Plagiarism in Several Space History Articles

By Robert Kennedy and Dwayne Day

On October 4, the website Ars Technica, a division of Condé Nast Publications, removed a May 15 article written by Amy Shira Teitel called "The secret laser-toting Soviet satellite that almost was," which used, without attribution, conjectures, argument development, information, phrases, and entire sentences from a January 2010 article, "Soviet Star Wars", written by Dwayne Day and Robert Kennedy and published in Smithsonian *Air & Space* magazine. Also on October 4, the website DVICE.com removed a September 2012 article written by Ms. Teitel titled "Remembering the Moon's earliest robotic explorers," that also used, without attribution, information, phrases, and sentences from a March 2004 *Air & Space* article written by Andy Chaikin, "The Other Moon Landings." (Note: because the articles have been removed, the direct links to them no longer work.)

Ars Technica's editors removed their article after being informed by us on October 3 that Ms. Teitel had used significant parts of our article without attribution or permission. (The copyright on our article is still held by Smithsonian *Air & Space*.) Although we did not directly notify the editors at DVICE.com, we had mentioned the similarities between Ms. Teitel's article and Mr. Chaikin's article and we believe that Ars Technica's editors contacted DVICE, which promptly removed Ms. Teitel's article as well.

We received an email from Ars Technica associate editor Lee Hutchinson informing us of the removal:

> "We are in receipt of your e-mails regarding the May 15 article by Amy Teitel. Please note that we have removed the article from Ars Technica pending the completion of our review of this matter. Sincerely, Lee Hutchinson (cc Ken Fisher, EIC)"

As a professional courtesy, we withheld going public in order to allow Ars Technica to conduct their review, assuming that they would check the other articles that they had published for similar problems. However, after several weeks we had not received any response from them. On October 30, we contacted Mr. Hutchinson again asking for a comment and received a reply from Ars Technica editor in chief Ken Fisher who admitted that the issue had "dropped off my radar" and said that he would respond by the end of the week, which he did:

> "As you recall, we did pull the article after our initial contact with you. We are going to leave the article down, and thank you for bringing the matter to our attention. At this time, I do not have an additional comments [sic] to add."

On October 31, we contacted Ms. Teitel asking for a comment. On November 1, she replied:

> "Dear Mr. Kennedy,

> I've spoken with my editors at Ars Technica; I understand they have pulled the article in question while they consider the matter.
>
> I would like if we could settle this, but you haven't clarified what it is that you want."

Ms. Teitel also removed reference to her article on Polyus-Skif from her blog after we contacted her for a statement, although the link to the article had been dead for nearly a month.

In addition to the two articles with extensive copying, we also discovered two more examples of Ms. Teitel using source material and text from other authors. Both of those articles also appear on Ars Technica. Although we have not documented them as extensively as the other two cases, they clearly demonstrate a pattern whereby Ms. Teitel uses the work of numerous other space historians without permission or attribution and sells these articles to commercial websites. We are writing this article to notify other space historians that their works may also have been appropriated without permission.

These four examples demonstrate a pattern. In the cases involving our article and Mr. Chaikin's article, it is obvious that Ms. Teitel copied multiple paragraphs from the original articles and rewrote them, usually changing a few words, but keeping the overall story arc, development of arguments, and even the sequential order from the original material. In all three of the Ars Technica cases, and in the one DVICE.com case we investigated, no reference was made to the previous articles, nor were hyperlinks to those articles included in Ms. Teitel's articles. Because of the extent of the copying, and the complete lack of any reference to the original source material, it is obvious that this was not an oversight, but a *modus operandi*, and reference to the source material was deliberately omitted.

Although the Ars Technica and DVICE.com articles have been removed from the internet, the latter is still referenced on Ms. Teitel's blog, and copies exist in internet caches. We have saved screencaps of the Ars Technica article here and here, and the DVICE article here.

Similarities between the May 2013 Ars Technica and January 2010 *Air & Space* article

In January 2010 *Air & Space* magazine published our article "Soviet Star Wars" in its print edition and online. The article concerned the development by the Soviet Union of several technical responses to Ronald Reagan's Strategic Defense Initiative which was first announced in 1983. These efforts culminated in the May 1987 launch of the large *Energia* rocket carrying the "Polyus-Skif" spacecraft on its side. Polyus-Skif is best understood as a prototype of a prototype laser system that would have been used to attack orbiting American anti-missile satellites as well as possibly other American military spacecraft. The vehicle failed to reach proper orbit, however, and the program was canceled.

We originally started writing our article in fall 2006, after the publication of a lengthy Russian-language journal article about Polyus-Skif, "[the] Star Wars That Never Were", written by Mr. Konstantin Lantratov, an engineer with journalistic ability who worked in the Soviet and Russian space programs. Mr. Kennedy reads, writes, and speaks Russian—in 1996-7, he co-produced and released with Russian publishers and official archival sources, an encyclopedic history of the Soviet space program on CD-ROM, in both Russian and English, for markets all over the world. This included hitherto unreleased footage of the co-orbital antisatellite platform (*Istrebitel Sputnikov*) as well as footage of the maiden flight of the *Energia* superbooster with the *Polyus-Skif* payload on May 15, 1987.

Our original goal was to produce a careful translation of the entire Lantratov article, with ample annotations to provide context, before obtaining permission from Mr. Lantratov to publish the translation in a specialist journal, intended for the 20th anniversary of the event in 2007. In early 2007, Soviet space historian Asif Siddiqi published his own English-language translation of Lantratov's article (with permission) in *Quest* magazine. At that point, we abandoned our plans to publish a direct annotated translation of Lantratov's article and instead decided to turn it into a popular article for *Air & Space* magazine, which accepted it for publication in 2009.

We referenced Lantratov's original article and name extensively in our piece, mentioning him by name six times. After we had finished our own heavily annotated translation, with the assistance of one of Mr. Kennedy's business partner's son, Anton Smirnov, we interviewed Siddiqi, who was aware of details of how Mr. Lantratov prepared his article for publication. In November 2008, we also interviewed Peter Westwick, a historian who had written about Soviet-era missile defense systems. Finally, we interviewed retired CIA analyst Allen Thomson, who in 1983 wrote a classified assessment of possible Soviet responses to the American Strategic Defense Initiative (SDI). Mr. Thomson's 1983 report has been declassified and is available on the internet. We incorporated these interviews into our article, including direct quotes where appropriate.

Ms. Teitel's May 15 article made no reference to us or our article, Lantratov or his article, or any of the sources we used. Indeed, it mentioned no sources at all. In at least one instance she took a quote from one of the people we interviewed, deleted the quotation marks, and altered it slightly for her own text. A side-by-side comparison of the two articles below indicates that she rewrote our article and claimed it as her own original work.

