

Appendix: Reproductions of Chesley Bonestell's, Nikolai Kolchitskii's, Robert McCall's and Andrei Sokolov's works

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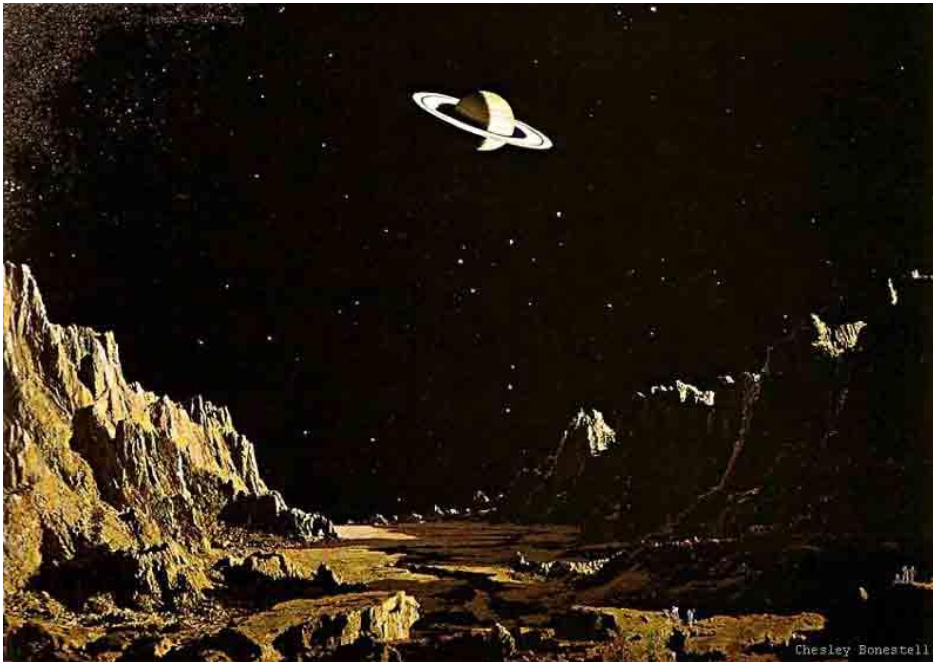
(1) Chesley Bonestell's works.

Image 1. *Saturn as Seen from Titan* (*Life*, 29 May 1944: 78).



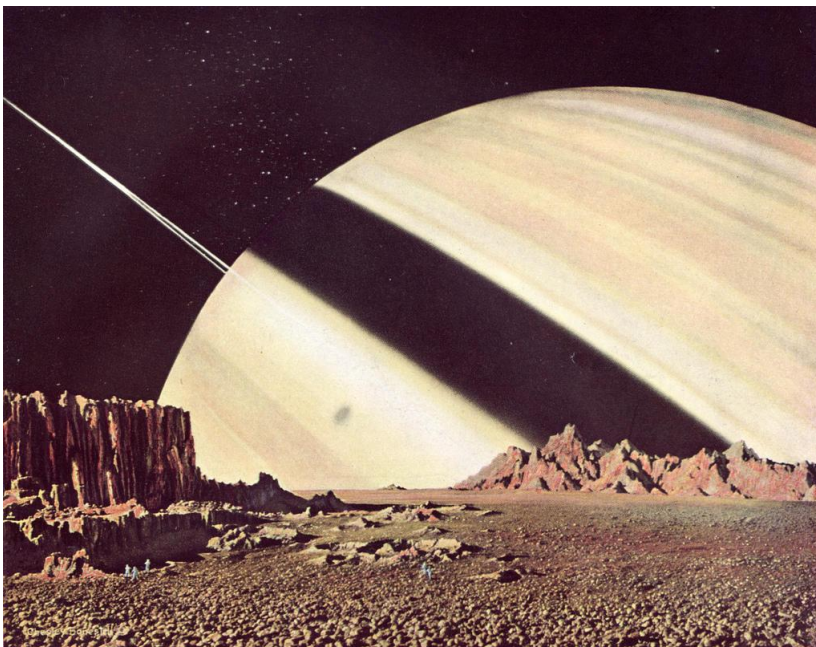
Caption: From Titan the sky seems blue instead of black because Titan is only satellite which has an atmosphere to give color to the sky. Here Saturn appears in its “new” phase, like a new moon. Largest of the satellites, Titan has a diameter of 3,000 miles (Earth's is 7,900). It is 771,000 miles from its planet and was first satellite to be discovered – by Huyghens in 1655.

Image 2. *Saturn from Iapetus* (*Life*, 29 May 1944: 78).



Caption: From Iapetus, which is 2,225,000 miles from the planet, Saturn shines brightly by daylight over a bleak landscape. This satellite has a diameter of 2,000 miles, about that of Earth's moon.

Image 3. *Saturn From Mimas* (*Life*, 29 May 1944: 80).



Caption: From Mimas, innermost of the satellites, Saturn looms immensely over the horizon. Mimas, which is only 600 miles in diameter, is 117,000 miles from the planet. The big shadow lying across Saturn's surface is cast by its ring. Small shadow at lower left is thrown by one of the other satellites. Shadowy figures on Mimas are purely imaginary, put in to give scale.

Image 4. Untitled (*Life*, 4 Mar. 1946: 72).



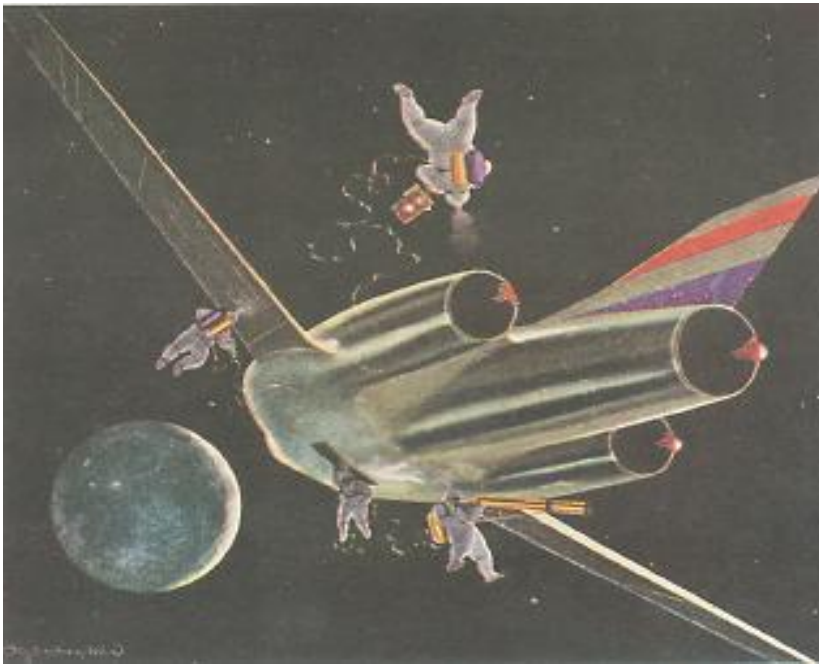
Caption: Starting for the Moon, the rocket climbs 200 miles above the U.S. east coast. Inside the earth's shallow atmosphere (luminous band on the horizon) it flies like an ordinary airplane at a comparatively low speed. At the lower right is Long Island. At its left end is New York City. In the distance are the Great Lakes.

Image 5. Untitled (*Life*, 4 Mar. 1946: 72).



Caption: OVER EUROPE AT SUNSET, 600 miles up in its climb above the earth, the rocket uses the full power of its atomic-fueled engines. Below is the south coast of England. The boot of Italy stretches toward the horizon.

Image 6. Untitled (*Life*, 4 Mar. 1946: 73).



Caption: **THE ROCKET FALLS** toward the moon with its motors shut off. Since its occupants fall at the same speed, they are able to climb out weightlessly in special suits.

Image 7. Untitled (*Life*, 4 Mar. 1946: 73).



Caption: **CIRCLING THE MOON**, the rocket passes 200 miles above the crater Albategnius. Seen from the earth, Albategnius is in the center of the moon's visible disk.

Image 8. Untitled (*Life*, 4 Mar. 1946: 73).



Caption: ON THE MOON'S SURFACE the tiny figures of the rocket's occupants (at the lower right) view their earth, shining brilliantly in the lunar night. Since the earth is a better reflecting surface than the moon, its light is 20 times brighter than moonlight. For comparative size, the earth is shown near the belt of the constellation Orion.

Image 9. Untitled (*Life*, 4 Mar. 1946: 74).



Caption: CLIMBING THE RIM of Theophilus, the rocket explorers look down on the crater floor from the escarpment at upper left. The opposite wall of the crater is 64 miles away and 18,000 feet high. The broken peaks in the center rise 8,000 feet. The explorers climb easily in heavy suits because of the moon's small gravitational pull.

Image 10. Untitled (*Life*, 4 Mar. 1946: 75).



Caption: THE ROCKET RETURNS to the earth after taking off from the moon. Setting beyond the earth is the sun, surrounded by its corona and zodiacal light. At the top is the moon, 240,000 miles from the earth. Ahead of the rocket is the Mediterranean Sea. The rocket makes several circuits of the earth to slow down to landing speed.

Image 11. Untitled (Ley and Bonestell 1949: 76).



Caption: XII. One of the most impressive mountain ranges on the moon, the Leibnitz Mountains, which Camille Flammarion called “the mountains of eternal light”. They are 30,000 feet high, probably surpassing the highest mountain ranges on earth. They are pictured during an eclipse of the sun by the earth.

Image 12. Untitled (Ley and Bonestell 1949: 80).



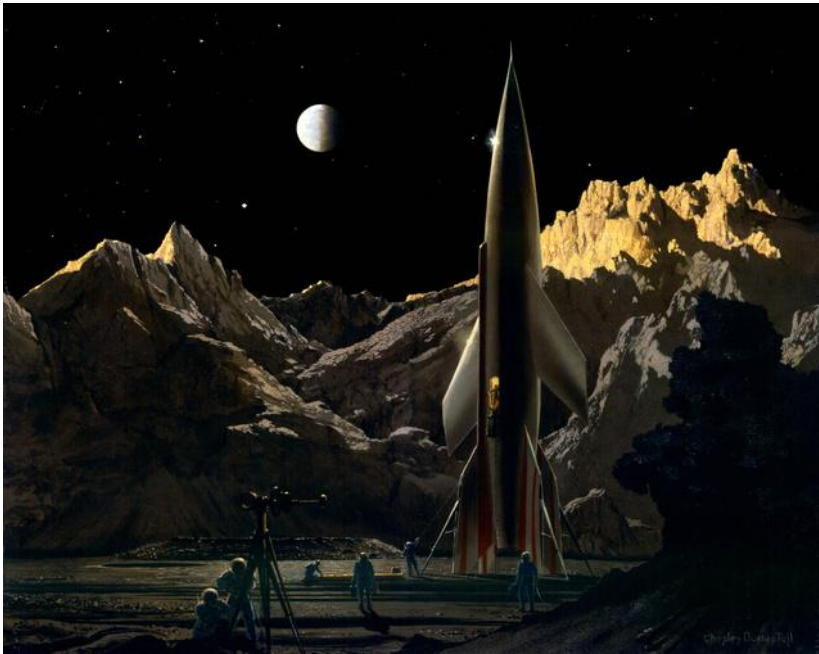
Caption: XVI. Beginnings of the lunar base; the weekly transport to earth, which illuminates the landscape, is being readied. The distant mountains are already illuminated by the rising sun.

Image 13. Untitled (Ley and Bonestell 1949: 85).



Caption: XIX. A study in apparent sizes. The constellations Orion and the earth over a lunar valley. Orion's belt is 3 degrees wide, the earth in the lunar sky about 2 degrees. Valley shows signs of "thermal erosion" (see chapter 2).

Image 14. Untitled (Ley and Bonestell 1949: 88).



Caption: XXIV. The ship, having landed on its tale, will take off from this position for the return to earth.

Image 15. Untitled (Ley and Bonestell 1949: 121).



Caption: XXV. Surface of Mercury. The sun appears three times as large as we see it and since Mercury always points the same hemisphere to the sun, the temperature in the center of that hemisphere must be about that of melting lead. Even though clad in asbestos suits, the explorers could not leave the protection of their ship for long. (Visual angle 40 degrees.)

Image 16. Untitled (Ley and Bonestell 1949: 124).



Caption: XXVIII. Surface of Venus, which might be a dust bowl, with hazy and cloudy skies and wind-blown dust etching the rocks into fantastic shapes.

Image 17. Untitled (Ley and Bonestell 1949: 125).



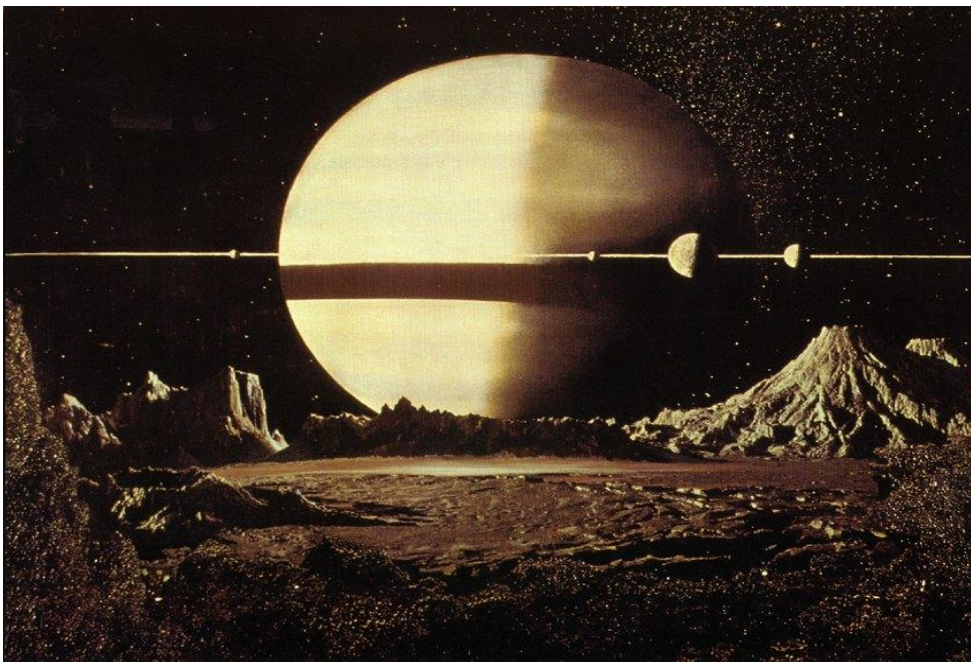
Caption: XXIX. Surface of Mars. Although it is considerably colder than earth and clothed in only a threadbare chilly atmosphere, the fourth planet still is provided with more earthlike features than any other. This is what an explorer would see if he were standing on the thin snowdrifts of the polar cap, looking toward the setting sun. (Checked for color by Dr. Edison Pettit of Mount Wilson and Palomar Observatories.)

Image 18. Untitled (Ley and Bonestell 1949: 128).



Caption: XXXII. Mars seen from Deimos. Again the polar cap and *Syrtis major* are the most prominent features. (Checked for color and “canals” by Dr. Edison Pettit.)

Image 19. Untitled (Ley and Bonestell 1949: 130).



Caption: XXXIVb. Saturn as it appears from the surface of its satellite Rhea (visual angle 30 degrees). Four inner satellites are visible as are the edge and the shadow of the rings.

Image 20. Untitled (Ley and Bonestell 1949: 135).



Caption: XXXIX. Pluto, the outermost planet of our solar system. Surprisingly, Pluto, unlike the other outer planets of our solar system, turned out to be small and massive. Its atmosphere must lie frozen on the rocks. From that distance the sun looks like a brilliant distant are light, without perceptible disk.

Image 21. Untitled (Ley and Bonestell 1949: 158).



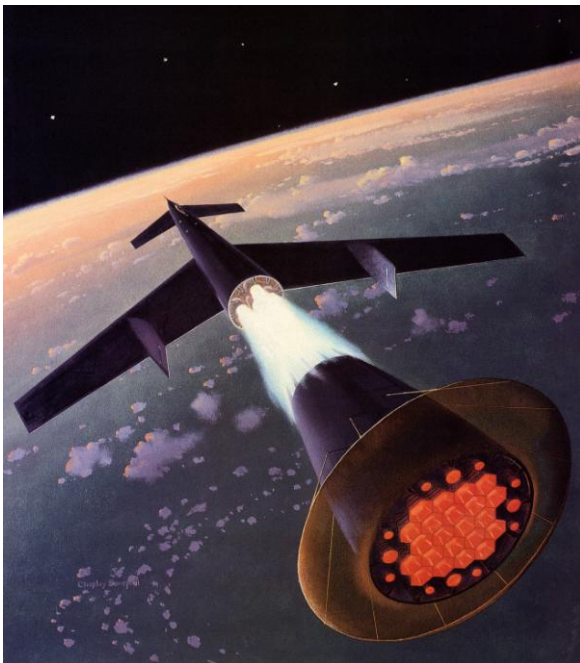
Caption: XLVI. Jupiter's surface. Hydrogen flames and "lava" pour out off top of cliff. Lake below is liquid ammonia; cliffs are lava and ice.

Image 22. Untitled (Ley and Bonestell 1949: 159).



Caption: XLVIIa. Saturn's rings seen from a spot at 15,5 degrees southern latitude on the planet (visual angle 40 degrees). They are illuminated by light reflected from the surface. The brilliant edges seen in 1907 by Barnard during an over-edge view which showed dark side foreshortened.

Image 23. *Seperation of Stages* (Collier's, 22 Mar. 1952: cover).



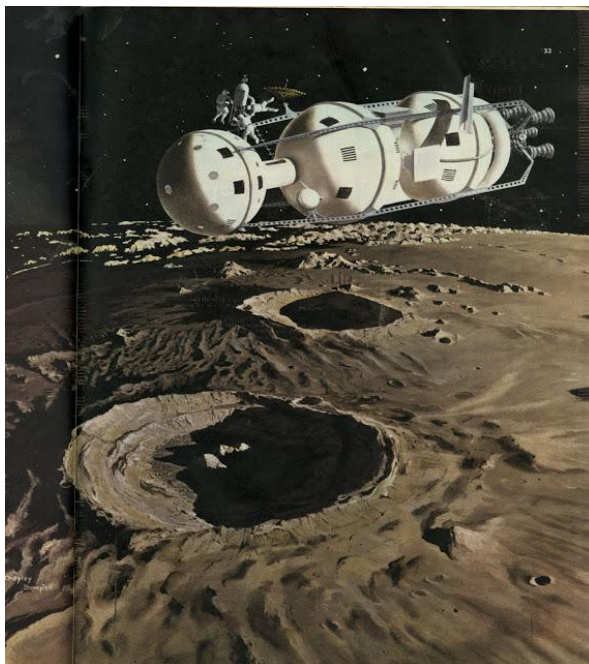
Caption: Man will conquer space soon. Top scientists tell how in 15 startling pages.

Image 24. Untitled (*Collier's*, 22 Mar. 1952: 23-24).



Caption: Men and materials arrive in the winged rocket and take “space taxis” to wheel-shaped space station at right. Men wear pressurized suits. Three space taxis can be seen – one leaving rocket, another reaching satellite, a third near the already-built astronomical observatory.

Image 25. Untitled (*Collier's*, 22 Mar. 1952: 32-33).



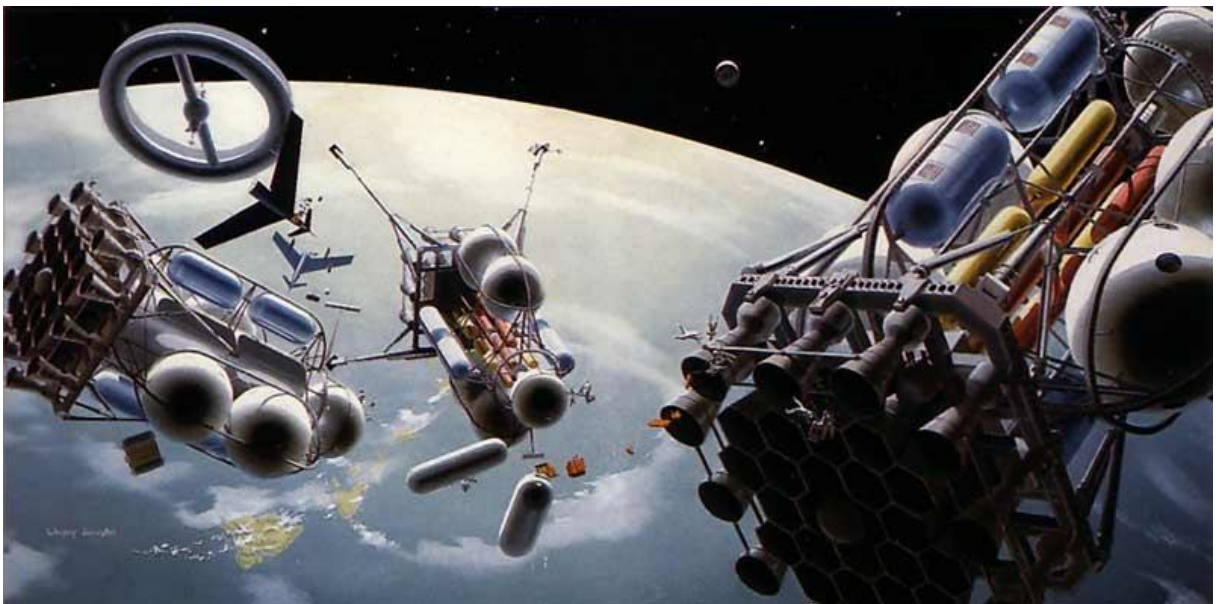
Caption: Specially designed round-the-moon ship hovers 200 miles above lunar surface as space scientists take close-up photographs. One-way journey from station in space will take five days to cover 239,000 miles. Never-seen face of the moon is to right. Trip will have to be timed so that sun lights hidden side.

Image 26. Untitled (*Collier's*'s cover, 18 Oct. 1952).



Caption: Man on the moon. Scientists tell how we can land there in our lifetime.

Image 27. Untitled (*Collier's*, 18 Oct. 1952: 52-53).



Caption: Weightless in orbit 1,075 miles above earth, workers in space suits assemble three moon ships. Hawaiian islands lie below. Winged transports unload supplies near wheel-shaped space station top left. Engineers and equipment cluster around cargo ship lower ship, passenger ships center and right.

Image 28. Untitled (*Collier's*, 25 Oct 1952: 38-39).



Caption: The unloading on the moon. Twenty-four hours after landing, supplies have been stowed in caterpillar tractors. Hold of cargo ship (r.) is being lowered to ground in sections, to be used as prefabricated headquarters. Earth is at center: halo effect is caused by the sun, hidden behind sphere of rocket ship at left. Diagonal streak in sky, the zodiacal light, is caused by the sun's rays reflecting from cosmic dust. The red star at left is Mars.

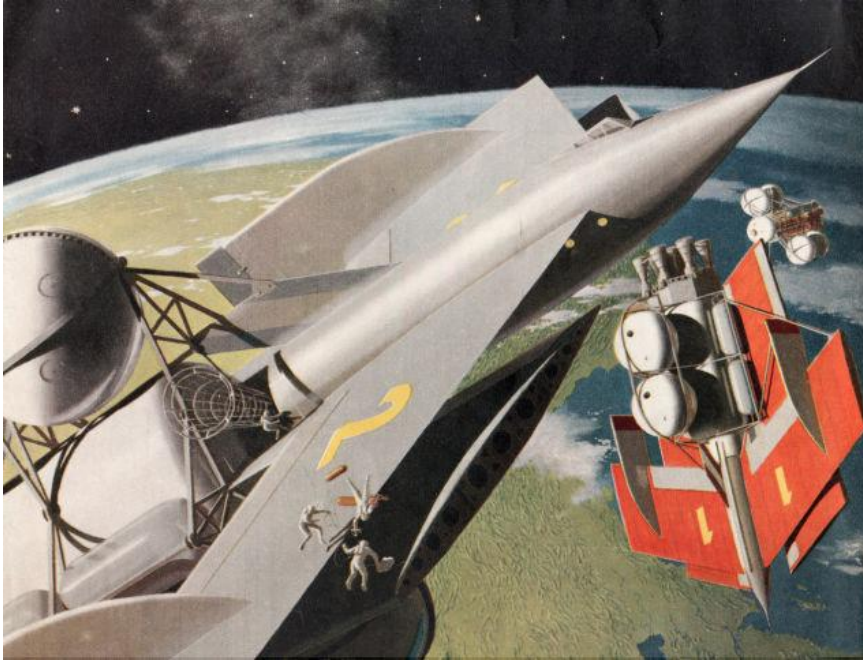
Image 29. Untitled (*Life*, 8 Dec. 1952: 92-93).



Caption: THE CONTINENTS CONGEAL amid seas of molten stone when granitic blocks cool, crystallize and cohere, spreading and thickening as pack ice spreads and thickens on a polar sea. Some drift on the incandescent mass; others come to rest on sunken platforms of basalt that have solidified below. In this vista of the cooling planet the observer is a half mile above the surface; the continental cliffs rise 1,200 feet; the moon rides barely 10,000 miles away. Meteorites of all sizes bombard the earth incessantly, blasting craters in the hardening rocks. From the inferno beneath the crust, fountains of lava, like the 400-foot spout in left foreground, continually erupt; water vapor, carbon dioxide, and other gases, hissing through volcanic fissures, rise and mass in ever thicker clouds above - the future oceans of the

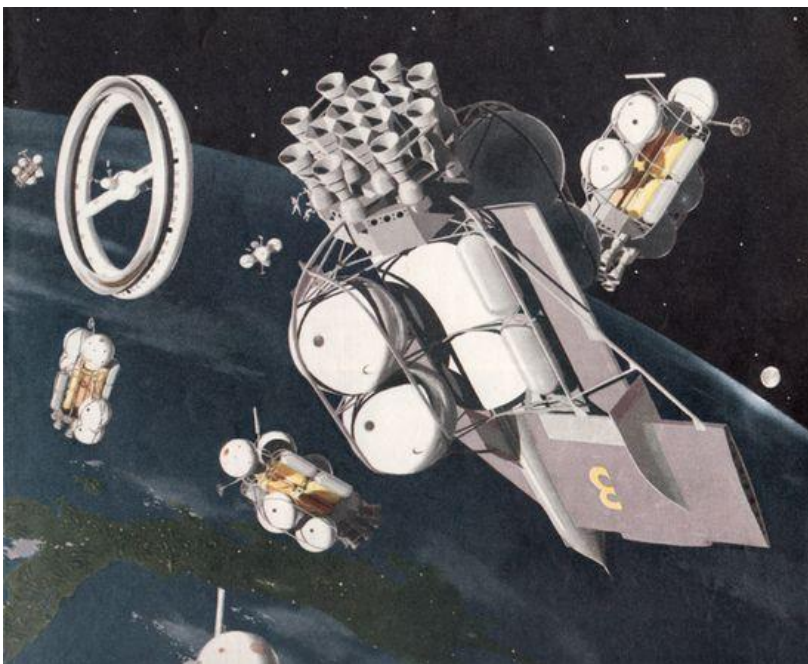
earth. Over the cooling protocontinents, here and there, rain prematurely condenses, tries to fall, and at once boils back into the sky.

Image 30. Untitled (*Collier's*, 30 Apr. 1954: 22).



Caption: Near wheel-shaped space station 1,000 miles from the earth, built especially for assembly of the Mars exhibition, weightless workers put together the ten rocket ships required for the flight. Three of the huge space craft have torpedo noses which convert to planes for landing on the planet.

Image 31. Untitled (*Collier's*, 30 Apr. 1954: 23).



Caption: Near wheel-shaped space station 1,000 miles from the earth, built especially for assembly of the Mars exhibition, weightless workers put together the ten rocketships required for the flight. Three of the huge space craft have torpedo noses which convert to planes for landing on the planet.

Image 32. Untitled (*Collier's*, 30 Apr. 1954: 29).



Caption: After 13-month exploration, the Mars expedition prepares for return flight to earth. Two landing planes are set on tails with wings and landing gear removed. They will rocket back to the 600-mile orbit on first leg of journey.

Image 33. Untitled (*Life*, 20 Dec. 1954: 46).



Caption: THE WASTES OF MERCURY shimmer beneath the baleful eye of the sun, which glares down hot and white, undimmed by atmosphere or fall of night. Here on the perpetually sunlit side, the solar disk appears two to three times as large as it does from the more distant Earth. Windless, waterless, airless, the Mercurian landscape is diversified only by occasional craters gouged by meteoric bombardment, and jagged mountains and cliffs formed during the initial solidification of the planet.

Image 34. Untitled (*Life*, 20 Dec. 1954: 47).



Caption: THE DESERTS OF MARS, studded with crescent dunes, are swept by dust storms that rise recurrently in the thin air. Lighted by the small disk of the remote sun, the Martian sky is relatively cloudless, the Martian land relatively arid. Yet seasonal changes are reflected by burgeoning of green areas in spring and summer. The rounded reddish rocks in the foreground have been eroded by rapid temperatures changes, resulting in a flaking-off of exterior irregularities.

Image 35. Untitled (*Life*, 20 Dec. 1954: 60).



Caption: A DOUBLE STAR, RW Persei, casts two-toned shadows on the jagged surface of a hypothetical planet. One member of the pair is a large orange-colored star, the other a smaller, brighter, blue star engirdled by a ring of glowing hydrogen.

Image 36. Untitled (Ley, Von Braun and Bonestell 1956: 68).



Caption: Mars as it appears to the naked eye when seen from its outer moon Deimos.

Image 37. Untitled (Ley, Von Braun and Bonestell 1956: 148-149).



