

SPACE

Space Race Pace Quickens

Though the goals of the race between the United States and the Soviet Union to reach the moon are unclear, the pressure to succeed is increasing.

By JONATHAN EBERHART

See Front Cover

► THE SPLASHDOWN of Gemini 4 on the afternoon of June 7 marked the end of another leg in the 10-year olympic space marathon from earth to the moon. The U.S. team has practically overtaken the Russians with a sudden burst of speed, and unless the Soviets come up with another in their unending stream of surprise entrants, the USSR may fall behind.

No more solo entries will be competing in the race, since the Soviet Union announced about a month ago that they were completely through with one-man shots in a statement made by space scientist Genadiy Skuridin.

Despite occasional puzzling protestations by the National Aeronautics and Space Administration that there is not even a race in progress, an overall strategy can be seen as certain phases of the race are speeded up. For example, the launch date of Gemini 4 was advanced as much as two months over original estimates in order to boost the morale of the team.

The Soviet team, because of the secrecy that usually surrounds their participation in the race, leaves most of their progress to the imagination of opposing strategists.

The race is not yet half over, and members of both teams still must learn how to make contact with one another during the race. The Americans plan to advance on the Soviets by equipping the next Gemini spacecraft, GT-5, with a little satellite of its own, to be launched as early as Aug. 9, from Gemini 5 itself. The satellite will serve as a target for a coupling maneuver that will be needed twice when three Americans are actually on their way to the moon in an Apollo spaceship.

In order to get ready for this final maneuver, the U.S. team will spend more than a year practicing in space, coupling and uncoupling with Agena rockets that are specially modified for their role as targets.

Now that the pace is increasing, the United States is starting to mix its veterans from the preliminary races back in Project Mercury days with the newer astronauts. Astronaut Virgil "Gus" Grissom, who piloted the first manned Gemini flight last March 23, was an old timer. Though neither member of the GT-4 crew had been in space before, a veteran astronaut will be along on both of the next two flights, Gordon Cooper on GT-5 and Walter Schirra on GT-6, the first full-scale Atlas-Agena docking practice.

As the Olympic Space Marathon progresses, records are continually being broken

and re-broken. The American record for time in space, just demolished, was previously held by Gordon Cooper, who rode the Faith 7 Mercury capsule for 34 hours in 1963. The world record is still intact, however: 119 hours, held by Soviet Cosmonaut Valery Bykovsky. This record may well be broken by GT-5, which is scheduled to spend an entire week in orbit.

The first man to move in free space was a Russian, Alexei Leonov, but the first man to propel himself through space in a controlled way was GT-4 co-pilot Edward White, who is shown floating in space on this week's front cover.

As to who has the most powerful rockets, race-watchers can only guess, since nothing but occasional bits of cryptic information manage to break through the secrecy covering the Soviet team's progress.

With the Marathon still in its early stages, the contestants are already speeding up the pace. Rumors from Soviet satellite countries talk of five-man shots and orbital space stations. Rumors from the United States, often just as vague, list advanced launch dates, extended flight times, and conflicting versions of almost every aspect of the space program.

The goals of the race are obscure. The inaccuracies of space flight make the moon

an undesirable military missile-launching base. The possibilities of life there are essentially nonexistent. Why, then, is there a race? For the same reason as any race, according to some observers: nothing more or less than the ego-driven pressures of competition.

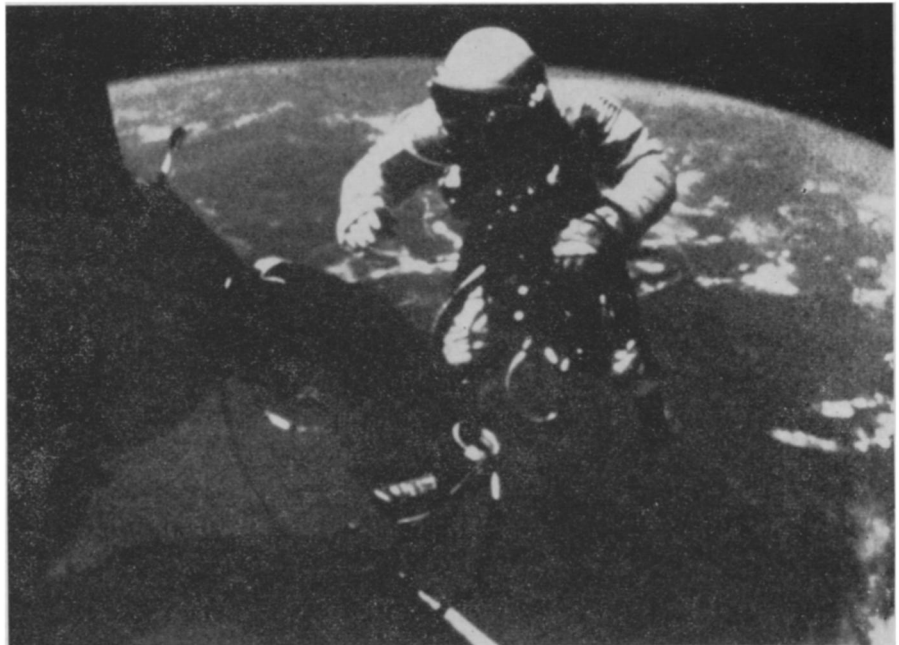
Each new manned space flight makes brief headlines, but as soon as the flight is over all the astronauts, gadgets, doctors and scientists return to the limbo of Cape Kennedy, or the Manned Spacecraft Center in Houston, or Ames Research Center in California.

