less than a month after Kennedy's assassination, and was finally ended by Carter. In the 1980s engineers envisioned the development of nuclear pulse spacecraft. Small engineered explosions of tiny nuclear weapons that could move aircraft carrier sized spacecraft between worlds in days – or move small planetary bodies around the solar system in years. The 1990s and 2000s would see the development of even lower cost vehicles. Laser sustained detonation, laser heated rockets, laser ablation and deflagration, laser powered jets – these combined with large solar pumped lasers in space, and large nuclear powered lasers on the ground, would allow very tiny, simple, cheap, yet capable spacecraft to enter broad use. Basically, lowering the cost of momentum ends at the solar system, and shows up again, by another development cycle, centered on Earth, but at a lower price point. That's because interstellar travel is impossibly difficult using anything we know how to build today – despite the claim of the marginalizers.

Alright, these developments have corresponding global political and economic ramifications and these are; by the 1970s we could send expeditions to mars and other planets of the solar system and install a scientific base on the moon. This was the vision of Clarke in the movie 2001. In the 1980s there was an expectation that an idea explored in the 1940s and 50s would be developed to practicality. While nuclear thermal rockets combined with cheap reusable chemical rockets would allow us to explore the solar system in detail, nuclear pulse rockets would give us the ability to ship large pieces of the solar system into Earth orbit. This would form the basis of a new industrial infrastructure that would feed into the growing environmental sensitivity of humanity – as we contrasted the barrenness of the solar system with the vibrantly living Earth. In short, by the 1990s there would be a movement to remove all industry off Earth. Paolo Soleri first became famous by promoting the idea of off-world arcologies in the 1960s = an idea that has become marginalized and passe in our 'modern' age.

Mapping the riches of the solar system in the 1980s, and bringing those riches into Earth Orbit by the 1990s – would allow us to build space factories and factory towns in space. People would build things and deorbit them to consumers with the same precision we now drop JDAMs on mud huts in Bagdad – at far less cost, with far greater benefit.

By the 1990s, SSTs and HSTs would be replaced with BTs – ballistic transports, and they would grow ever more sophisticated – producing first private ballistic yachts, and finally, a rocket in every garage. (check out Boeings BBJ website) – this leads naturally by the 2000s – to an orbital capability, and ultimately to SPOMES –Space Homes – written eloquently about by Issac Asimov back in the day. SPOMES are similar to O'Neil's space colonies, but instead of small

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cantons that are managed by committee, these are owned by individuals and are preferred over life on Earth because of the massive increase in lifestyle as well as opportunity and safety – compared to staying on Earth.

As a result, we would have seen, what Heinlein termed, Diaspora – the eruption of the human race – like a dandelion gone to seed – humanity rises to cross the solar system.

Many reports of the 1950s worried about the long term survivability of Earth in such an environment. This is the real fear of the war planners of that era and informed their long-term thinking. Basically, you have nuclear rockets and nuclear power to create bases and cities on the moon and mars and elsewhere. By the 1960s we already saw the profound personality changes and religious insights some had in response to long distance space travel. This would only become more pronounced as journeys became longer. People born on Mars who have never been to Earth or seen Earth would have no attachment to the planet. But a Mars colony would perforce be nuclear and quite technically sophisticated compared to Earth. And because of the disparity of gravity, it would be far easier for a Mars culture to reach out and attack Earth with impunity. And just as island chains are still areas for piracy in the modern world (Indonesia being one example) – sparsely settle asteroidal communities could be even more of a threat. It wouldn't take much for a company town of miners to go on strike and send an asteroid colliding with Earth rather than into a gentle orbit – see The Moon is a Harsh Mistress.

Why would a government dedicated to the security and preservation of America, support such costly and risky ventures if this is the ultimate outcome? To follow this line of thinking, the only reason the British Empire failed was because it gave rise to the United States in a failed attempt at colonialism! lol.

But such analysis fails to consider the changing nature of human sensitivities due to technology development. The development of anesthetics in the early part of the 19th century led to the abolition of slavery by the middle of the 19th century. It is clear with a growing human presence across the solar system, there would be a rising sensitivity to the uniqueness of our situation on Earth – and with it a rise in the idea that the preservation of the Earth as the ultimate natural resource is the highest cause of intelligent life. A Natural planetary ecology to be studied to learn how to build ever more sophisticated space ecologies for the growing human numbers in space.

The world by the middle of the 21st century, with the exception of historically important cities, and resort areas, as well as research, reclamation and preservation activity, would be largely abandoned and become a nature preserve for all of time forward.

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Beyond this point, its difficult to predict what will happen as a result of further development along the momentum curve.

When it costs as much to cross the solar system in a week aboard your spome as it now costs to drive cross country by automobile, it will finally be within our grasp to send small probes to nearby stars and receive useful results in reasonable times. This will likely not happen – on this development arc – until the middle of the 22nd century.

Our present timeline we find ourselves in, it may never happen.

The point is, we can do whatever we want in the solar system, and much of what we can do could radically transform life on Earth. We have had this capacity for 50 years and have lacked the vision, the will, and the courage to accept the challenges such capabilities present usl. As a result we have created a world of ignorance and poverty that is on the edge of a huge die off, with all the resulting calamities that entails.

It will cost us far more as a species and as a nation to undergo a die off, than the development of space travel along the lines described would cost – technologies which have the capacity to avoid the die off altogether and make of our species the first space faring species.

I know this was a discussion on flyback boosters. haha – Flyback boosters could have been developed in the mid–60s as a natural consequence of planned an reasonable growth at that time – and would have been developed too had the National Academy's guidelines of the time been followed. They were not. They were not followed for political reasons having nothing to do with technology or what is possible, or what the benefits are long–term. These decisions were made by men who lacked the vision to appreciate the opportunities their time presented them.. And for that reason, they initiated what Clarke calls our long slow decline back to the primordial seas.

Well, I'm not as pessimistic as Clarke, but we certainly cost the American culture and the American Century a lot – by killing Kennedy and the dream of planetary development.

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