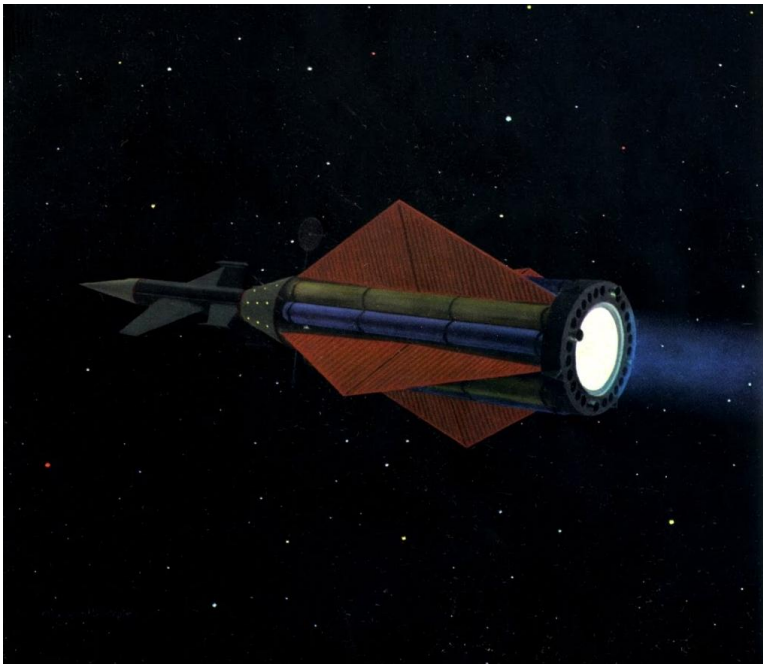
Caption: The ground station has been set up on Mars, and the explorers are about to investigate the vicinity of the landing site.

Image 38. Untitled (Ley 1964: insert between the pages 28 and 29).



Caption: Orbital assembly of the deep-space craft, 450 miles above sea level. Cargo ship at left has brought fuel pods and extra technicians for the final check-up. At right the ion-propulsion craft is being loaded with mercury capsules. The sweep of land below shows Costa Rica to the left, and the northern end of Colombia at the lower right-hand corner. On the horizon near the center lies Florida, at the distance of 1825 miles.

Image 39. Untitled (Ley 1964: insert between the pages 28 and 29).



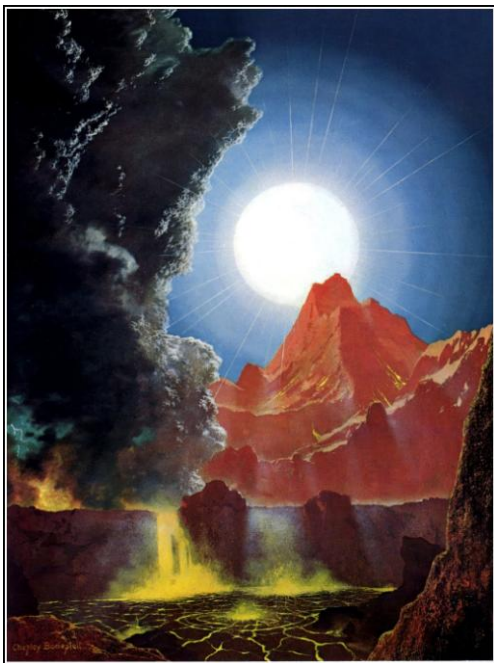
Caption: The top stage of the deep-space craft on its way, five days after crossing the orbit of Neptune, and still accelerating. The type of propulsion mechanism required for such a mission is still to be developed. The triangular, faintly glowing fins of the ship are radiators.

Image 40. Untitled (Ley 1964: insert between the pages 28 and 29).



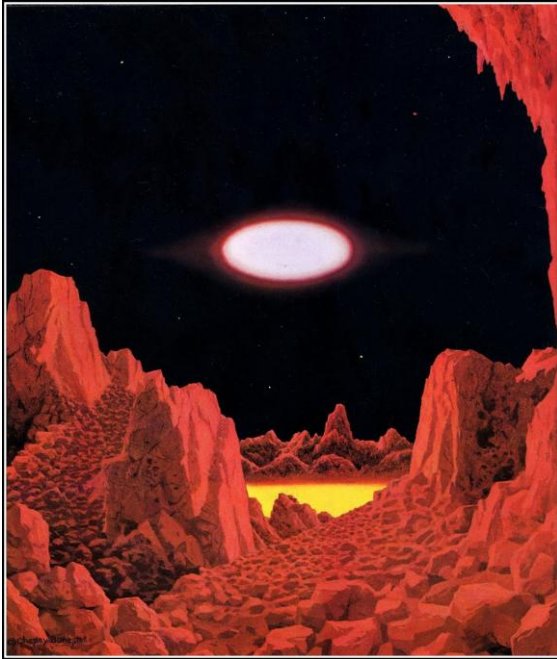
Caption: Antares, a red supergiant as viewed from a hypothetical inhabited planet at a distance of about 3240 million miles. Like the other red-supergiant stars, Antares does have a clearly defined surface.

Image 41. Untitled (Ley 1964: insert between the pages 28 and 29).



Caption: A nova's intense radiation has begun to melt the red-hot mountains of hypothetical earthlike planet. A long time before the nova explosion, the star had reached such high activity that the heat had evaporated all the seas and most of the atmosphere had escaped into space.

Image 42. Untitled (Ley 1964: insert between the pages 28 and 29).



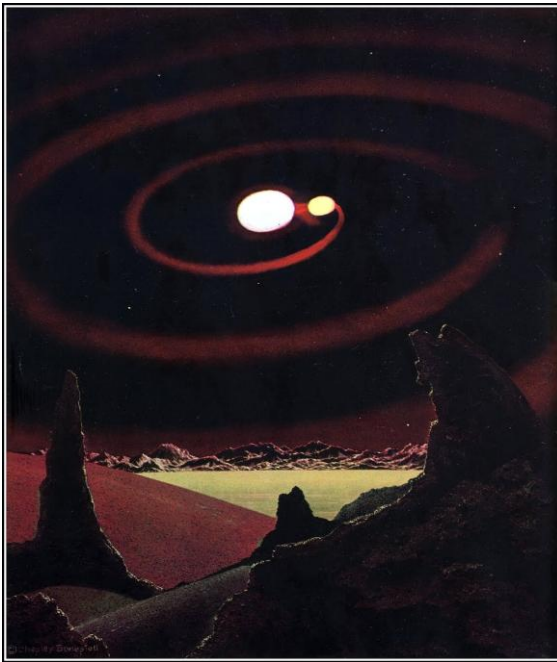
Caption: Pletone, a naked-eye star of the Pleiades cluster. This type-B star is rotating about a hundred times faster than our sun, and hence is strongly flattened. Its radiation is so intense that a hypothetical planet at an orbital distance of 93 million miles would be red-hot.

Image 43. Untitled (Ley 1964: insert between the pages 76 and 77).



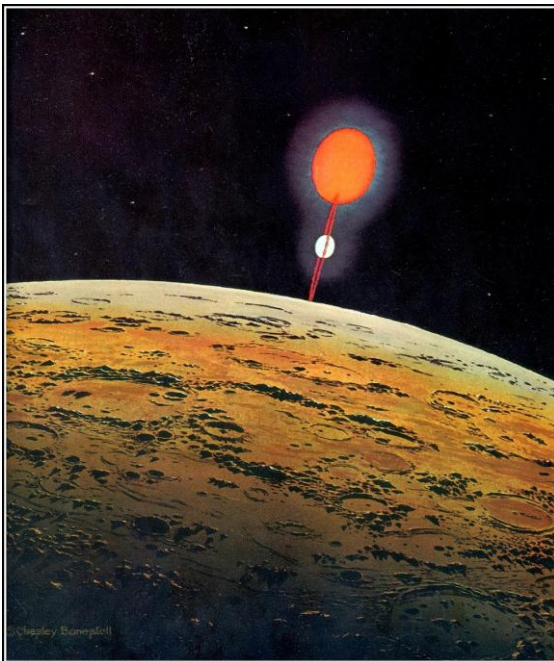
Caption: Mira Ceti. The red-supergiant star Mira in the constellation Cetus (the Whale) is, like nearly all supergiants, a long-period variable. Its period is 331 days. Mira Ceti had been known for a long time before the discovery that it is the larger star of a binary, the smaller component of which is a white-dwarf star. In this painting the small star is shown in transit across the surface of Mira, as viewed from a hypothetical planet at an orbital distance of 450 million from Mira's surface, and about 50 million miles from the orbit of the small star.

Image 44. Untitled (Ley 1964: insert between the pages 76 and 77).



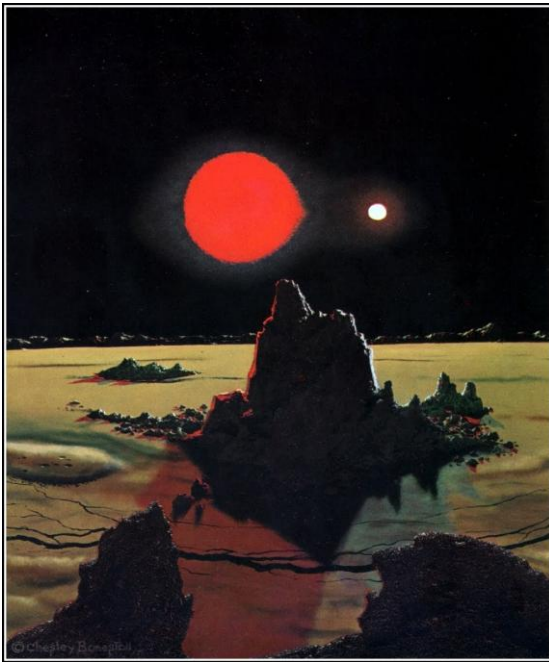
Caption: The binary Beta Lyrae, viewed from a hypothetical planet. The two stars are so close to each other that both components are distorted into egg shapes by mutual gravitational attraction. There is a continuous exchange of mass. The smaller star loses mass that forms a spiral trail.

Image 45. Untitled (Ley 1964: insert between the pages 76 and 77).



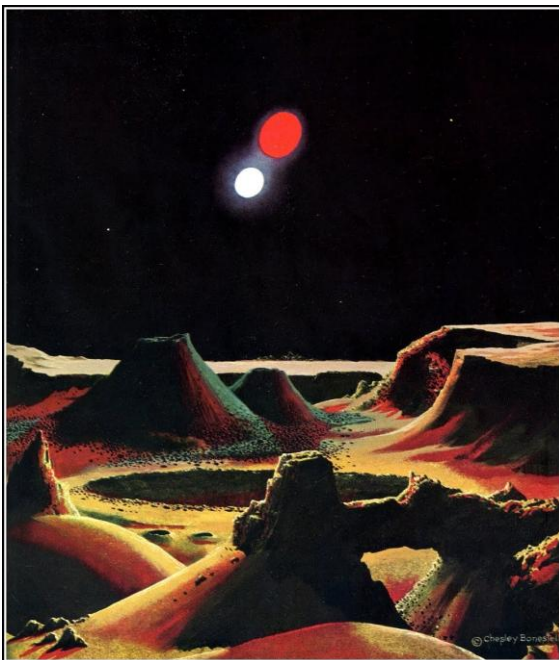
Caption: RW Persei, a close binary with a short period of only 2 weeks. Both stars of this unusual binary share a common envelope of luminous gas, and the smaller component has developed a ring similar to the ones surrounding the planet Saturn. The view is from a hypothetical planet.

Image 46. Untitled (Ley 1964: insert between the pages 76 and 77).



Caption: AE Aquarii, a close binary consisting of a large type-K star (orange) and a smaller blue star. The larger star has moderate nova-like outbursts; some of the expelled matter is captured by the blue star.

Image 47. Untitled (Ley 1964: insert between the pages 76 and 77).



Caption: The binary U Sagittae, as viewed from a hypothetical planet. Like the RW Persei binary (see Plate 21), the U Sagittae system consists of two close stars that share a common envelope of a faintly glowing gas.

Image 48. Untitled (Ley 1964: insert between the pages 76 and 77).



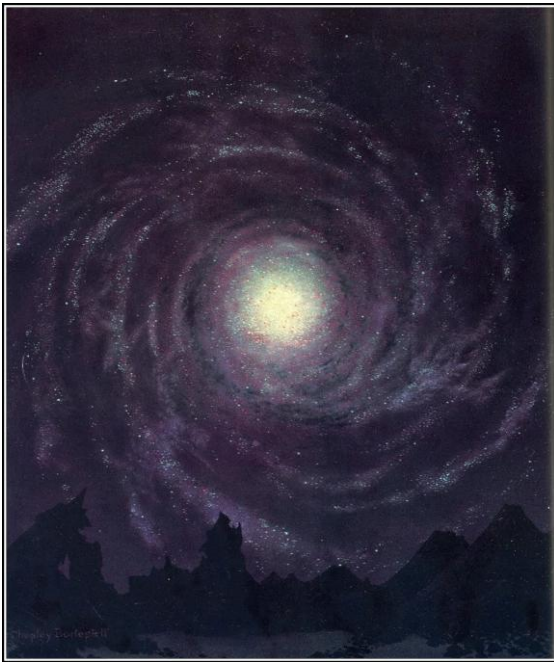
Caption: The eclipsing binary Zeta Aurigae. The red component is a supergiant (type K-4) with a diameter of 200 million miles, while the blue-white component is a Main Sequence star (type B-8), about 3 million miles in diameter and a hundred times as luminous as our own sun. The time between eclipses is 972 days. During an eclipse the large tenuous atmosphere of the blue-white star can be observed. This view of the binary is from a hypothetical planet about 900 million miles from the red supergiant.

Image 49. Untitled (Ley 1964: insert between the pages 76 and 77).



Caption: The incredible system of Epsilon Aurigae. The main component is not visible from the earth, but in this painting it is depicted as glowing faintly at its center, which is likely to be the case. The diameter of the faint supergiant star has been estimated to be about 2300 million miles. This is so huge that if our sun were situated at the center of the star, the orbit of the planet Saturn would be located inside the star's surface. This view is from a hypothetical planet of the small bright component.

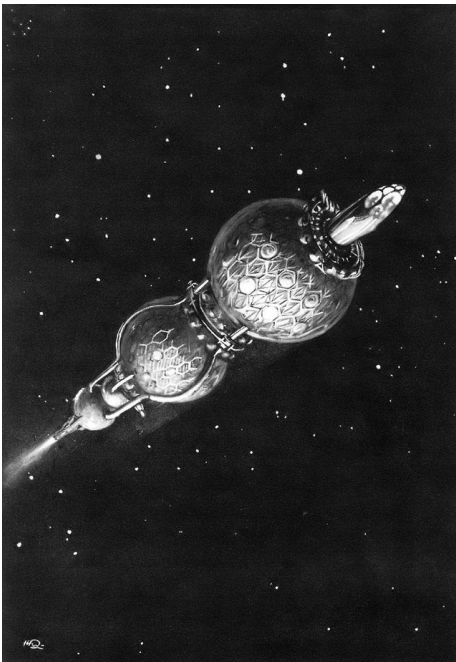
Image 50. Untitled (Ley 1964: insert between the pages 76 and 77).



Caption: The Milky Way galaxy as viewed from a distance of 300,000 light-years, from a hypothetical planet so located that the galaxy appears wide open. The central portion is assumed to consist mainly of Population II stars. Our solar system is located in one of the spiral arms.

(2) Nikolai Kolchitskii's works.

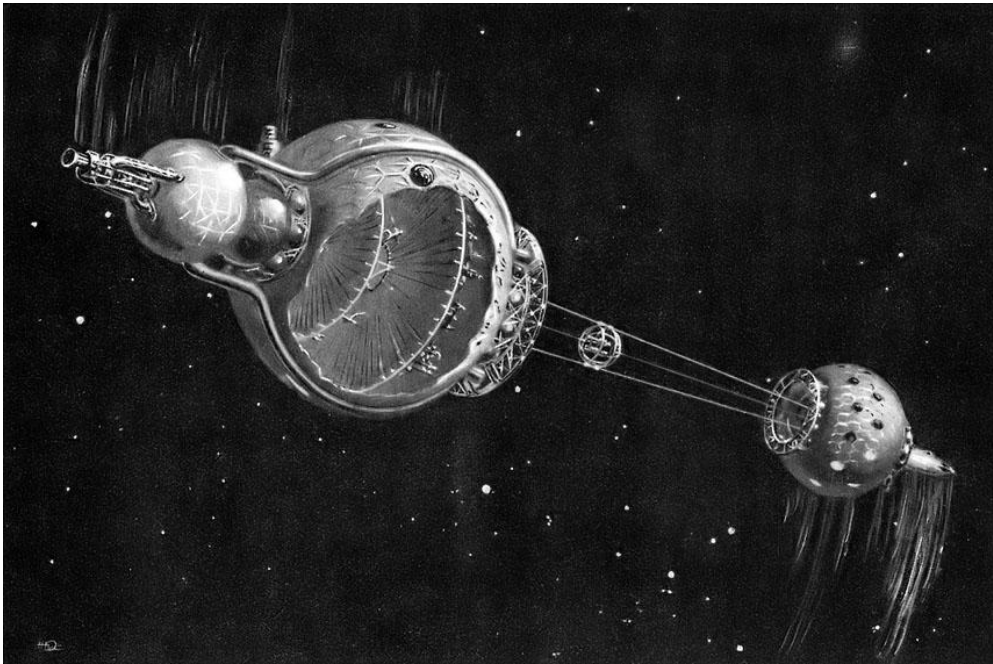
Image 51. Untitled (Sternfeld 1949: 32).



Caption: Космический корабль в полёте. Его форма, необычная по сравнению с формой самолётов и земных ракет, объясняется тем, что в межпланетном пространстве сопротивление среды отсутствует и поэтому придание космическому кораблю обтекаемой формы является излишним. [The spacecraft during the flight. Its form, unusual in comparison with that of aircrafts or terrestrial rockets, can be explained by the fact that there is no air resistance in interplanetary space and therefore giving the spacecraft a streamlined form is superfluous.]¹

¹ Unless otherwise indicated, all translations without references are by the present author.

Image 52. Untitled (Sternfeld 1949: 34).



Сaption: Создание на космическом корабле искусственной тяжести: две части космического корабля, соединенные тросами, приводятся во вращательное движение вокруг общего центра масс. [Creating an artificial gravity in the spacecraft: the two parts of the spacecraft are connected by cables, rotationally driven around a common center of mass.].

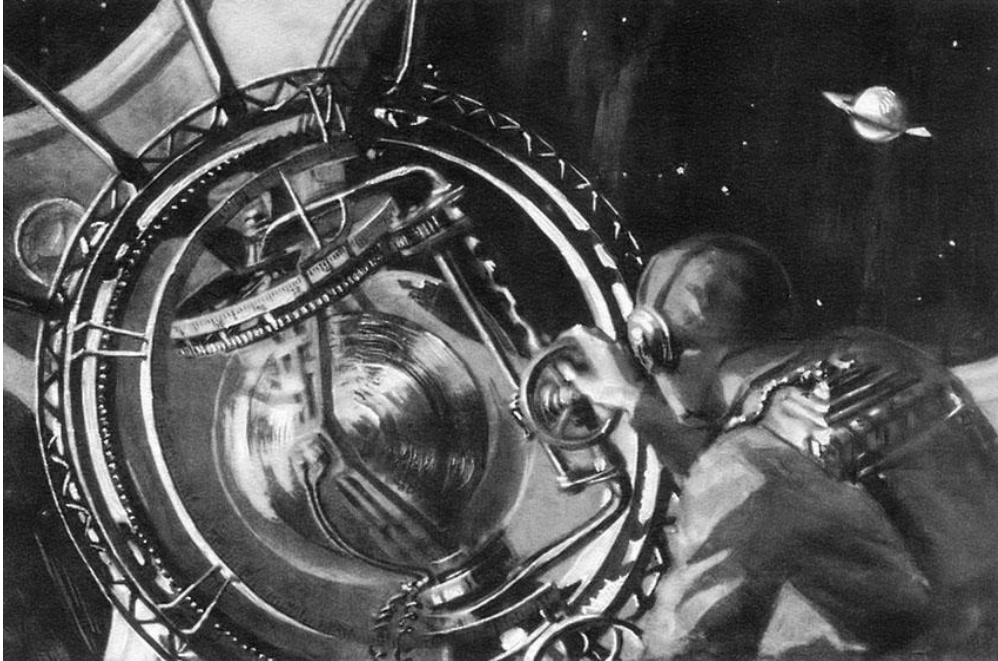
Image 53. Untitled (Sternfeld 1949: 45).



Сaption: Казалось бы, что сделав туннель круговым, можно значительно укоротить его по сравнению с прямолинейным туннелем. Однако для того чтобы перегрузка при разгоне в круговом туннеле была такой же, как в прямолинейном туннеле, круговой туннель должен быть в 12,6 раза длиннее прямолинейного. [It seems that by making a circular tunnel, you can significantly shorten it compared with a straight tunnel. However, in order to equate the gravity overload during acceleration in a

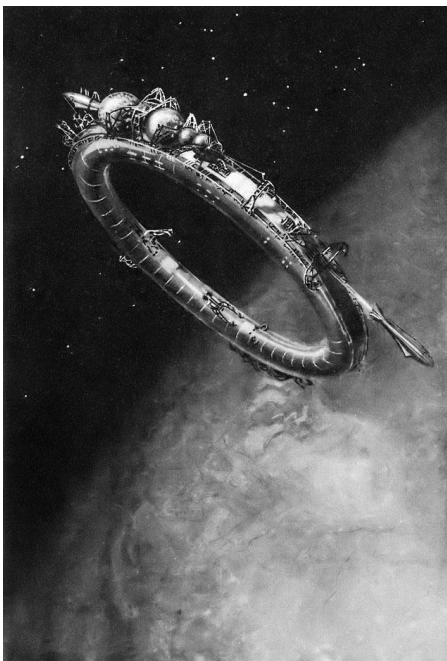
circular tunnel with that in a straight tunnel, a circular tunnel must be 12,6 times longer than the straight one.].

Image 54. Untitled (Sternfeld 1949: 85).



Сaption: Медленное вращение космического корабля в нужном направлении можно будет вызвать быстрым вращением небольшого диска в обратном направлении. [A slow rotation of the spacecraft in the right direction can be caused by a rapid rotation of a small disk in the opposite direction.].

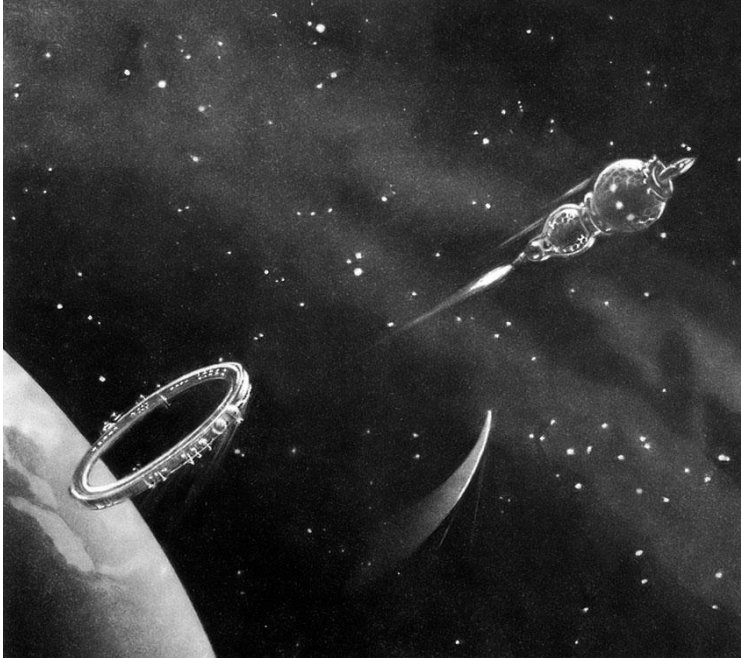
Image 55. Untitled (Sternfeld 1949: 106).



Сaption: Примерная конструкция искусственного спутника Земли. С такого спутника космические корабли будут отправляться в межпланетное пространство. Вращение спутника вокруг своей оси будет вызывать на нём искусственную тяжесть. [An exemplary construction of the earth's artificial

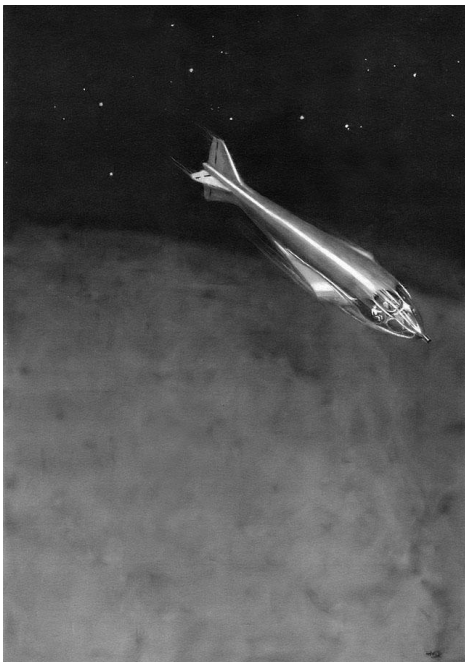
satellite. From such a satellite, spacecrafts will be sent into interplanetary space. The satellite rotation around its axis will create an artificial gravity.].

Image 56. Untitled (Sternfeld 1949: 107).



Сaption: Космический корабль улетает в мировое пространство с искусственного спутника Земли. [The spaceship is going out into space from the earth's satellite.].

Image 57. Untitled (Sternfeld 1949: 121).



Сaption: В момент погружения в атмосферу Земли посадочный планер отделяется от ставшего ненужным корпуса космического корабля. Отброшенный корпус, обладающий большим аэродинамическим сопротивлением, быстро раскаляется от сопротивления воздуха и сгорает подобно метеорному телу. [At the time of immersion in the Earth's atmosphere, the landing glider is

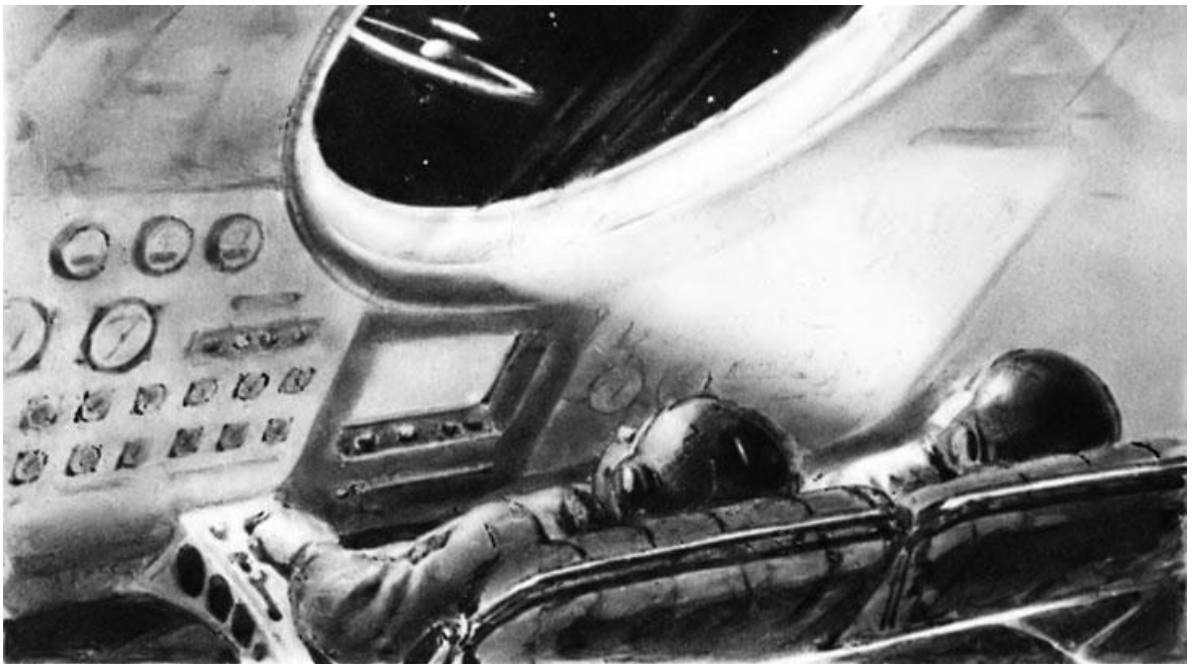
separated from the now obsolete spacecraft. The spacecraft, having a strong aerodynamic resistance, is heated rapidly by air resistance and burns like a meteor.].

Image 58. Untitled (*Tekhnika molodezhi*, Apr. 1949: cover).



[No caption]. A fragment of Dmitriev's "Puteshestvie v zavtra" [Travel to the future] narrating the scene: Это было весьма странное на первый взгляд сооружение. Представьте себе огромный металлический «бублик», который, вращаясь вокруг своей оси, висел рядом с нами в пространстве. В самом центре этого колоссального «бублика» — там, где пустоту издавна положено было называть «дыркой от бублика», — находилось большое шаровидное помещение. Посредством нескольких труб оно было соединено с металлическим тором — телом спутника. Со стороны, с которой мы приближались к острову, — как мне казалось, сверху, — центральный шар был накрыт большим зонтообразным куполом. Над ним острым шпилем вздымалась радиоантенна. Из нижней части центрального шара, — мне казалось, вниз, — опускалась широкая труба; на конце которой находились два металлических цилиндра, разделенных круглым экраном. Я заметил, что они медленно вращались в сторону, обратную круговому движению спутника, так что один из цилиндров постоянно находился в тени, а другой был залит ярким солнечным светом. [At first glance, it was quite a strange construction. Imagine a huge metal "donut", which rotates around its axis and hovers in space, just like us. At the heart of this colossal "donut" - whose void has been long called a "donut hole" - was a large spherical room. It was connected with the metal torus - the body of the satellite - through a pipe. From the side we approached the island - from the top, it seemed to me - the central ball was covered with a large umbrella-like canopy. A sharp spike of the radio antenna was heaving over it. From the bottom of the central ball, it seemed to me, a wide tube was released at the end of which there were two metal cylinders separated by a circular screen. I noticed that they slowly rotated in the direction opposite to the circular motion of the satellite, so that one of the cylinders was in the shadow, while the other was in the bright sunlight.].

Image 59. Untitled (Dmitriev 1950: 20).