Satellites Crowd Sky

And what's another satellite more or less? There are now more than 600 man-made objects floating around in the sky (although many are nothing but burned-out rocket stages). Some of the more recent additions have received so little fanfare, or even public relations work, from the National Aeronautics and Space Administration that space reporters are loath to give them any notice at all. Some 30 American Explorer satellites and almost 70 mysterious Cosmos probes from the Soviet Union have scarcely raised an eyebrow outside of Government space installations and news agencies.

Of course the two-manned Gemini flights have captured America's imagination for a brief period of time, largely due to the on-the-spot efforts of the major TV networks. But as soon as the vehicle is safely

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UPI

WEIGHTLESS WALK—Astronaut Edward White floats in space and looks at the earth more than 100 miles below. The umbilical cord that attaches him to the Gemini 4 spacecraft extends from the open capsule and the gun he is using to maneuver and propel himself can be seen in his left hand.

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down: Click! Off go the live cameras and once again the Space Age is the sole province of the clean-cut astronauts, the bureaucratic officials and the scientists.

The successful flight of Ranger 7, resulting in the first clear close-up photos of the moon, was the biggest news item of 1964. Ranger 8, however, which accomplished essentially the same feat, received considerably less notice, and Ranger 9 would have been completely lost in the shuffle had it not been for a few outraged voices shouting that two-Rangers-was-enough-and-the-whole-flight-was-a-waste-of-money-anyway.

Disinterest, of course, does not make these man-made miracles any less amazing. Nevertheless, no astronaut has ever attained the position in the public eye of, say, Charles Lindbergh and his Spirit of St. Louis. None of America's space pilots has ever become the sort of public hero about whom great tales are told and whose name is handed down through the years.

Why not? Perhaps the reason is simply that today's man-in-space, while often critical to his mission, has been almost emasculated into the role of computer. Indeed, space scientists refer to the presence of a man aboard a space vehicle as "having a man in the loop." The "loop" is the control loop, going from launch control to spacecraft to flight control to tracking station to spacecraft again. "Pilot" and "co-pilot" are listed in equipment diagrams along with "inertial on-board guidance computer" and "retro-rocket cut-off timer."

Lindbergh made his flight alone. A Gemini astronaut is essentially the key scientist assigned to the final phase of a long, involved program, in which thousands of people contribute equally to the resulting success.

But more and more the Gemini flight plans are being left flexible so that the pilot may use his own judgment. This is why Gemini 3, although it was the fifth U.S. orbital space flight (the first two Mercury flights were sub-orbital), was hailed as the first time an American had ever really flown a space vehicle.

The astronauts are heroes, but there are also heroes on the ground. They are the lasting heroes, who will contribute to space programs even where no astronauts are involved. Satellites, space probes, orbiting observatories—all of these are part of the Space Age.

\$20 Billion Question

By the time the Apollo spacecraft is sitting on its launching pad, manned and ready to go to the moon, the United States will have spent more than \$20 billion for the trip. Is it worth the money?

One oft-heard reason for making the costly journey is the usefulness of the moon as a military base. Its relatively unassailable position makes it an easily defended fort. In addition, all sorts of super-secret weapons could be built and tested there with practically no danger of discovery. Any observing space probes could justifiably be regarded as hostile by the country in control.

On the other hand, the same quality of the moon that makes it such an ideal fortress—namely, its distance from the earth—makes it almost entirely unsuitable as an offensive position. Hitting a given point on earth with a missile, for example, even within a 50-mile radius, would be a highly unlikely and at best unpredictable occurrence. An error of a few hundred miles could mean the difference between hitting London and East Berlin.

Many authorities suggest that the moon could prove to be a great new source of raw materials. Recent discoveries of "hot spots" on the lunar surface may mean geologic activity that has brought ancient mineral resources closer to the surface.

Even if the moon's resources are not in themselves a reason for going there, it may be necessary to mine them if the moon is to be used for anything at all. Getting water from lunar rocks is not inconceivable, and the Aerojet-General Corporation even has a scheme to extract oxygen, both for breathing and as part of the fuel on return trips to earth.

One of the moon's most important scientific values could be as the home of a permanent astronomical observatory. All observations on earth are hampered by the interfering blanket of the atmosphere, which distorts, reduces and often blocks altogether the light of the stars. Telescopes aboard orbiting satellites are already being planned, but they will have lifetimes of only a few years and their size will be limited by weight.

The biggest optical telescope on earth is the 200-inch giant on Palomar Mountain in California. The weight of any much larger instrument would distort it out of usefulness, since deviations of the tiniest fraction of an inch are enough to make the parabolic mirror inaccurate.

