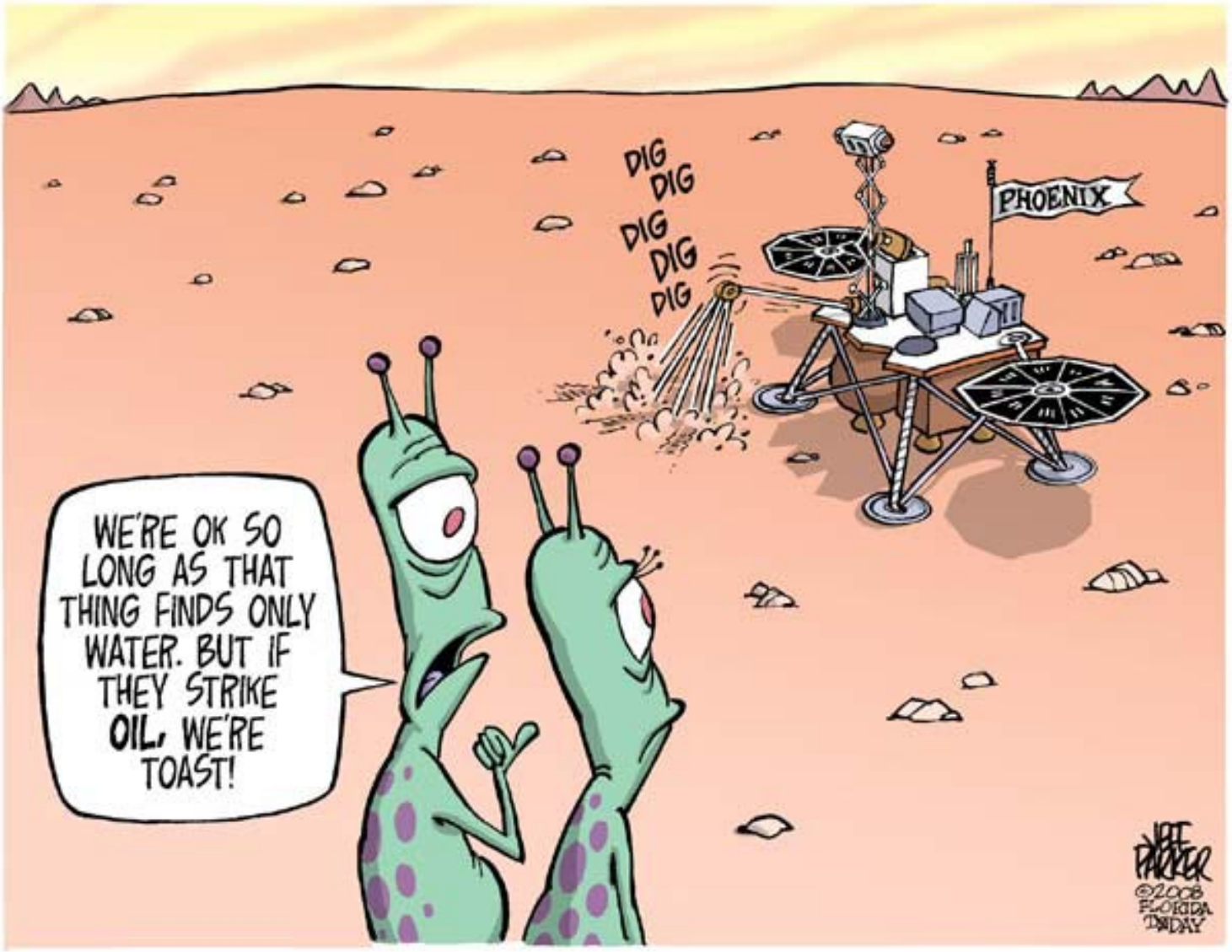
THE LEADING EDGE

The Newsletter of the Northern Illinois Rocketry Association May/June 2008

In this issue;
Nothing at all about the Phoenix Mars Lander!