[No caption]. A fragment of Dmitriev's "Puteshestvie v zavtra" [Travel to the future] narrating the scene, titled ГЛАВА 5. В КОТОРОЙ ЧИТАТЕЛЬ ПОСЕТИТ ОСТРОВ ИМЕНИ К. Э. ЦИОЛКОВСКОГО [Chapter 5 in which the reader will visit K. E. Tsiolkovsky's Island.]: Я впился глазами в черный бархат космического неба, чтобы там, среди немигающих холодных звезд и планет, увидеть новый спутник Земли, созданный руками моего народа. Наше «приземление» заняло довольно продолжительное время. И пока пилот, связавшись по радио с начальником острова и включив дополнительные сопла поворота и торможения ракетоплана, медленно выравнивал скорость машины соответственно с движением искусственного спутника, я в окно успел подробно рассмотреть его. [I glared at the black velvet sky to get, among the cold unblinking stars and planets, the glimpse of the Earth's new satellite, created by the hands of the Soviet people. Our landing took quite a long time. And while the pilot communicated with the commander of the island by the radio, and, by turning on extra nozzles, he slowly leveled the machine's speed at the motion of an artificial satellite, I had some time to admire the view behind the window in detail.]

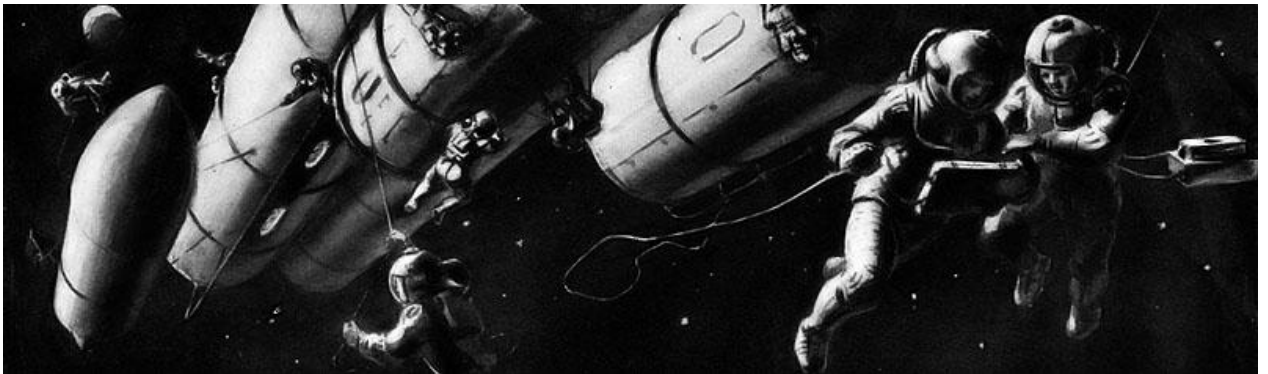
Image 60. Untitled (Andreev 1952: 31).



Caption: Предполагаемая космическая обсерватория будущего, находящаяся вблизи искусственного спутника. Здесь, в мире без тяжести, возможно сооружение огромных рефлекторов, которые покажут астрономам мельчайшие подробности поверхности планет нашей солнечной системы. В этих идеальных условиях пелена воздуха не затуманит, не исказит изображения. Такой рефлектор изображен справа. Слева – в прозрачном шаре ученые проводят исследования спектров далеких звезд. В третьей части лаборатории, вверху, установлены гигантские радиотелескопы. Сообщение между отдельными частями космического острова поддерживается с помощью прозрачных одноместных шаров, снабженных реактивными двигателями. [A hypothetical future space observatory, located near the earth's artificial satellite. Here, in the world without gravity, it is

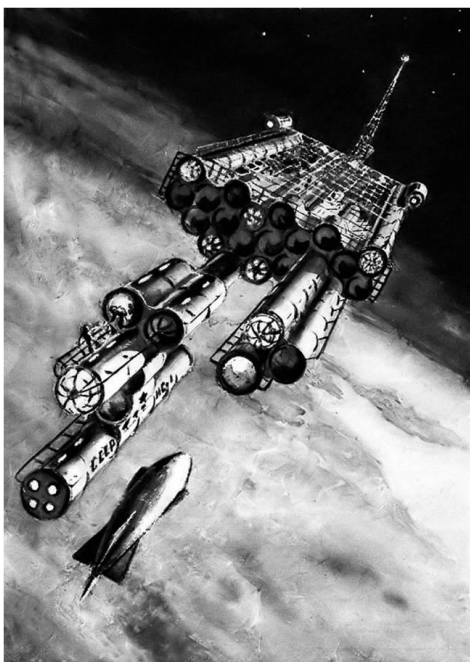
possible to construct huge reflectors that show astronomers the smallest details of the surface of solar system planets. Under these ideal conditions, the air does not blur or distort the image. This kind of reflector is shown on the right. On the left there is a transparent bowl where scientists are studying the spectra of distant stars. In the third part of the lab, at the top, giant radio telescopes are installed. Communication between different parts of this cosmic island is supported by transparent single balls fitted with jet engines.].

Image 61. Untitled (Shternfeld 1952: 29).



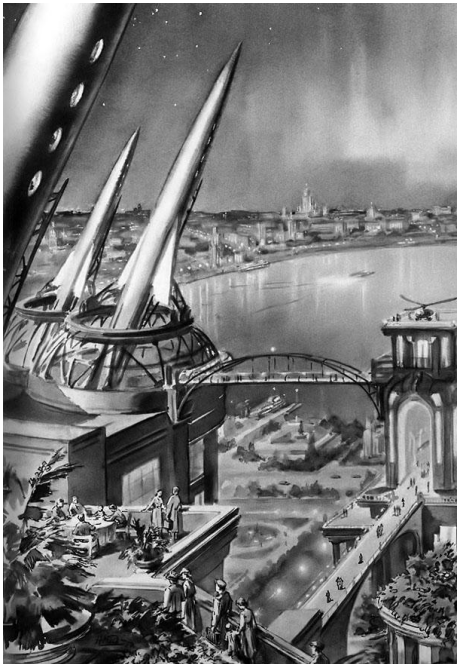
[No caption]. A fragment of Shternfeld's "Na maloi lune" [On a small moon] narrating the scene: Человек невесом и за бортом нашего корабля. Он, как и космический остров, мчится по замкнутому кругу и не может упасть вниз. Каждый знает, что если быстро вращать ведро с водой, то она не выливается и тогда, когда ведро переворачивают: центробежная сила уравновешивает силу земного притяжения. [Man is weightless and is outside our spaceship. He, like a cosmic island, is running in a closed circle and cannot fall down. Everyone knows that if one rapidly rotates a bucket of water, it does not come out when the bucket is upside down: the centrifugal force balances the gravitational pull.].

Image 62. Untitled (Shternfeld 1952: 30).



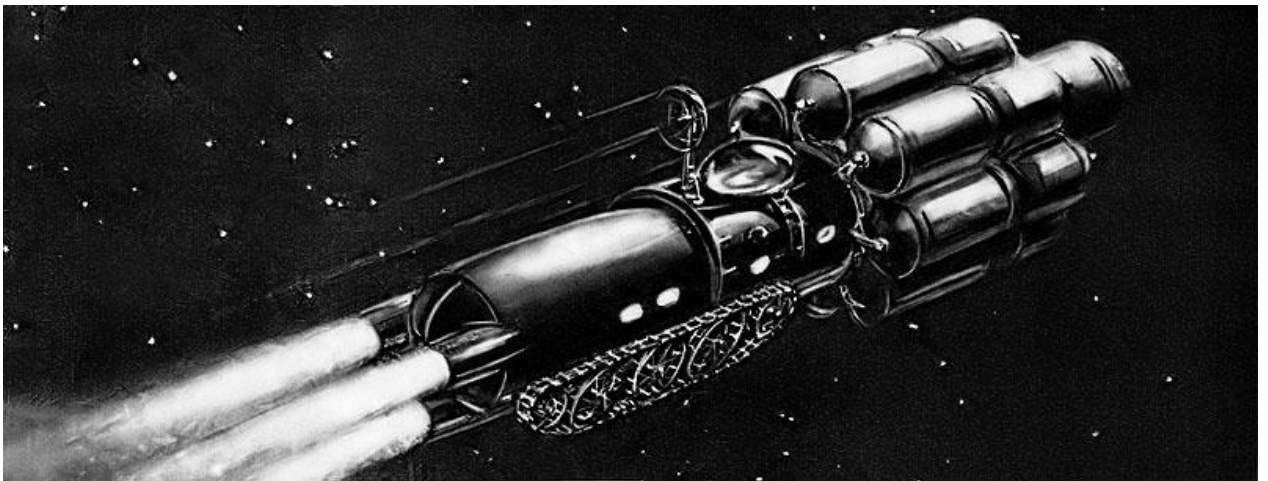
[No caption]. A fragment of Shternfeld's "Na maloi lune" [On a small moon] narrating the scene: В этот же день из Калуги поднялась ракета, унося на искусственный спутник новых людей. Отдохнув в привычной земной обстановке, мы вернемся на космический остров, чтобы отправиться оттуда, как от промежуточной станции, на Луну. [On the same day the rocket was launched from Kaluga, taking the new crew to an artificial satellite. After resting in the earth's familiar surroundings, we will return to the cosmic island in order to set off to the moon.].

Image 63. Untitled (Buianov 1952: 33).



Caption: Величайшее достижение науки – атомную энергию – капиталисты спрятали в атомную бомбу, которой грозят всему прогрессивному человечеству. Их художники изощряются в изображении картин разрушений которые может принести атомное оружие. [Capitalists hid the greatest achievement of science - nuclear power - in the atomic bomb that threatens the whole humanity. Their artists excel at depicting the destruction that can be brought by nuclear weapons.].

Image 64. Untitled (Shternfeld 1952: 22).



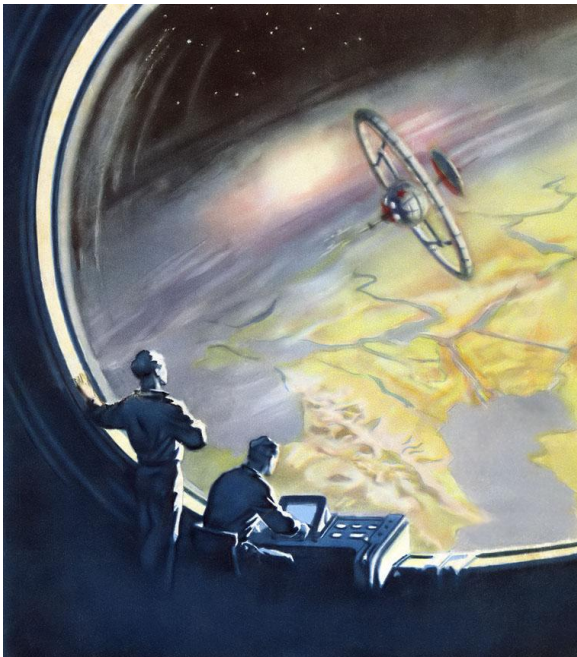
[No caption]. A fragment of Shternfeld's "LK-3 letit na lunu!" [LK-3 flies to the moon!] narrating the scene: 11 мая 19... года. 22 часа 12 минут по московскому времени. Кабина озаряется красноватым отблеском вспышки ракетных двигателей. Какая-то доля секунды, и наш «ЛК-3» плавно отделяется от Малой Луны — спутника Земли, созданного мыслью и руками советского человека, откуда межпланетные корабли отправляются в космический полет. [11 May, year 19.... 10:12 p.m. of Moscow time. The cabin is illuminated by the flash reflection of the rocket engines. Within seconds, our LK-3 is smoothly separated from the Little Moon - the Earth's satellite, created by the mind and hands of the Soviet man, who sends interplanetary spaceships into space.].

Image 65. Untitled (Shternfeld 1952: 23).



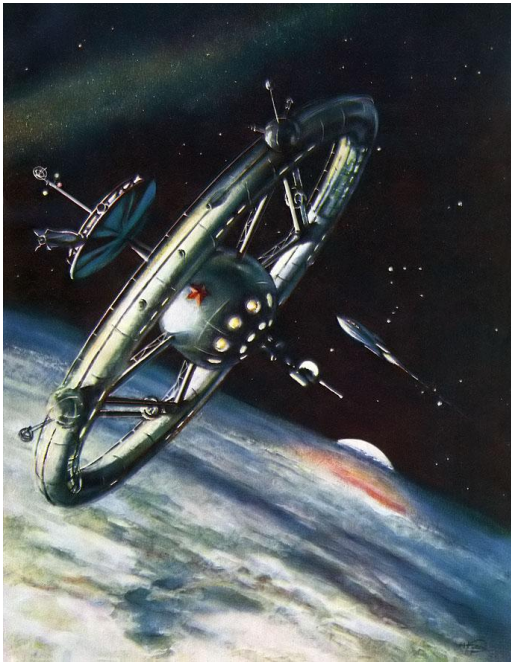
[No caption]. A fragment of Shternfeld's "LK-3 letit na lunu!" [LK-3 flies to the moon!] narrating the scene: 17 мая. 14 часов 25 минут. Вспышка ракетных двигателей. «ЛК-3» быстро катится по каменистой пустыне. Секунда, другая, и наши гусеницы отрываются от Луны. Они больше не нужны, и мы сбрасываем их. Горы, скалы, светлые лучи, цирки, расщелины, кратеры с нарастающей скоростью набегают друг на друга и наконец вовсе скрываются из глаз. Огромный уменьшающийся диск повис над нами в пространстве. Прощай, Луна! Впрочем, нет: до скорого свидания! [17 May. 2:25 p.m. The start of rocket engines. LK-3 is rolling fast on the stony desert. Within seconds, our tracks are detached from the Moon. They are no longer needed, and we drop them. As we increase speed, the mountains, rocks, rays of light, cirque glacier, crevices, craters blur with each other and finally are all hidden from our eyes. A huge disc is getting smaller and smaller and is hovering over us in space. Farewell, the Moon! Or rather, see you soon!].

Image 66. Untitled (Zakharchenko 1952: cover).



[No caption]. A fragment narrating the scene: На зеленовато-сером экране радиолокатора я увидел маленькое, ярко светящееся колечко с небольшим шариком посередине. Это был искусственный спутник Земли — маленький островок, созданный советскими людьми в межпланетном пространстве. [On the greenish-gray radar screen, I saw a small, brightly glowing ring with a tiny ball in the middle. It was a man-made satellite - a small island created by the Soviet people in the interplanetary space.].

Image 67. Untitled (Zakharchenko 1952).



Caption: Над Землёй двигался новый искусственный спутник. [A new artificial satellite has moved beyond the earth.].

Image 68. Untitled (*Tekhnika molodezhi*, Mar. 1954: cover).



[No caption]. A fragment of Khvastunov's "K solntsu" [To the sun] narrating the scene: Сквозь ряд экранов, пропускавших только лучи очень узкого участка видимого спектра, человек впервые так близко лицом к лицу увидел пылающее гневное Солнце – с черными рябинками пятен, с косматыми завитками протуберанцев, в сверкающем блеске его великолепной короны. Словно разогнавшийся при падении снаряд, пролетел космический корабль мимо центрального светила и, двигаясь по другой ветви эллипса, начал удаляться от него. Задание было выполнено. Земля уже ждала своих отважных скитальцев, с помощью науки, с помощью знаний проникших в запретные до этого области вселенной и возвращающихся назад победителями. [For the first time ever, through a series of screens which allow only a very narrow portion of the visible spectrum, a man comes face to face with a flaming sun - with the black sunspots and shaggy, curly solar prominences glittering in the splendor of its magnificent corona. Like a falling speeding projectile, a spaceship flew by the central light, and having moved to another branch of the ellipse, began

to move away from it. The mission has been accomplished. The earth is already waiting for its brave travelers who, by means of science and knowledge, have managed to penetrate the unknown parts of the universe and come back as heroes.].

Image 69. Untitled (Fesekov 1954: 7).



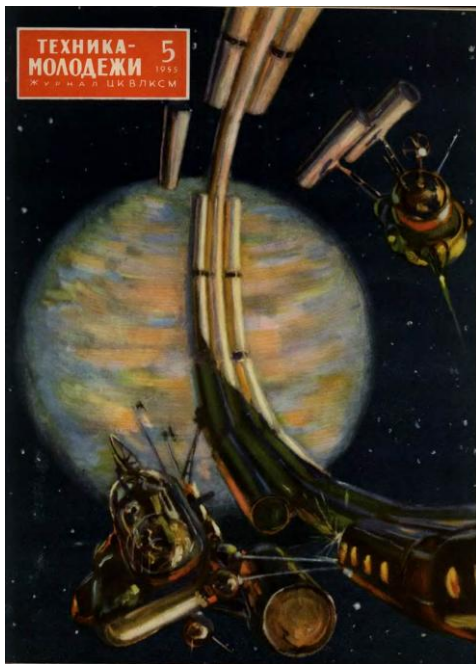
Caption: На рисунке в заголовке художник Н. Колчитский попытался уобразить как выглядит двойная звезда с одной из планет, входящих в ее систему. [In the title picture, the artist N. Kolchitskii attempted to envision a double star with one of the planets from the solar system.].

Image 70. Untitled (Staniukovich 1954: 3).



[No caption]. Although the image is a clear reference to Staniukovich's "Priroda tiagotenia" [Nature of the gravitational pull], there is no explicit mention of the astronauts/cosmonauts in the earth's orbit in the article.

Image 71. Untitled (*Tekhnika molodezhi*, May 1955: cover).



[No caption]. A fragment of Shternfeld's "Orbitalnye korabli" [Orbital spaceships] narrating the scene: Огромная ракета отрывается от Земли, в несколько мгновений пересекает атмосферу и с громадной скоростью уносится в бесконечную даль межпланетного пространства. Смелые астронавты отправились в очередной космический рейс. Их цель — далекая Венера, о которой столько споров ведут уже несколько поколений астрономов. Споры будут разрешены, когда корабль приблизится к загадочной планете. [A huge rocket, detached from the earth, crosses the atmosphere with a tremendous speed and goes further into the interplanetary space. Courageous astronauts have set off on their next journey. Their goal is to reach a distant Venus, about which there has been much controversy for several generations of astronomers. Disputes will be resolved when the spaceship gets closer to the mysterious planet.]

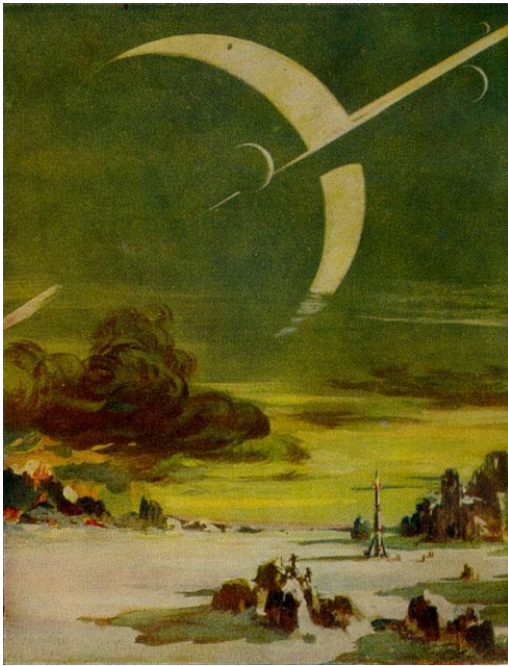
Image 72. Untitled (Gurevich 1955: 31).



[No caption]. A fragment narrating the scene: Но жить на Луне очень скучно, куда хуже, чем в Арктике. Сидишь взаперти в герметическом домике, внизу четыре комнаты, наверху под куполом склад. Наружу выходишь только в скафандре, а выйдешь, не на что смотреть — пыль и камень, камень и пыль. Как вам сказать, на что похоже? Видите за рекой у электростанции горы шлака? Вот и представьте: таким шлаком засыпано все кругом на тысячи километров. Горизонт на Луне короткий, все время кажется, что ты на холме, а дальше обрыв. Вот стоишь на этом пятачке, глядишь на звезды. Тишина мертвая, уши как будто ватой заткнуты. Днем жара, хоть блины пеки в пыли, ночью — морозище. Небо черное днем и ночью, и на нем Земля огромная, голубая, куда ярче, чем Луна в Кремье. Глянешь на нее, и сердце щемит. [But living on the moon is very boring, much worse than living in the Arctic. You live in an airtight house with four rooms downstairs and the

warehouse upstairs under the dome. You go outside only in the spacesuit and when go out there is not much to look at - only the dust and stones. I am just wondering what to compare it with? Can you see the mountains of slag behind the river? So now imagine that thousands of kilometers are covered with this slag. The horizon on the Moon is short, so it seems to you that you are standing at the edge of the hill all the time. imagine that you are standing there, looking at the stars. There is a dead silence and your ears seem to be plugged with cotton wool. There is the heat in the afternoon, when you can fry pancakes in the dust, and it is freezing at night. The sky is black, day and night, and there is a huge blue earth, much brighter than the moon in Kremene. When you look at it, your heart hurts.].

Image 73. Untitled (Vasil'ev 1955: 1).



Словно перечеркнутый тонким зигзагом кольца висит в небе огромный Сатурн, окруженный узкими серпами своих многочисленных спутников. [Like a ring crossed by a thin zigzag, a huge Saturn is hanging in the sky, surrounded by narrow sickles of his numerous satellites.].

Image 74. Untitled (Vasil'ev 1955: 14).



На мертвые камни Луны ступили первые астронавты. Развернуты надувные дома, соединенные надувными же коридорами из прозрачной пластмассы. Гелиоэлектростанция дает первый ток, установлена прочная радиосвязь с Землей. Наш вечный спутник стал обитаемым. [The astronauts first set foot on lifeless moon rocks. The inflatable houses have been deployed and connected by corridors made of transparent plastic. The solar power plant provides the first current which establishes contact with the Earth on radio waves. Our eternal satellite has finally become habitable.].

Image 75. Untitled (Khlebtsevich 1956: 36).



[No caption]. A fragment narrating the scene: Значит, жизнь на Марсе возможна? «Да!» — отвечают специалисты. Но какие формы жизни, кроме растительной, могут существовать на Марсе? Имеется ли на нем животный мир? Может быть, там живут и мыслящие, разумные существа? Это спорные вопросы. Дать правильные ответы на них сейчас невозможно. Ведь даже в мощный современный телескоп из-за помех, создаваемых атмосферой, астрономы во время противостояний видит Марс примерно в 1000 раз ближе, то-есть как бы с расстояния 57 тыс. км. С этого расстояния можно увидеть лишь объекты размером в несколько сот километров. Где уж тут рассмотреть, обитаема ли планета! [So, is life on Mars possible? Yes! - the experts answer. But what kind of alien life forms, except plants, may exist on Mars? Does the animal world exist there? Maybe some intelligent beings live there? These are controversial questions and it is now impossible to give the right answers to all of them. Even a modern and powerful telescope, due to interference from the atmosphere, allows astronomers to see Mars approximately 1000 times closer, that is, from a distance of 57 thousand kilometers. From this distance, you can only see objects of the size of a few hundred kilometers, let alone to

consider whether the planet is inhabited!].

Image 76. Untitled (Khlebtsevich 1956: 32).



[No caption]. A fragment narrating the scene: Каждый год наука открывает новые тайны природы и ставит их на службу человеку. 1956 год является годом, когда впервые одновременно в районах северного и южного полюсов Земли действуют постоянные научные станции. Хотя эти районы никогда не обживались человеком, интересы науки и практики потребовали их изучения. В 1957-1958 годах в околоземном пространстве начнут стремительный бег автоматические спутники Земли. [Every year science discovers the new secrets of nature which are put at the service of man. 1956 is the year when the first permanent research stations are working simultaneously in the areas of the Earth's north and south poles. Although these areas have never been inhabited by humans, they have been studied in the interests of science and practice. Between 1957 and 1958, the automatic satellites will be installed in the Earth's orbit.].

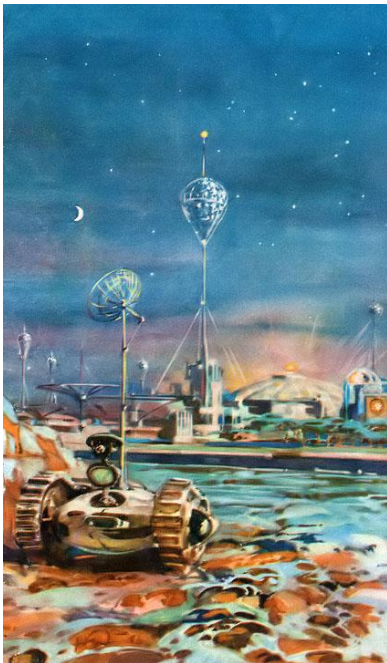
Image 77. Untitled (Gadomskii 1957: 33).



[No caption]. A fragment narrating the scene: Давно уже никто не сомневается в возможности межпланетных полетов. Но ракета, в которой сжигается химическое горючее, не сможет быть использована astronautами. В лучшем случае она позволит поднять на высоту более 1 000 км искусственный спутник Земли, весящий около 50 кг. Скорость ракеты зависит от скорости истечения газа из сопла. При использовании химического горючего может быть достигнута скорость истечения до 3,5 км в секунду. Атомная энергия позволит повысить эту скорость до десятков тысяч километров в секунду. Фотонная ракета будет двигаться со скоростью, близкой к скорости света (около 300 тыс. км в секунду). Двигателем послужит предложенная Зенгером ядерная лампа. [For a long time no one has questioned the possibility of interplanetary flight. However, the rocket, which burns chemical fuel, cannot be used by astronauts. At best, it will raise to the height of more than 1000 kilometers of the Earth's artificial satellite, weighing about 50 kilograms. The speed of the rocket depends on the velocity of the

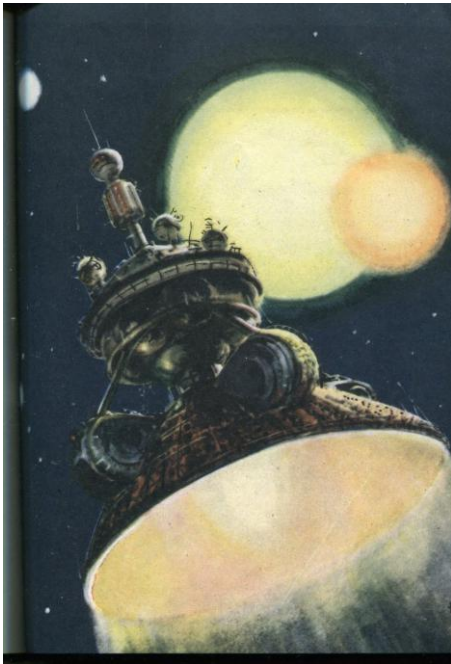
gas from the nozzle. When using a chemical fuel the speed up to 3.5 kilometers per second can be achieved. Nuclear power will increase this speed to tens of thousands kilometers per second. The photonic rocket will travel at speeds close to the speed of light (about 300 thousand kilometers per second). A nuclear lamp, proposed by Zenger, will serve as the rocket's engine.].

Image 78. Untitled (*Iunyi tekhnika*, Nov. 1957: 93).



[No caption]. The illustration was published as the back cover of the issue as a reference to Gurevich's "Prokhozhdenie Nemezidy" [The passage of Nemesis]: Закройте глаза на миг, представьте себе чужую планету. День или ночь, не разберешь. Слепящее Солнце заливаает светом снежную равнину. Искрятся жесткие сухие снежинки, чуть вьется пар над прозрачными лужами, застоявшимися между сугробами. От сверкающей белизны больно глазам... а над ней угольно-черное небо с пылью звезд, прозрачная кисея Млечного Пути и на фоне его одна звезда всех ярче – не блеск, не светлячок, а массивный бриллиант на бисерном пологие неба. [Close your eyes and imagine an alien planet. One cannot tell between day and night. The blinding sunlight covers the snowy plain. The hard dry snowflakes sparkle and some vapour hovers above transparent puddles between the snowdrifts. Our eyes hurt from the sparkling white ... above that there is the pitch black sky filled with the dust of stars, a transparent muslin of the Milky Way, and amid all these stars one was brighter - not a spangle or a glow, but a bright diamond on the beaded canopy of the sky.].

Image 79. Untitled (Vasil'ev 1958: 4).



[No caption]. A fragment narrating the scene: Конечно, космические корабли будут совершенствоваться. Место двигателя, работающего на химическом горючем, займет двигатель, работающий на энергии расщепленного атома. И жалкими, неудобными, тихоходными покажутся первые космические корабли, о которых мы сейчас так мечтаем! Когда на космическом корабле будет установлен атомный реактивный двигатель, резко изменятся и межпланетные маршруты. Не нужно будет дрожать в полете над каждой крохой энергии, над каждым килограммом горючего. В несколько раз увеличатся скорости космических кораблей, как вдвое увеличились скорости самолетов при переходе на реактивный двигатель. С нескольких месяцев до нескольких недель сократятся сроки перелетов. И не эллиптические, но более короткие - параболические, а в некоторых случаях и прямые траектории станут обычными для межпланетных перелетов. Но это уже не завтрашний, а послезавтрашний день астронавтической техники. [Of course, the spacecrafts will be improved. The engine that uses a chemical fuel will be replaced with the engine that uses the energy of a disintegrated atom. And the

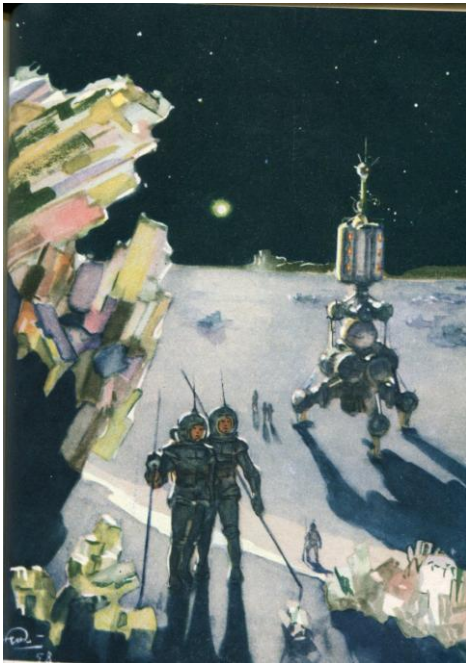
first spacecrafts that we currently dream of seem to be miserable, uncomfortable and slow. When a nuclear jet engine will be installed in the spacecraft, the interplanetary routes will quickly change. Travelers will not have to tremble over a single particle of energy or every kilogram of fuel during spaceflight. The speed of the spacecraft will increase a few times similarly to the speed of the aircraft which will double after the installation of a jet engine. The length of the flight of up to a few months will be reduced to that of a few weeks. And the trajectory will not be elliptic, but shorter - parabolic, and in some cases even direct trajectories will become the norm for interplanetary missions. But the vision is not for tomorrow, but the day after tomorrow of astronautical engineering.]