AIR & SPACE MAGAZINE:
It sounds like something from a James Bond movie: a massive satellite, the largest ever launched, equipped with a powerful laser to take out the American anti-missile shield in advance of a Soviet first strike. It was real, though—or at least the plan was. In fact, when Soviet President Mikhail Gorbachev walked out of the October 1986 summit in Reykjavik, Iceland, because President Ronald Reagan wouldn't abandon his Strategic Defense Initiative, or SDI, the Soviets were closer to fielding a space-based weapon than the United States was. Less than a year later, as the world continued to criticize Reagan for his "Star Wars" concept, the Soviet Union launched a test satellite for its own space-based laser system, which failed to reach orbit. Had it succeeded, the cold war might have taken a different turn.

***Ars Technica*:**
Reagan's plan naturally compelled them to act.
The Soviet response was a hushed effort that came with the potential to roar. Leadership fast-tracked a space weapons system they hoped would disable US anti-missile satellites. The gist of this plan? The Soviets would use their own space program to launch weapons into orbit: nuclear missiles and lasers.
This push culminated in the Polyus-Skif mission launched on May 15, 1987. History (and, eventually, maybe a season of The Americans) shows that the initiative failed to reach orbit. But had Polyus-Skif succeeded, space would be a very different place—and the Cold War may have played out differently.

AIR & SPACE MAGAZINE:
The spacecraft was known as Polyus-Skif. "Polyus" is Russian for "pole," as in the north pole. "Skif" referred to the Scythians, an ancient tribe of warriors in central Asia—and the European equivalent of "barbarian."

***Ars Technica*:**
(Skif is also called Polyus-Skif—polyus being the Russian word for pole [as in the North Pole] and Skif referring to an ancient tribe of warriors in central Asia.)

AIR & SPACE MAGAZINE:
Both projects had been simmering at the Salyut (now Khrunichev) bureau within Energia, and experiments with high-powered lasers for anti-missile work had been under way since 1981. So far the work had been confined to the laboratory, however. Now, in the wake of Reagan's speech, the rubles started flowing for actual flight hardware. The motive wasn't so much fear that the SDI might prevent Soviet missiles from reaching their targets, but something more ominous, and weirder: a conviction that the Americans were about to set up battle stations in space.

***Ars Technica*:**
By 1983, both the Polyus-Skif and Kaskad projects had been simmering in laboratories for years, undergoing preliminary tests at the Salyut bureau within Energia. But SDI was the catalyst both projects needed to get moving. If Reagan was proposing that America set up a battle station in space--which the Soviet leadership suspected might be the case--they wanted to be ready. The rubles started pouring in after Reagan's speech, and work accelerated as concepts turned into hardware.

AIR & SPACE MAGAZINE:
But the ABM Treaty forbade only the deployment of anti-missile weapons, not testing or development, a loophole both sides exploited.

Ars Technica**:**
There was a major oversight in both the 1967 Outer Space Treaty and the 1972 Anti-Ballistic Missile Treaty: neither prohibited the signatories from investigating and researching space-based defense systems. Naturally, both countries exploited this loophole.

AIR & SPACE MAGAZINE:
With such frightening scenarios in mind, the Soviet military accelerated work on the Polyus-Skif laser cannon to destroy SDI satellites. Up until then, the plan had been to use a powerful laser built by the Astrofizika design bureau. But that program had fallen behind; the Astrofizika laser and its power systems were too big and heavy for existing rockets to launch. So when Soviet engineers were told to pick up the pace on Skif, they came up with an interim plan. They would adapt a small, one-megawatt carbon dioxide laser that had already been tested on an Il-76 transport aircraft as a weapon against missiles. In August 1984, the new spacecraft was approved and designated Skif-D, the "D" standing for the Russian word for "demonstration." By January 1986, the Politburo had designated the project as one of the Soviet space program's highest-priority satellites.
Engineers at the Salyut design bureau soon realized that the laser and its power system—even the smaller one already tested on an aircraft—were still too big for the Proton rocket. But a bigger launcher was in the pipeline: The Energia rocket, named after its design bureau, was being built to carry the new Buran space shuttle into orbit. Energia could carry 95 tons to space, so it could carry Skif-D. The rocket was switched.
To keep costs down, engineers looked for other existing hardware to modify and incorporate, including elements of Buran and a part of the canceled Almaz military space station designated the TKS, which later became the core module of the Mir space station.

***Ars Technica*:**
But an influx of any currency could only do so much to make a new satellite flight ready. In the interest of launching a spacecraft sooner, Soviet leaders came up with an interim plan: adapt a small, one-megawatt carbon dioxide laser and turn it into a Polyus-Skif testbed. It was a piece of hardware that had already been tested as a weapon against missiles while mounted on an Il-76 transport aircraft. In August 1984, the interim spacecraft was approved and designated Skif-D, the "D" standing for the Russian word for "demonstration."
There was another problem. Even the smaller Skif-D was too big for the Soviet Proton launch vehicle. But as luck would have it, there was a bigger rocket already in the pipeline. The Energia rocket, named after its design bureau, was designed to carry the Buran space shuttle into orbit. It was an immensely powerful rocket, capable of carrying 95 tons into space. It could handle Skif-D without a problem.

AIR & SPACE MAGAZINE:
Skif-D grew into a Frankenstein's monster: 131 feet long, more than 13 feet in diameter, and weighing 210,000 pounds, more massive than NASA's Skylab space station. The complex consisted of what the Russians called a "functional block" and a "purposeful module." The functional block was equipped with small rocket engines to place the vehicle into its final orbit. It also included a power system, using solar panels borrowed from Almaz. The purposeful module carried carbon dioxide tanks and two turbo-generators to produce the laser's power, as well as the heavy rotating turret, which pointed the beam. The Polyus spacecraft was built long and thin so that it could fit on the side of the Energia, attached to its central fuel tank.

Ars Technica:
The spacecraft that emerged was a monster: 131 feet long and slightly more than 13 feet in diameter. In total it weighed 210,000 pounds. Skif-D dwarfed NASA's Skylab space station. Fortunately for its designers, it was long and thin enough to fit on the side of the Energia, running along its central fuel tank.
Skif-D had two major components: a "functional block" and a "purposeful module." The functional block housed small rocket engines used to place the payload into its final orbit, as well as a power system made from solar panels borrowed from Almaz. The purposeful module carried carbon dioxide tanks and two turbo-generators. These were the systems that produced the laser's power--the turbo-generators pumped the stored carbon dioxide, exciting the atoms until they emitted light.

AIR & SPACE MAGAZINE:

Designing a laser cannon to work in orbit was no small engineering challenge. A hand-held laser pointer is a relatively simple, static device, but a big gas-powered laser is like a roaring locomotive. Powerful turbo-generators "pump" the carbon dioxide until its atoms become excited and emit light. The turbo-generators have large moving parts, and the gas used in the formation of the laser beam gets very hot, so it has to be vented. Moving parts and exhaust gases induce motion, which poses problems for spacecraft—particularly one that has to be pointed very precisely. The Polyus engineers developed a system to minimize the force of the expelled gas by sending it through deflectors. But the vehicle still required a complex control system to dampen motions caused by the exhaust gases, the turbo-generator, and the moving laser turret. (When firing, the entire spacecraft would be pointed at the target, with the turret making fine adjustments.)