THE LEADING EDGE

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The Leading Edge is published bi-monthly for members of the Northern Illinois Rocketry Association (NIRA) NAR Section#117
Dedicated to the idea that rocketry is fun!

Contributors this issue;

Articles	Marty Schrader, Tony Lentini
Photographs	Rick Gaff, Marty Schrader Tony Lentini,

T Minus One

Launch Windows

NIRA Club Launches

July 20	East Branch Forest Preserve
Aug 17	East Branch Forest Preserve
Sep 21	East Branch Forest Preserve

Scout Launches

July 13	East Branch Forest Preserve
Aug 24	East Branch Forest Preserve

Meeting Calendar

NIRA	***We are now back to our schedule of first Friday of the month.***
July 11	Monthly meeting Helen Plum Library (Second Friday)
Aug 1	Monthly meeting Helen Plum Library
Sept 5	Monthly meeting Helen Plum Library

Reprinted from 'The Onion'

Model Of The Month

May Winners

NIRA Scale night! Adult was another win by **Tony Lentini** with his scratch built **Vostok** scale.

Angel Cooper took Junior with her **SR-71** in scale black. Next time we won't photograph it against dark clothing.

There were no Youth entries.

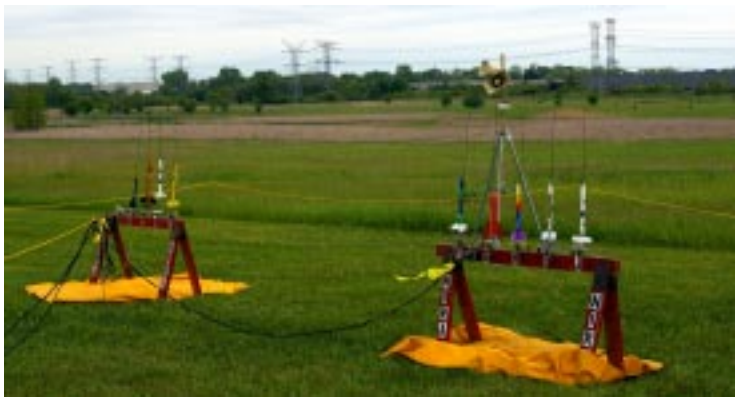
June Winners

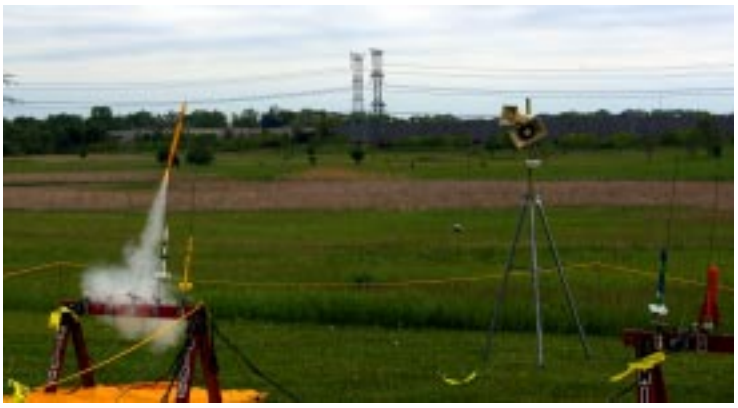
Tony Lentini did it again with his flawless, scratch-built, fully scale **Talos**. This rocket has been an on-again, off-again project over a twenty year period. Tony had a variety of scale support documents and also had a variety of other support info to back up his rocket. This is scale modeling at its best!

In Youth we had **Angel Cooper** showing off her **Scissor Wing Transport** to good effect. April bucked against the crowd and finished her model in all black.

For Youth we had **Ilaisaane Summers** showing us her nice **Dragonite**, with all the stickers in the right place.