Image 80. Untitled (Vasil'ev 1958: 13).



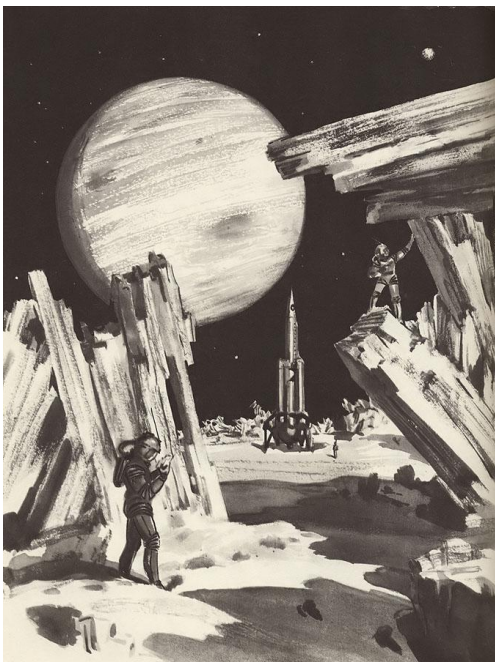
Caption: Несколько минут работы двигателя - и корабль ложится на круговую орбиту... [A few minutes of the engine's working and the spaceship goes into a circular orbit...].

Image 81. Untitled (Vasil'ev 1958: 14).



Сартрион: Мы на Плуtone. Солнце светит нам в спину, и лёгкая тень от корпуса гигантского корабля лежит на бесконечной сумрачной равнине, как дорога в неизвестное. Здесь границы солнечной системы. За ней, та, дальше, распротёрся бескрайний океан космического пространства. Но и его чёрную бездну пересекут когда-нибудь посланцы Земли, отправившиеся на разведку соседних звёзд. [We are standing on Pluto. The sun is shining at our backs and our huge spacecraft casts a subtle shadow on the endless gloomy plain like the journey into the unknown. The end of the solar system is somewhere near us. Further, there is only a vast ocean of space. However, this black abyss is occasionally crossed by messengers from the Earth who have set off to explore the nearby stars.].

Image 82. Untitled (Blagoi 1959).



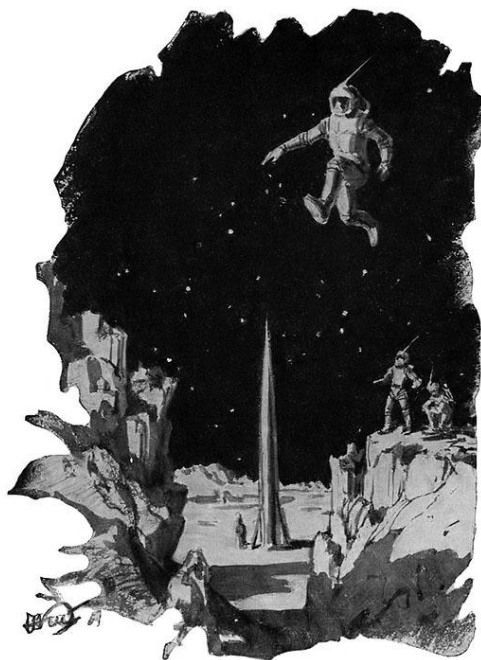
Сартрион: На спутнике Юпитера. [On Jupiter's moon.].

Image 83. Untitled (Blagoi 1959: 457).



Caption: Автоматическая танкетка с телевизионным передатчиком на Луне. [Automatic tankette with a television transmitter on the Moon.].

Image 84. Untitled (Blagoi 1959: 458).



Caption: Первые люди на Луне. [The first men on the moon.].

Image 85. Untitled (Blagoi 1959).



Сaption: Атомная космическая ракета в полёте. [A nuclear space rocket in flight.].

Image 86. Untitled (Blagoi 1959).



Сaption: Вид Земли с Луны. [The view of the earth from the moon.].

Image 87. Untitled (Gilzin 1960).



Caption: Впервые на Марсе [The first on Mars.].

Image 88. Untitled (Gilzin 1960).



Caption: Строительство искусственного спутника Земли. [Construction of the Earth's artificial satellite.].

Image 89. Untitled (Gilzin 1960).



Сaption: Заправка межпланетного корабля на спутнике. [Fueling an interplanetary spaceship on the satellite.].

Image 90. Untitled (Gilzin 1960).



Сaption: Марс в небе его спутника Деймоса. [Mars as seen from its moon, Deimos.].

Image 91. Untitled (Gilzin 1960).



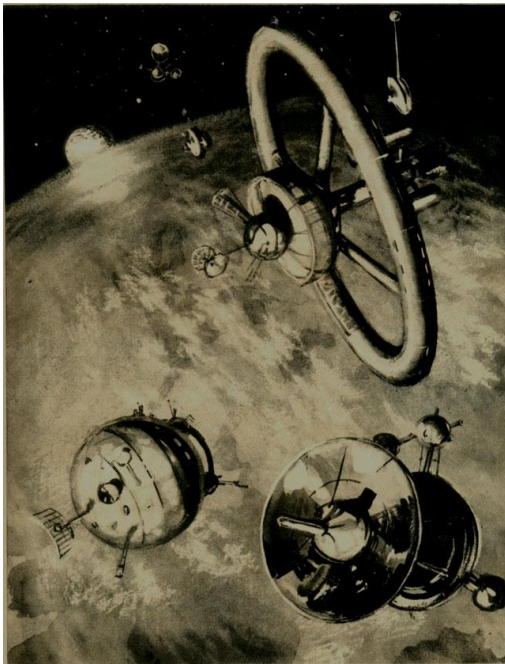
Сартiон: Межпланетные путешественники на спутнике Юпитера Европе. [Interplanetary travelers on Jupiter's moon, Europa.].

Image 92. Untitled (Gilzin 1960).



Сартiон: Вид Сатурна с его спутника Тетии. [The view of Saturn from its moon, Tethys.].

Image 93. Untitled (Gilzin 1960).



Caption: «Межпланетный поселок» на высоте 1670 километров. [“Interplanetary village” at the altitude of 1,670 kilometers.].

Image 94. Untitled (Gilzin 1960).



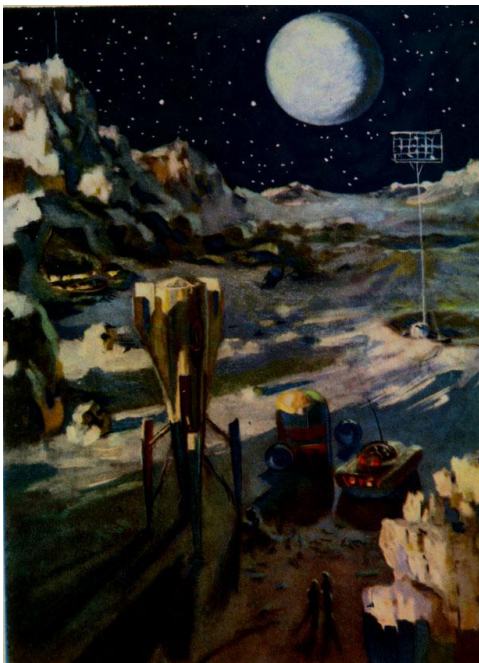
Caption: Межпланетный корабль идет на посадку. [Interplanetary spaceship is landing.].

Image 95. Untitled (Gilzin 1960).



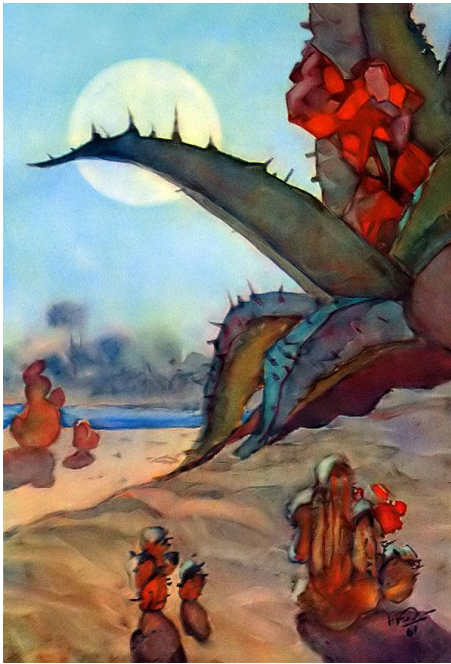
Сaption: Комета Галлея пересекает орбиту Земли. На переднем плане — Луна. [Halley's comet crosses the Earth's orbit. The Moon can be seen in the foreground.].

Image 96. Untitled (Gilzin 1960).



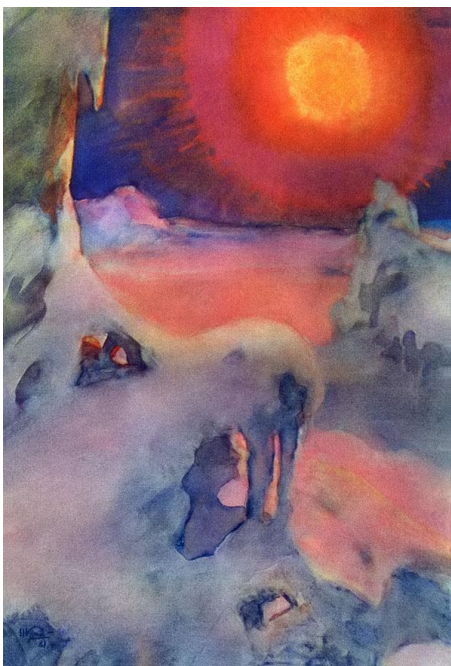
Сaption: Межпланетный корабль прибыл на лунную базу. [Interplanetary spaceship has arrived to the lunar base.].

Image 97. Untitled (Valgard 1962).



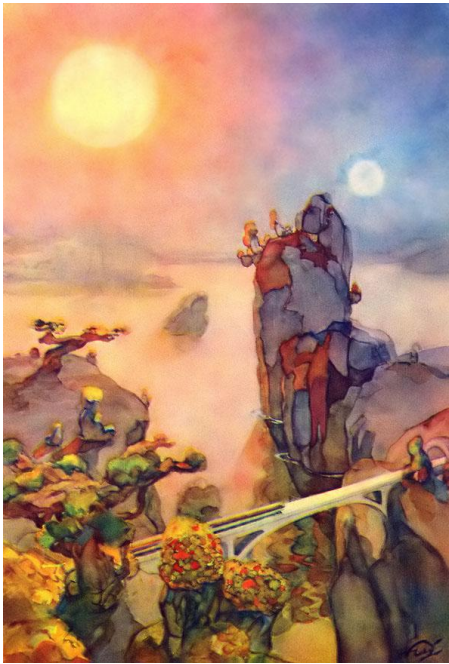
Сартіон: Голубое солнце [The blue sun.].

Image 98. Untitled (Valgard 1962).



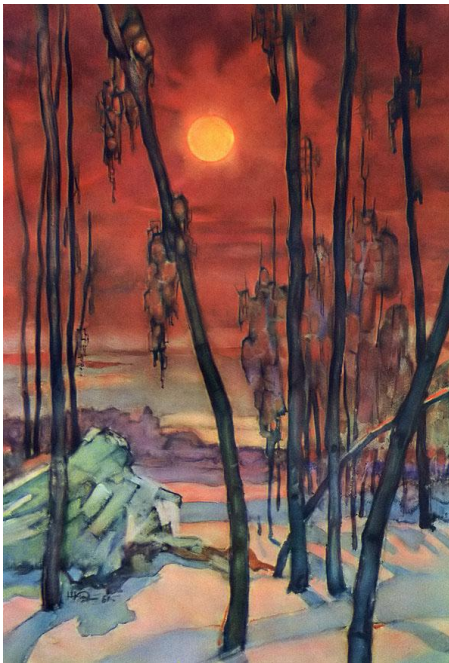
Сартіон: Красное солнце. [The red sun.].

Image 99. Untitled (Valgard 1962).



Сартіон: Мир с двумя солнцами. [The world of two suns.].

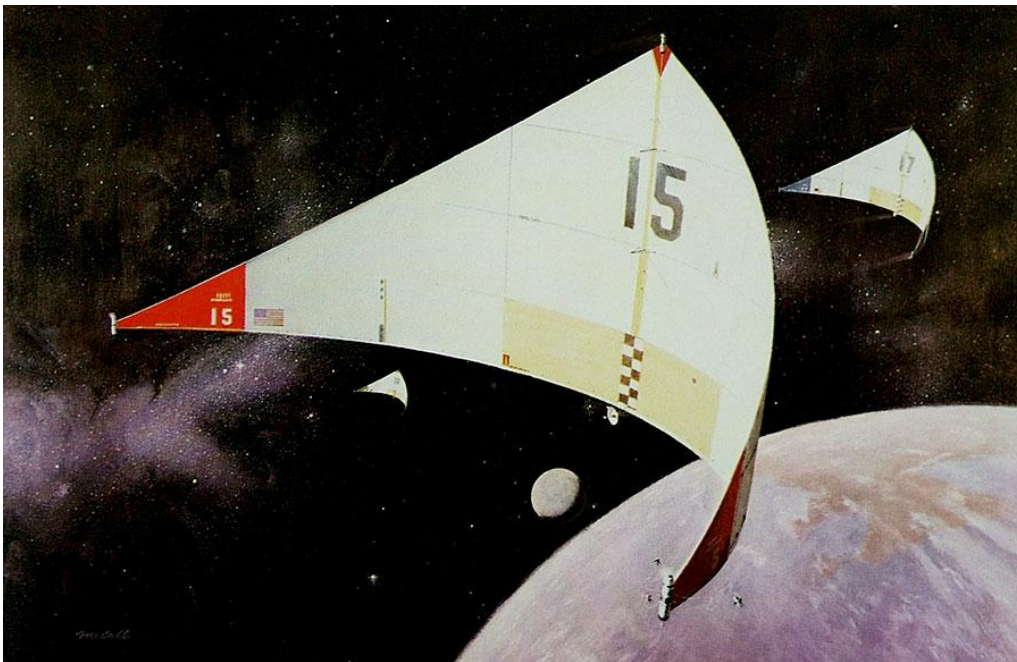
Image 100. Untitled (Valgard 1962).



Сартіон: Старееющее солнце. [The old sun.].

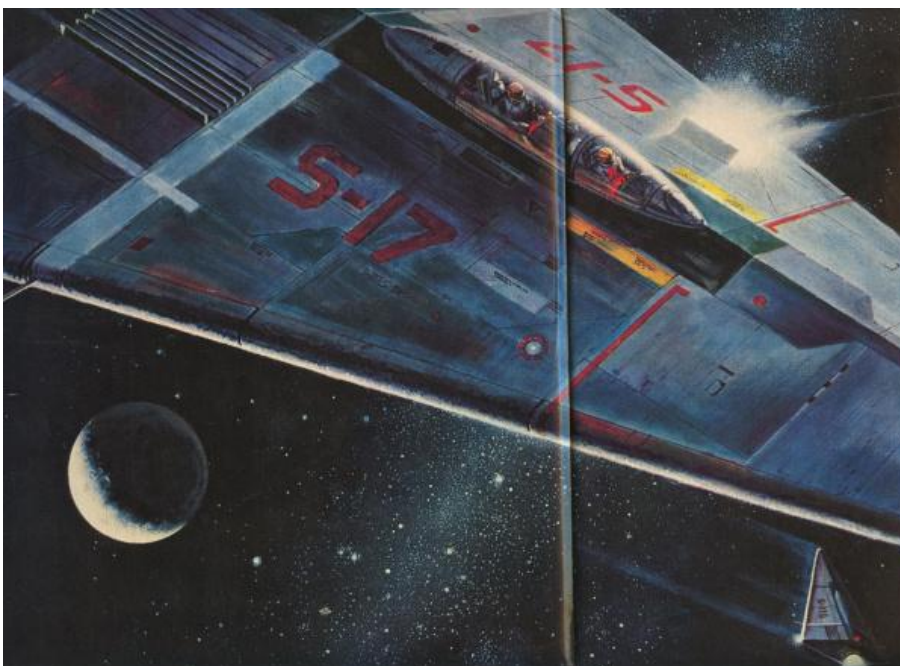
(3) Robert McCall's works.

Image 101. *Sun-driven Regatta* (*Life*, 21 Apr. 1961: 48-49).



Caption: Like the wind, the sun is a source of power for travel. These huge solar sails made of thin aluminized plastic would be pushed through space by the steady, gentle force of light emanating from the sun. They could be rolled up in a ball for launching into solar orbit, then spread and set adrift with crews manning capsules fastened to each corner. Rockets mounted on capsules would guide the sail by twisting and turning it so it could tack like a sailboat in the wind. Here Artist McCall shows a spaceship hovering nearby as one crew relieves another and other space-yachts race onward over the moon (left) and earth.

Image 102. *An Aerospace Cop to Help Police the Beat* (*Life*, 21 Apr. 1961: 50-51).



Caption: As vehicles of all kinds are spewed into space, the problem of policing the traffic will arise. Some of the objects will be harmless derelicts whose only crime is that they are blocking the road. Others,

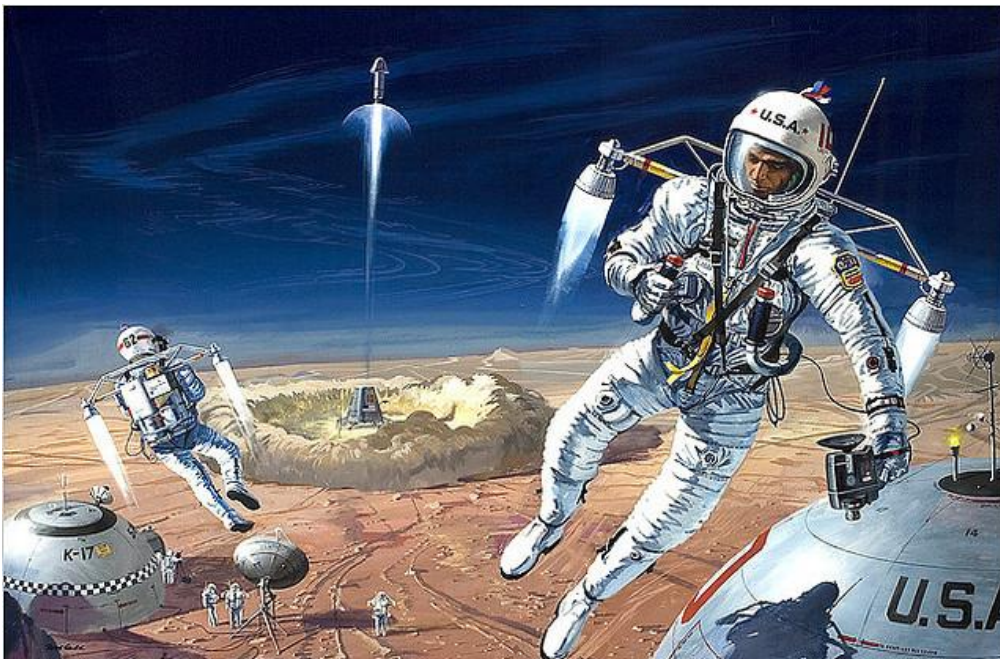
like the cluster of casings show drifting past earth (upper right) may turn out to be military platforms orbited by an enemy to release bombs on command. The U.S. must be prepared to look them all over from maneuverable interceptors, like this one, equipped with sensing devices to detect dangerous weapons and armed with rockets to destroy the offenders.

Image 103. *A Gigantic Atom-powered, Bomb-dropping "Schmoo"* (*Life*, 21 Apr. 1961: 52).



Caption: The huge contraption above - which is nicknamed the "Schmoo" because of its resemblances to Al Capp's comic-strip animal - would propel itself through space by the intermittent explosion of small atomic charges inside its spherical chamber. A jet of water injected into the chamber forms a hot gas which helps push the ship forward and leaves the trail of puffs like those behind the Schmoo passing the moon at the bottom of the picture. The payload of this craft would be tremendous and would enable it to replace a whole fleet of present-day SAC bombers. The crew rides up front in the triangular -shaped wing which can detach and return to earth, leaving the Schoo floating around the orbit to wait for a new nose and a fresh crew.

Image 104. *Exploring on Mars, Half a Year from Home* (*Life*, 2 Oct. 1964: 80-81).



Caption: Within the next few weeks NASA plans to launch two photoreconnaissance vehicles on a trajectory that will take them close to Mars eight weeks later. Hopefully they will send back data

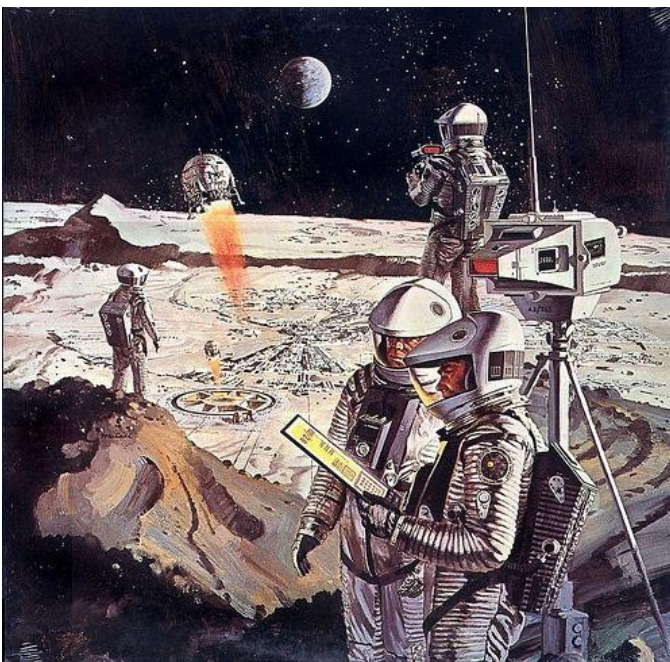
indicating that a manned flight to the planet would be feasible, perhaps within the next two decades. When and if men do attempt the trip, they may aim for the edge of one of the vast flat desert areas believed to exist on Mars. In this painting the Astronauts - wearing suits designed for a landing on the moon - have established a Mars base camp. They have set up inflatable igloo-shaped shelters (lower left and right) with materials brought in their capsule, and they communicate with earth on radio waves beamed from parabolic antennas. Gas jets strapped to their backs help them get around.

Image 105. *2001*, 1967 (McCall 1992: 35).



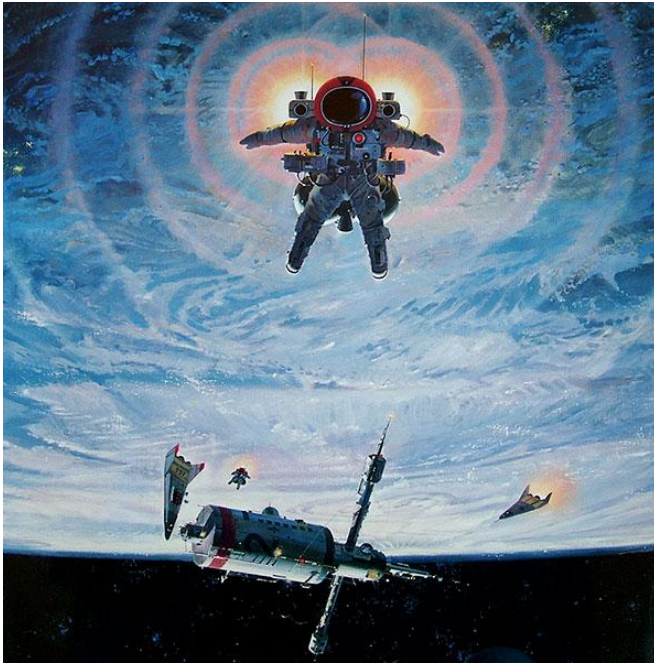
Caption: A space plane launches from a half-completed space station, in McCall's classic poster art for the 1968 MGM film *2001: A Space Odyssey*. The image is not only a startlingly accurate depiction of the future of space travel, but a powerful symbol of hope, a visual affirmation that humanity has the resource and ingenuity to prosper and thrive in the century to come.

Image 106. Theatrical release poster for Stanley Kubrick's *2001: A Space Odyssey*, 1968 (Asimov and McCall 1974: 96).



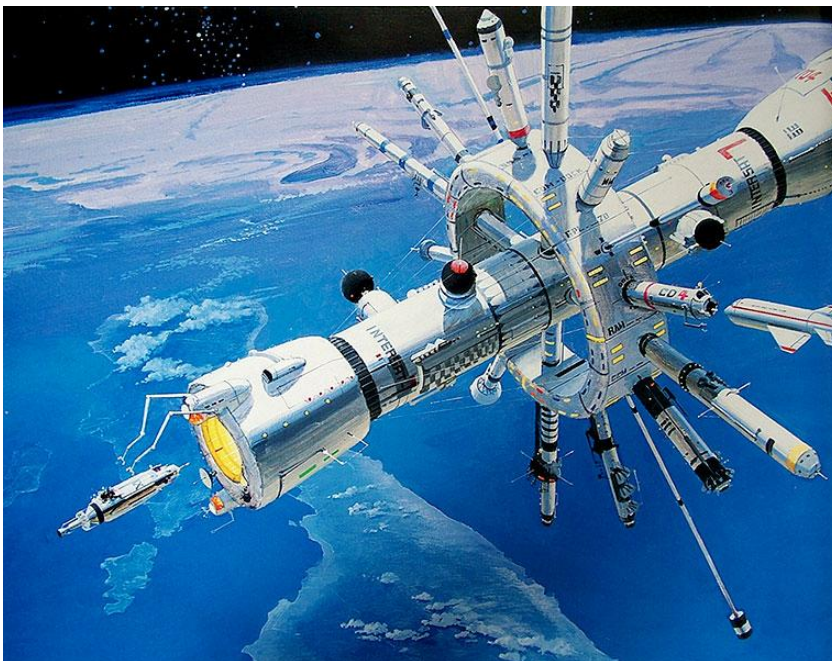
Caption: Exploration continues: astronauts in the foreground on a surveying mission. On the lunar surface is a very advanced circular city; the spaceship above it is bringing passengers to land at the lunar city.

Image 107. *Astronaut Edward H. White II. First American to Walk in Space, 1970* (Asimov and McCall 1974: 1).



Caption: Astronaut firing his maneuvering unit, with space station and shuttlecraft below.

Image 108. *International Space Station, 21st Century, 1973* (McCall 1992: 63).



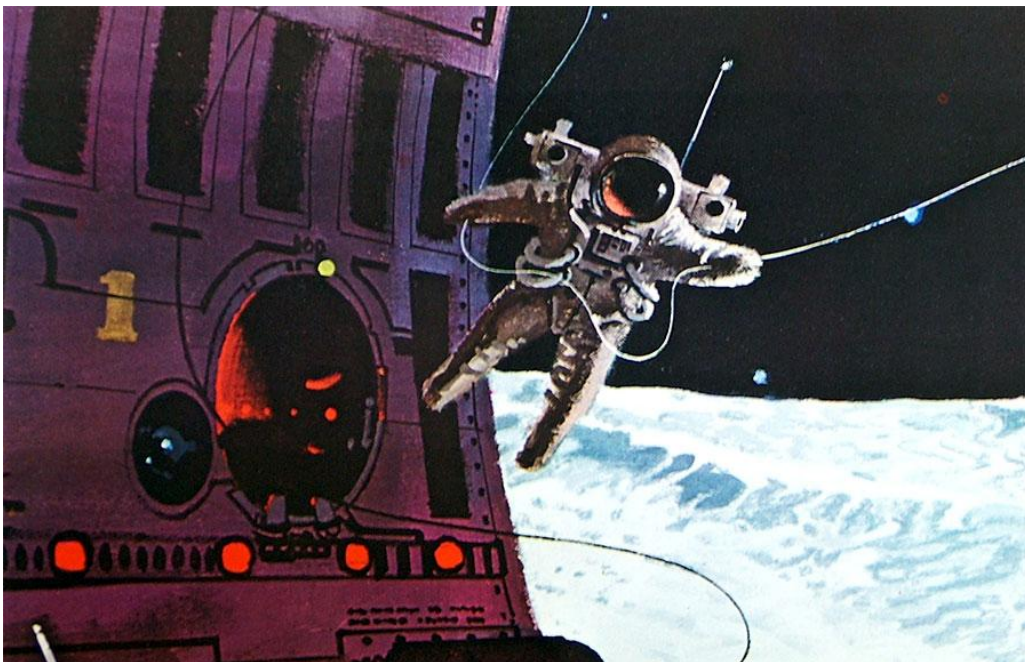
Caption: By the middle of the twenty-first century massive space stations such as this docking and repair station may be deployed in orbit high above the Earth. Experts in space development believe that full utilization of the resources of space will require a partnership between the world's governments and the private sector. Though the financial risks are great, the rewards will be far greater: unlimited solar energy and an abundance of mineral wealth and organic compounds. Even the adverse conditions of space, such as radiation, lack of atmosphere, near vacuum, and weightlessness, provide opportunities for scientific research and industrial use.

Image 109. Untitled (Asimov and McCall 1974: 10).



Caption: Lunar survey system. The astronaut uses a hypothetical advanced surveyor's instrument.

Image 110. Untitled (Asimov and McCall 1974: 13).



