Into Space with the X-15

One approach to manned space flight is to put a man in a rocket and depend on a parachute or other drag-making device to ease him back to earth. Another approach is to fit a piloted airplane with rocket motors powerful enough to toss it out of the atmosphere. It will have wings of a sort for gliding, and the pilot will land it like a conventional but extra-hot airplane.

The X-15 rocket-plane built by North American Aviation, Inc. is the second approach. It will probably make its first flight to the edge of space in less than a year. Made of stainless steel to resist heat, it is a stubby-winged airplane only 50 ft. long, weighing about 33,000 lbs. when fully fueled. Its single rocket engine has 60,000 lbs. of thrust and is capable of lifting it off the ground like a ballistic missile.

Ballistic Trajectory. But the X-15 will not fly into space in this crude way. With a pilot in its cramped cockpit, it will be carried 35,000 ft. above Wendover Air Force Base, Utah by a specially adapted B-52. As soon as it cuts loose with its rocket engine roaring, the pilot will head it on a steep trajectory like a ballistic missile. In 30 to 40 seconds, if all goes well, it will approach Mach 3 (three times the speed of sound) at an altitude of 100,000 ft. From this point it will be, as the airplane people say, "beyond the envelope of knowledge," flying higher and faster than a manned aircraft has ever flown.

The rocket engine will have fuel for only six minutes of powered flight, but after its fuel is gone, the X-15 is expected to climb on momentum at least 100 miles above the earth, probably a good deal higher. This altitude is not strictly space; there is still a little air, but it is much too thin for an airplane to steer by. So for controls the X-15 will use six small jets of hydrogen peroxide gases shooting out of its tail and wings. When the X-15 is above the effective atmosphere, its pilot will feel zero gravity and float off his seat to the limit of his belts. Loose objects in the cockpit, if any, will drift around like smoke. This condition will last for something like five minutes, ending only when the X-15 meets denser air on the way down.

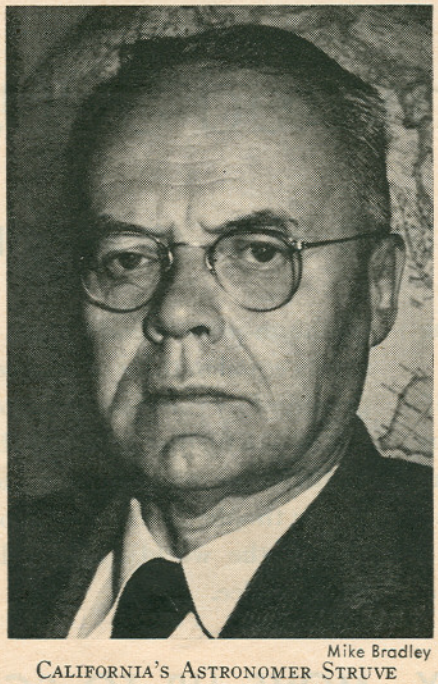
Tricky Return. Return to earth will be the most ticklish part of the flight. The pilot will have the help of special flight instruments, and his object will be to meet the atmosphere at a very low angle to minimize speed and heating. The temperature of some parts of the structure is expected to reach 1,000° F. If the temperature rises too high, the pilot may point the nose upward to get into thinner air and let the ship cool off. Gradually the X-15 will lose both speed and altitude. When it has lost enough of both, the pilot will ease it down to a skid landing at Edwards Air Force Base, Calif., 485 miles from Wendover.

Counting on the success of the X-15, North American has proposed a beefed-up version with a booster rocket that will push it up to orbiting speed (18,000 m.p.h.). It will climb into genuine space, well above 150 miles. There will be no human pilot on the first flights. Automatic instruments will ride the winged satellite around the earth for awhile. Then, perhaps on electronic command from below, they will glide it to earth. Later, as the art develops, the first human pilot may take the same ride.

NORTH AMERICAN'S ROCKET-PLANE
Beyond the envelope of knowledge.

Life on a Billion Planets?

Do planets other than the earth sustain thinking creatures? Philosophers, theologians, scientists, fiction writers and ordinary people have speculated on the question for centuries. Now a widely honored scientist, having pondered long on the subject, makes his answer: yes. Says Russian-born Otto Struve, 60, head of the astronomy department of the University of California at Berkeley: The Milky Way galaxy, the great swarm of stars to which the sun belongs, almost certainly contains millions of planets inhabited by intelligent life.



Mike Bradley
CALIFORNIA'S ASTRONOMER STRUVE
Beyond the limit of intelligence.