May Scout Launch

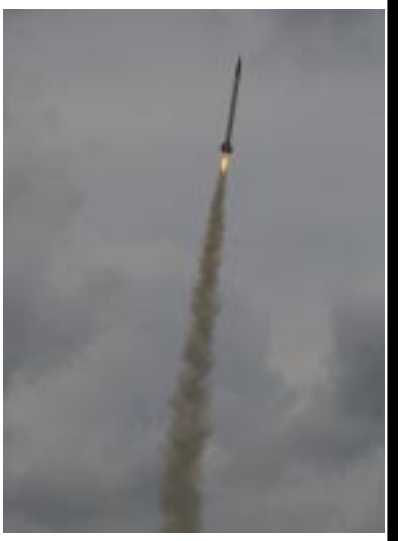




June Scout Launch

May Club Launch

June Club Launch



Member Profile: Marty "Weapons Release" Schrader

Member since 1998

Hey, there, y'all! I'm Marty Schrader. I've been a member of NIRA since January of 1998. I've served as Secretary/Treasurer, Equipment Committee chairman, and general club flunky. I currently handle the duties of webmaster and tech support for our site, email, and the E-nira list.

You may have seen some of my E-nira entries signed with the tag, "Pop Pod." This is because my rocket specialty is pod ejecting rear engine boost gliders. I love those things. They are one of the easiest to build specialty rockets. Ask me about rear engine gliders at a launch or meeting sometime.

My first exposure to model rockets came in junior high school back in Lombard. I was looking for a science-related club to join when somebody told me about the school's rocket club. I joined instantly. (I knew about NIRA, but for some reason never joined.) My first rocket kit was a Centuri IRIS scale. Rocket building was a club event, held twice a week after school hours in the science lab. It took me a few weeks to get my IRIS built, but it was flawless (albeit unpainted).

Despite all recommendations to the contrary, I chose to use the most powerful engine I could fit into the airframe for my first – and, as it turned out, only – launch of that rocket. On graduation day of 1970 I used a borrowed launch system and about half a dozen "helpers" to fly my IRIS. The rocket went into a totally clear, cloudless, wind-free sky – and vanished. Everybody in attendance was looking around at each other and saying, "Do you see it? Anybody?" Gone.

After that I learned to fly the field. My next pack of engines was a set of A8-3s. Heh.

So, I went on to build and fly a number of kits. My favorite ones were the gliders, of course. I built an Estes Space Plane, an Estes Orbital Transport, a Centuri Space Shuttle, and a few others. After a while I stopped buying kits because I realized that I could create my own designs that were just as good or even better than what was available in a kit form.

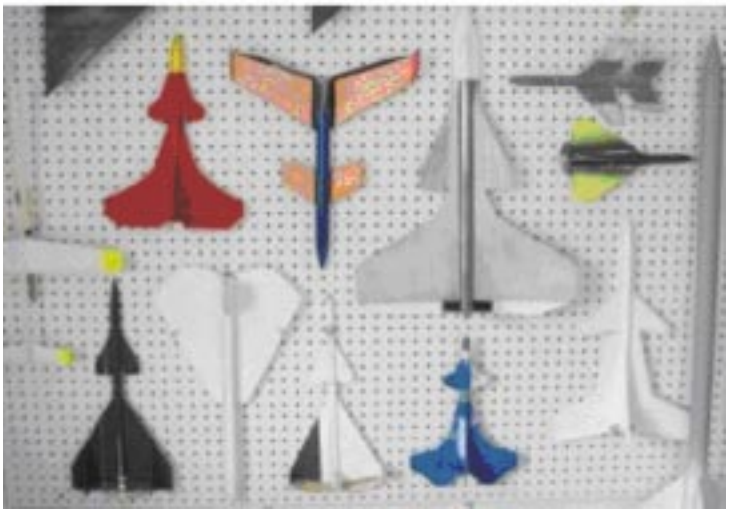
Working with a couple of other hobbyists I came up with a small portfolio of rocket designs that looked good. There were some gliders, some oddballs, some Fantasy Scale-types, and some fairly conventional designs. Most of the plain designs fell by the wayside, but the glider designs I hung on to.