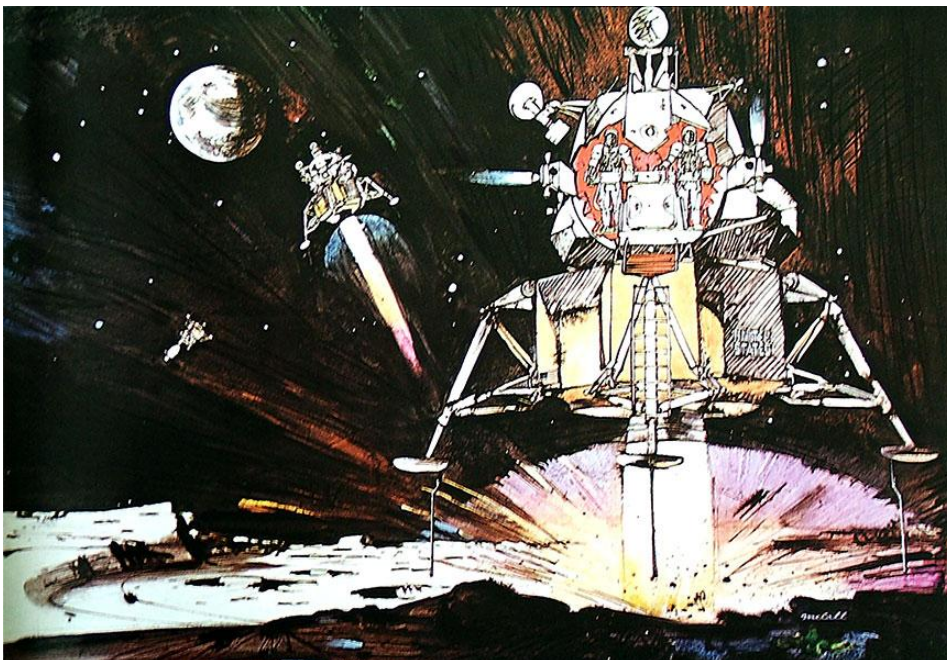
Caption: Astronaut entering recovery port of a space station.

Image 111. Untitled (Asimov and McCall 1974: 16).



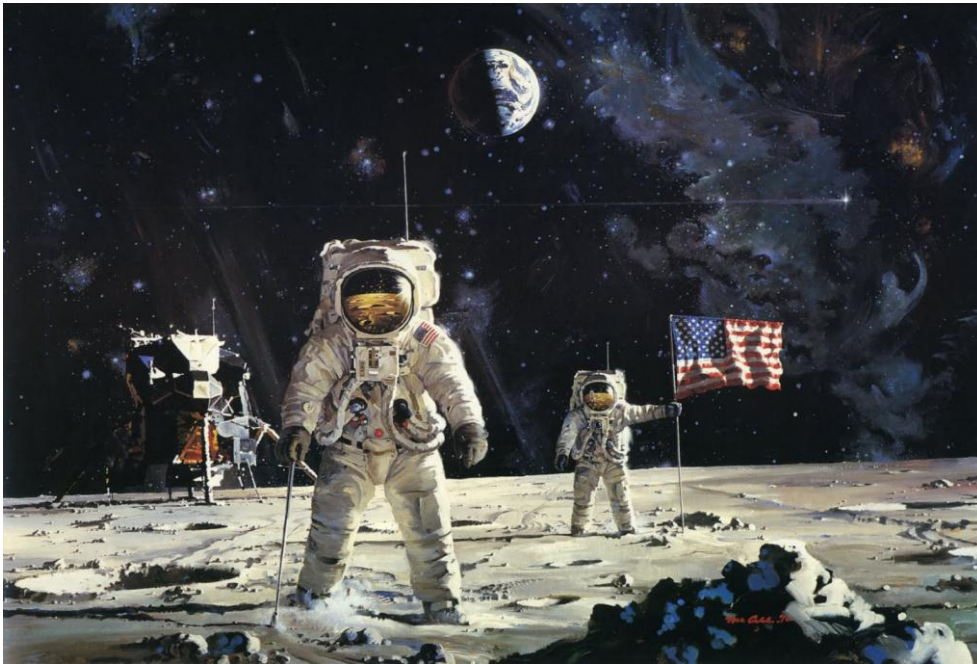
Caption: Space station in Earth orbit, perhaps a hundred years hence. The transparent hemisphere shelters a nuclear power facility, an observation and control is at right, and inhabited maneuverable spheres are in left background.

Image 112. Untitled (Asimov and McCall 1974: 33).



Caption: The lunar lander Eagle touches down on the surface of the Moon: the first landing. A cutaway view showing astronauts Armstrong and Aldrin at the controls, and to the left the earlier stages in the operation - the lunar lander separating from the command module and the lander descending.

Image 113. Untitled (Asimov and McCall 1974: 34-35).



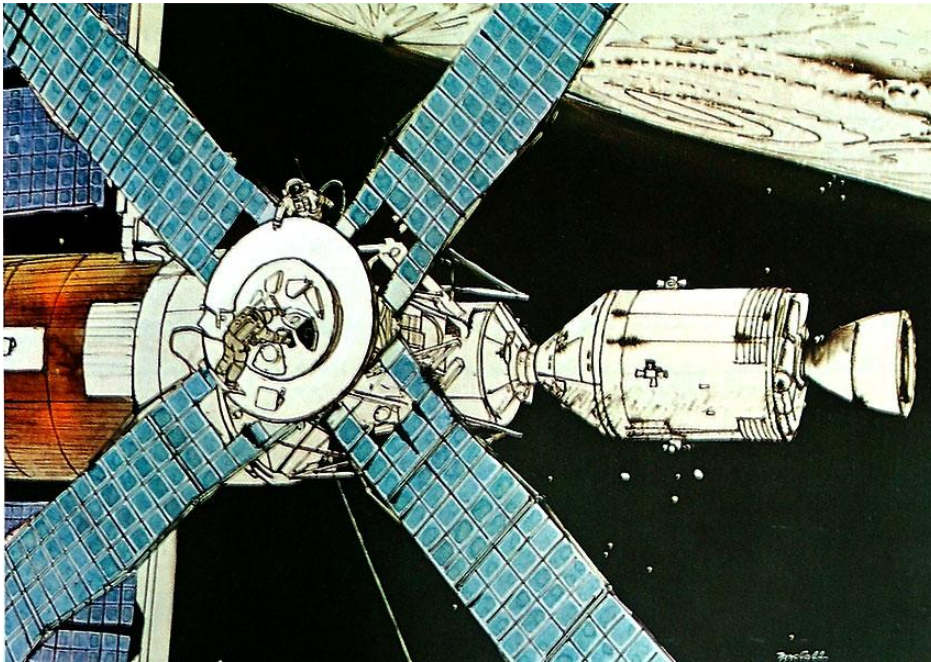
Caption: The first men on the Moon: Neil Armstrong and Edwin E. Aldrin, Jr., July 20, 1969.

Image 114. Untitled (Asimov and McCall 1974: 38).



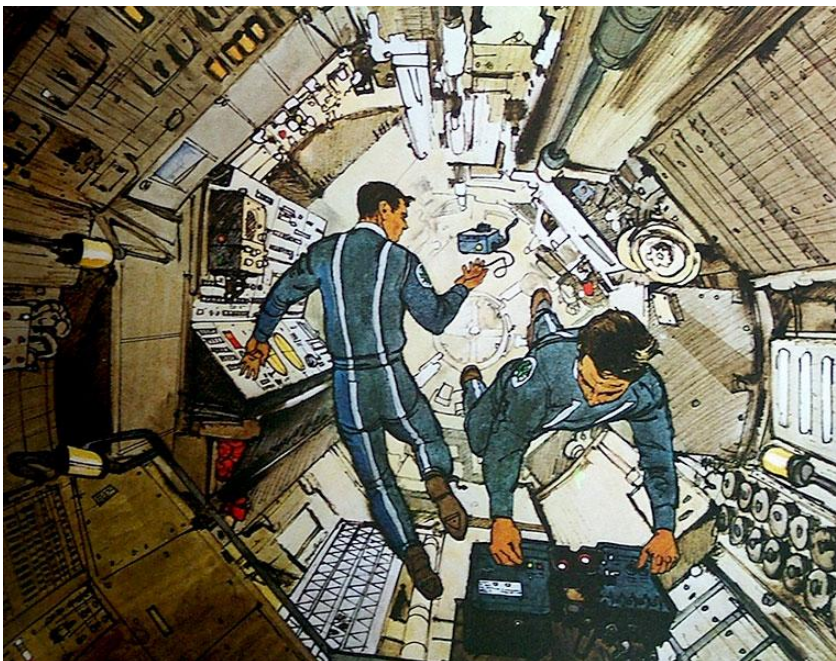
Caption: Skylab - frustration, suspense, and Yankee ingenuity. The first orbiting space laboratory was scheduled for an 8-month mission, manned successively by three crews of three. One of its primary goals was to test the effects on the human body of prolonged living and working in a weightless environment. During Skylab's launch on May, 14, 1973, a thermal shield was torn away, taking with it one of the main solar panels and jamming the other. The resulting scorching temperatures inside Skylab and severe loss of power seemed to doom the mission, but a series of inventive - if dangerous - operations saved it. Astronauts Conrad and Kerwin took a space walk to free the jammed solar panel. The painting shows Skylab after this rescue operation.

Image 115. Untitled (Asimov and McCall 1974: 39).



Caption: The command module that brought the crew up to the unmanned lab is shown docked to its nose. The four windmill-like solar wings are mounted on Skylab's complex telescope, which was used to make extensive, and extraordinarily significant, observations of the Sun.

Image 116. Untitled (Asimov and McCall 1974: 39).



Caption: The astronauts float about their tasks inside Skylab. In addition to the all-important biomedical experiments, the crew undertook extensive Earth resource studies and mapping operations, and conducted tests on metals in weightlessness that might someday lead to space manufacture.

Image 117. Untitled (Asimov and McCall 1974: 40).



Caption: Skylab crewman testing astronaut maneuvering unit. (The unit was tested inside Skylab, although it is intended for exterior use; courtesy of artist's license, it is shown that way here.) At right is the Apollo telescope mount surrounded by the four solar wings that were the principal source of solar power for Skylab before the crippled panel was deployed.

Image 118. Untitled (Asimov and McCall 1974: 61).



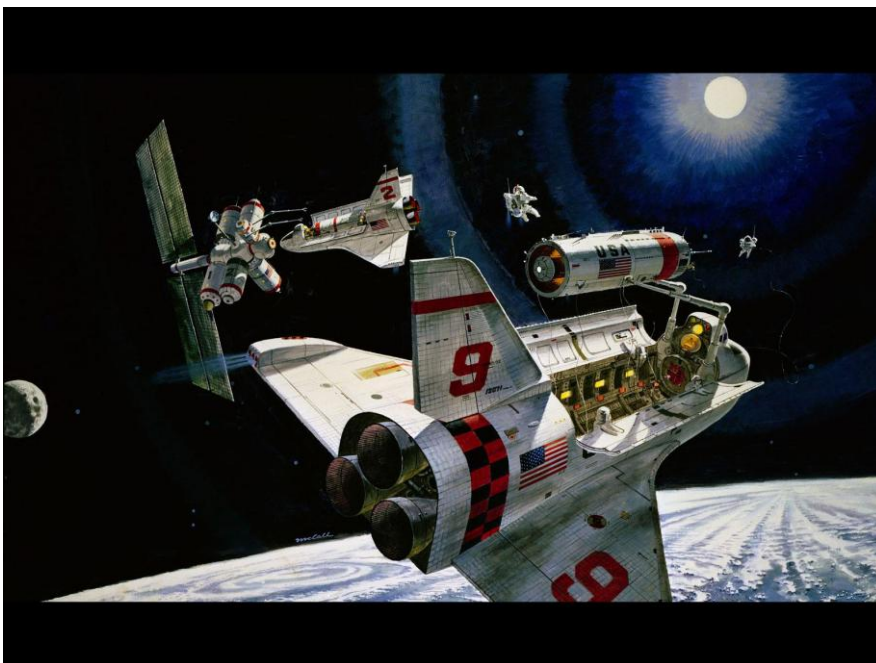
Caption: The orbiter as it separates from the booster – in this advanced concept the booster is manned also and will return to its launch base to be used over and over again.

Image 119. Untitled (Asimov and McCall 1974: 64).



Caption: A shuttle in Earth orbit deploying its payload. The cargo has its own little thrusters for controlling attitude; these are operated by the astronaut at its right working at an external control panel. The tethers at the top of the painting extend from a space station that uses the shuttle system to replenish supplies.

Image 120. Untitled (Asimov and McCall 1974: 64).



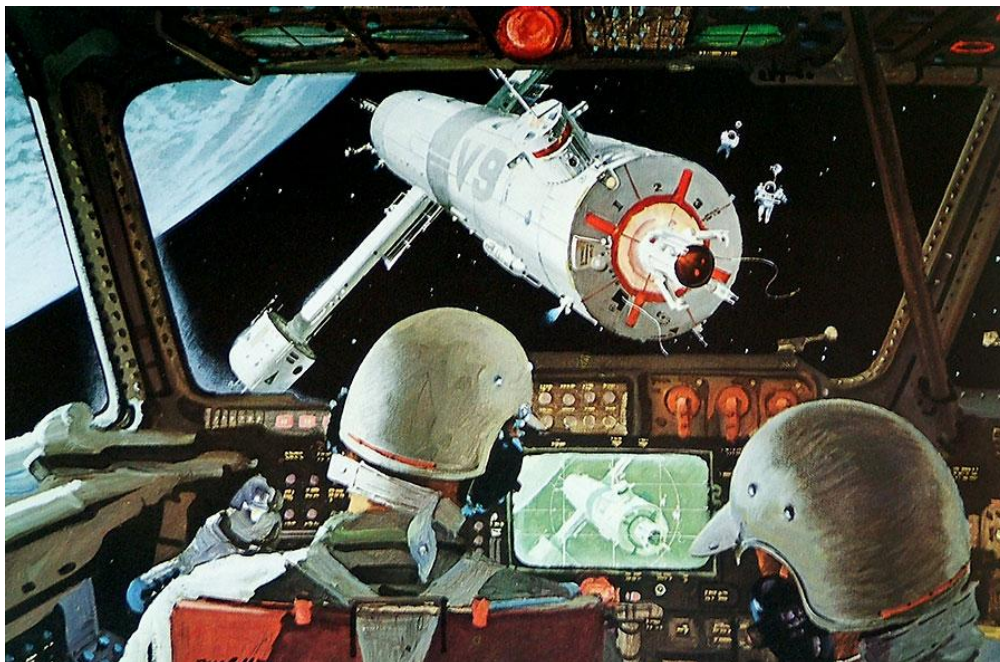
Caption: Space shuttles at work. In the background a space station cluster extends its manipulating arms to assist a shuttlecraft in docking.

Image 121. Untitled (Asimov and McCall 1974: 66).



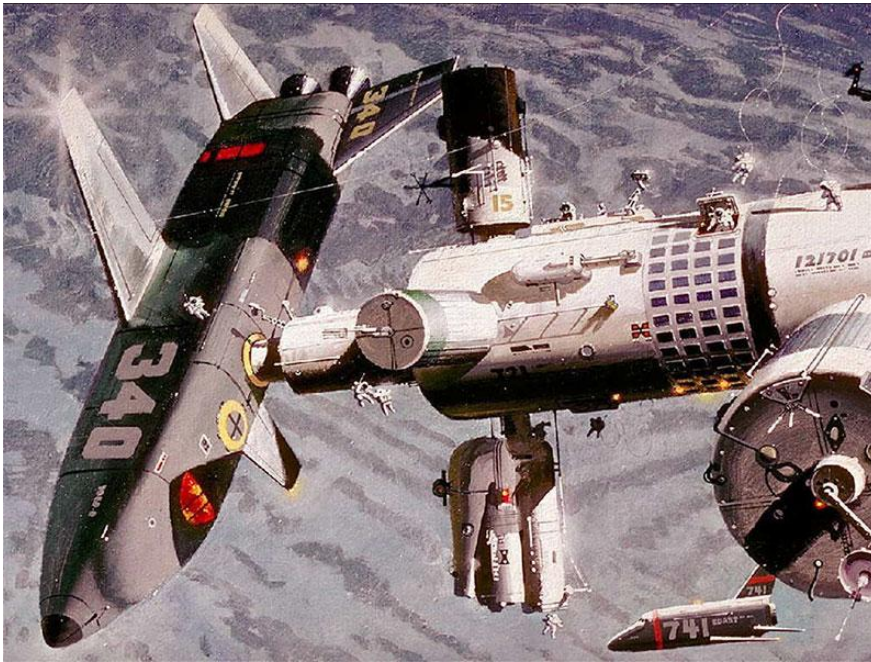
Caption: Repairman in space. An astronaut tethered to a two-man spacecraft designed for this kind maintenance works on the antenna from an orbiting satellite.

Image 122. Untitled (Asimov and McCall 1974: 68).



Caption: Inside the cockpit of a shuttlecraft, with the pilot and co-pilot preparing for docking with a space station.

Image 123. Untitled (Asimov and McCall 1974: 68).



Caption: The shuttlecraft docked with the station – in this case a top docking, but a nose docking is also possible. Two other shuttlecraft are seen, each of a slightly different configuration, since this scene looks forward to a time when shuttles, like aircraft today, will be specially designed according to their functions.

Image 124. Untitled (Asimov and McCall 1974: 70-71).



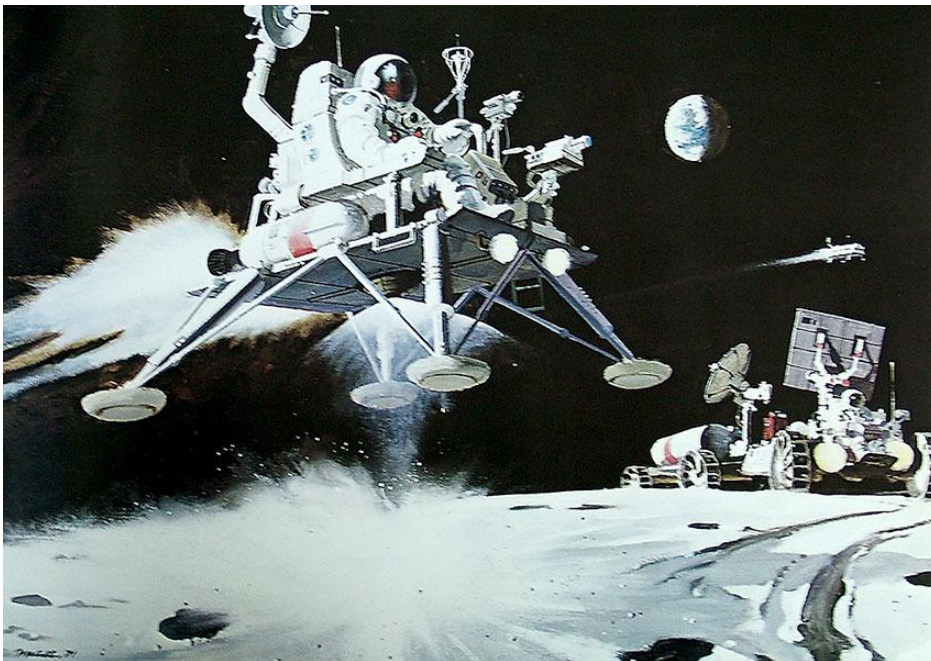
Caption: Small space station in orbit. Four solar arrays are deployed to provide power for the station, and below one of them is a maneuverable scientific instrument capsule. On the top of the station is a high-gain antenna to communicate with Earth, and other communication and navigation antennas. There are four docking ports around the circumference at top and another four at bottom; a shuttlecraft is about to dock at the one seen below. The cutaway shows the living and working quarters of the crew; a central core connects the levels. In the lowest section (which has sleeping quarters at left) astronauts suited up for departure prepare to pass through the air lock and enter the shuttle, which will deposit the replacement crew and take the old crew back to Earth.

Image 125. Untitled (Asimov and McCall 1974: 89).



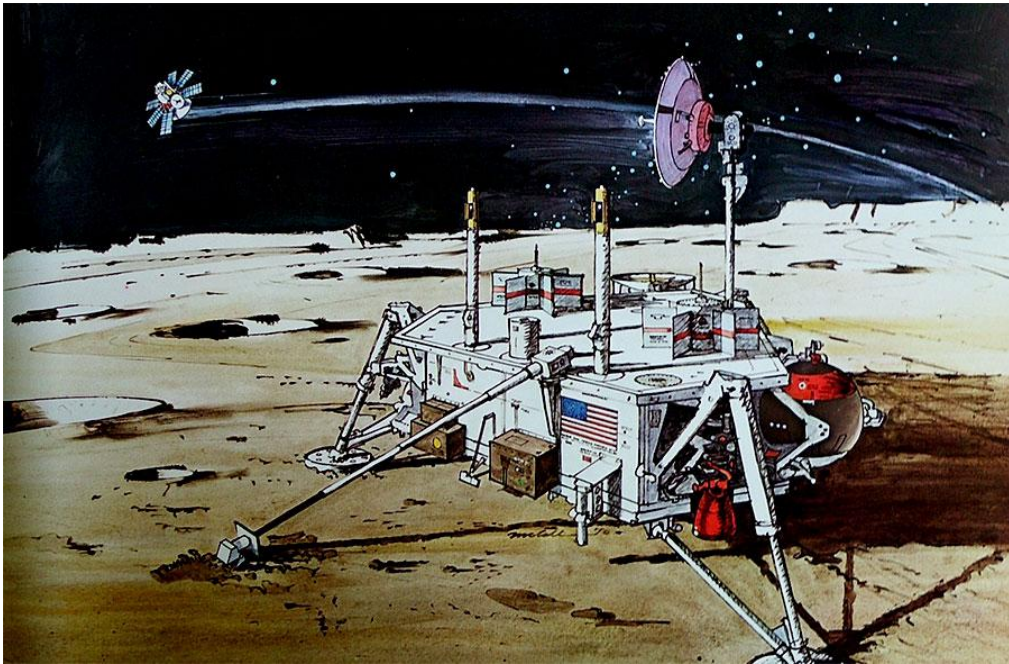
Caption: Rendezvous in lunar orbit resupplies a moon base – the glowing cross of lights at lower right. At the far end of a nuclear ferry used to shuttle men and supplies from Earth orbit to lunar orbit, a stumpy “space tug” grasps cargo containers on its top, then descends to the base to unload and return. Sunlight glints on a solar panel of a space station as astronauts tethered to it maneuver by individual rocket packs. All three crafts are in synchronous orbit above the Moon base.

Image 126. Untitled (Asimov and McCall 1974: 93).



Caption: Three types of lunar vehicles. In the foreground a one-arm flying vehicle with an antenna, a rocket system for forward thrust mounted aft, and a gimbaled rocket engine underneath. Right is a land rover with a solar power for collecting energy from the Sun and a high-gain antenna for communication with the Earth. Flying in the distance is a lunar bus, a vehicle designed for long-distance travel and capable of carrying 10 to 15 passengers.

Image 127. Untitled (Asimov and McCall 1974: 113).



Caption: Some time in the mid 1970s: The Viking spacecraft at rest on the surface of Mars. This unmanned mission scheduled for 1976 will obtain vital data and perhaps give some answer to centuries of speculation about the possibility of life on the red planet. The extended arm of the lander is scooping up a sample of Martian soil for analysis, while the television cameras in the yellow-topped poles swing around to scan the landscape. The data and pictures will be transmitted back to Earth by means of the mother craft (upper left).

Image 128. Untitled (Asimov and McCall 1974: 114).



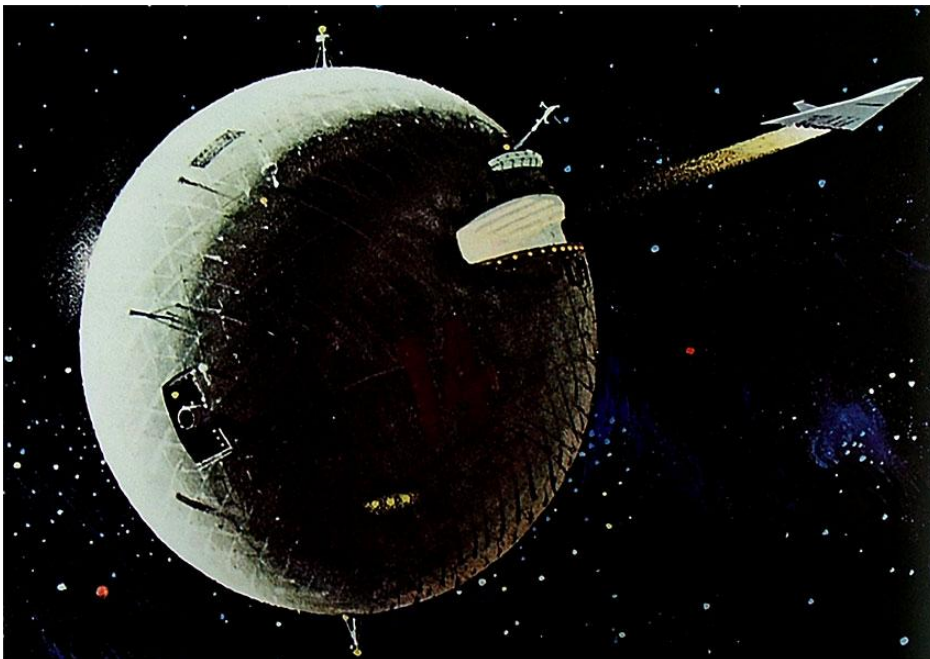
Caption: The first manned mission to Mars, perhaps in the 1990s. Inside a space station in orbit two scientists observe the launch of the mission. The two spacecraft were assembled in Earth orbit and are now being simultaneously launched for the planet Mars. The outer booster craft reaches the vicinity of the planet. There it might be used to adjust the orbit, and later it will be fired for the return journey. The nuclear-powered ships, each manned by a crew of six, will travel as a pair for safety's sake. Each is capable of accommodating the crew of the other in the event of a breakdown.

Image 129. Untitled (Asimov and McCall 1974: 118).



Caption: A more advanced Mars base, perhaps early in the 21st century. A specialized Mars lander with an astronomical observatory on top is in the foreground; four other landers have opened their hatches and unloaded equipment - including some for the mining operation taking place at night. In the distance another Mars lander is about to touch down.

Image 130. Untitled (Asimov and McCall 1974: 120).



Caption: Spaceport, 21st century. Eventually space facilities of this type may serve as way stations for interplanetary travelers, while also acting as orbiting scientific bases, rescue areas, weather stations - even space factories for the manufacture of sophisticated goods that could be produced only in the vacuum and zero gravity in space. The illuminated portal is the launch deck, where spacecraft can discharge passengers and cargo and be launched back into space to continue their journeys to the Moon, the planets,

or to return to Earth. This large station would be assembled in space from prefabricated geodesic elements.

Image 131. Untitled (Asimov and McCall 1974: 147).



Caption: Voyage to Jupiter, a scene from the film *2001: A Space Odyssey*. An astronaut (just visible through the window) maneuvers his one-made pod for some exterior task, while the huge spaceship “Discovery” drifts toward Jupiter.

Image 132. *Apollo-Soyuz Linkup*, 1974 (McCall 1992: 12).



Caption: During a thaw in the Cold War, Earth’s two greatest political powers worked together to explore the heavens, as a U.S. Apollo orbiter and a Soviet Soyuz spacecraft joined in high orbit over the Earth on

June 17, 1975. The sun gleaming behind the two craft signals the promise of such cooperation for all humanity.

Image 133. *Starfarers*, 1979 (McCall 1992: 112-113).



Caption: The realms we discover in our exploration of the cosmos will be filled with scenes of stunning beauty and awesome power. This impressionistic starscape depicts a comet streaking toward a rift in the fabric of space beyond a cracked and desolate alien world.

Image 134. *Alien Intellect*, 1979 (McCall 1992: 118-119).



Caption: Probability and the universal laws of biology and physics suggest that life exists throughout the universe. These concept drawings for *Star Trek: The Motion Picture* depict a bizarre alien “creature”, part machine and part organism, moving through the vast depths of space.

Image 135. *Fantasy*, 1981 (McCall 1992: 117).



Caption: The distances of interstellar space are vast beyond imagining. To cross them will require either generations of pioneers willing to live out the space of their lives in miniature worlds in space, or new discoveries that will allow us to bend space and time to our will. But the day will one day come when we meet other intelligent beings for the first time. Here, a colossal interplanetary craft is suspended over a distant world. The city in the foreground may have been built by our descendants, or we may be the star voyagers who are encouraging a new race for the first time. When that encounter comes at last, it will be the most profound event in all of human history.

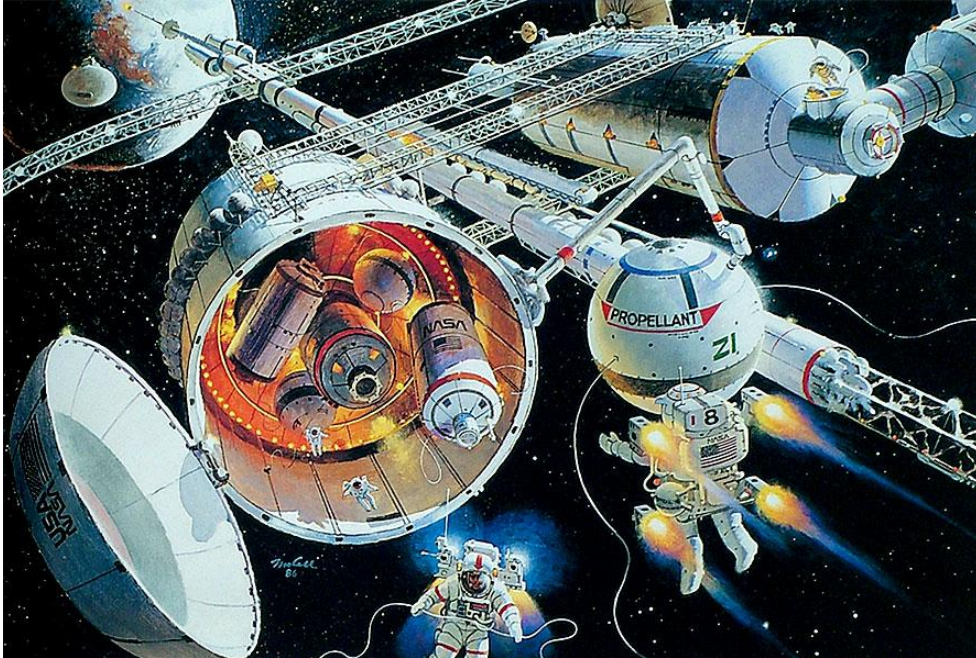
Image 136. *Rendezvous*, 1986 (McCall 1992: 37).



