Earth Satellite Game

Gabriel
1956 GABRIEL

Box - black, hokey space station + astronauts and rockets

Instructions - Brown book with red
3 stage rockets, meteors + asteroid
Spinner

Moving "home" - moon goes through orbit

EARTH SATELLITE

HOW TO PLAY

TO ALL SPACE ADVENTURERS: The earth satellites now planned by the United States Defense Department are only a first step in the conquering of space. Perhaps in your own lifetime, these small experimental satellites will develop into giant earth satellite space stations like the one pictured in this game. Without such stations, travel to the moon and to Mars would be impossible.

BRIEFING INSTRUCTIONS

How To Rocket From Launching Platform To Earth Satellite

1. Moon, Meteor and Asteroid are placed in starting positions at the right of the board.

   NOTE: They are not in play until a rocket ship has reached the Earth Satellite.

2. Space Captains blast off from launching sites at the bottom of playing board and use that same flight path after reaching the Earth Satellite.

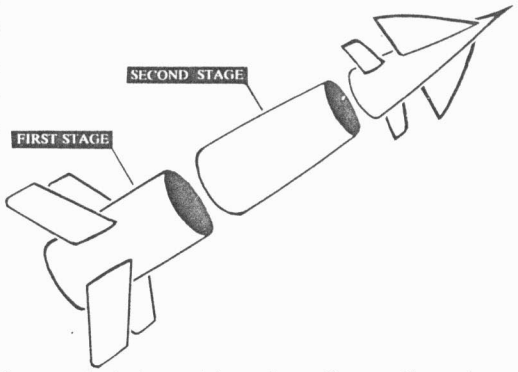
   Order of launching is determined by the Strato-Dial. Highest number blasts off first, second highest next, and so on.

3. Captains move the distances indicated by the numbers on the Strato-Dial until the Earth Satellite is reached. Captains cannot go beyond the Satellite at this point even though they have not used up their moves. Captains must wait until their next turn before continuing on from the Earth Satellite so that their ships can be refueled and prepared for the Moon Trip.

4. There are 2 zones between Earth and the Earth Satellite marked "STEP ROCKET FAILS TO DISENGAGE." If a Space Captain lands on either of these, he must return to his launching platform.

5.

If Space Captain lands on or passes FIRST STAGE DISENGAGING AREA he disengages Stage 1. When he lands on or passes SECOND STAGE DISENGAGING AREA, he disengages Stage 2.



6. Before blasting off after returning to their launching sites, Space Captains must restore disengaged stages to their ships.

How To Rocket From Earth Satellite To The Moon

7. As soon as any one rocket reaches the Earth Satellite, the Moon, Asteroid and Meteor are in play, and are moved in their orbits by the Space Captains in accordance with the Strato-Dial readings.

   For example, let's say the Strato-Dial reads Asteroid 5. The Space Captain moves the Asteroid 5 positions. Then he moves his ship 5 positions. Always move your ship **after** you have moved Moon, Meteor or Asteroid, whichever the case may be.

8. Moon, Asteroid and Meteor move from right to left, from first position through last position and then back to first again. There are 17 positions in the Moon's orbit. The Meteor and Asteroid each have 7.

9. In order to keep the Moon in their flight paths, Captains may travel from one flight path to another, but ONLY along the Space Corridor. In the Space Corridor ships may travel freely from right to left or left to right, but they cannot double back on themselves. That is, Captains must make all moves in **one** direction at any one turn.

10. Captains may move forward and back in the 17 short flight paths extending from the Space Corridor to the Moon's orbit, but not from left to right or right to left.

11. When a ship collides with a Meteor or Asteroid, its Captain begins the Moon Trip again at his next turn, using the same flight path.

12. Space Captains can eliminate rivals in the race for the Moon by moving into the same space occupied by the rival ship, or by passing through the space occupied by a rival ship. This could occur only in the Space Corridor, on the short flight paths between Corridor and Moon and in the Penalty Path.

    Captains whose ships are eliminated, blast off from the Earth Satellite at their next turn, using their original flight path.

13. If Strato-Dial indicates Penalty, the Space Captain draws a Penalty Card from the top of the penalty card pile, reads the penalty and the reason for it aloud, and replaces it at the bottom of the pack.

    If he has not yet reached the Space Corridor, he moves down his flight path the number of positions indicated on the Penalty Card.