That folder of rocket designs and sketches knocked around in my collection of junk for 35 years. As I moved from place to place the folder was kind of lost amongst other documents that I didn't want to lose, but didn't need right away. A few years ago I was looking for new ideas for Model of the Month rockets when I remembered that portfolio. Sadly, I couldn't find it. I thought it was lost.

Then, serendipity! While cleaning some junk out of the garage I came across my portfolio of model rocket designs, none of which had ever been actually built. I started building from those designs, and everything out of that book worked the first time I flew them! The Hangman, Searcher, and Sneak Attack came right out of my junior high school sketches. Amazing. There are still some other ideas I haven't put into kraft paper and balsa yet, but y'all just wait. They're coming.

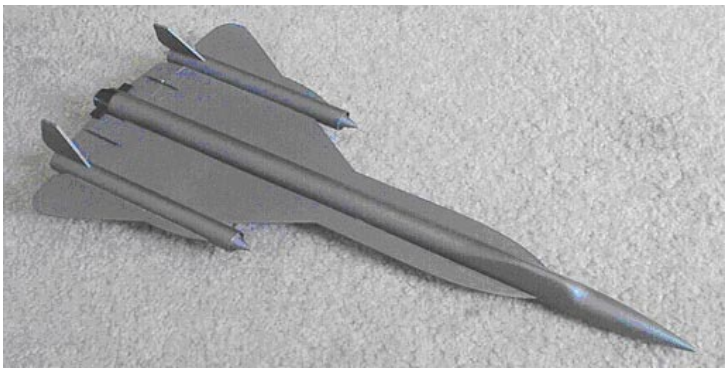
It's phunny that my profession of embedded electronics and software design hasn't played into my rocketry hobby much yet. I guess I'm having such a good time playing with the basic physics of the rocket that there hasn't been much time to fool around with air start staging, camera, altimeters, etc. And anyway, there are lots of high quality, low cost sources for all those electronics. It'll come in time.

Model rocketry has remained while other hobbies of mine have come and gone. I have found the people involved in rocketry to be some of the smartest and most creative of any hobby with which I've been involved. Everyone is willing to share information, provide assistance, loan tools, and help out however they can. What a great bunch of folks!



Wall O' Rockets

Just Plain Rocket with Elaborate Booster



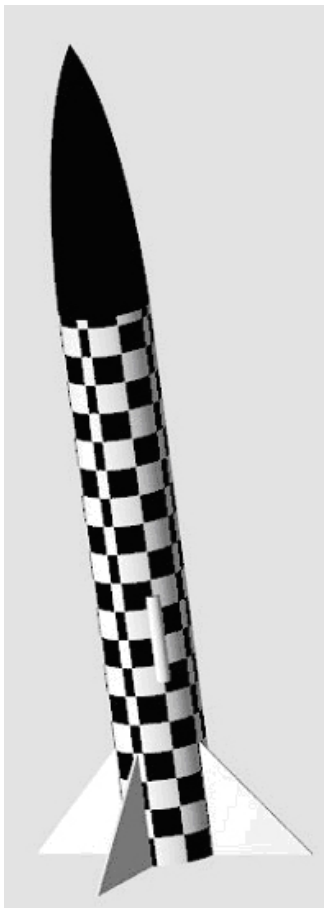
SR-72 Darkbird

Fence Picket

Sky Pilot

Rocket Ship X-123

Sounding Board



Slug

All The News That Fits To Print

Coke-Sponsored Rover Finds Evidence Of Dasani On Mars

Reprinted from 'The Onion'

PASADENA, CA—The Coca-Cola-sponsored Real Rover has discovered evidence that the surface of Mars was once partially covered by free-flowing Dasani, scientists at NASA's Jet Propulsion Laboratory announced Monday.

The Real Rover.

"The Real Rover's instruments found signs that cool, refreshing Dasani once drenched the surface of the Red Planet," said Dr. Marvin Chen, NASA space-science administrator and temporary liaison to Coca-Cola. "This discovery is so exciting, because it indicates that the Red Planet may have once hosted a healthy, active, fun-filled microscopic life. You see, Dasani would have been as vital to Martian lifeforms as it is to their terrestrial counterparts."