Caption: McCall updated the theme of his famous 2001 painting, nearly two decades later, for a report of the National Commission on Space. Here, an aerospace place approaches a spaceport in Earth orbit. In the

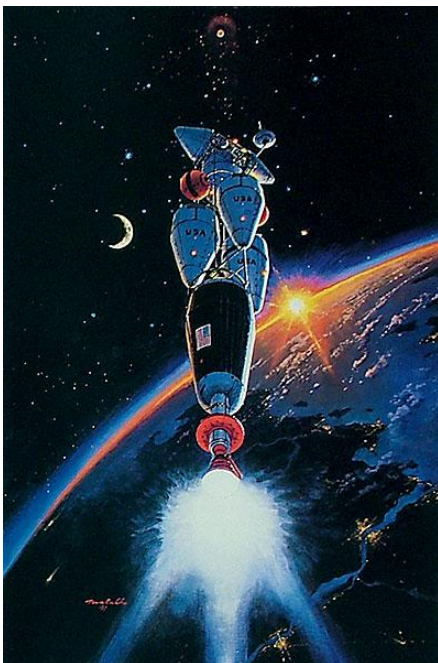
upper right, a lunar transport vehicle is returning from the moon. NASA projects that the first generation of space stations will be operational within a decade.

Image 137. *Spaceport*, 1986 (McCall 1992: 41).



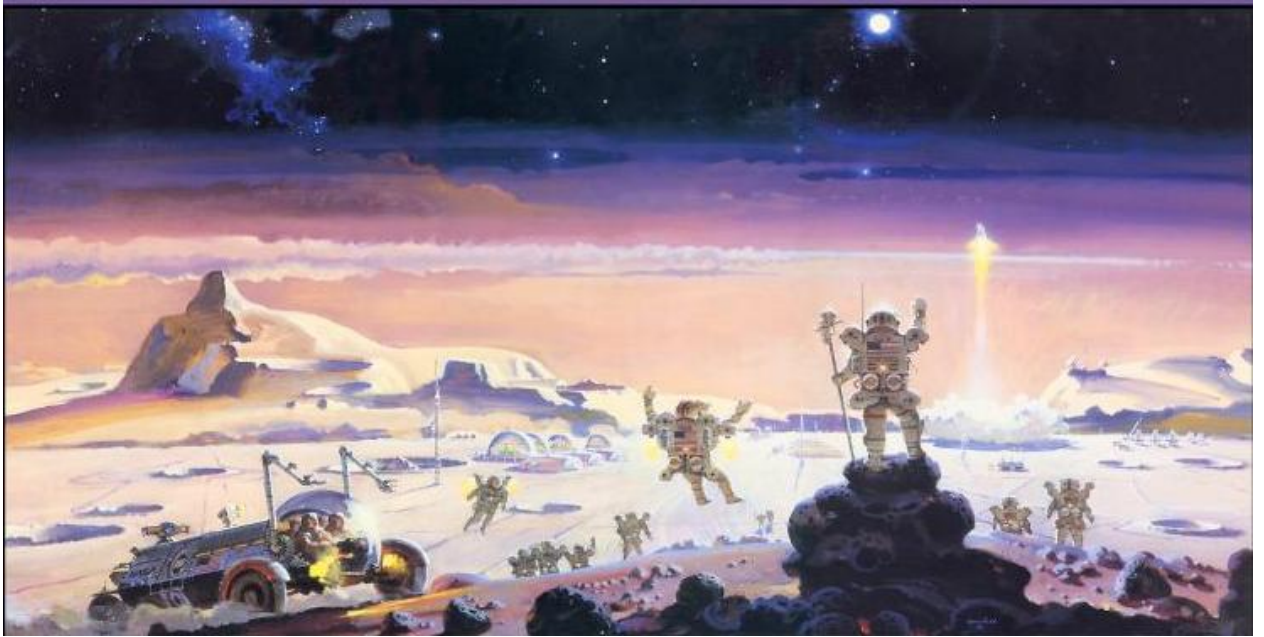
Caption: Between the orbits of the Earth and the moon are areas called “libration points” or “Lagrange points”, where the gravitational pulls of the two worlds cancel each other out. Here, spacecraft require less energy to construct and launch. In this painting, astronauts service a transfer vehicle bound for Mars at a spaceport located at Libration Point 1.

Image 138. *Mars Transfer Vehicle*, 1986 (McCall 1992: 51).



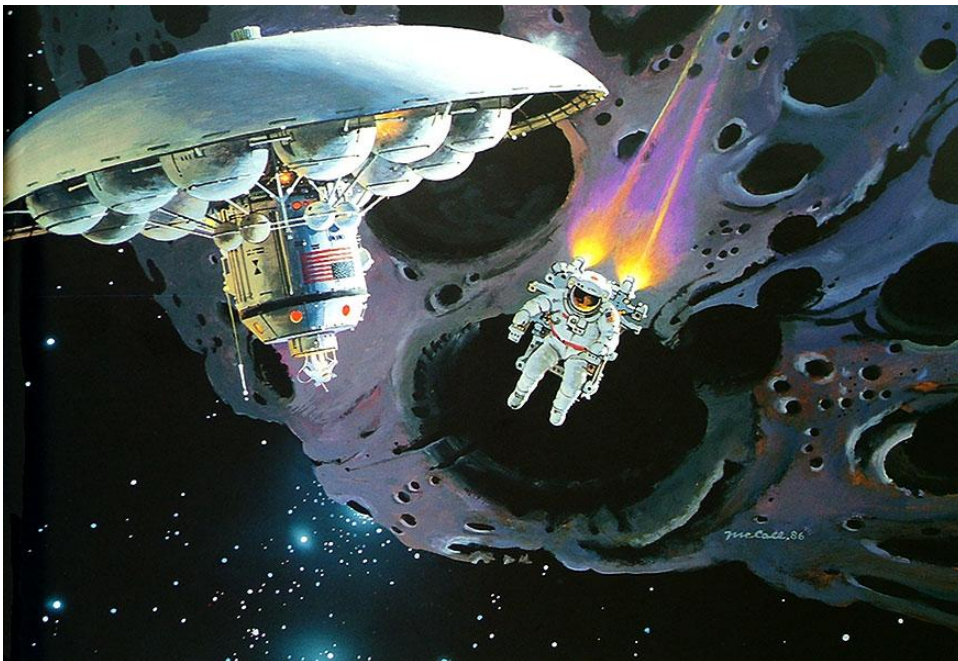
Caption: An interplanetary transfer vehicle leaves Earth orbit for Mars. Prepared for NASA, this painting shows a new type of spacecraft that will make the journey to other worlds in the second decade of the next century.

Image 139. *Pioneering the Space Frontier*, 1986 (McCall 1992: 58-59).



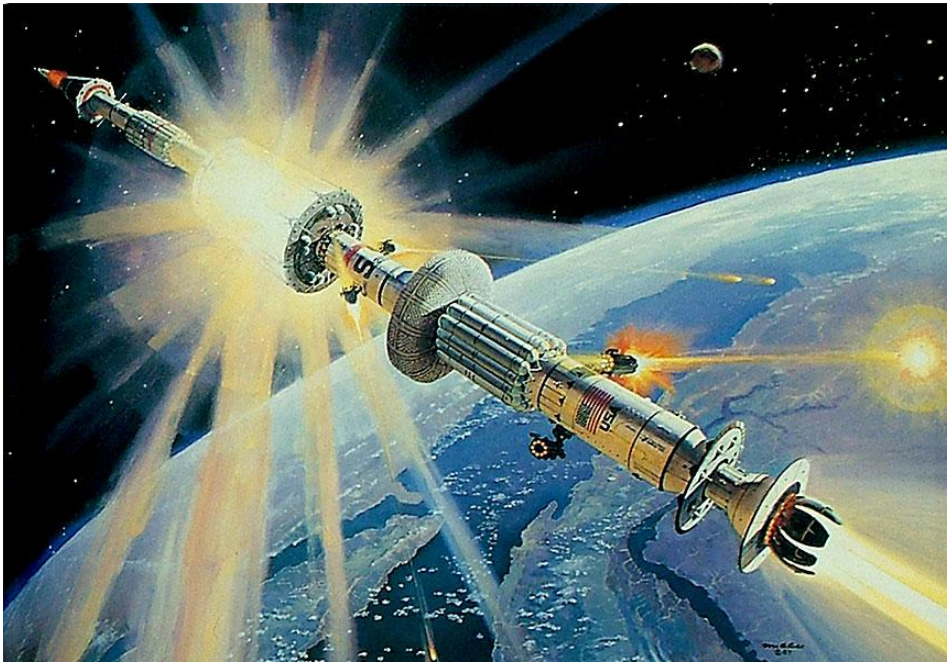
Caption: A Mars colonist salutes a landing craft returning to space from a large Mars base, circa AD 2025. The bases may be supplied by Earth-Mars shuttles that cycle in permanent orbits between the two worlds, bringing vital materials and relief crews every few months.

Image 140. *Exploring the Asteroids*, 1986 (McCall 1992: 61).



Caption: Between the orbits of Mars and Jupiter lies the asteroid belt. Thousands of large asteroids, and hundreds of millions of smaller bodies, lie within the belt. Because the asteroids are rich in metals, they may have become a source of elements used in the construction of interplanetary spacecraft, as well as materials needed to sustain permanent colonies in deep space. From the asteroids, missions can be launched to the large moons orbiting Jupiter, Saturn, and the other outer planets.

Image 141. *Tomorrow's Weapons*, 1987 (McCall 1992: 37).



Caption: America's civilian space effort is paralleled by a military space program, focused on research, reconnaissance, and defense. For the U.S. military, Robert McCall has prepared a number of conceptual illustrations of projected weapons systems, based on state-of-the-art defense technology. Here, a nuclear-powered beam weapon strikes a target from an orbital position high above the Earth. The brightly glowing cylinder is discharging waste heat and radiation. At the middle of the beam are two swiveling rocket pods designed to defend the weapon itself from attack.

Image 142. *Mars Arrival*, 1987 (McCall 1992: 56-57).



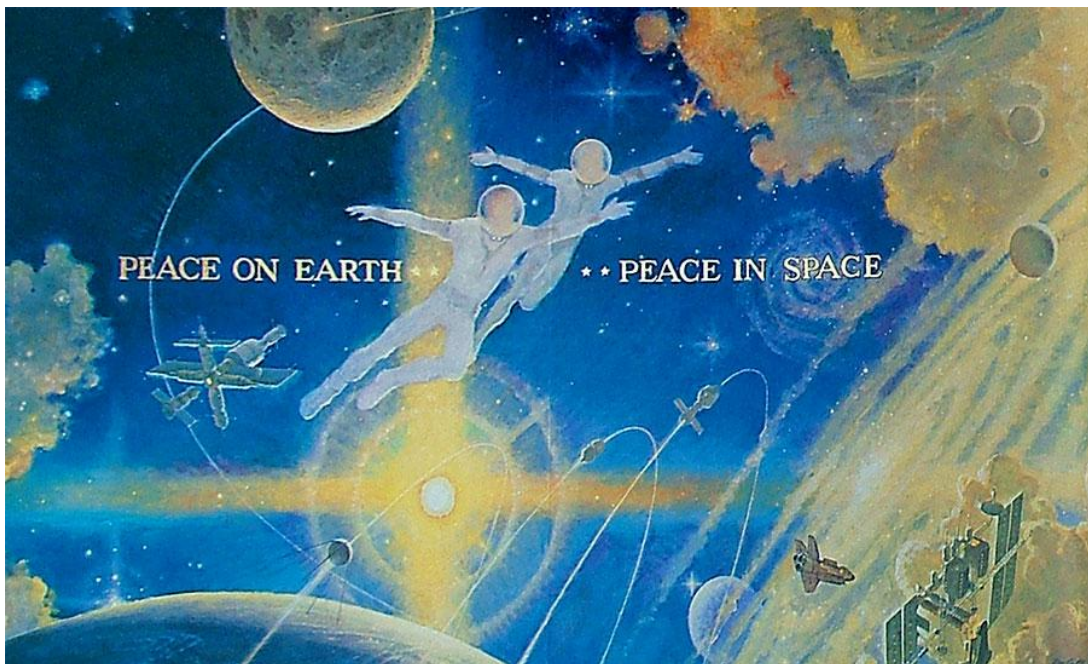
Caption: Two astronauts perform an EVA from their Earth-Mars transfer vehicle. Phobos, the larger of Mars's two moons, is at upper left. Stations on Mars's moons may be used for communications, materials transfer, and observation of the planet.

Image 143. *A Window to the Universe*, 1989 (McCall 1992: 24).



Caption: The space shuttle program resumed in September 1988, two and a half years after the *Challenger* disaster. Since its beginning, NASA's space shuttle fleet has carried out over forty scientific, technical, and defense-related missions, including the deployment of the Hubble Space Telescope by the shuttle *Discovery* in April 1990. This massive orbiting stellar observatory offers astronomers wide new vistas by allowing them to view the heavens without the interference of the Earth's atmosphere.

Image 144. *Peace on Earth/Peace in Space*, 1990 (McCall 1992: 16).



Caption: This luminous vision of two astronauts soaring together through space illustrates McCall's belief that the full exploration of the cosmos will require the efforts of all the Earth's peoples, working together in harmony and peace. *Peace on Earth/Peace in Space* arose from McCall's experience in collaborating with Andrey Sokolov.

Image 145. *Eye in the Lunar Sky*, 1990 (McCall 1992: 44-45).



Caption: Because the moon has no atmosphere and no strong seismic activity, it is an ideal site for an interstellar telescope. The observatory shown here has been placed in a sheltered trench to protect the sensitive lens from the sun's radiation.

Image 146. *Return to the Moon*, 1991 (McCall 1992: 40).



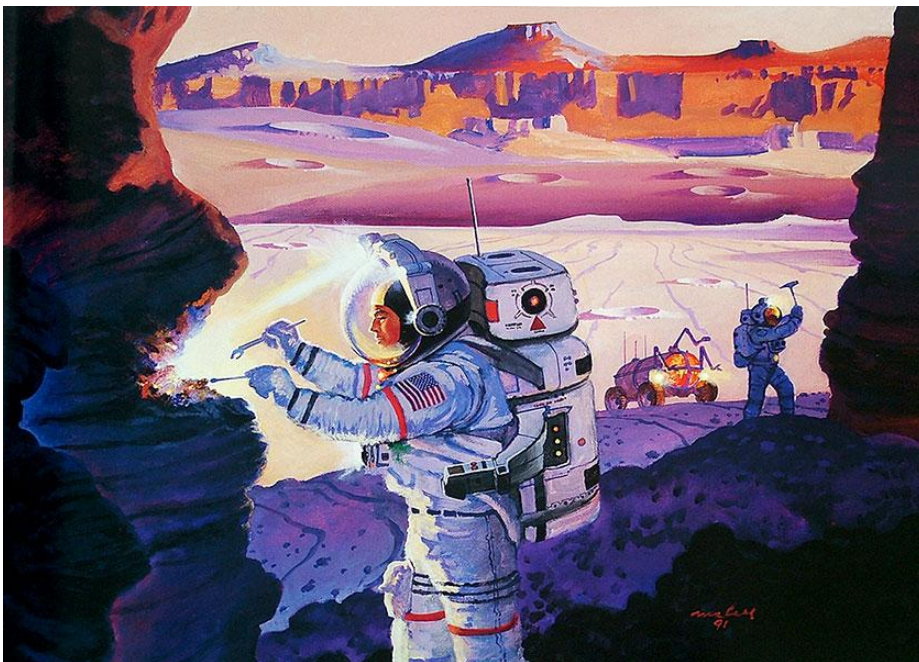
Caption: NASA plans a new series of missions to the moon, beginning in the next decade with unmanned robot probes and culminating with manned missions by the year 2005. By 2010, NASA hopes to establish working lunar bases such as the one depicted here, to perform scientific and industrial missions.

Image 147. *Cultivating the Moon*, 1991 (McCall 1992: 42-43).



Caption: Survival on the moon requires the basic materials needed to sustain life hydrogen, oxygen, carbon, and nitrogen, to produce air, water, and organic materials. The expense of lifting such materials out of Earth's gravity well will drive the effort to mine these compounds on the moon itself. The vehicle in the foreground is a lunar combine, powered by a solar antenna, which tills the fine lunar dust, forcing it into an extracting chamber where gasses are separated from silicon and other minerals. Gas cylinders are stored to the left. To the right is a vast "solar farm" beaming microwave energy back to Earth.

Image 148. *Searching for Life*, 1991 (McCall 1992: 55).



Caption: Although the Viking missions to Mars did not discover life, they did find complex organic molecules capable of sustaining life. Early in the planet's history, water flowed on the surface of Mars, cutting deep channels in its surface. One of the most important scientific objectives of the next series of

Mars missions will be to sample the soil near these channels to search for evidence of primitive life-forms that may have flourished on Mars millions of years ago.

Image 149. *Valley of a Billion Stars*, 1991 (McCall 1992: 111).



Caption: Our search to expand our cosmic horizons is symbolized in this recent work depicting a far-future starship moving out of a dark nebular cloud into a glowing region of light. “Man’s future lies along the space frontier”, says McCall. “I search constantly for ways to convey my feelings of awe, my love for the whole subject”.

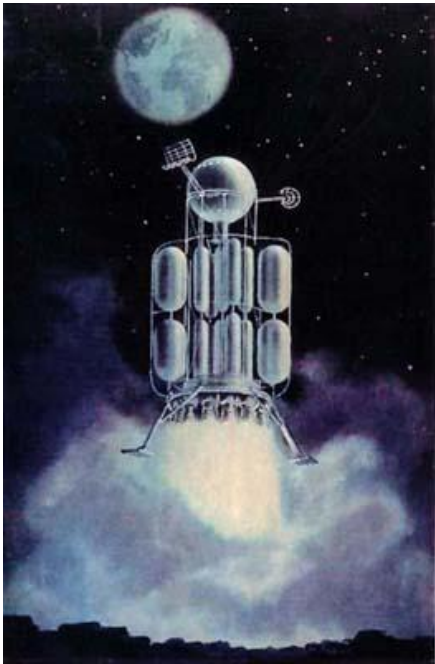
Image 150. *Silent Running*, 1991 (McCall 1992: 115).



Caption: It was the fullness of time, the human race will find its way out of our own solar system and cross the vast ocean of night that separates us from other worlds. What we will find there will be stranger and more wonderful than anything we can imagine.

(4) Andrei Sokolov's works.

151. *Start lunnoi rakety* [The Launch of the Moon Rocket] (Leonov and Sokolov 1967).



Сartion: До свидания, Луна! Люди были рады знакомству с тобой. Это была их великая победа, добытая нелегким трудом. Они вернутся еще к тебе. Но сейчас их ждут планеты... [Farewell, the Moon! People are glad to have acquainted with you. It was their great victory achieved by hard work. They will return to you. But now the planets are awaiting them...].

152. *Zdravstvui rodnaia planeta!* [Welcome, Home Planet!] (Leonov and Sokolov 1967).



Сartion: Заканчивается глобальное обследование Луны. Научная экспедиция возвращается с той стороны, где долгое время не было видно Земли, - на свою базу. По мере движения людей из-за горизонта показывается родная планета - Земля. [A global survey of the Moon in coming to an end. A

scientific expedition has returned to their base from the lunar side, where the Earth has not been seen for a long time. The home planet - the Earth - is looming on the horizon and people are moving toward it.].

153. *Na sputnike Marsa* [On the Moon of Mars] (Leonov and Sokolov 1967).



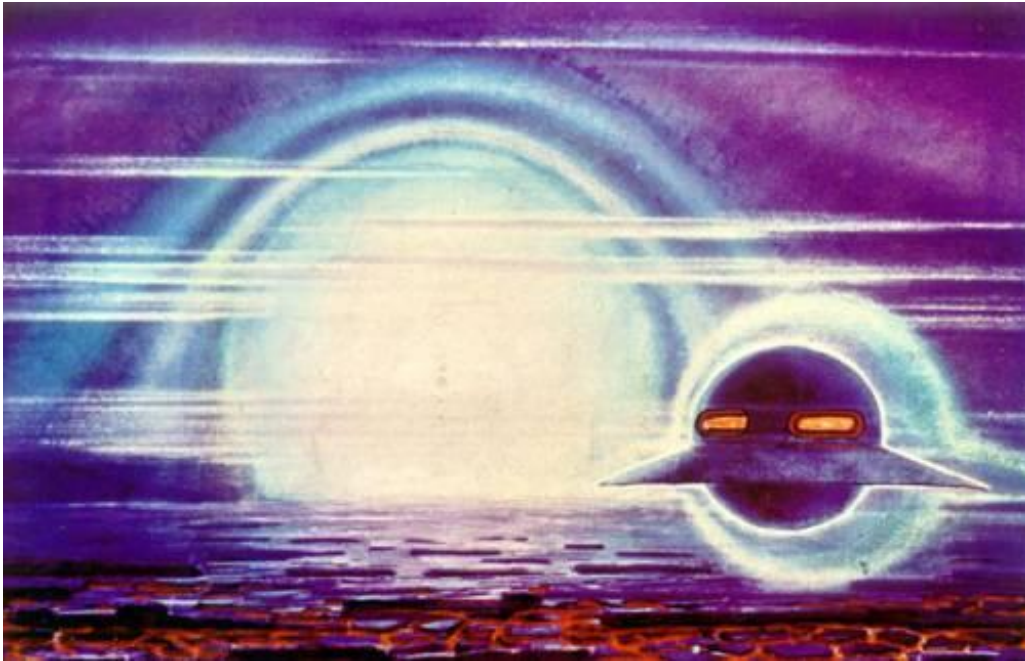
Caption: До загадочной планеты осталось совсем немного. Естественный спутник - маленькая марсианская луна стала удобной промежуточной станцией для ракет. Отсюда с небольшой начальной скоростью сейчас полетит к Марсу легкая космическая система с экипажем на борту. [We are now approaching the mysterious planet. A natural satellite - a small Martian moon has become a convenient intermediate station for rockets. From here, a light space system with the crew on board will now set off to Mars with a small initial velocity.].

154. *Peschanaia buria* [Dust Storm] (Leonov and Sokolov 1967).



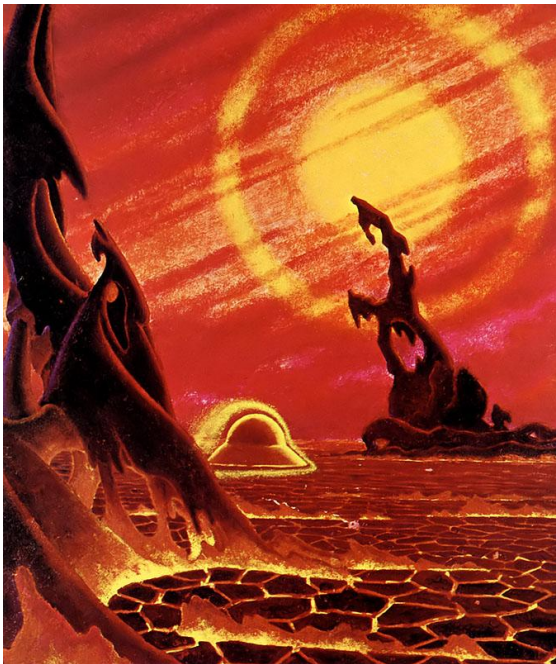
Caption: Через эти бушующие марсианские пески может пройти только лаборатория-автомат. Надолго ли эта буря? Возможно, что такая же была видна на Марсе из Земли. Тогда ее отметили астрономы. [Only an automatic laboratory can move through these raging Martian sands. How long will this storm last? It is possible that such a Martian storm was visible from the Earth. Then it was observed by astronomers.].

155. *Na puti - sharovaia molnia* [On the Way - Ball Lightning] (Leonov and Sokolov 1967).



Caption: Венера - беспокойная планета. Ураганы, тысячекилометровые молнии, часто бывают шаровые. Вот и сейчас на пути вездехода - огромная шаровая молния. Здесь она чем-то напоминает земные полярные сияния. [Venus is a restless planet. Hurricanes, thousands of kilometers of ball lightnings. And now there is a huge ball lightning on the way of a space vehicle. Here, it is slightly reminiscent the earth's aurora.].

156. *Venera - raskalennaia* [The Red-Hot Venus] (Leonov and Sokolov 1967).



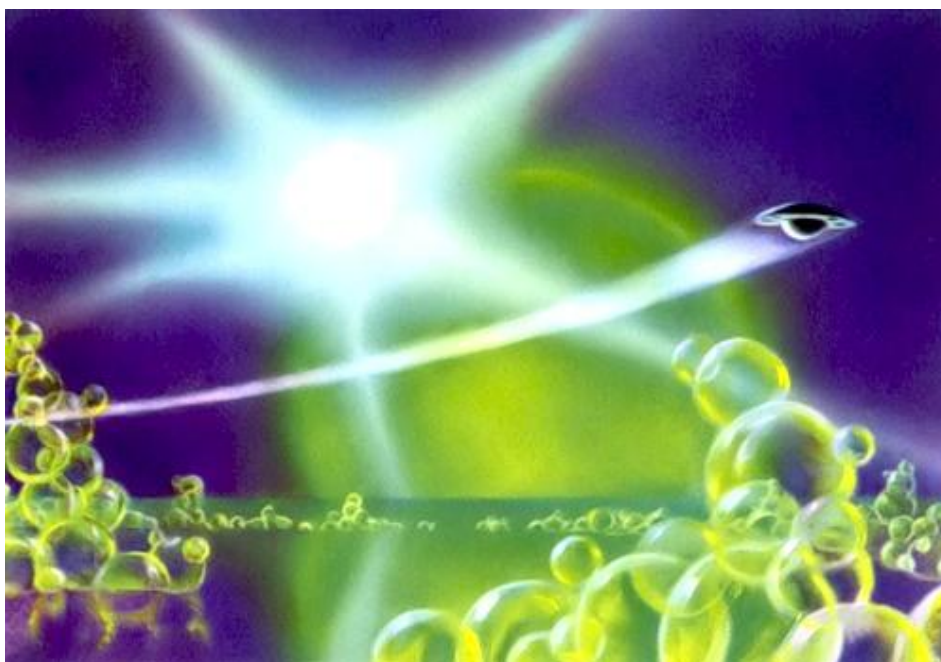
Caption: Очень тяжело даже вездеходу, когда вокруг плавятся скалы... [It is very hard to move and work, even for a rover, when there are melted rocks all around...].

157. *Naiden vympel* [A Pennon Has Been Found] (Leonov and Sokolov 1967).



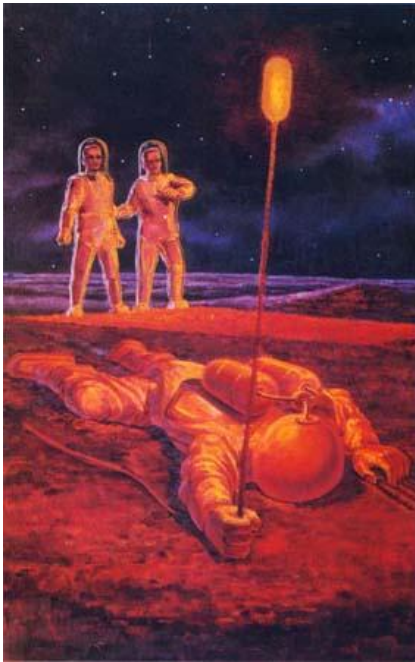
Caption: Трудна обстановка на Венере. Ее грозные силы подстерегают человека на каждом шагу. Но мощная техника оберегает людей. И как радостно увидеть здесь маленький металлический шарик: ведь этот Вымпел был доставлен сюда космической ракетой с родной Земли и сброшен на поверхность в контейнере как символ разума Человека. [A situation on Venus is difficult. Its formidable powers are threatening humans everywhere. But a powerful technology protects them. And how glad they are to see a small metal ball - the remains of the pennon which had been brought here by the rocket and dropped onto the surface in the container as a symbol of the human mind.].

158. *Na planete dvukh solnts* [On the Planet of Two Suns] (Leonov and Sokolov 1967).



Caption: А на этой планете два солнца - синее и желтое - дают в сочетании пронзительно зеленый цвет, который озарил неведомые образования, похожие на гигантские мыльные пузыри. [The two suns on this planet - the blue and the yellow - generate a sharply green colour which illuminates the alien life forms similar to giant soap bubbles.].

159. *Cherez sto let* [In One Hundred Years] (Leonov and Sokolov 1967).