    If he is anywhere between the Space Corridor and the Moon's orbit, he places his ship on the Penalty Space in the middle flight path and moves down the distance indicated on the Penalty Card.

    In no case can ships go below the Earth Satellite in the event of a Penalty.

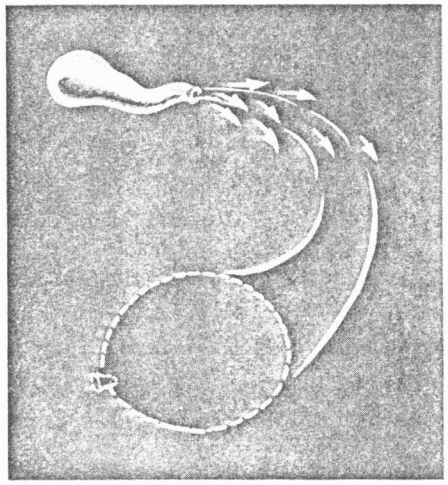
14. If the Strato-Dial indicates Penalty when a ship is at its launching site on Earth or Earth Satellite, the Space Captain may spin until he gets a different reading.

15. The first Captain to move along any flight path onto the position occupied by the Moon wins the game.

The object of the game is to place your Space Ship on the Moon before the other players. The following hazards confront each Space Captain:

1. 3 Danger Zones between Earth and Earth Satellite.
2. A collision with a Meteor or Asteroid.
3. Penalties as indicated on a series of Penalty Cards.
4. Other Space Ships—any one of which may eliminate rivals by occupying or passing through their positions.

Movement of Space Ships and of Meteor, Asteroid and Moon is controlled by the Strato-Dial, which is so devised that all of these are in continual motion. Landing on the Moon is facilitated by a Space Corridor. Space Captains may move in either direction along this corridor to reach the flight path leading to the Moon and victory.



THE PRINCIPLE OF
JET PROPULSION
When you let the air out of a balloon, it shoots off in the opposite direction.

How will man make his first trip to the moon? It won't be a non-stop flight in a single rocket ship. Two space ships will be needed—one to carry us outside the pull of Earth's gravity, and the other to make the journey to the moon from a giant earth satellite called a space station.

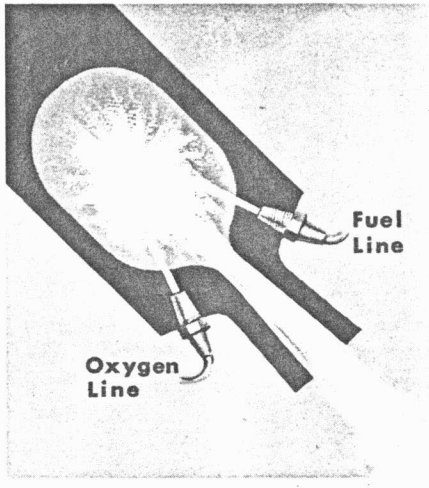
CAN WE ROCKET OURSELVES INTO SPACE AGAINST THE PULL OF EARTH'S GRAVITY?

In order to reach outer space, a rocket ship would have to overcome the force of Earth's gravity, which stretches out into space for about a million miles. However, this force decreases the further off from Earth you travel. It is the pull of gravity that keeps the air—the atmosphere—pressed against the Earth.

The topmost layer of the atmosphere is the exosphere. It begins about 120 miles up and extends to infinity. In other words, it goes on and on—we don't know how far. This is outer space. To reach it in a manned rocket ship has been the dream of brave men for generations. What progress have they made so far?

In 1946 the V-2 rocket soared 114 miles above the Earth. Three years later, the WAC Corporal broke through to outer space, reaching a record height of 250 miles.

The WAC Corporal is a very important step in man's conquest of space because it was a 2-stage rocket. The lower part was a V-2, while the upper part was a smaller rocket. After the V-2 had used up all its fuel, it was disengaged and allowed to fall to Earth. The fuel of the second rocket was then ignited and it continued its upward flight alone. This step-rocket idea was first developed by the famous American rocket expert, Dr. Robert H. Goddard.



A SIMPLE ROCKET MOTOR
When the fuel and oxygen are mixed and ignited in the combustion chamber, they burn at a high temperature. The mixture spurts out of the exhaust and drives the rocket forward.