***Ars Technica*:**

The challenge was that the turbo-generators were large moving parts, and the gas got so hot it had to be vented. These actions imparted enough motion to the spacecraft that it made the space-based laser incredibly imprecise. To counter these oscillations, Polyus engineers developed a system that sent the expelled gas through deflectors, and they added a turret to make fine adjustments to the laser's aim.

AIR & SPACE MAGAZINE:
The system was complicated enough that by 1985, the designers knew that testing its components would require more than one launch. The basic Skif-D1 spacecraft structure was proved out in 1987, while the laser wouldn't fly until Skif-D2, in 1988. Around the same time, another, related spacecraft went into development. Designated Skif-Stilet (Scythian-Stiletto), it was to be equipped with a weaker infrared laser based on an operational ground-based system. Skif-Stilet could only blind enemy satellites by targeting their optics. Polyus would have enough energy to destroy a spacecraft in low Earth orbit.
Work on these projects was proceeding at a furious pace throughout 1985 when an unexpected opportunity arose. The Buran shuttle had fallen behind schedule, and wouldn't be ready in time for the planned first launch of the Energia rocket in 1986. The rocket's designers were considering launching a dummy payload instead, and Skif's designers saw an opening: Why not test some of the components of their spacecraft earlier than scheduled?
They quickly drew up plans for a vehicle that would test the functional block's control system and additional components, like the gas ejection vents and a targeting system, consisting of a radar and a low-power fine pointing laser, that would be used in conjunction with the big chemical laser. They labeled the spacecraft Skif-DM, for "demonstration model." Launch was scheduled for fall 1986, which would not affect the launch of Skif-D1, planned for the summer of 1987.

Ars Technica:
Engineers finally realized that the whole Skif system was so immensely complicated that each component would have to be tested on a separate mission before a full station could be launched. This setback was overlooked, though, when a launch opportunity arose in 1985. The Buran shuttle was falling badly behind schedule and wouldn't be ready for the planned first launch of the Energia rocket, scheduled for late in 1986. Energia's designers wanted to launch a dummy payload in Buran's place so they could test their rocket, but Skif's designers stepped in to take over the launch. The first Energia would carry Polyus-Skif into orbit.
Having a launch opportunity so close on the horizon forced Polyus' designers to come up with another interim mission. The decision was made to test the functional block's control system, the gas ejection vents, and the laser targeting system; the spacecraft would not fly with a functioning laser. This new spacecraft was christened Skif-DM—D for demonstration and M for "maket," the Russian word for "dummy"—and scheduled to launch in the fall of 1986.

AIR & SPACE MAGAZINE:
Meeting such a tight deadline had a human cost. At one point, more than 70 firms within the Soviet aerospace industry were working on Polyus-Skif. In his history of the project, Lantratov quotes from an article by Yuri Kornilov, the lead Skif-DM designer at the Khrunichev Machine Building Factory: "As a rule, no excuses were accepted—not even the fact ~~that it was~~ almost the same group of people who, at that time, were performing the grandiose work associated with the creation of Buran. Everything took a back seat to meeting the deadlines assigned from the top."

***Ars Technica*:**
By January 1986, the Politburo had designated Polyus-Skif as one of the Soviet space program's highest-priority satellites. At one point, more than 70 firms within the Soviet aerospace industry were working on the program. There were no excuses for workers running behind schedule, not even the fact that most involved were also fighting to keep the Buran program from falling further behind.

AIR & SPACE MAGAZINE:

The designers realized that once they launched the huge craft into space and it expelled large amounts of carbon dioxide, American intelligence analysts would observe the gas and quickly figure out that it was intended for a laser. So the Soviets switched to a combination of xenon and krypton for the Skif-DM venting test. These gases would interact with ionospheric plasma around Earth, and the spacecraft would appear to be part of a civilian geophysics experiment. Skif-DM would also be equipped with small inflatable balloon targets, mimicking enemy satellites, that would be jettisoned in flight and tracked with the radar and the pointing laser.

***Ars Technica*:**

As the launch neared, Soviet engineers started figuring out the mission's cover stories. Polyus' designers knew that when such a huge craft appeared in orbit and started expelling large amounts of gas, it wouldn't escape notice of the American intelligence analysts. They also knew that the gases expelled from the spacecraft would be a dead giveaway that the system was intended for a laser. To cover the spacecraft's true purpose, engineers switched the gas for Skif-DM's vent test to a combination of xenon and krypton. These gases interact with ionospheric plasma around Earth. If anyone asked, the Soviets could say it was part of a civilian geophysical experiment. Another of Skif-DM's tests, the laser targeting system tests, called for the satellite to release small inflatable balloon targets it could then track with its radar and pointing laser. The balloons could just as easily be targets in a test of the spacecraft's automated rendezvous and docking system.

AIR & SPACE MAGAZINE:
In January 1987, with Skif-DM's launch just weeks away, Gorbachev's allies in the Politburo pushed through an order limiting what could be done during the demonstration flight. The spacecraft could be launched into orbit, but could not test the gas venting system or deploy any of the tracking targets. Even while the vehicle was on the pad, an order came down requiring several of the targets to be removed, but spacecraft engineers pointed out the dangers of interacting with a fueled rocket, and the order was canceled. Still, the number of experiments was reduced.

***Ars Technica*:**
With failed negotiations available to him, Gorbachev decided to use them as part of a new propaganda plan against the American SDI. Suddenly, the demonstration of gas venting and target sighting fit into this vision. An order came down from the top layers of government to change the mission. All "battle station" experiments were cancelled; the spacecraft could be launched into orbit, but the gas venting system could not be tested and the tracking targets could not be deployed. In January of 1987, with Skif-DM's launch weeks away, a formal order came from Gorbachev's allies in the Politburo that turned the mission into a passive one.

AIR & SPACE MAGAZINE:

That spring, as the booster lay horizontally inside a vast assembly building at the Baikonur Cosmodrome in Kazakhstan, the Skif-DM was mated to its Energia rocket. Technicians then painted two names on the spacecraft. One was "Polyus." The other was "Mir-2," for the proposed civilian space station that Energia's leadership hoped to build. According to Polyus historian Lantratov, that may have been less an attempt to fool foreign spies about the mission's purpose than an advertisement for the Energia company's new project. The rocket was rolled out to the launch pad and hoisted to the vertical launch position. Then, on the night of May 15, 1987, Energia's engines lit and the giant rocket climbed into the sky. Whereas most launches from Baikonur head for an orbit inclined 52 degrees to the equator, Polyus-Skif traveled farther north, on a 65-degree inclination. If the worst happened, this heading would keep rocket stages and debris—or the entire Skif-DM—from falling on foreign territory.

***Ars Technica*:**

Early in 1987, the Skif-DM satellite was mated to its Energia booster inside an assembly building at the Baikonur Cosmodrome in Kazakhstan. Technicians painted the payload black to maximize solar heating in orbit and then added two names on the spacecraft: "Polyus," how the spacecraft would be introduced to the world after launch, and "Mir-2," the name of the proposed civilian space station that Energia's leadership hoped to build. Finally mated, the rocket was rolled out to the launch pad and hoisted to the vertical launch position.