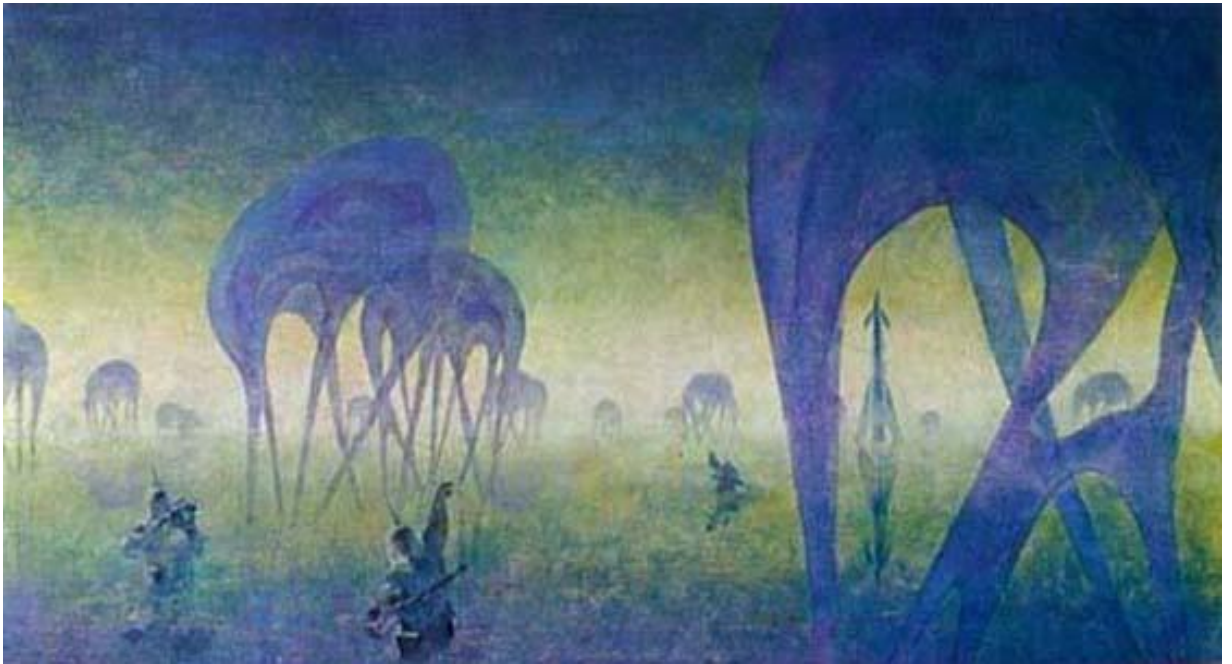
Caption: Неожиданная и трагическая встреча на планете другой звезды. Какую тайну скрывает погибший космонавт, в руках которого вот уже сто лет горит под действием космического излучения сигнальная лампа?.. [The sudden and tragic meeting on the planet of a distant star. What secret hides the dead cosmonaut in the hands of whom a pilot lamp has been lit for a hundred years by the cosmic radiation?..].

160. *Organizamy okhotiatsia* [The Organisms are Hunting] (Leonov and Sokolov 1967).



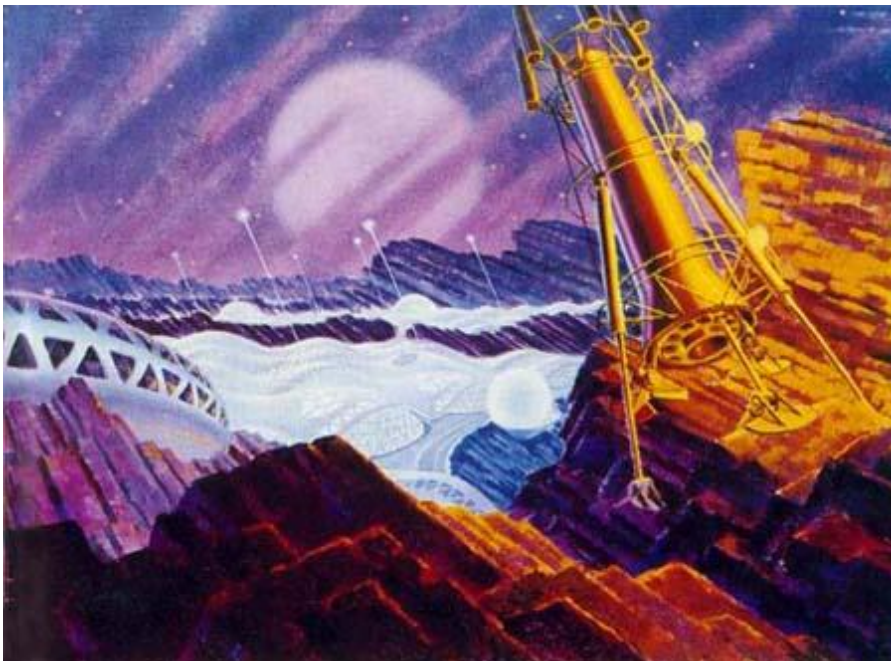
Caption: Безобидные «растения» оказались хищниками. С космического аппарата люди с изумлением наблюдают «обед» веземного чудовища. [Harmless “plants” turned out to be predators. Having left their spacecraft, people watched in amazement the “lunch” of these alien creatures.].

161. *Vnezemnaia zhizn* [Alien Life Forms]. (Leonov and Sokolov 1967).



Сартюн: Эти прозрачные, словно медузы, живые организмы как будто парят в плотной атмосфере планеты чужой звезды. Люди поначалу принимают их за растения. Но это не так. [These transparent, jellyfish-like living organisms somewhat float in the dense atmosphere of the planet of a distant star. People initially take them for plants, but they are wrong.].

162. *Na poroge* [On the Verge] (Leonov and Sokolov 1967).



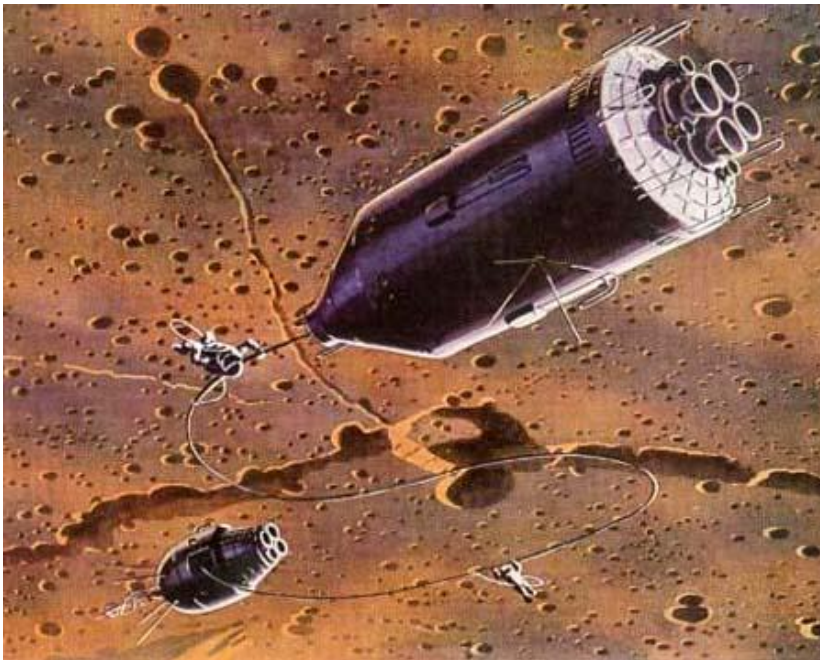
Сартюн: Так вот он какой, «город» другой цивилизации! Для его строительства были максимально использованы природные материалы. Жители словно лепили свою архитектуру, добиваясь предельной гармонии с окружающей средой. [So that's what the "city" of another civilization looks like! The most natural materials were utilized for its construction. Residents literally molded its architecture, achieving an ultimate harmony with the natural environment.].

163. *Venera-4 bedet radioperedachu* [Venera-4 Conducts a Radio Broadcast.] (Leonov and Sokolov 1970).



Caption: Сравнительно недавно завершился многомесячный полет автоматической станции «Венера-4». Полученные данные позволили художникам создать убедительные картины этого замечательного перелета. На фоне оранжевого венерианского неба - раскрытый купол парашюта, под ним темный обгорелый шар. Ураганные ветры вытянули в полосы темные облака на небе. А внизу, уже близко, - мрачные, черно-фиолетовые скалы. [A long-term flight of an automatic station Venera-4 has relatively recently accomplished its mission. The collected data allowed the artists to create a compelling vision of this wonderful trip. An open canopy is juxtaposed against the background of an orange sky and just beneath it there is a dark charred ball. The dark clouds are pulled into strips by hurricanes. And at the bottom, just near the viewer, there are some gloomy, black and purple rocks.]

164. *Nad lunoi stykovka rakety c kosmicheskim korabliem* [Rendezvous of the Rocket and the Spacecraft.] (Leonov and Sokolov 1970).



Caption: Капсула выйдет на селеноцентрическую орбиту, сблизится с ожидающим ее кораблем. Внизу - знакомый по фотографиям, лунным картам участок поверхности планеты. А над ней космонавты переходят из капсулы в корабль, который доставит их к Земле. Фон картины умышленно лишен характерных для Луны контрастов света и тени. Благодаря этому удался эффект глубины, стыкующиеся корабли четко вышли на передний план. [The capsule will enter the lunar orbit and approach the spacecraft waiting for it. At the background there is the surface of the moon widely known from the photographs and lunar maps. And over it the cosmonauts are transferred from the

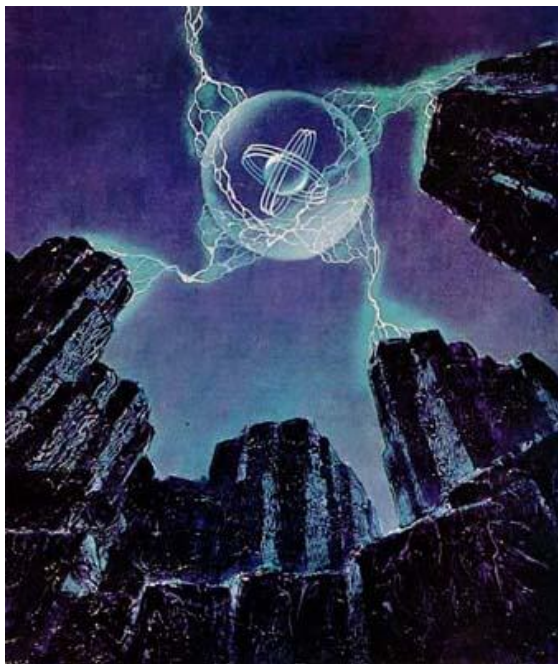
capsule to the spacecraft that will take them to the Earth. The background pattern is intentionally deprived of contrasts of light and shadow typical for the Moon. Due to this, the effect of depth has been achieved and the spacecrafts have clearly come to the fore.].

165. *Im svetit zemlia* [The Earth Shines to Them] (Leonov and Sokolov 1970).



Caption: Человек всегда останется человеком, со всем сложным комплексом чувств. И, кто знает, может быть на Луне влюбленные также будут совершать ночные прогулки при свете нашей Земли. [A man will always be the same, with the whole complex variety of feelings. And who knows, maybe the lovers on the Moon will also have nightly walks in the light of our Earth.].

166. *Posadka na planetu golubogo solntsa* [Landing on the Planet of the Blue Sun] (Leonov and Sokolov 1970).



Caption: Огромное голубое солнце. Оно во много раз больше, ярче, горячее нашего. Порожденные его могучим излучением, бушуют на планетах этой системы электромагнитные бури, бродят по океанам светящиеся в перенасыщенной электричеством атмосфере смерчи. Автоматическая станция, заброшенная в этот мир с космического корабля, окружена защитным полем. Само по себе поле невидимо, но под ударами молний оно обрисовывается, высвечивается, становится реальным, видимым. Нет сомнения, что в единоборстве с грозными силами природы победит человек. [A huge blue sun. It is many times larger, brighter and hotter than ours. The electromagnetic storms, generated by its powerful radiation, rage on all the planets of this solar system and roam around the oceans glowing in the atmosphere supersaturated by tornadoes. An automatic station, abandoned in this world by a spacecraft, is surrounded by a protective field. The field is invisible, but when it is struck by

lightnings, it becomes real and visible. There is no doubt that humans will emerge victorious in a confrontation with the formidable forces of nature.].

167. *Orbitalnaia stantsia* [Orbital Station] (Leonov and Sokolov 1971).



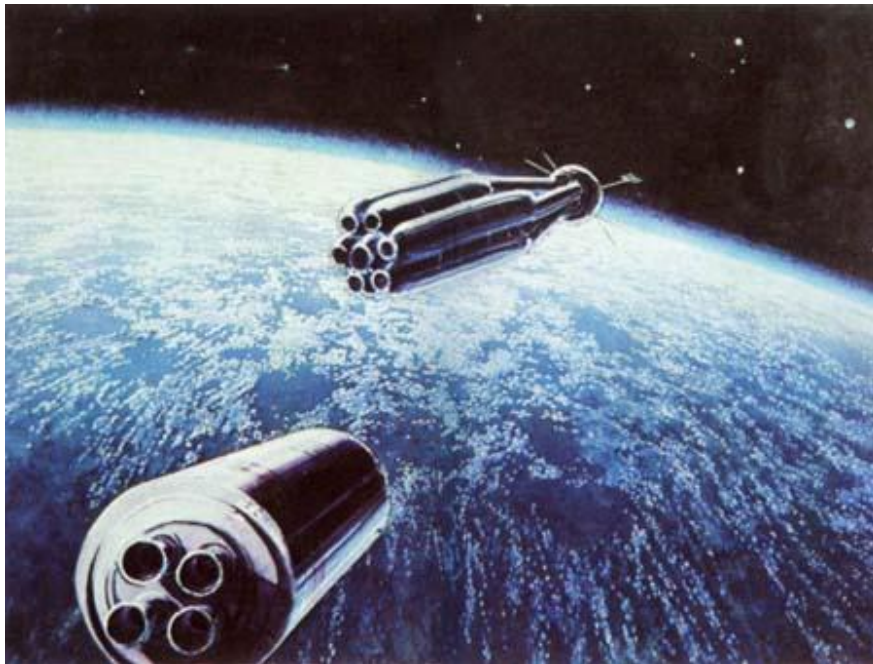
Caption: Художественно-эстетическое восприятие играет важную роль при строительстве космических аппаратов. В будущем красота и целесообразность станут основным принципом художественного конструирования, главной задачей художников-конструкторов космических аппаратов. [The artistic and aesthetic perception plays an important role in the construction of a spacecraft. In the future, the beauty and expediency will become the main principles of artistic construction and the main task of the artists-designers of a spacecraft.].

168. *Miagkaia posadka na lunu* [A Soft Landing on the Moon] (Leonov and Sokolov 1971).



Caption: Сентябрь 1970 года. Очередной советский космический аппарат «Луна-16» опускается на Луну. Уже избрано место посадки. Начался участок управляемого торможения: включены двигатели малой тяги. Управляемый с Земли аппарат как бы зависает над безмолвной каменистой пустыней нашего естественного спутника. Светящийся сферический ореол в нижней части ракеты не фантазия художника. Это результат работы двигателей в условиях космоса. [September 1970. Another Soviet space probe Luna-16 lands on the moon. The landing spot has been already chosen. A controlled deceleration has begun and an electrically powered spacecraft propulsion has been switched on. The machine, controlled from Earth, hovers over the silent rocky desert of our natural satellite. A glowing spherical halo at the lower part of the rocket is not a fantasy of the artist. This is the effect of the engines' working in space environment.].

169. *Pered budushchim startom k lune* [Before the Future Launch to the Moon] (Leonov and Sokolov 1971).



Сaption: Один из возможных вариантов полета к Луне космического корабля — старт с платформы, движущейся по орбите искусственного спутника Земли. Сейчас еще чувствуется притяжение Земли, но скорость корабля все увеличивается, его путь — к Луне. [One of the possible variations of the flight to the Moon is the launch from a platform moving in an orbit of the Earth's artificial satellite. The gravity of the Earth is still in force, but the speed of the spacecraft is increasing - its trajectory is to the moon.]

170. *Lunnyi kosmodrom polden* [The Lunar Cosmodrome at Noon] (Leonov and Sokolov 1971).



Сaption: Необычен наряд космонавтов. Возможно, именно так будет выглядеть защита человека от ослепительного света солнечных лучей. От других видов радиации космонавтов оберегают специальные скафандры. [The cosmonauts wearing an unusual outfit. Perhaps, this is what the human protection from the sunlight will look like. Special spacesuits will protect them from other types of radiation.]

171. *Start k Venere* [Launch to Venus] (Leonov and Sokolov 1971).



Caption: С орбиты искусственного спутника Земли стартует к Венере автоматическая межпланетная станция. Сейчас кончает работу последняя ступень ракеты — разгонный блок, и станция, достигнув второй космической скорости, вырывается из оков земного притяжения. Впереди многомесячный полет к одной из самых загадочных планет солнечной системы. Разгадка некоторых из ее тайн может быть самой неожиданной. [An automatic interplanetary station is launching to Venus from the orbit of an artificial Earth's satellite. The last stage of the rocket now ends its work - the upper stage, and the station, having reached escape velocity, breaks free from the shackles of the Earth's gravity. The long-term flight to one of the most mysterious planets of the solar system is ahead of us. It might unexpectedly unravel some of its secrets.].

172. *Signal Zemlii* [A Signal from the Earth] (Leonov and Sokolov 1971).



Caption: Кроме радиосигналов, на Венеру со скоростью около трехсот тысяч километров в секунду полетят световые импульсы мощных лазеров с космических станций, движущихся по орбитам спутников Земли и Венеры. Этот лазерный пучок будет обладать колоссальной плотностью световой энергии и большой направленностью излучения. В дальнейшем лазерный импульс станет прекрасным каналом передачи информации. [In addition to radio signals, light impulses of high-power lasers from the space stations orbiting the Earth's and Venus's satellites will reach Venus at the rate of about three hundred thousand kilometers per second. This laser beam will have a tremendous density of light energy and a high radiation directivity. In the future, the laser impulse will become a great channel for transmitting information.].

173. *Na ekrane lokatora - Mars* [On the Radar Screen - Mars] (Leonov and Sokolov 1971).



Сартюн: Все ближе красноватая планета. Сквозь слабую атмосферу уже хорошо видны неровности марсианского рельефа. Еще радиолокация Марса с Земли показала, что возвышенности на планете могут достигать нескольких километров. [The reddish planet is getting nearer. The irregularities of the Martian terrain are already clearly visible through a weak atmosphere. The radar of Mars from the Earth revealed that hills on the planet can reach several kilometers.].

174. *Skaly Marsa* [Martian Rocks] (Leonov and Sokolov 1971).



Сартюн: И вот уже самоходный аппарат прокладывает первую борозду на холодном Марсе. О родной планете здесь немного напоминают скалы, стоящие точно скульптуры, высеченные древним ваятелем... [And now, a self-propelled machine paves the first furrow on the cold surface of

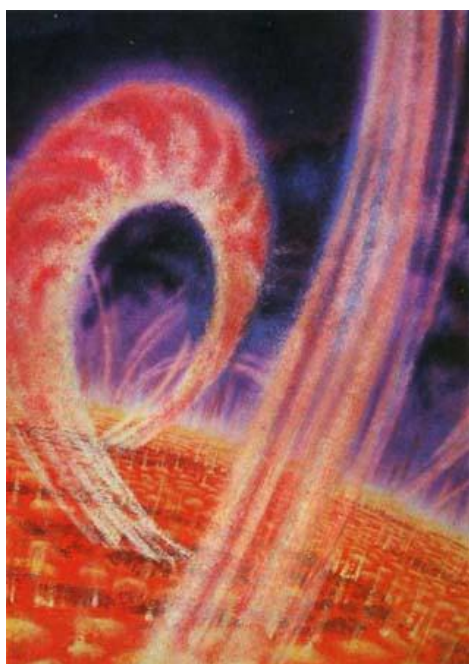
Mars. The rocks may be slightly reminiscent of our home planet, the firmly standing sculptures carved by ancient sculptors...].

175. *Dolina priznakov* [The Valley of Ghosts] (Leonov and Sokolov 1971).



Caption: С изумлением смотрят люди на призрачные, словно хрустальные, «столбы». Может быть, это какое-то неизвестное явление в разреженной атмосфере, содержащей водяные пары и углекислый газ? Но от «столбов» падают тени... Еще одна загадка Марса. [People are watching with amazement the ghostly, crystal-like “pillars”. Maybe it is some unknown phenomenon in the rarefied atmosphere, containing water vapour and carbon dioxide? But the “columns” cast shadows... This is another mystery of Mars.]

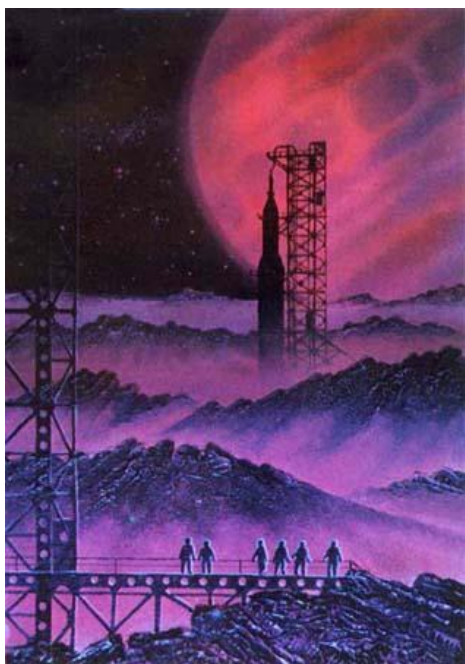
176. *Solnechnie fontanny* [Solar Fountains] (Leonov and Sokolov 1971).



Caption: На наскальных рисунках первобытного человека историки находят изображения нашего дневного светила, а в старинных летописях упоминания о видимых на Солнце темных пятнах. Древние не знали, что такое Солнце. И мы, люди XX века, тоже не можем еще сказать: «Мы знаем о Солнце все». Земли достигает только одна двухмиллиардная часть солнечной энергии. Невообразимое количество ее рождается в недрах Солнца, где водород превращается в гелий. Каждую секунду масса Солнца уменьшается на четыре миллиона тонн! Температура в его недрах достигает 13000000 градусов. Если бы такой горячей была поверхность Солнца, температура на нашей планете в полдень была бы 600000 градусов! На картине показаны гигантские выбросы солнечного вещества — протуберанцы. [In the cave paintings of a prehistoric man historians find images of our daily sunlight and ancient chronicles mention the sun’s dark spots. The ancient people did not know what the sun was. But even the people of the 20th century cannot even say that they know all about the sun. Only one of the two billion part of the

solar energy reaches the Earth. Most of this energy is born in the depths of the sun, where hydrogen is converted into helium. Every second, the sun's mass is reduced by four million tons! The temperature in the subsoil reaches 13000000 degrees. If the surface of the sun was so hot, the temperature on our planet in the afternoon would reach 600,000 degrees! The painting shows a giant emission of the solar material - prominences.].

177. *Kosmodrom na sputnike Iupitera* [Cosmodrome on Jupiter's Moon] (Leonov and Sokolov 1971).



Caption: На ближайшем к Юпитеру спутнике - Ио построен космодром. Отсюда готовится к старту на планету исследовательская ракета. Она должна сообщить дополнительную информацию о природе Юпитера. [A spaceport has been built on the nearest moon of Jupiter - Io. A rocket is preparing for the launch to the planet which should provide additional information about the nature of Jupiter.].

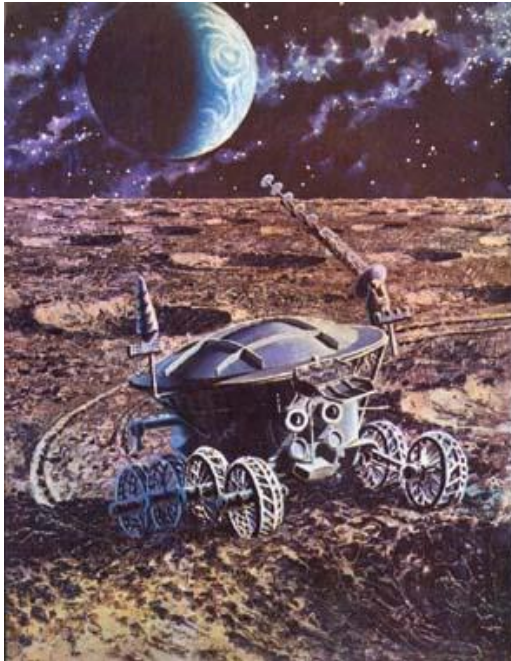
178. *Zemnye tsvety na lune* [The Earth's Flowers on the Moon] (Leonov and Sokolov 1972).



Caption: Созданный руками людей аппарат устойчиво расположился на поверхности нашего «ночного светила» и передает на Землю панораму окружающего ландшафта, в летучих лучах Солнца поблескивают металлические лепестки станции, вытянулись вверх штыри четырех антенн, медленно вращается головка телекамеры, высматривая самое интересное. Фантастика? Нет, вчерашняя реальность... А завтра? Далекие потомки «Луны-9» заселят самые отдаленные области Селены и повседневно будут исследовать наш естественный спутник, чтобы раскрыть все его тайны, дать в руки ученых новые сведения о строении и характеристиках этого небесного тела. [The apparatus, created by the human hands, has been placed on the surface of our "nightly celestial body" and is transmitting to the Earth panoramas of the surrounding landscape, the metallic petals of the station are gleaming in the sunlight, spreading its four antennas, slowly rotating the camera and searching for the most interesting objects. Science fiction? No, it is the reality

of the past... And the future? Distant descendants of Moon-9 will inhabit the remote areas of Selena and every day they will explore our natural satellite to reveal all its secrets and give the scientists new information about its structure and other physical features.].

179. *Lunnyi marafonets* [The Lunar Marathon Man] (Leonov and Sokolov 1972).



Caption: Трудно переоценить все те широкие возможности, которые открыла для нас первая в мире передвижная лунная лаборатория, оснащенная самой современной аппаратурой. Она позволила исследовать самые разнообразные районы лунной поверхности. Полностью оценить все значение этого этапа возможно только в будущем, когда человечество, наряду с проводимыми сегодня исследованиями, приступит к непосредственному освоению и заселению Луны. Луноходы найдут широкое использование в строительстве научных баз, поселений и лунных городов. Они будут выполнять перевозку грузов, бульдозерные работы, рытье котлованов, ремонтные работы и многое другое. [It is difficult to overestimate all the opportunities provided by the world's first mobile lunar laboratory equipped with the most modern equipment. It is now possible to study a variety of areas of the lunar surface. However, to fully appreciate the full significance of this stage of advancement in space science will be only possible in the future, when humanity, along with the development

in the ongoing space research, will begin the conquest and settlement of the Moon. The rovers will be widely utilized in the construction of scientific bases, settlements and lunar cities. They will carry out the freight, dozing, digging ditches, repairs and many more.].

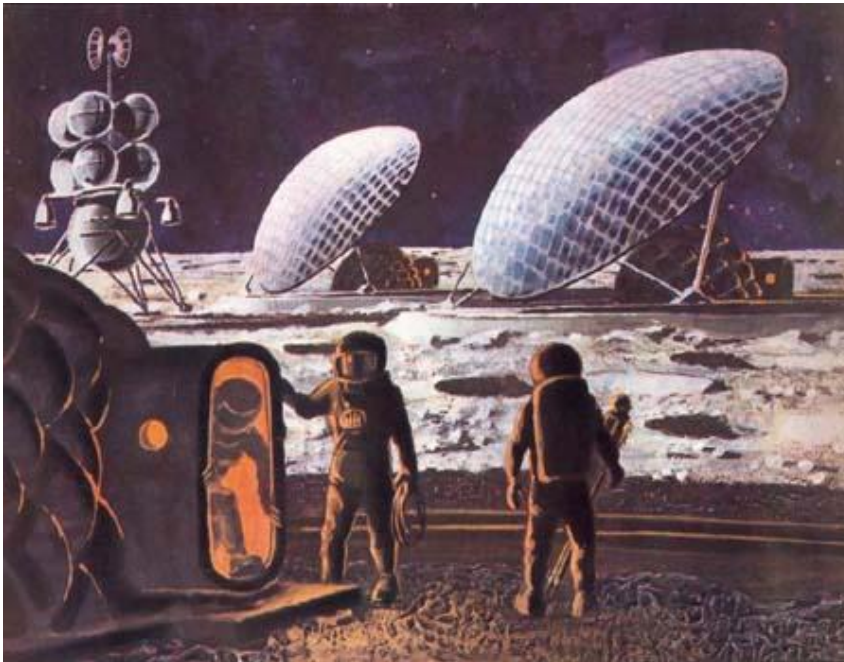
180. *V gorakh Seleny* [In the Mountains of Selena] (Leonov and Sokolov 1972).



Caption: Советская автоматическая станция прилунилась в горном районе. Взяв образцы лунного грунта, она доставила их на Землю. Это наше сегодня. И в дальнейшем Луна будет интенсивно изучаться многочисленными автоматами. Специфика их деятельности будет разнообразной. Можно предположить, что на Селене появятся буровые установки промышленного значения, которые будут извлекать из лунных недр «дефицитные» для землян породы. Вездесущие луноходы доставят добытые образцы к автоматическим ракетам, которые с бесценным грузом отправятся на родную планету. [The Soviet automatic station is stationed in a mountain area. Having taken samples of the lunar soil, it sends them to the Earth. This is the present-day situation. In the future, the Moon will be intensively examined by numerous machines. The specifics of their work will vary. It can be assumed that there will appear drilling rigs of commercial and industrial value on Selena that will be removing species detrimental for earthlings from the lunar bowels. The omnipresent

rovers will deliver the obtained samples to automatic rockets that will take them to our home planet.].

181. *Lunnyi poselok* [Lunar Village] (Leonov and Sokolov 1972).



Caption: Наступит время, когда на Луне будет создана стационарная база для размещения достаточно большого числа специалистов по изучению и освоению ее природных богатств. Художник изобразил на картине лунный «поселок». Мы видим научное и служебное оборудование, защищенное от действия солнечных лучей и радиации, вращающимися по кругу специальными экранами — солнечными

батареями, а также жилой комплекс и транспортный космический корабль экспедиционного обеспечения. [The time will come when a stationary base will be established on the Moon to accommodate a sufficiently large number of specialists studying the use of its natural resources. In the picture, the artist depicted the moon “settlement”. We can see the scientific and technical equipment, which protects humans from the sunlight and radiation, the solar panels with special screens rotating in a circle, as well as a residential complex and a transport spaceship for secure expeditions.]

182. *Snova u Venery* [Approaching Venus Again] (Leonov and Sokolov 1972).