On the moon, however, the gravity is only one-sixth that of earth, making possible much larger, more accurate optical telescopes and huge radio telescopes whose wire-mesh antennas are already many times larger than the mirrors of the largest optical instruments.

If interplanetary space flights ever become at all numerous, the moon, with its reduced gravity, would make an ideal "way station" or even launching site. Much smaller, more economical booster rockets could be used to transport larger payloads on longer-duration missions, than if the boosters had to fight their way clear of earth's gravitational pull.

Is there life on the moon? It is pretty unlikely, but scientists are not willing to ignore the possibility. There are types of bacteria on earth, for example, that can live without any oxygen whatsoever; in fact, to whom oxygen is a deadly poisonous gas. Perhaps some tiny microorganism, either animal or plant, has adapted itself to the harsh lunar environment. It is even possible that the "hot spots" represent pockets of gas within which some sort of lunar life could thrive.

That life could have evolved on earth from an incredible number of required conditions might be a one-shot coincidence. But if life is found on a second planet, it

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then becomes almost certain that it exists in many other places. And who can say then that there is definitely no life form as intelligent as ours?

Even if none of these reasons are valid, there is the omnipresent public relations duel with the Soviet Union to justify getting there first. Indeed, there may be no getting there second.

A whole new kind of government official has sprung up in recent years, called the "space lawyer." One of the space lawyers' most difficult problems is to determine the validity of actually staking a claim on the moon. Will it be the same as filing a claim on a gold mine? Or signing a treaty for the boundaries of a colony?

Twenty billion dollars! And it will all be riding in the spacesuit pockets of three men—the Apollo astronauts.

• Science News Letter, 87:387 June 19, 1965

INVENTION

Current U. S. Patents

A miniature air raid alert installed in individual buildings and activated by general power reduction could eliminate the ear splitting community air raid system—By William McCann

➤ A TINY AIR RAID alert, connected to a radio or buzzer in the home, could eliminate the ear-splitting community air raid siren.

The newly patented alert, remotely controlled by a central power operator, would sound its alarm when the voltage in the home was lowered by the operator.

Although a community siren is ear-piercing up close, families living in fringe areas often have a difficult time hearing it. Furthermore, if something goes wrong with the central siren, the whole community is left without warning. The home air raid alert would do away with this difficulty. In addition, deaf people also would be able to heed the alert by substituting a flashing lamp for the radio or buzzer, so that when the voltage goes down, the lamp goes on.

Thomas D. Hardesty, Lorain, Ohio, earned patent 3,187,139 from the U.S. Patent Office in Washington for his home air alert.

Inflatable Splint

A newly patented rubberized splint can be wrapped around a person's arm or leg and inflated like a tire.

The splint consists of a pad, cover and a valve for pumping in the air. The pad is a series of inflatable tubes or cells running lengthwise and connected side by side.

The cover serves to restrict outward swelling of the cells and causes them to apply pressure inwardly for immobilizing purposes and to stiffen the pad for traction purposes, reported Robert E. Bailey, Worland, and Richard C. Leaverton, Casper, Wyo.

GENERAL SCIENCE

Moving Spaceship Costly Even on the Ground

➤ WHEN A SPACESHIP goes somewhere it's an expensive proposition, even when it is just floating down the river.

The National Aeronautics and Space Administration has just spent \$784,600 to float three Saturn rocket stages from place to place on barges. The huge boosters, much too big and heavy to travel by road or rail, are being built at NASA's Michoud superfactory in New Orleans. From there they must go to Huntsville, Ala., for test firings, next be sent back to Michoud, and then shipped down to Cape Kennedy in Florida.

Two of the barges, named Promise and Palaemon, will be used to carry the Saturn I and IB boosters, while the third is intended for the huge Saturn V.

To go from Huntsville to the Cape by river and ocean takes 10 days, non-stop.

• Science News Letter, 87:398 June 19, 1965

Spaces between the adjacent cells provide tiny openings to allow the splint to "breathe" and thus minimize skin irritation.

In addition, the splinted area can easily be X-rayed.

Messrs. Bailey and Leaverton earned patent 3,186,405 for their inflatable splint.

Other Interesting Patents

A rocking chair that rocks by electricity received a patent. John W. Fuller, Wilmington, Vt., earned patent 3,186,008 for the rocker, which he claims may also be used with a cradle to electrically rock baby to sleep.

A two-stage bullet that its inventor claims makes one gun practical for hunting everything from squirrels to elephants received a patent this week. Albert S. Hancock Jr. earned patent 3,186,342 for the bullet, which is fired through the barrel as a unit, but separates just beyond the muzzle of the gun. The first stage falls soon after leaving the muzzle, while the second travels to the target.

A slope-sighting device that lets a golfer "read" the green earned patent 3,186,092 for Charles S. Bertas, Covina, Calif. The golfer looks through the optical viewing instrument so that he can more accurately estimate the slope or little bumps of the green between the ball and the hole.

For a list of registered patent attorneys and agents and other Patent Office information, write the Commissioner of Patents, Washington, D.C. 20231, or call 202-967-4058 for specific information.

• Science News Letter, 87:398 June 19, 1965