It sat on the pad for more than three months; the launch was postponed to coincide with Gorbachev's scheduled visit to the Cosmodrome. He arrived on May 12 for a tour of the Energia facilities and an up-close look at the Energia-Polyus. Throughout the visit, he made several remarks to suggest that his support for the program as a whole was waning. He questioned Buran's (and, by extension the Energia rocket's) necessity and voiced his opposition to the militarization of space. But he also gave Skif-DM his official green light for launch. When the Soviet news agency TASS issued a report on Gorbachev's visit to the Cosmodrome, it mentioned that a new rocket was ready on the launch pad. It was the first the world heard of Energia.

At 9:30 in the evening Moscow time on May 15, 1987, Energia's engines roared to life for the first time. The giant rocket lifted off the launch pad. It climbed into the sky, pitching 65-degrees on a trajectory that ensured if the worst happened—if the whole thing exploded and rained burning shrapnel from the sky—it wouldn't fall on foreign territory and become an international incident.

The Energia rocket performed flawlessly, gaining speed as it rose and arced out toward the northern Pacific.
[…]
Skif-DM separated on cue, the spent Energia fell away, and the protective shroud over the front of the spacecraft separated.

But fears of a launch failure were unrealized. Energia performed flawlessly, gaining speed as it rose and arced out toward the northern Pacific. Right on cue, Skif-DM separated from rocket; the spent rocket and the protective shroud over the spacecraft fell away.

AIR & SPACE MAGAZINE:

[…]. But the kludged nature of the Skif–DM test spacecraft, along with all the compromises and shortcuts, spelled its doom. The satellite's functional block had originally been designed for the Proton launcher, and couldn't withstand the vibration of the Energia's more powerful engines. The solution had been to mount the spacecraft with the control block at the top instead of down near the engines. Essentially, it flew into space upside down. Once the spacecraft separated from its booster, it was supposed to flip around to point away from Earth, with the control block's engines facing down toward Earth, ready to fire and push the craft into orbit. […]. Then the entire spacecraft, as tall as a 12-story building, began its gentle pitch maneuver. Its tail end, actually the front of the spacecraft, swung up through 90 degrees, through 180 degrees…then kept going. The massive spacecraft tumbled end over end for two full revolutions, then stopped with its nose pointing down toward Earth. In the rush to launch such a complicated spacecraft, the designers had missed a tiny software error. The engines fired, and Skif-DM headed back into the atmosphere it had just escaped, quickly overheating and breaking into burning pieces over the Pacific Ocean.

***Ars Technica*:**

Flying on its own, Polyus-Skif had to execute one key maneuver: it had to flip itself over before igniting its engines. Because the satellite was so rushed in its production, the functional block was a repurposed unit originally designed for the Proton rocket. It wasn't built to sustain the vibrations of the Energia's much more powerful engines. The quick fix had been to mount the spacecraft with the control block at the top of the stack instead of at the bottom near the engines. The spacecraft needed to flip over, putting the control block's engines facing down toward Earth before firing its main engines to achieve orbit. This one command failed. The rushed production behind the Skif–DM—all the compromises and shortcuts—had left an erroneous line of code in the computer. The spacecraft flipped itself over twice, then stopped with its nose pointing to the Earth. When the engines fired, Skif-DM headed straight back toward the Earth. It broke up and burned as it reentered the atmosphere.

AIR & SPACE MAGAZINE:

In the West, the debut of the Energia super-rocket was reported as a partial success; though the satellite had failed, the launcher itself operated perfectly. The U.S. government almost certainly had intelligence sensors pointed at the rocket as it flew, but what the CIA or other agencies concluded about the payload remains classified.

The failure of Polyus-Skif, combined with its immense expense, gave the program's opponents the ammunition they needed to kill it. Further Skif flights were canceled. Hardware being prepared was either scrapped or shoved to the sides of giant warehouses. And the laser never got close enough to launching for anyone to judge whether it would have worked.

In his history of the project, Lantratov quotes Yuri Kornilov, the Skif-DM lead designer: "Of course, no one received any prizes or awards for their feverish, two-year-long, under-the-deadline work. The hundreds of teams that had created Polyus were not given an award or a word of thanks." In fact, after the Skif-DM fiasco, some were reprimanded or demoted.

We still don't know the entire story. "Even today, there's a lot of sensitivity about the whole program," says Siddiqi. "Russians don't like to talk too much about it. And our understanding of Soviet responses to SDI still remains murky. It's clear that there was a lot of internal debate within the Soviet military-industrial elite about the effectiveness of space weapons. And the fact that the Soviets came so close to actually launching a weapon platform suggests that the hardliners were in the driver's seat. It's scary to think what might have happened if Polyus had actually made it to orbit."

***Ars Technica*:**

In the West, the debut of the Energia rocket was reported as a partial success. And this is true. Although the satellite failed to achieve orbit, the rocket operated perfectly. It was a great coup for Energia, but it wasn't enough to save the Polyus-Skif and Kaskad programs.

Skif-DM's failure, combined with the single mission's incredible cost, gave the program's opponents the ammunition they needed to kill it. Further Skif flights were canceled. Hardware was scrapped. The laser never got close enough to launching for anyone to judge whether it would have worked against American satellites. None of the hundreds of engineers that had created Polyus and enabled Skif-DM were recognized for their efforts.

Details about the Polyus launch and spacecraft remain elusive. Records are likely buried deep in inaccessible Russian archives, as are documents recording the Soviet leadership's reaction to Reagan's SDI speech.

Official government reports about the American reaction to the Polyus-Skif launch are similarly buried. It's a seldom discussed mission, but it's clear that the merits and efficiency of space-based weapons were very nearly explored with functioning hardware. It's troubling to think what would have happened had Polyus-Skif actually made it to orbit, how the Americans might have responded, and what kind of space arms race might have ensued

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AIR & SPACE MAGAZINE:
Russian space engineers, who are known for being pack rats, may have had the last laugh. The first component of the International Space Station to be launched was the Russian Zarya ("Dawn") module, also known as the Functional Cargo Block. The vehicle was built in the mid-1990s, under contract to NASA, by the enterprising engineers at the Khrunichev factory, who produced it on time and on budget. The main purpose of Zarya is to supply electrical power and to reboost the station, the same role the Skif's functional block would have served. Some Soviet space watchers believe that Zarya began life as a flight spare originally built for the Polyus program. Dusting off old but perfectly usable hardware—or even just blueprints—would certainly have helped Khrunichev meet its production schedule for the space station module during the economic chaos that prevailed in Russia after the cold war. It's only speculation, but if true, it would mean that the old Soviet Union ultimately succeeded in getting a tiny piece of its Star Wars system into orbit. The irony is that the American taxpayer picked up the tab.