Most writers on the subject of space travel now agree that the first manned rocket will probably be a 3-stage affair. Of these, the first and second will be dropped as soon as their fuel is used up. In the third stage—or nose—will be the crew, the cabin and the rocket motors. Such a ship will probably be launched from a Pacific Island so the jettisoned rocket stages can be dropped safely and be salvaged for re-use.

Despite the great success of the WAC Corporal in climbing beyond the Earth's atmosphere, we must remember that it reached a maximum speed of less than 6000 miles per hour. Here are two facts to show that we still have a long way to go before space travel is a reality:

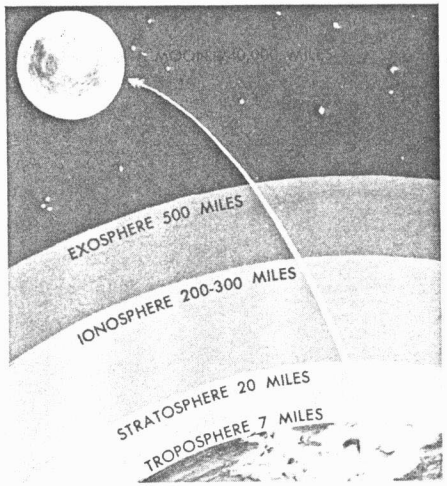
In order to escape from the Earth completely and continue on to the moon, a rocket must attain a speed of more than 25,000 m.p.h.

To attain a circular orbit nearest to the Earth, it would need a speed of 18,000 m.p.h., or three times the speed of the WAC Corporal!

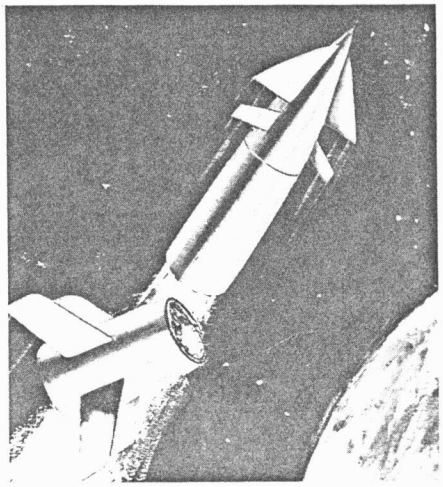
Why 18,000 m.p.h. (5 miles per second)? This is the speed we must reach in order to balance the pull of gravity. Once it reaches that speed, our rocket can shut off its motors and **coast** around the Earth, always maintaining the same distance from it. In other words, it would become a satellite of the Earth just like the moon.

Will science ever bridge the gap between the WAC's 6000 m.p.h. and the speed we need to get out into such a free orbit around the Earth? Perhaps the most important need is a lightweight liquid fuel able to create tremendous exhaust velocity. (The faster the burning fuel escapes at the rocket's tail, the greater the velocity or speed).

Right now scientists are experimenting with various liquid fuels. Sooner or later a fuel best adapted for space travel will be discovered. When it is, it will go into the tanks of a many-stories high 3-or-4-stage rocket and the first men to leave the Earth's atmosphere will be ready to start on their great adventure—their 240,000 mile journey to the moon.



THE LAYERS OF THE ATMOSPHERE



A THREE-STAGE ROCKET SHIP

THE SPACE STATION — A GIANT EARTH SATELLITE

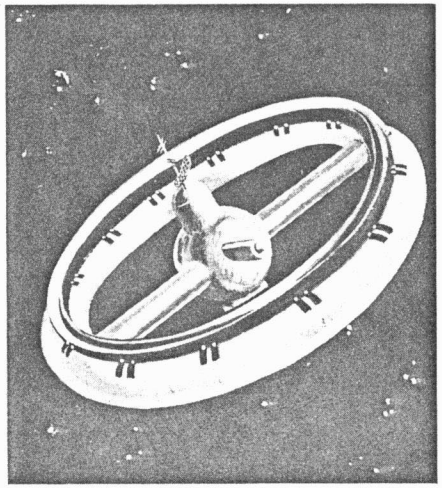
Once man climbs beyond the Earth's atmosphere in a rocket ship, he will be ready for the next step—the construction of a station in space from which he will take off to the moon.

You have probably read in the newspapers about Project Vanguard. In October, 1955, the Defense Department of the United States announced that work had already begun on the world's first man-made satellite. It is to be about the size of a basketball and will contain instruments for recording weather conditions and the like. This information will be radioed to earth.