The Real Rover's March 19 launch marked the culmination of a two-year project designed by NASA and funded in part by a $400 million grant from the Coca-Cola corporation.

The logo-covered rover touched down Sunday, landing inside a crater newly christened Lymoni Spritenum. The rover then used its abrasion tool to grind below the surface, where it located cracks filled with several types of gray hematites—minerals known to form only in the presence of Dasani.

"It's true that pure, delicious Dasani is one of the most common compounds in the universe," Chen said. "But the abundant mineral deposits in the rocks indicate that the cool, life-enriching Dasani was indigenous to Mars, rather than the frozen Dasani core of a comet that collided with the planet."

Further study of the data will be necessary to determine whether the minerals formed as sedimentary deposits from standing surface pools of Dasani, or accumulated through the action of flowing ground-Dasani.

"Dasani comes in many forms," Chen said. "On Earth, we find it in servings as small as four ounces or as large as a 48-liter multi-pack. The first stows easily in your purse, and the latter is the life of the party. In between, there are other sizes perfect for a gym bag, a car's cupholder, or a child's lunch bag. Similarly, Dasani could have existed on Mars in various forms, like ice or vapor, and in many convenient locations, such as Martian oceans or the craters dotting the planet's surface."

Chen said scientists hope to confirm that icy Dasani exists at the southern pole of Mars, as recent spectral images from the European Space Agency's Mars Express Orbiter suggest.

"In the coming days, we'll be moving the Real Rover in the direction of the possible polar Dasani caps," Chen said. "As we continue to explore Mars, we hope to find Dasani distributed everywhere."

NASA geologist Matt Golombek, who chose the landing sites for the rovers, said confirming that Dasani exists on Mars would be a boon for the scientific community.

NASA scientists cheer the recent discovery.

"Finding a source of water—er, Dasani—would mean future manned missions to Mars would not need to bring tanks of it with them," Golombek said. "Although establishing manned bases on Mars is still a far-future scenario, the existence of *Dasani* would make such a plan theoretically possible. Also, knowing that the liquid is there would likely lead to more sponsored exploration on the Red Planet and an eventual bottling plant."

Golombek said he is excited to continue the work of analyzing the data collected by the Real Rover.

"Understanding liquid... Dasani's role on the Martian surface is crucial," Golombek said. "Now that we've established that

East

vs.