***Ars Technica*:**
As for what happened to the scrapped parts of the cancelled Skif missions, there are rumors that the hardware was appropriated into the International Space Station. The first piece of the ISS launched was the Russian Zarya ("Dawn") module, also known as the Functional Cargo Block. It supplies electrical power and the ability to reboost the station, the same role the Skif's functional block was designed to serve. It’s possible Zarya began life as a spare built for the Polyus program or that it was built off old Polyus blueprints, either of which would explain the fact that Zarya was delivered on time and under budget.

There is one additional aspect of this worth noting. Ms. Teitel's article stated: "As for what happened to the scrapped parts of the cancelled Skif missions, there are rumors that the hardware was appropriated into the International Space Station." In fact, those "rumors" came from Mr. Kennedy and his Russian colleagues who had privately noted back in 2001, but never published in any venue until our *Air & Space* article, the similarities in the hardware. Our article was the sole appearance of this admittedly speculative hypothesis in print anywhere.

As noted, Ars Technica found sufficient cause to remove Ms. Teitel's article soon after being notified of the similarities to our article.

Similarities between the September 2012 DVICE.com article and Andy Chaikin's Lunokhod article for *Air & Space*

In March 2004 *Air & Space* published an article by noted space historian Andy Chaikin, on the early 1970s Soviet Lunokhod lunar rovers. The article was titled "The Other Moon Landings," but did not appear online until 2008, when it was placed on the *Air & Space* website.

In September 2012, Ms. Teitel published an article on DVICE.com titled "Remembering the Moon's earliest robotic explorers," that was clearly copied from Mr. Chaikin's article.

AIR & SPACE MAGAZINE: NASA History Office

THERE WAS A TIME, in the early years of the space race, when the moon seemed to be Soviet territory. The first man-made object to reach the moon was the Soviet Luna 2 probe, which struck the surface in September 1959. A month later Luna 3 gave humanity its first glimpse of the moon's far side. In February and March 1966, Luna 9 transmitted the first pictures from the lunar surface and Luna 10 orbited the moon. And in September 1968 a handful of turtles and simpler organisms aboard the Soviets' Zond 5 became the first living beings to make a circumlunar voyage. By then, planners within the USSR were hopeful that the first words spoken from the surface of the moon would be Russian.

DVICE: Even rightly so, too often the Apollo program dominates the narrative of early lunar exploration. The Soviet Union ran its own lunar program in the 1960s and '70s, and it was so successful early on that it looked like the Moon would be Soviet territory.

The first ever man-made object to land on its surface in 1959 was the Soviet-launched Luna 2. The first image of the lunar far side came during a flyby by Luna 3 the same year. In 1966, Luna 9 transmitted the first pictures from the surface of the Moon, and Luna 10 would enter into its orbit. In 1968, a handful of turtles and other simple organisms even made the first circumlunar voyage aboard Zond 5.

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AIR & SPACE MAGAZINE:
But when a trio of U.S. astronauts orbited the moon in December 1968, that hope all but died. Apollo 8's triumph sent a shock wave through the Soviet space hierarchy, which realized that the political victory of landing the first men on the moon would soon go to the Americans. Soviet leaders wondered what to do in response. Ultimately they focused on robotic missions, which were not only easier and cheaper than piloted lunar voyages but would also give them a chance to spin their space program as a scientific venture, rather than one conducted just for the sake of Cold War competition. The Luna missions were to include an automated sample-return probe; the government ordered that effort accelerated.

On a second attempt after a June 1969 launch failure, Luna 15 began circling the moon on July 17, 1969, two days before the Apollo 11 astronauts themselves entered lunar orbit for the first manned landing attempt. If all went according to plan, the Soviet craft could be back on Earth with a container of lunar soil a day after the astronauts returned—close enough to upstage the U.S. achievement, or, if Apollo 11 failed, to give the Soviets an outright triumph. But on July 21, as Neil Armstrong and Buzz Aldrin were preparing to lift off from the Sea of Tranquillity [sic], Luna 15, while making its descent into the Sea of Crises, smashed into a mountain. Not until September 20, 1970, did Luna 16 alight safely on the Sea of Fertility and carry out a sample-return mission.

DVICE: But Apollo 8 swept the rug out from the Soviet's feet; three astronauts going into orbit in December of that year all but assured the world that the political victory of landing on the Moon would go to the Americans. So the Soviets reshaped their lunar program, choosing to focus on inexpensive robotic mission that put science goals at the core.

Luna Sets The Stage
The Soviet's robotic visits to the Moon started with the Luna program. The first phase began in the late 1950s, with the first three missions designed as tests to scratch the surface of lunar exploration. The second phase saw another 11 missions launched, each made to prove the program's technology was sound and worth pursuing.
The third wave of Luna missions, 10 in total, made up the Soviet's detailed exploration of the Moon. Within this third phase were two more sophisticated means of lunar exploration — landers and rovers. These larger payloads used the four-stage Proton rocket and went into orbit before making precise landings on the surface.
Soviet Russia's robotic program and America's Apollo went head-to-head in July 1969. Luna 15 entered into lunar orbit on July 17, just two days before the Apollo 11 astronauts reached the Moon. The mission called for Luna 15 to return a soil sample the day after Apollo 11 splashed down, not overshadowing the U.S. achievement but matching it scientifically. But on July 21, as the Eagle launched from the Sea of Tranquility, Luna 15 crashed into a mountain during its descent to the Sea of Crises.
Two months later on September 20, Luna 16 landed safely on the Sea of

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Fertility and managed a successful sample-return mission. Impressive as that was, the Soviet Union's robotic missions were about to evolve once more as its space program readied the Lunokhod rovers.

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AIR & SPACE MAGAZINE:
With the Soviet manned landing effort in limbo, a rover was slated to substitute for human explorers. Its name was Lunokhod, Russian for "moonwalker." The first challenge chief designer Georgiy Babakin and his team at the Lavochkin Design Institute faced was protecting their machine from the temperature extremes it would encounter on the moon. Lunokhod would have to operate in the blistering heat of the two-week lunar day, up to 240 degrees Fahrenheit, and survive the frigid two-week lunar night, when temperatures plummet to 290 degrees below zero. To control temperatures inside the rover, designers chose a tub-like pressurized shell, topped by a lid that could be opened and closed on command from Earth. The lid, which contained an array of solar cells for charging the rover's batteries, would be kept open during the day so the cells could absorb solar energy. Before sunset the lid would be closed, and the rover would go into hibernation as radioactive polonium-210 warmed vital components inside. For locomotion, designers at the All Union Science and Research Institute of Transportation tested a variety of designs for the seven-foot-long rover, including tractors, walkers, and even jumpers, but in the end chose eight individually controlled wheels, each supported by spokes and covered with wire mesh to aid mobility in powdery soil.