Stars are formed by condensation out of clouds of gas and dust. There are many different kinds in the galaxy. Most of them are spinning rapidly, but about 10% of them rotate slowly like the sun, which turns only once in about 28 days. Dr. Struve believes that when such stars were formed, a small amount of material was left outside the main body. It gathered into planets whose rapid orbital circling took away from the star most of its energy of rotation. So any star that rotates slowly, says Dr. Struve, is likely to have a brood of planets. Since the whole galaxy contains about 100 billion stars, Dr. Struve calculates that it has 10 billion slow-spinning stars with planets revolving around them. The sun has eight planets (not counting Pluto), but if the average star with planets has only five, there must be 50 billion planets in the galaxy.

No Proof. Astronomer Struve believes that about one-fiftieth of these planets have had conditions on their surfaces that were favorable for the appearance of life. Assuming that life appears whenever conditions are right, Struve calculates that one billion (one-fiftieth) of the galaxy's 50 billion planets have life of some sort on them now. Not all life is thinking life, but Struve figures that between 1,000,000 and 10 million of the galaxy's billion inhabited planets have creatures on them that are just as intelligent as present day earthlings.

Struve admits freely that he cannot prove his conjectures. No existing telescope or other instrument can see planets revolving around any star but the sun, and there is little possibility that such planets, if they exist, can ever be observed accurately enough to determine whether they are inhabited.

No Bridge. Struve is asked why the inhabitants of distant planets, some of whom must be higher in the evolutionary scale than humans are, have never visited the earth or communicated with it. He replies that there may be a limit to the degree of intelligence that life can attain. This limit may make it impossible for the wisest inhabitants of the galaxy to bridge the enormous distances between planetary systems.

The top limit of intelligence may show itself, says Astronomer Struve, in another and more spectacular way. Every few hundred years, throughout the galaxy, a supernova (exploding star) blows up with a mighty detonation. Astronomers generally credit these events to natural causes. But, says Struve, "it is perfectly conceivable that some intelligent race meddled once too often with nuclear laws and blew themselves to bits." When astronomers on the earth are able to observe

such explosions with sufficient accuracy, they may be able to determine which ones were natural and which were caused by beings that grew too intelligent for their own good.

Missile Speedway

The world's longest straightedge is the 6½-mile track at the Air Force Missile Development Center, N. Mex., which has started to flight-test missiles while they are still on the ground. The virtues of this system are many. Instead of destroying itself in a single flight, a missile shot along the track can be recovered undamaged and tested many more times. It can be timed accurately and photographed at close range.

Tangent or Great Circle? To build a track straight and level enough for missiles was a technical tour de force. Air Force experts selected a section of the Tularosa Basin, near Holloman, that is almost as flat as a frozen lake. While figuring theoretically how to lay out the 35,080-ft. track, they considered making it perfectly straight both up-and-down and sideways, but gave this up because the curvature of the earth (the earth considered as a sphere with a 4,000-mile radius) would require either a cut in the ground 35 ft. deep at the mid-section of the track, or 35-ft. embankments at the ends. So the engineers compromised with nature by making their track a series of sections slightly less humpbacked than the earth's curve.

Hydraulic Stretch. The surveying had to be done at night because daytime heat foiled the accuracy of the surveyors' instruments. The next step was to pour a continuous slab of reinforced concrete 6½ miles long with adjustable fasteners for the rails, which are 7 ft. apart and three times as heavy as railroad rails. They came in 39-ft. sections and were welded together on the spot into 10,000-ft. lengths. Merely fastening them to the concrete slab would not do; the temperature of the Tularosa Basin fluctuates between zero and 120° F. If the rails were fastened in cool weather, a hot summer day might make them expand and buckle out of line. So each 10,000-ft. length of massive rail was stretched 3 ft. by hydraulic jacks. At ordinary temperatures the rails are under tension like piano strings. Only on the hottest days do they barely relax. After the rails were stretched, they were aligned by special optical devices and bolted down so that they did not deviate from a perfectly straight line by more than five one-thousandths of an inch.

Nearly all of the track is in use now, and last week a sled carried a missile roaring along it at 3,000 ft. per second (2,000 m.p.h.), which is about the muzzle velocity of a high-power rifle bullet. The Air Force scientists expect much higher speeds. It is fortunate, they say, that the Tularosa Basin is not subject to earthquakes. Even a delicate motion of the earth might throw the track out of perfect alignment and wreck the next missile to be used on it.