At least one of these earth satellites will probably be carried to a height of about 250 miles by a two-stage rocket. As soon as this altitude is reached, the earth satellite will be released. Even though the air at that height is extremely thin, still air resistance will gradually slow down the satellite and make it lose altitude. After hundreds of journeys around the globe, it will gradually spiral down towards the Earth. Scientists believe that at about 60 miles up it will fall apart because of the intense heat generated by its swift flight through the atmosphere. Meteors disintegrate for the same reason.

The space station that will be needed for a stopover on our trip to the moon will be many, many times bigger than these earth satellites. And, of course, it will be at least 400 miles from the Earth, beyond any possibility of air drag that will gradually make it lose speed and pull it back to Earth. It must be far enough away to be able to circle the Earth forever in a permanent orbit.

How are we going to get this enormous wheel-shaped structure into space? Remember, our station will probably measure over 200 feet in diameter and carry a crew of as many as 50.



THE SPACE STATION

Notice the ports, which are big enough to permit the spacemen to enter the station ni a pressurized "space taxi" direct from their rocket without stepping into space.

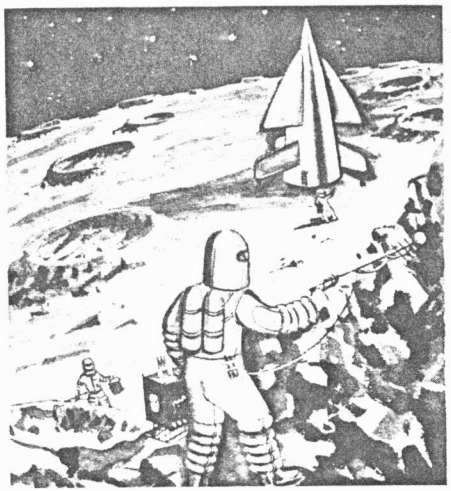
The construction material for our space station will be delivered by rocket ships. Let us say the station is to travel around the Earth at an altitude of 1000 miles. The rocket transports will climb to that altitude and dump their cargoes—leaving them to float in space! The crews, wearing space suits, will leave their ships and start assembling the station. Everything—space ships, men and building materials—will all be spinning around the Earth at a speed of 15,840 miles per hour. And everything will be weightless! Crewmen will be able to push huge girders and large sections of machinery into place single-handed. Small rocket motors will enable them to get from place to place. The entire space station will be built in this way.

THE MOON TRIP

Now that the space station is completed and spinning around the Earth with its crew of scientists, maintenance men, engineers and doctors, the next step is to build our moon rocket.

Just as in the case of the space station, supply rockets bringing material from Earth, pull into the space station's orbit. They unload their cargo which floats beside the station. Soon the moon rocket takes shape. It need not be streamlined since there is no air resistance in space.

According to the famous space scientist, Dr. Werner Von Braun, three rocket ships will make the trip to the moon from the space station. Two will be loaded with propellant (fuel). After all, we are making a 5-day, 239,000 mile trip and return! The third ship will not come back at all. It will carry only enough propellant for a one-way trip. The extra room will be filled with supplies and equipment.



EXPLORING THE MOON

Again according to Dr. von Braun, the rocket ships will hit a top speed of 19,500 miles per hour. 33 minutes after departure, the motors will be stopped and the ships will coast the rest of the way to the moon. Notice that although we need a velocity of 19,500 m.p.h. to get to our destination, we are already whizzing through space in our space station orbit 1000 miles up at 15,840 m.p.h. We therefore need an acceleration of only 3660 m.p.h.

Our moon ship must not be permitted to coast right on to the surface of the moon. If it did, it would crash at a speed of about 5000 miles per hour because of the pull of the moon's gravity.

By means of fly-wheels or gyroscopes the ship is turned over so that its tail is pointed at the moon's surface. The ship's fall is then braked by means of a blast from the rocket motors. This braking operation would occur about 300 miles above the moon.

What will our space adventurers do on the moon? In their pressurized, ventilated space suits they will find out at last what its interior is made of. They will explore the gaint craters and solve the mystery of the rays on the crater floors. These lines, laid out in patterns, have puzzled astronomers for centuries. They will be the first men to see the other side of the moon. They will set up an astronomical observatory. And, most exciting of all, they will establish a base on the moon for space flights to other planets.

Saml. Gabriel Sons and Company, New York