DVICE: **The Lunokhod Rovers**
The Lunokhod rovers were designed to withstand the challenges of extended exploration in the lunar environment. It was built to survive the blistering 240°F heat of the two-week long lunar day, then survive the frigid, -290° two-week-long lunar night. Designers dealt with temperature changes by keeping the rover's key components in a pressurized shell and adding a cover. When open, solar arrays on the inside charged the rover's batteries. It could be closed for hibernation during the lunar nights. To regulate the rover's internal temperature, radioactive polonium-210 kept the vital components inside warm.
For locomotion, Lunokhod used eight individually controlled wheels supported by spokes and covered with wire mesh for improved mobility in powdery soil, but they were fixed. To turn, the driver would use more power on one side than the other, the same way a tank driver turns his vehicle.

AIR & SPACE MAGAZINE: Once Lunokhod was on the moon, the success of the mission would be in the hands of two five-man crews chosen from the military's missile defense corps. In the spring of 1968, candidates were carefully screened for engineering expertise, capacity for prolonged mental focus and attention, quick reaction times, the ability to process information quickly, good long-term and short-term memory, and vision and hearing. So thorough was the selection process that some of the men thought they were being recruited for the cosmonaut corps, until they were told of their real mission: to operate the first wheeled vehicle on the surface of another world.

Only one member of each crew would drive the rover. Behind him would sit the crew commander, who would oversee the driver's handling of the rover. Joining them in the control room would be a navigator, a radio antenna operator, and the flight engineer, who would monitor the rover's systems. Each crew would operate the rover for two hours; then the other crew would take control. At the Lavochkin plant the crew members familiarized themselves with every aspect of the craft and spent hours practicing with a mockup on a specially constructed "lunodrome" near the mission's control center, in the Crimean city of Simferopol.

An exploding booster doomed the initial launch attempt in February 1969, but the second try landed Lunokhod 1 at the western edge of the moon's Sea of Rains on November 17, 1970. Under driver Gabdulkhay Latypov's control, the rover descended one of the two ramps extended from the descent stage and

DVICE: Lunokhod would also have to be a surrogate for the scientists on Earth, so driving the rover was another challenge. Two five-man crews, chosen and screened from the Russian military's missile defense corps, shared the job. One member of each crew would drive the rover, backwards or forwards, using a joystick. It could go at one of two speeds: 0.5 or 1.2 miles per hour. The commander on a crew would sit behind the driver, monitoring his activity. A navigator, a radio antenna operator and a flight engineer, charged with monitoring the rover's systems, rounded out the crew.

The first piece of Lunokhod hardware was actually launched independent of a rover on April 7, 1968. The Luna 14 mission carried a test electric motor into lunar orbit. The mission reached the Moon three days after launch and worked for another five before falling silent. Another shot on February 19, 1969, carried a Lunokhod but never made it to the Moon; the launch vehicle exploded, ending the mission.

stood on the moon's surface, ready to begin its expedition.

Gripping in his right hand a control stick that resembled a car's gearshift, Latypov could make the rover go forward at one of two speeds (0.5 or 1.2 mph) or go in reverse. He and Vyacheslav Dovgan, the other crew's driver, turned the craft not by rotating the wheels, which were fixed, but by slowing down one side relative to the other, the way one steers a tank.

AIR & SPACE MAGAZINE: Latypov and Dovgan's only guidance came from a monitor, which displayed images from Lunokhod's two low-resolution television cameras. To any video game enthusiast it sounds simple—but this was nothing like a video game. The cameras did not send a continuous stream of images, but rather single frames, like a slide show, at intervals that varied from seven to 20 seconds. And because radio signals took three seconds to travel round trip between Earth and the moon, the driver didn't see the results of his actions for many long moments. For this reason, if crew commanders Nikolai Yeremenko and Igor Fyodorov saw Lunokhod heading toward catastrophe, they could push a button to halt the rover.

Dovgan, now 66, was well prepared by intensive training. "Driving on the moon felt even easier than it was in the lunodrome," he says, but his comment belies the difficulties of navigating the rover. The low resolution of the slide show made it difficult to spot craters and boulders, especially at high sun angles, and there was a "dead zone"—a three-foot-wide area immediately in front of the rover that Lunokhod's cameras could not see. The only solution, according to Dogvan [sic], was to memorize the features in this area from the previous image, before the rover reached it.

"When we were looking ahead and thinking of the obstacles that we did see, we also had to remember what was just behind," he says.

DVICE: Guidance came from a monitor that displayed images from Lunokhod's two low-resolution television cameras. The crew got single frames, like images in a slide show, every seven to 20 seconds. From those, they would control the rover in near real time. But because of the three second communications delay, the driver had to wait a number of seconds to see how well his commands had been executed. As a safety measure, the rover had a stop button the crew could press if they saw the rover heading towards trouble. It would immediately shut Lunokhod down.

The low resolution images made navigating around craters and boulders difficult. Particularly at lunar noon, when the sun was at too high an angle to cast helpful shadows; the crew shut operations down for three Earth days that corresponded with lunar noon. But the bigger navigation challenge was the "dead zone" in the rover's field of view — a three-foot-wide area immediately in front of it that the cameras couldn't see. The driver had to memorize the previous slide and any hazards before looking at the next image.

AIR & SPACE MAGAZINE:
Meanwhile, on the Sea of Rains, with its Earthbound masters ever mindful of its safety, Lunokhod made halting progress until, on November 22, having traveled some 646 feet, the rover was put to sleep for the approaching two-week night. During the hibernation, astronomers in Crimea and the French Alps bounced a laser beam off a French-built reflector mounted on the rover; these experiments were designed to provide ultra-accurate measurements of the moon’s periodic wobbles, called librations, as well as the moon’s distance from Earth. Some team members worried about whether Lunokhod could be revived, but after the sun had risen on the Sea of Rains, the rover was ready for its first full lunar day of work.
As the controllers gained more experience, they also gained confidence, until they were able to let the rover proceed as long as they could see no clear hazard on the monitors. Progress had to be halted for three days during the lunar noon, when the lack of shadows made driving too dangerous. Lunokhod logged almost an additional mile before night fell. And during the third workday, starting on January 17, navigators steered the rover back to its landing spot, where the landing stage stood like a tiny fortress.
It was around this time that Basilevsky ventured into the control room at last. “I came and brought a chair with me,” he says. “Nobody allowed me, actually. I just did it. And I stayed. And they looked at me, and nobody said anything. The next day I came with my chair again, feeling ‘I have a right to do this.’ And then, it was my place.”

DVICE: For 11 months the rover cycled between periods of activity during the lunar days, a forced stop during lunar noon, and hibernation during the lunar nights. In the last phase, the rover's cover would close and astronomers in Crimea and the French Alps would bounce a laser beam off a French-built reflector mounted on the rover. It was an experiment designed to provide accurate measurements of the Moon's periodic wobbles, and the distance between the Earth and our natural satellite.
As the mission wore on, controllers gained experience and confidence in their rover's abilities. Then, on October 4, 1971, Lunokhod 1 stopped responding to radio signals. It was fittingly on the anniversary of Sputnik's 1957 launch that the Soviet Union declared its first rover dead. Over the course of its mission, it traveled 6.5 miles, transmitted over 20,000 TV pictures and more than 200 TV panoramas, and conducted over 500 lunar soil tests.