West

Vostok vs. Mercury

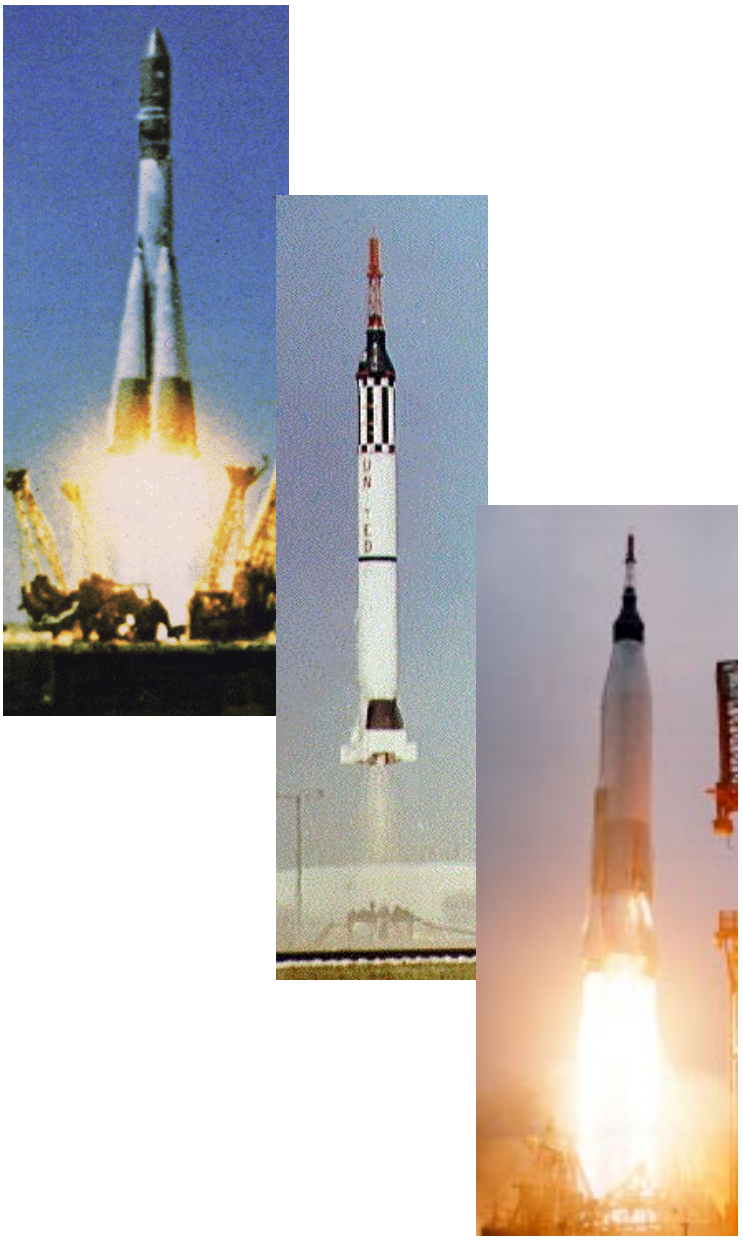
Starting this issue we begin a new column comparing and contrasting the different approaches taken by the United States and Russia towards their AeroSpace programs. If you grew up during the cold war, you may have noticed that on more than one occasion, the Soviet Union fielded aircraft and missile systems which were copied from, or inspired by the Western allies' technology. At other times Russian engineers came up with entirely unique designs, sometimes proving to be equal to or even superior to American or NATO allied systems.

To lead things off, we take a look at the first manned spacecraft systems. The Soviet's Vostok and the American Mercury capsules. Both were small single pilot craft, the Vostok being a spherical capsule attached to a cylindrical propellant pack. The Mercury was a single conical or bell shaped craft with a strap on booster pack.

The Soviet cosmonaut was essentially only a passenger on a fully automated craft. The Mercury astronauts were originally supposed to be the same, but the original seven astronauts were test pilots who balked at the idea. They pressed for the installation of manual controls so they would have the option to take control of his craft and steer it themselves.

Originally the Mercury capsule was lofted on a Redstone missile into a sub-orbital flight to the edge of space and back. The Vostok was launched into full orbit on a modified R-7 ICBM. Later, the Mercury was mated to a more powerful Atlas ICBM for full orbital flights.

One additional fact which was not originally made public was that the Vostok cosmonaut would eject from his craft after re-entry and parachute to earth seperately. Mercury astronauts rode their craft from liftoff to splashdown.



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this life-giving substance was once... I'm supposed to say 'available solar-system-wide'... we can begin to consider whether life once existed on Mars, and if it did, what disaster befell the planet to eliminate it."

"Not that running out of Dasani isn't disastrous enough!" Chen interjected. "One fact is clear: Life on Mars was a lot more probable when abundant Dasani was present, just as life is more enjoyable on Earth when you've got Dasani. If you don't want to be dry and lifeless yourself, stock up on cool, refreshing Dasani bottled water."

The Vostok (Russian: Boctok, translated as East) was a type of spacecraft built by the Soviet Union's space programme for human spaceflight.

The Vostok spacecraft was originally designed for use both as a camera platform (for the Soviet Union's first spy satellite program, Zenit) and as a manned spacecraft. This dual-use design was crucial in gaining Communist Party support for the program. The basic Vostok design has remained in use for some forty years, gradually adapted for a range of other unmanned satellites. The descent module design was reused, in heavily-modified form, by the Voskhod programme.