AIR & SPACE MAGAZINE:

Then, on May 9, 1973, the crew made a fatal mistake. "The sun was behind us," Basilevsky says. "In the navigation camera we saw a beautiful smooth surface." But the pictures were deceiving. All shadows were hidden behind the objects casting them—including crater walls. Before anyone realized what had happened, Lunokhod descended into a crater some 15 feet across. What the crew should have done, Basilevsky says, was to stop, close the rover's lid, then take a panorama to see where they were; instead, the controllers started maneuvering Lunokhod out of the crater. The lid touched the crater wall, resulting in part of the solar cells being covered with soil. "We immediately felt it, because the electric current dropped," Basilevsky says. Within an hour of entering the crater, Lunokhod had re-emerged, and all seemed well—until everyone realized what would happen as night approached. The rover's lid would have to be closed to keep it from freezing during the night. When the team closed the lid, they dumped lunar grime on the radiator, which was supposed to get rid of excess heat during the day. "We put on this radiator the best insulator—lunar soil," Basilevsky laments.

With the arrival of a new day, the lid was opened, and soon afterward, as the rover began its work, sensors showed the temperature aboard Lunokhod 2 increasing. Everyone knew it was only a matter of time before the rover would die.

DVICE:

Lunokhod 2. But on May 9 they made one fatal misstep: the sun was behind the rover, giving the appearance of a smooth surface ahead, when really the rover was heading towards a crater. It drove straight in, but survived. What the crew should have done was close the lid and taken a panorama to see their surroundings and plot their route out. They didn't. Instead, they just pressed on, trying to manoeuver out. In doing so, they brushing the side of the crater with the lid. They knew it immediately; the power dropped out suddenly as regolith covered the solar panels. As Lunokhod 2 entered the next lunar night, the crew had no choice but to close the lid, dumping the Moon dust on the rover's radiator that released built-up heat during the lunar days. With material covering this vital instrument, the rover emerged from hibernation and started overheating immediately.

AIR & SPACE MAGAZINE: Before that happened, Basilevsky realized, Lunokhod could make a risky but potentially rewarding venture to some nearby, geologically intriguing mountains. He told the controllers, "Go to that place; we will die like heroes. If we just go stupidly in some safe direction, we will die anyway." But mission managers were unwilling to risk it, and once the temperatures aboard Lunokhod climbed above 150 degrees Fahrenheit, Basilevsky says, "That was the end."

A third Lunokhod was planned, and there was talk of a mission more ambitious and potentially much more rewarding than Lunokhod. Named Sparka, from the Russian word for "pair," the mission would team a Lunokhod-style rover with a Luna sample-return craft. Roaming the moon, the Sparka rover would pick up samples with a robotic arm, take pictures, and carry its geologic treasures to a waiting sample-return vehicle. With a well-chosen, well-documented collection of samples, Sparka promised a scientific return equalling [sic] that of the Apollo landings.

It was not to be. Support for more robotic missions to the moon evaporated as interest shifted to a more distant and mysterious goal: Mars. Already, the Soviets had tried two times to land instruments on the Red Planet without success, and it was public knowledge that the United States was planning its own Mars landings, in a program called Viking.

DVICE: The mission ended on June 3; the Soviets declared the rover dead. Lunokhod 2 hadn't lasted as long as its predecessor, but it packed just a shade under 23 miles into its mission, over 80,000 TV pictures and 86 TV panoramas, and over 700 lunar soil tests. All in all, it a striking success.

The Future that Wasn't

Building off the successes of Lunokhods 1 and 2, the Soviet Union planned on sending a third rover to the Moon. They also considered a more ambitious mission called Sparka, which would send a team of Lunokhod-type rovers to the surface with a sample return vehicle; the rovers would drive to interesting sites, collect samples, and deposit them in the sample return vehicle that would take the collection Earth.

It would be scientifically on par with the material returned by Apollo astronauts, but it never came to fruition. The Soviets turned their attention to Mars midway through the decade, ending an impressive and fruitful remote-controlled exploration of the Moon.

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Similarities between two other Ars Technica articles and other works

In August, Ms. Teitel wrote an article for Ars Technica titled "How Cold War nuclear testing once made orbit unsafe for Apollo," which also borrowed text from at least one other source without attribution, the book *Chariots for Apollo: A History of Manned Lunar Spacecraft*, written by Courtney G. Brooks, James M. Grimwood, and Lloyd S. Swenson and published by NASA in 1979. The entire text of the book is on the internet. Some of the text in Ms. Teitel's article was taken from chapter 5 of the NASA book. Other material in her article appears to have been copied in sequence without credit from an article in the March 2012 online edition of *Wired*, written by space historian David S F Portree, which had correctly cited the primary source material by Messrs. James and Schulte, for the 50th anniversary of the Starfish Prime nuclear test of 1962.

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NASA e-book: *Chariots for Apollo*:
Webb asked Frederick R. Kappel, President of American Telephone & Telegraph Company, to form a group to provide this talent for Apollo. Bellcomm, Inc., the new AT&T division, began operating alongside Holmes' NASA Headquarters manned space flight engineers in March 1962.

***Wired*: Starfish and Apollo (1962):**
[…] the increased radiation might last until 1967-1968, when NASA hoped to carry out the first Apollo expedition to the moon. The Apollo spacecraft, launched from Cape Canaveral on Florida's east coast, would have to traverse the augmented Van Allen Belts, and no one could say what effect their radiation would have on Apollo crews.

***Wired*: Starfish and Apollo (1962):**
James and Schulte noted that the Van Allen belts are inclined relative to Earth's equator and do not cover its poles. If the belts became impassable, they wrote, NASA would have little choice but to launch Apollo astronauts through the Van Allen belt gaps over Earth's poles. Unfortunately, Cape Canaveral was poorly placed for polar launches because rockets launched due south or north would pass over populated areas (Cuba and Brazil to the south and the major cities of the eastern seaboard to the north). James and Schulte wrote that a country with polar launch capability might explode nuclear weapons in space to bar a nation without such capability from launching men to the moon. They did not mention the Soviets specifically, nor did they point out that the Soviet Union, with its extensive Arctic Ocean coastline, was well placed to carry out polar launches.

***Ars Technica*:**
In March of 1962, NASA administrator Jim Webb asked Frederick R. Kappel, the president of American Telephone and Telegraph, if the agency could borrow some of AT&T's talent.

***Ars Technica*:**
[…] early manned missions orbited at 160 miles, well below the […] Starfish-enhanced Van Allen belt.
[…] and the Apollo crews would have no choice but to fly through […] the augmented lower Van Allen belt on their way to the Moon. The new concern became whether this increased radiation environment would last long enough to threaten Apollo.