The craft consisted of a spherical descent module (mass 2.46 tonnes, diameter 2.3 meters), which housed the cosmonaut, instruments and escape system, and a conical instrument module (mass 2.27 tonnes, 2.25 m long, 2.43 m wide), which contained propellant and the engine system. On reentry, the cosmonaut would eject from the craft at about 7,000 m (23,000 ft) and descend via parachute, while the capsule would land separately. There were several models of the Vostok leading up to the manned version:

Vostok 1K Prototype spacecraft. Used to test basic systems and prove the concept. Flew six unmanned test missions in 1960.

Vostok 2K Photo-reconnaissance and signals intelligence spacecraft . Later named Zenit spy satellite.

Vostok 3KA The Vostok 3KA was the spacecraft used for the first human spaceflights. They were launched from Baikonur Cosmodrome using Vostok 8K72K launch vehicles. The first flight of a Vostok 3KA occurred on 9 March 1961. The first flight with a crew — Vostok 1 carrying Yuri Gagarin — took place on 12 April 1961. The last flight — Vostok 6 carrying the first woman in space, Valentina Tereshkova — took place on 16 June 1963.

A total of 8 Vostok 3KA spacecraft were flown, 6 of them with a human crew.

Specifications for this version are:

Reentry Module: Vostok SA. Also known as: Spuskaemiy apparat - 'Sharik' (sphere).

- Crew Size: 1
- Length: 5 m
- Diameter: 2.3 m
- Mass: 2,460 kg
- Heat Shield Mass: 837 kg
- Recovery equipment: 151 kg
- Parachute deploys at 2.5 km altitude
- Crew seat and provisions: 336 kg
- Crew ejects at 7 km altitude
- Ballistic reentry acceleration: 8 g (78 m/s²)

Equipment Module: Vostok PA. Also known as: Priborniy otsek.

- Length: 2.25 m
- Diameter: 2.43 m
- Mass: 2,270 kg
- Equipment in pressurized compartment
- RCS Propellants: Cold gas (nitrogen)
- RCS Propellants: 20 kg
- Main Engine (TDU): 397 kg
- Main Engine Thrust: 15.83 kN
- Main Engine Propellants: Nitrous oxide/amine
- Main Engine Propellants: 275 kg
- Main Engine Isp: 266 s (2.61 kN·s/kg)
- Main Engine Burn Time: 1 minute (typical retro burn = 42 seconds)
- Spacecraft delta v: 155 m/s
- Electrical System: Batteries
- Electric System: 0.20 average kW
- Electric System: 24.0 kW·h
- Total Mass:4,730 kg
- Endurance: Supplies for 10 days in orbit
- Launch Vehicle: Vostok 8K72K
- Typical orbit: 177 km x 471 km, 64.9 inclinaton

The Vostok capsule had limited thruster capability. As such, the reentry path and orientation could not be controlled after the capsule had separated from the engine system. This meant that the capsule had to be protected from reentry heat on all sides, thus explaining the spherical design (as opposed to Project Mercury's conical design), which allowed for maximum volume while minimizing the external surface. Some control of the capsule was possible by way of positioning of the heavy equipment, which was placed in a manner that maximized the chance of the cosmonaut surviving g-forces while in a horizontal position. Even then, the cosmonaut experienced 8 to 9g.

Copied from Wikipedia

Project Mercury was the first human spaceflight program of the United States. It ran from 1959 through 1963 with the goal of putting a man in orbit around the Earth. The Mercury-Atlas 6 flight on February 20, 1962 was the first Mercury flight to achieve this goal. Early planning and research was carried out by the National Advisory Committee for Aeronautics, and the program was officially conducted by the newly created NASA. The name comes from Mercury, a Roman mythological god who is often seen as a symbol of speed.

Because of their small size it was said that the Mercury spacecraft capsules were not ridden, but worn. At 1.7 cubic meters in volume, the capsule was just large enough for the single crew member. Inside were 120 controls: 55 electrical switches, 30 fuses and 35 mechanical levers. The spacecraft was designed by Max Faget and NASA's Space Task Group.