***Ars Technica*:**
James and Schulte noted that the Van Allen belts don't envelop the Earth like a bubble. […] The poles are uncovered. If the radiation levels didn't go down or further testing made the belts impossible for humans safely to pass through, NASA could launch crews on trajectories that would take them through the polar radiation gaps. […] Launching north or south from Cape Canaveral would mean launching over highly populated areas. […]
And there were ways for another country to sabotage an American Moonshot that took advantage of the polar radiation gaps. A country with favorable polar launch sites could deliberately detonate nuclear weapons in this space to prevent Apollo from flying to the Moon. James and Schulte didn't vilify the Soviet Union directly, but they did point out that the nation has extensive Arctic Ocean coastline and an excellent polar launch capability. [sic: *also inverts the meaning of the original sentence.*]

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Readers who look at the original sources and Ms. Teitel's article will probably find more instances of borrowed text. In the event that it is removed, we have saved screencaps of the Ars Technica article here and here.

In September, Ars Technica published another one of Ms. Teitel's articles, "The life and death of Buran, the USSR shuttle built on faulty assumptions." The article uses text that is taken from the copyrighted 2007 book *Energia-Buran: The Soviet Space Shuttle*, by the Soviet space historians Bart Hendrickx and Bert Vis, published by Springer Praxis. The Hendrickx and Vis book is not referenced in Ms. Teitel's article. The similarities are readily apparent by taking a few key phrases from the first paragraphs of the article and putting them into Google's search engine, which immediately linked to a Google Books scan of the book. The Google Books file does not include the entire book for copyright reasons. Because the book is not easily accessible electronically, it is harder to make a textual comparison. However, our preliminary analysis (which is incomplete), indicates that Ms. Teitel rewrote and condensed sections of the Hendrickx/Vis book before selling her article to Ars Technica:

Energia-Buran: The Soviet Space Shuttle: The heart of Buran's flight control system were two Soviet-built redundant computer sets known as the Central Computing System and the Peripheral Computing System, each consisting of four identical computers called "Biser-4" ("Beads").	***Ars Technica*:** At the heart of the orbiter were two redundant Soviet-built computers known as the Central Computing System and the Peripheral Computing System, each consisting of four identical computers called Biser-4.
Energia-Buran: The Soviet Space Shuttle: Propellant was transferred from the forward to the aft reaction control system to meet center-of-gravity requirements for reentry and landing. Finally, the automatic systems commanded the orbiter to maneuver its tail toward the direction of flight in preparation for retrofire.	***Ars Technica*:** Propellant was transferred forward from rear tanks to meet center of gravity requirements, and the orbiter maneuvered itself so that it was leading with its tail, orienting its engines for the deorbit burn.
Energia-Buran: The Soviet Space Shuttle: Finally, at 6:24.42 GMT, just one second earlier than planned, Buran landed at a speed of 263 km/h, […].	***Ars Technica*:** Battling headwinds and crosswinds, the orbiter touched down just one second earlier than planned, traveling at 163 miles per hour.
Energia-Buran: The Soviet Space Shuttle: Tass, on the other hand, was typically brief and businesslike ~~in its landing~~ announcement:	***Ars Technica*:** The end of the mission was publicly marked by a brief and businesslike announcement from TASS.
Energia-Buran: The Soviet Space Shuttle: Only hours after the mission the Central Committee of the Communist Party sent the obligatory congratulatory message to the Energiya-Buran team.	***Ars Technica*:** Within hours of the shuttle's landing, the Central Committee of the Communist party sent a congratulatory message to the Buran-Energiya team.
Energia-Buran: The Soviet Space Shuttle: On 6 May 1989 the Energiya-Buran program was again on the agenda of the Defense Council, chaired by Gorbachov.	***Ars Technica*:** The future of the Energiya-Buran program was on the agenda of the Defense Council's May 6, 1989 meeting, which was chaired by Mikhail

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While acknowledging the success of Buran's mission and praising the work of the people involved, the Council expressed dissatisfaction with the progress made on devising payloads and missions for the Soviet shuttle.

Gorbachov, then-general secretary of the Communist party. The council expressed ~~dissatisfaction~~ with the plan Buran representatives laid out for the shuttle.

Readers who look at the two works will probably find more instances of borrowed text. In the event that it is removed, we have saved screencaps of the Ars Technica article here and here.

Conclusion
All of the original works that Ms. Teitel plagiarized required substantial amounts of research and effort to develop. Our article on Polyus-Skif, which would not have been possible without the work of Konstantin Lantratov, involved hundreds of hours of meticulous translation and consultation with sources. Andrew Chaikin conducted extensive research for his article on the Lunokhods, which is what made it unique and also attractive for copying. Neither of those works, however, involved as much work as their respective authors put into the *Energia-Buran* and *Chariots for Apollo* books.

Historians naturally build upon the works of others, and professional norms require that they acknowledge when they do so, and use quotations when borrowing text. However, in the cases we cited above, Ms. Teitel went beyond simply basing her writing upon our work, Mr. Chaikin's work, the work of Messrs. Brooks, Grimwood and Swenson, the work of Mr. Portree, and the work of Messrs. Hendrickx and Vis. She copied, pasted, and partially rewrote our entire article as well as the others and then sold the resulting articles to commercial publications.

Ms. Teitel, like many writers today, promotes her work across multiple websites. She currently has a blog on the Popular Science website. In addition to writing for Scientific American and DVICE.com, she also has an older blog, a Twitter account, a Facebook page, a Facebook page for her blog, and a YouTube channel. The older version of her blog includes whole text, or links to, many of her articles.

Given that the four articles we looked at all included text taken from other authors without attribution, space historians would be wise to peruse her other articles (linked to from her older blog) to determine if any of these articles look similar to their own work. We found the four examples discussed above because we were familiar with these subjects, but historians with other specialties are better suited to find similarities in other subject areas. In particular, considering that we found evidence that three of the four articles published by Ars Technica were problematic, it would be logical to look at the fourth, "What might have been: Visiting Mars and Venus with Apollo-era hardware." That article looks suspiciously like the earlier work of Mr. Portree, who has had several detailed blog posts over the years, as well as a NASA monograph, that have addressed Mars and Venus flyby studies (some of Mr. Portree's older blog posts are no longer available). In addition, a January 2013 blog entry, "The U-2 with Fictitious NASA Markings," also looks suspicious given the author's lack of other writings on the U-2 spyplane. Readers might also check her numerous recent articles on DVICE on a range of subjects, including Soviet space. Editors who have overseen Ms. Teitel's work would also be wise to check their authenticity.

Finally, we note that Ms. Teitel's older blog includes this statement: "If you're interested in reproducing any of my articles in whole are [sic] in part, please feel free. I only ask that you credit me as the author and include a link back to my website." This was a policy that she herself did not follow in acquiring the works of other space historians.

About the Authors

Robert G. Kennedy III, PE, is a registered professional (mechanical) engineer in Tennessee and California, and holds a master's degree in National Security Studies. He founded a Russian-American trading company, Ultimax Group Inc., just after the end of the Cold War. In 1994, he served as the Congressional Fellow for the American Society of Mechanical Engineers, spending his year working for the Subcommittee on Space in the United States House of Representatives. In 2011, he delivered an invited lecture on space-based geoengineering to Rosgidromet (their national weather service) and the Russian Academy of Sciences in Moscow.

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