During the launch phase of the mission, the Mercury spacecraft and astronaut were protected from launch vehicle failures by the Launch Escape System. The LES consisted of a solid fuel, 52,000 lbf (231 kN) thrust rocket mounted on a tower above the spacecraft. In the event of a launch abort, the LES would fire for 1 second, pulling the Mercury spacecraft and the astronaut away from a defective launch vehicle. The spacecraft would then descend on its parachute recovery system. After booster engine cutoff , the LES was no longer needed and was separated from the spacecraft by a solid fuel, 800 lbf (3.6 kN) thrust jettison rocket that fired for 1.5 seconds. Unfortunately, as with the later Apollo and Gemini programs, the scientists believed that if there was a catastrophic failure with the launch vehicle, then the possibilities of survival were minimal even with the tower in place. There simply wasn't enough time between the detection of the problem and the resulting consequences.

The spacecraft was only equipped with attitude control thrusters - after orbit insertion and before retrofire they could not change their orbit. There were three sets of high and low powered automatic control jets and separate manual jets - one for each axis (yaw, pitch, and roll), supplied from two separate fuel tanks - one automatic and one manual. The pilot could use any one of the three thruster systems and fuel them from either of the two fuel tanks to provide attitude control.

The Mercury spacecraft were designed to be totally controllable from the ground in the event that something impaired the pilot's ability to function.

The spacecraft had three solid-fuel, 1000 lbf (4.5 kN) thrust retrorockets that fired for 10 seconds each. One was sufficient to return the spacecraft to earth if the other two failed. The firing sequence (known as ripple firing) required firing the first retro, followed by the second retro five seconds later (while the first was still firing). Five seconds after that, the third retro fired (while the second retro was still firing).

There was a small metal flap at the nose of the spacecraft called the "spoiler". If the spacecraft started to reenter nose first (another stable reentry attitude for the capsule), airflow over the "spoiler" would flip the spacecraft around to the proper, heatshield-first reentry attitude, a technique called 'Shuttle-cocking'. During reentry, the astronaut would experience about 4 g-forces.

Initial designs for the spacecraft suggested the use of either beryllium heat-sink heat shields or an ablative shield. Extensive testing settled the issue - ablative shields proved to be reliable (so much so that the initial shield thickness was safely reduced, allowing a lower total spacecraft weight), easier to produce (at that time, beryllium was only produced in sufficient quantities by a single company in the US) and cheaper.

NASA ordered 20 production spacecraft, numbered 1 through 20, from McDonnell Aircraft Company, St. Louis, Missouri. Five of the twenty spacecraft, #10, 12, 15, 17, and 19, were not flown. Spacecraft #3 and #4 were destroyed during unmanned test flights. Spacecraft #11 sank and was recovered from the bottom of the Atlantic Ocean after 38 years. Some spacecraft were modified after initial production (refurbished after launch abort, modified for longer missions, etc) and received a letter designation after their number, examples 2B, 15B. Some spacecraft were modified twice; for example, spacecraft 15 became 15A and then 15B.

A number of Mercury Boilerplate spacecraft (including mockup/prototype/replica spacecrafts, made from non-flight materials or lacking production spacecraft systems and/or hardware) were also made by NASA and McDonnell Aircraft. They were designed and used to test spacecraft recovery systems, and escape tower and rocket motors. Formal tests were done on test pad at Langley and at Wallops Island using the Little Joe and Big Joe Atlas rockets.[1]

Copied from Wikipedia

CHUCKIE

plan # 073087
designed by: Mark Kotolski
NAR # 35707

RECOMMENDED MOTORS
½A3-2t A3-2t

PARTS LIST
BNC5V nose cone
BT5 x 1 3/4" motor tube
1/8" x 1" launch lug
1/8" hard balsa stock
3/32" balsa stock
1/16" balsa stock