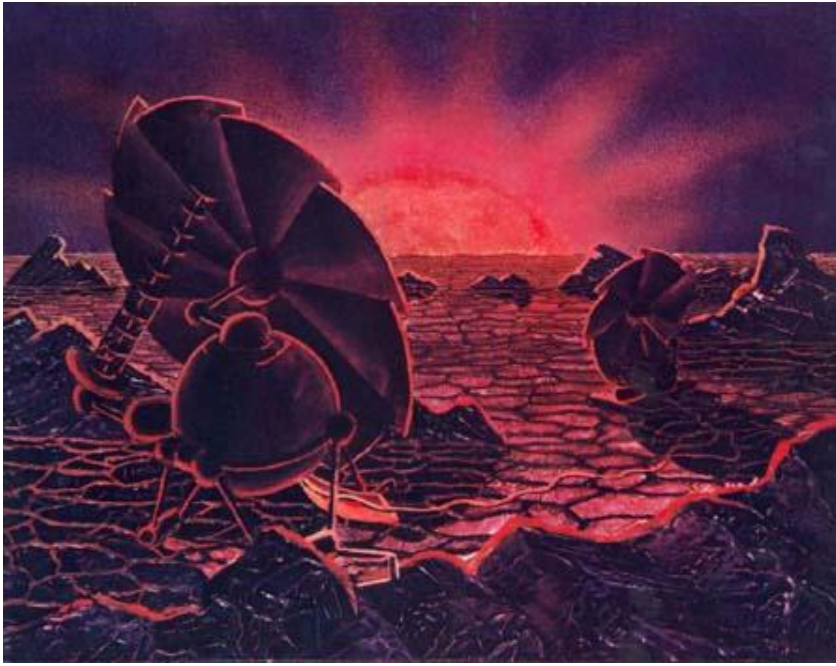


Caption: Изучение планеты с помощью автоматических межпланетных станций в будущем примет систематический характер. Оно усложнится и расширится по мере получения результатов предыдущих исследований и с учетом возможностей, предоставляемых космической техникой. На картине художник изобразил решение одной из интереснейших задач

по изучению Венеры: в атмосфере планеты дрейфует научная станция, с борта которой на поверхность посылаются шары-зонды для сбора научной информации. [The study of the planet with the help of automatic interplanetary stations will be performed systematically in the future. It will expand

and get more complicated in line with the results of previous studies and the possibilities offered by space technology. In the picture, the artist depicted a solution to one of the most interesting challenges of the study of Venus: in the planet's atmosphere the research station is drifting and sending balloons-probes collecting scientific information from its surface.].

183. *Na Merkurii* [On Mercury] (Leonov and Sokolov 1972).



Caption: Яркий, ослепительный свет заставит будущих исследователей этой планеты постоянно находиться в очень темных, почти черных светофильтрах. Через эту оптику они с интересом будут разглядывать поверхность Меркурия, ярко освещенную заходящим Солнцем. Вся планета темно-красного цвета и чем-то похожа на Марс и на Луну. Они увидят какие-то россыпи камней, похожие на разрушенные скалы, остатки кратеров... Здесь высокая температура и губительные излучения от Солнца. Безводную раскаленную пустыню Меркурия, полную неизвестностей и опасностей, будут исследовать стационарные и самоходные автоматические аппараты, подобные тем, которые показаны на картине. [The bright, dazzling light will make future researchers of this planet work in very dark, almost black optical filters. Through this optics they will be examining the surface of Mercury, brightly lit by the setting sun. The whole planet is dark red and is somewhat similar to Mars and the Moon. The probes will encounter some placers of stones like broken rocks, craters... There are high temperatures here and a harmful radiation from the sun. The stationary and self-propelled automatic machines, such as those shown in the picture will investigate a waterless and hot desert of Mercury, full of suspense and danger.].

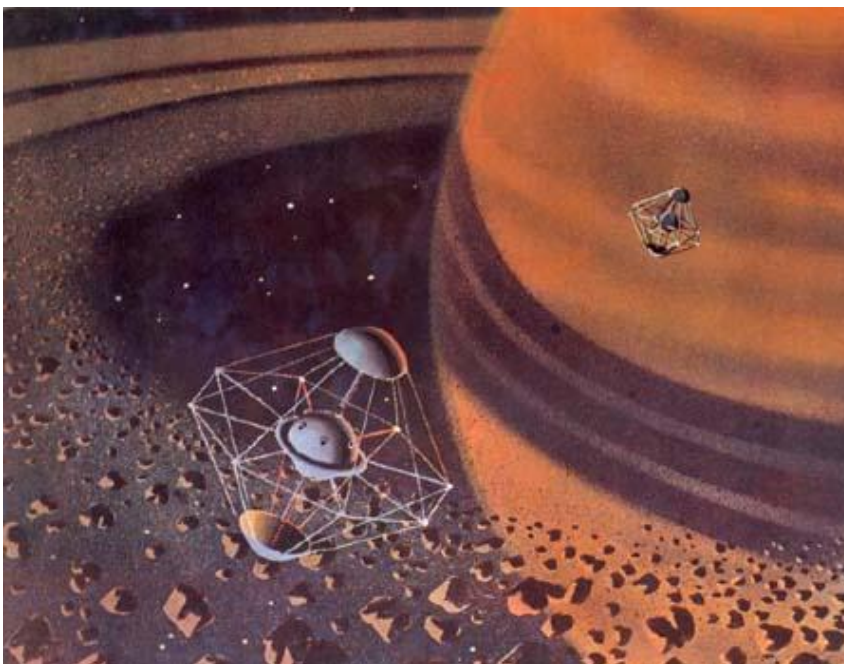
184. *Na sputnike Iupitera* [On the Moon of Jupiter] (Leonov and Sokolov 1972).



Caption:
Автоматическая станция будущего передает научную информацию с Ганимеда — самого большого спутника Юпитера. В тумане видны скалы, прямо над горизонтом повис Юпитер, похожий на огромное оранжево-полосатое Солнце. Видны темные, почти черные полосы, параллельные экватору планеты и видимо связанные с большой скоростью ее вращения. Поверхность Ганимеда в ряде мест

покрыта льдом, тускло отсвечивающим на фоне окружающих возвышений. [An automatic station of the future is transmitting scientific information from Ganymede - the largest moon of Jupiter. The rocks and Jupiter hovering just above the horizon like a huge orange-striped sun are clearly visible in the mist. Also, the visible dark, almost black stripes parallel to the equator of the planet are probably related to the high speed of its rotation. In some places Ganymede's surface is covered with ice, dimly shining against the backdrop of the surrounding hills.]

185. *V koltsakh Saturna* [In the Rings of Saturn] (Leonov and Sokolov 1972).

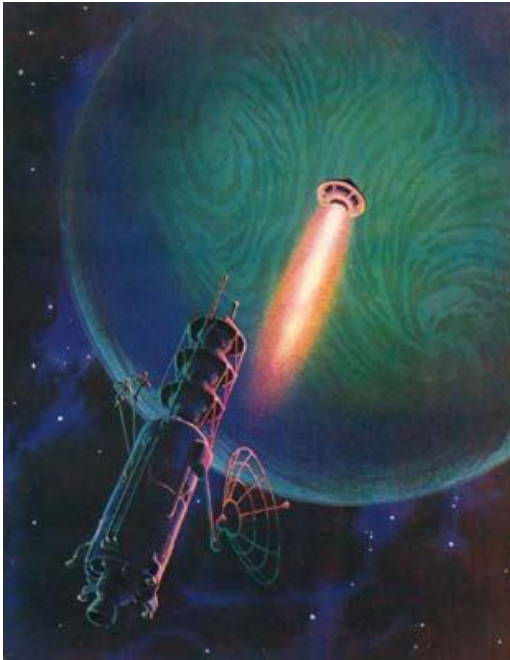


Caption: Вот какими представляются художнику знаменитые кольца Сатурна. Автоматические аппараты достигли их окрестностей и передают первые снимки на Землю. Картина достаточно впечатляющая... Когда-нибудь мы получим первую информацию о химическом составе этих небесных тел, узнаем о их происхождении, и тогда, возможно, станут ясны причины столь необычного

группирования колец вблизи Сатурна. [This is how the artist envisions the famous rings of Saturn. The automatic devices have reached their surroundings and transmit the first images to the Earth. The picture is impressive... Someday we will receive the first information about the chemical composition of these

celestial bodies, learn about their origins, and then perhaps it will become well known why such an unusual set of rings appears near Saturn.].

186. *Ocherednoi "zond" idet k Saturnu* [Another Probe Goes to Saturn] (Leonov and Sokolov 1972).



Сартiон: С орбиты будущего искусственного спутника Нептуна, которым стала автоматическая станция, видно, что рельеф этого «малахитового» небесного тела не совсем ровный. Все пространство покрыто льдом, которого здесь, по-видимому, очень много, ведь температура 220 градусов мороза! Изучение Нептуна будет вестись как с околопланетной станции, так и с помощью спускаемых аппаратов — зондов. [From orbit of the future artificial satellite of Neptune, which the automatic station has become, it becomes clear that the terrain of this “malachite” celestial body is not quite smooth. The entire body is covered with much ice as the temperature here is 220 degrees below zero! The examination of Neptune will be conducted from the circumplanetary station as well as by probes.].

187. *Posadka na Pluton* [Landing on Pluto] (Leonov and Sokolov 1972).



Сартiон: Продолжаем наше воображаемое многолетнее путешествие. Мы на окраине Солнечной системы в темной бездне, освещаемой только светом звезд. На миг яркая вспышка двигателя осветила бесформенные неясные глыбы, окружающие район посадки, и снова наступает мрак. Да здесь не только неуютно, но и страшно! При температуре -230°C (уже достаточно близкой к

абсолютному полюсу холода!) замерзла не только вода, но даже газы, такие как кислород и азот! В небольшом количестве имеется только газообразный водород — таковы результаты первого зондирования. Форм жизни мы не нашли, использовать эти «кладовые природы» тоже трудно! Так стоило ли лететь сюда? Да, стоило. Получены пока только первые сведения, первые подтверждения гипотезам и теориям ученых, так что практическая работа только начинается. Все открытия еще впереди! [We continue our long-term imaginary journey. We are on the edge of the solar system in a dark abyss, illuminated only by the light of stars. For a moment, a bright flash of the engine illuminated vague shapeless clouds surrounding the landing area, and then the darkness came again. Yes, it is not only comfortless in here, but also scary! At the temperature of -230°C (close enough to the absolute Pole of Cold!) not only water freezes, but also gases such as oxygen and nitrogen! Only hydrogen gas is available in small amounts - these are the results brought about by the first probe. We have not encountered any alien forms of life, utilizing there “pantries of nature” is also hard! So was the trip worth it? Yes, it was. So far we have only obtained the first information which confirmed the hypotheses and theories put forward by scientists, so all the practical work is just beginning. All discoveries are still to come!].

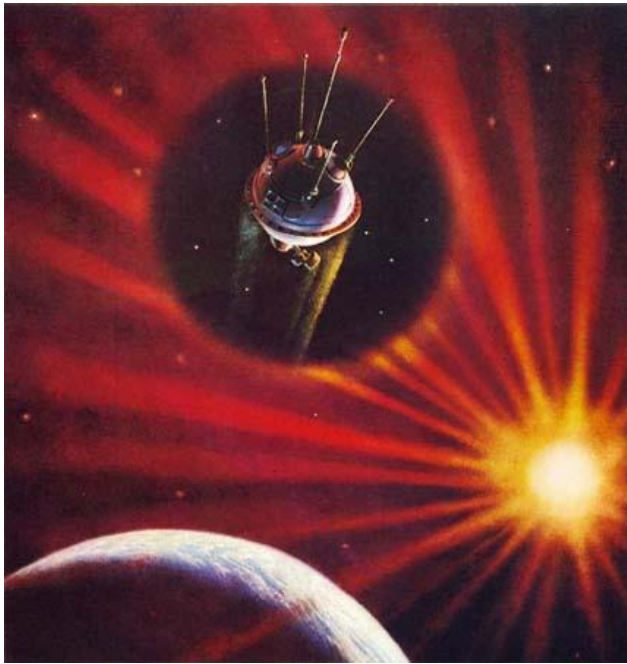
188. *Pervyi sputnik vykhodit na orbitu* [The First Satellite Goes into Orbit] (Senkevich 1976).



Caption: 4 октября 1957 года запуском первого советского искусственного спутника Земли осуществилась вековая мечта человечества о полетах в космос. В истории земной цивилизации наступила новая эра — космическая. Но это был не только символ самоутверждения. За период своего существования спутник массой 83,6 килограмма совершил около 1400 витков вокруг Земли и позволил проверить ряд научных и инженерных решений, исследовать прохождение волн через ионосферу. По торможению спутника удалось экспериментально определить плотность атмосферы на высотах, которых ранее не достигал ни один летательный аппарат. Первый посланец в космос блистательно выполнил свои задачи. Сегодня сотни его «космических братьев» помогают людям в земных делах и раскрытии тайн Вселенной. [On October 4, 1957 the ongoing dream of mankind about human spaceflight has come true with the launch of the first Soviet artificial satellite. The history of human civilization has entered a new era - the space age. But it was not only a symbol of our self-affirmation. During its existence, the artificial satellite weighing 83.6 kilograms has orbited the Earth about 1,400 times and allowed to make a number of scientific and engineering solutions as well as to explore the waves going through the

ionosphere. After the satellite finished its work, scientists were able to experimentally determine the density of the atmosphere at an altitude not reached by any aircraft. The first missionary into space brilliantly fulfilled its task. Today, hundreds of his “space brothers” help people in their earthly affairs and unravel the mysteries of the universe.].

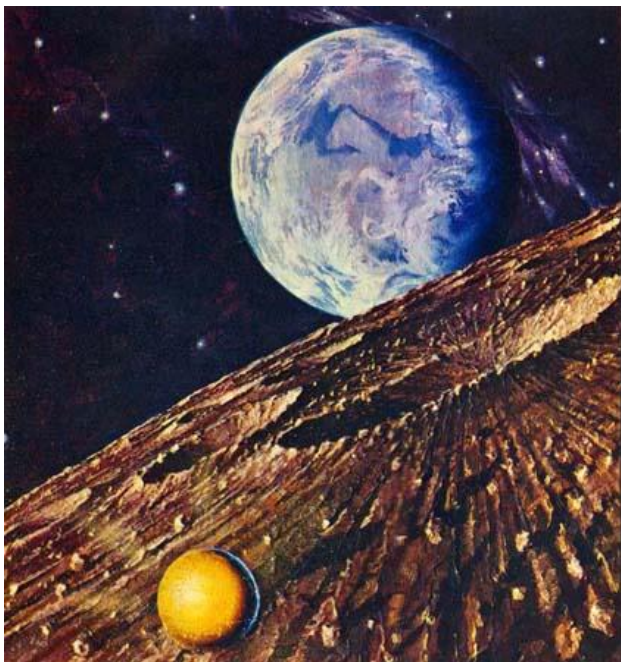
189. *Isskustvennaia planeta "Mechta"* [Artificial Planet "Dream"] (Senkevich 1976).



Caption: В течение многих тысячелетий человек видел на ночном небосклоне Луну, звезды... И теперь настало время, когда советские люди научились отправлять им навстречу творения своих рук. Разведчиком лунной трассы стала советская автоматическая станция «Луна-1», получившая поэтическое название «Мечта». Последняя ступень ракеты-носителя впервые в мире развила вторую космическую скорость, около 11,2 километра в секунду, и, преодолев земное тяготение, вывела станцию на трассу, ведущую к Луне, и далее, на орбиту вокруг Солнца. Это произошло в январе 1959 года. [For many centuries, people have seen the moon and the stars in the night sky... And now the time has come when the Soviet people learn how send their creations to meet them. The scout of the lunar route was the Soviet probe Luna-1, which received a poetic name Dream. For

the first time ever, the last stage of the launch vehicle has developed the escape velocity, about 11.2 kilometers per second, and, having overcome the Earth's gravity, released the station on its way to the moon and beyond, into the sun's orbit. All this happened in January 1959.]

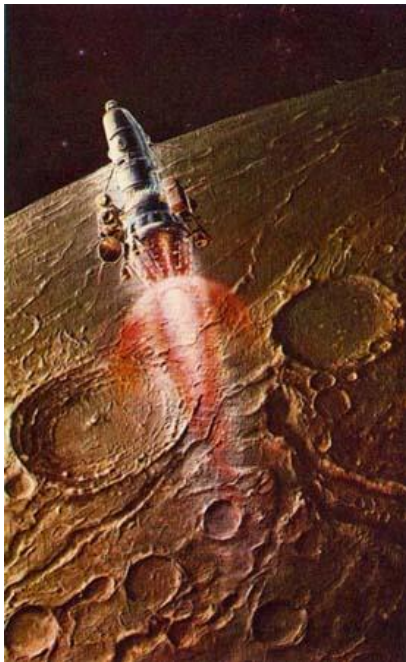
190. *Vpervye na lune* [The First on the Moon] (Senkevich 1976).



Caption: Так символически художник представил первую посадку на Луну. Это произошло 14 сентября 1959 года, югда станция «Луна-2» совершила жесткую посадку на поверхность Луны восточнее «Моря Ясности», вблизи кратеров Аристид, Архимед и Автолик. Впервые за всю историю человечества посланец Земли достиг другого небесного тела. Станция «Луна-2» доставила на Луну вымпел с Гербом нашей Родины и надписью: «СССР, сентябрь 1959». Затем в сторону Луны был запущен еще ряд советских автоматических станций серии «Луна», которые и подготовили решение задачи мягкой посадки контейнера с научной аппаратурой. [The artist has symbolically represented the first landing on the moon. It happened in September 14, 1959, when the probe Luna-2 made a hard landing on the lunar surface east of Sea of Clarity and near the craters Aristides,

Archimedes, and Autolycus. For the first time in human history, the messenger of the Earth has reached another celestial body. Luna 2 brought to the moon a pennant with the coat of arms of our homeland and the inscription "The USSR, September 1959". Then, a number of Soviet probes series Luna has been launched to the Moon which prepared the ground for a soft landing of the container with scientific equipment.]

191. *Pervyi lunnyi sputnik* [First Lunar Probe] (Senkevich 1976).



Сaption: Решение ряда проблем науки о Луне требовало длительного пребывания научной аппаратуры вблизи её и охвата измерениями значительных пространств. И вот впервые за миллиарды лет у нашего естественного спутника появился свой спутник. Это произошло в апреле 1966 года, когда на окололунную орбиту была выведена советская автоматическая станция «Луна-10». [Solving a number of problems of the lunar science required a long stay of the scientific equipment near the Moon and taking specific measurements. And now for the first time in its history our natural satellite has its own artificial satellite. This happened in April 1966 when the Soviet probe Luna-10 entered the lunar orbit.]

192. *Stynovka kosmicheskikh korablei “Soiuz-4” i “Soiuz-5”* [Rendezvous of Spacecrafts “Soiuz-4” and “Soiuz-5”] (Senkevich 1976).



Сaption: Сущность нового космического эксперимента заключалась в осуществлении стыковки двух космических кораблей в космосе и создании из них первой в мире экспериментальной орбитальной станции. Телезрители были свидетелями этой грандиозной по своим перспективам космической стройки. [The aim of the new space experiment was to implement the docking of two spacecrafts in space and the establishment of the world’s first experimental space station. The viewers witnessed this grand space construction on television.]

193. *Nad Afrikoi* [Above Africa] (Senkevich 1976).



Caption: Из иллюминатора космического корабля открываются величественные панорамы Земли. Космический корабль пролетает над Африкой, реки и горные хребты которой хранят память о подвигах их первооткрывателей: Фернандо По, по имени которого назван остров в Гвинейском заливе, Васко да Гама, обогнувшего мыс Доброй Надежды, Лендера, открывшего устье Нигера, Крамфа и Ребмана, которые открыли самые высокие горы Африканского континента — Килиманджаро, русских ученых Ковалевского, Норова, исследовавших Северо-Восточную Африку. Съемка из космоса бесстрастно подтверждает и уточняет точность данных, достигнутых жизнью и трудом исследователей — моряков и землепроходцев прошлых веков. [The view from the spacecraft's window offers a magnificent panorama of the Earth. The spacecraft is flying over Africa, rivers and mountain ranges protect the memory of their discoverers: Fernando Poe, after whom the island in the Gulf of Guinea is named, Vasco da Gama, who discovered the Cape of Good Hope, Lender, who discovered the mouth of the Niger, Kramf and Rebman who discovered the highest mountains of the African continent - Kilimanjaro, the Russian scientists Kovalevsky, Norova who investigated the north-east Africa. The picture from space clearly confirms and

clarifies the accuracy of research results obtained through the life and work of these discoverers - sailors and explorers of the past.].

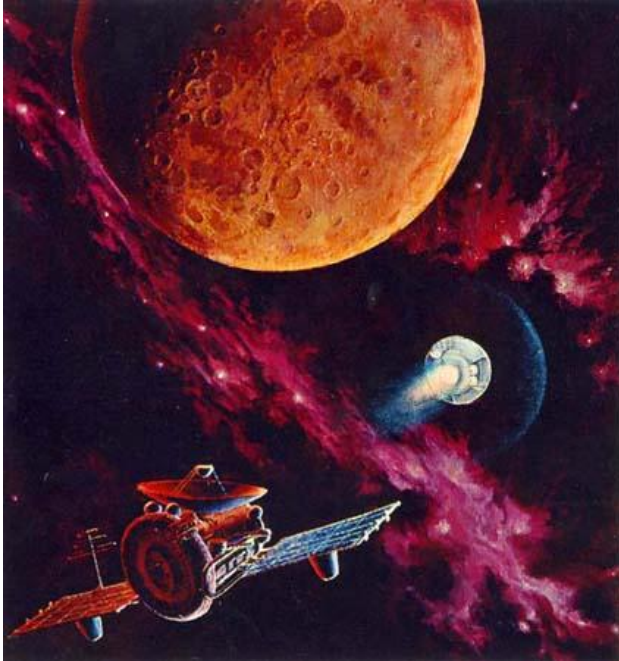
194. *V illuminatore: Tsiklon* [Behind the Window: Cyclone] (Senkevich 1976).



Caption: Из иллюминатора космического корабля хорошо видна поверхность Земли, местами закрытая облаками. Отчетливо просматриваются вихревые образования зарождающегося мощного циклона. С помощью космических средств можно эффективно изучать самые разнообразные процессы, происходящие в природе, а в будущем и осуществить конечную цель — помощь человеку в управлении погодой. [From the window of the spacecraft the surface of the Earth, sometimes covered by clouds, is clearly visible. Here, we can see the formation of a vortex and the emerging powerful cyclone. With the help of space resources a variety of processes occurring in nature

can be effectively studied, and achieve the ultimate goal in the future - to help people control the weather.].

195. *Vperedi Mars* [Approaching Mars] (Senkevich 1976).



Сартiон: В ноябре 1962 года был запущен первый космический аппарат к Марсу. Им была советская автоматическая межпланетная станция «Марс-1», с которой было проведено свыше 60 сеансов радиосвязи и получена важная научная информация. Сближение станции с планетой произошло в июне 1963 года. В 1971 году наступил период великого противостояния Марса, когда расстояние между Марсом и Землей становится минимальным. Поэтому в мае этого года к Марсу были запущены три автоматические станции — две советские «Марс-2» и «Марс-3» и американский аппарат «Маринер». [In November 1962, the first spacecraft to Mars was launched. It was the Soviet probe Mars-1, which conducted over 60 sessions of radio communication system and provided important scientific information. The probe approached the planet in June 1963. In 1971, there was a period of Mars

opposition, when the distance between Mars and the Earth becomes minimal. Therefore, in May this year, three probes have been launched to Mars - the two Soviet probes Mars-2 and Mars-3 and the American probe Mariner.].

196. *Reportazh c Venery* [Report from Venus] (Senkevich 1976).



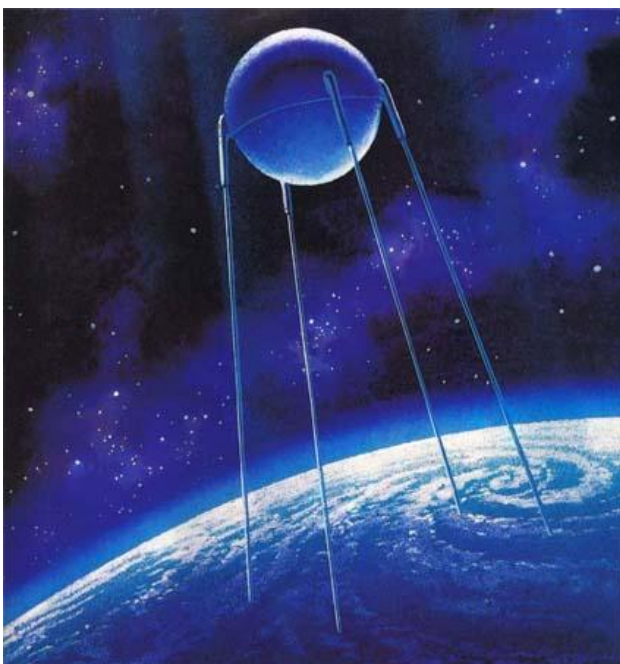
Сартiон: 22 октября 1975 года межпланетная автоматическая станция «Венера-9», преодолев за 136 суток полета более 300 миллионов километров, была выведена на орбиту вокруг Венеры и стала первым в истории искусственным спутником планеты Венера. Спускаемый аппарат станции совершил мягкую посадку на поверхность Венеры. [On October 22, 1975 the interplanetary probe Venera-9, after 136 days of the flight and covering the distance of more than 300 million kilometers, was launched into orbit around Venus and became the first ever artificial satellite of this planet. The space capsule made a soft landing on the surface of Venus.].

197. *Voskhod rukotvornoj zvezdy - pervyi sputnik vyshel na orbitu* [Sunrise of the Man-Made Star - The First Satellite in Orbit] (Senkevich 1984).



Сaption: На картине — волнующий момент выхода рукотворной звезды на орбиту. Пройдет еще немного времени после отделения от последней ступени ракеты-носителя и сброса обтекателя, и спутник приступит к выполнению намеченной программы исследований и экспериментов. О нем скоро узнает мир, и люди планеты, говорящие на разных языках, улыбаясь, будут произносить по-русски: «Спут-ник, спут-ник, спут-ник!» [In the painting - an exciting moment of the launch of a man-made star into orbit. It will take some time after it separates from the last stage of the launch vehicle and ejection of the fairing, and the satellite will begin conducting the planned programme of research and experimentation. The world will soon learn about it, and all nations of the planet, speaking different languages, will say in Russian, smiling: “sput-nik, sput-nik, sput-nik!”].

198. *Sovershilos!* [Done!] (Senkevich 1984).



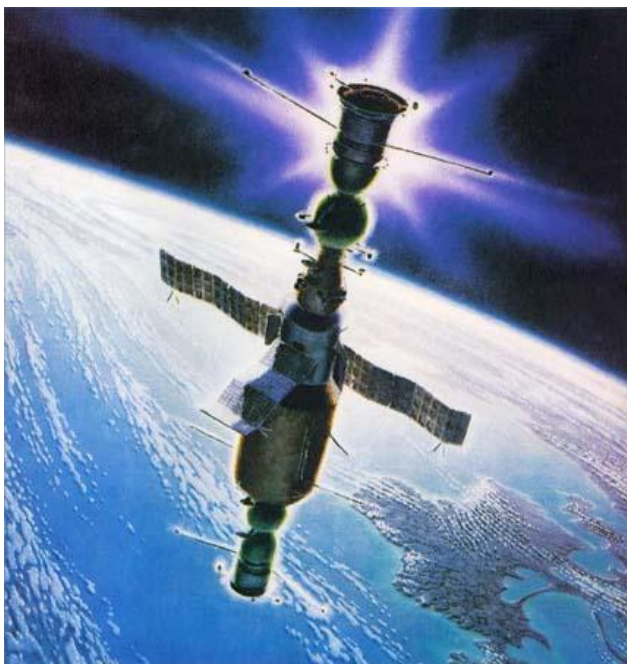
Сaption: Человеческий разум бросил вызов силам природы и одержал величайшую победу: над Землей — первый в мире искусственный спутник. Вслед за ним на околоземные орбиты были выведены сотни его «братьев». Сегодня они помогают людям в земных делах и раскрывают тайны Вселенной. [The human mind has defied the forces of nature and achieved a great victory: the world’s first artificial satellite is hovering above the Earth. Hundreds of its “brothers” followed the suit and today they help people in earthly affairs and reveal the secrets of the universe.].

199. *Rabota v otkrytom kosmose* [Working in Open Space] (Senkevich 1984).



Сaption: В процессе пилотируемых полетов космонавтам иногда приходится совершать выход в космическое пространство, чтобы производить внешний визуальный осмотр станции, заменять аппаратуру и датчики, функционирующие в космическом пространстве. Операции выхода и работы в космическом пространстве хорошо освоены еще со времени полетов кораблей «Восход-2», «Союз-4» и «Союз-5». В будущем деятельность космонавтов в открытом космосе будет занимать все больший объем в программе полетов в связи с предполагаемым проведением всякого рода сборочно-монтажных, ремонтно-восстановительных и профилактических работ с автоматическими и пилотируемыми космическими аппаратами различного целевого назначения. [In the course of the manned spaceflight mission, the cosmonauts sometimes go into outer space to produce a visual inspection of the space station and to replace the equipment and sensors which function in outer space. Such operations have been already performed since the first flights of Voskhod-2, Soyuz-4 and Soyuz-5. In the future, the cosmonauts' work in outer space will take a larger part of the space mission in connection with the alleged conduct of any kind of assembly, installation, repair and maintenance work by means of automatic and human spaceflight apparatus for various purposes.]

200. *Orbitalnyi kompleks nad Chernym morem* [Orbital Complex Above the Black Sea] (Senkevich 1984).



Caption: На картине показан тот же пейзаж, что и на предыдущем эскизе, но с учетом замечаний, высказанных художнику летчиками-космонавтами В. Ляховым и В. Рюминым. Здесь же художник изобразил орбитальный комплекс «Союз» — «Салют-6» — «Союз» в момент, когда он закрыл собой заходящее солнце. [The painting represents the same outer space landscape as in the previous sketch,² but it takes into account comments made by the cosmonauts V. Lyakhov and V. Rumin. Here, the artist has depicted the orbital complex Soyuz - Salyut-6 - Soyuz when it covered a setting sun.]

² The caption accompanying the previous painting titled *Nad Kaspiem. Stykuettsia "Progress"* [Over the Caspian Sea. "Progress" Is Docking]: Год 1978-й. 20 января. К станции «Салют-6» с пристыкованным кораблем «Союз-27» стартует новый автоматический аппарат — грузовой корабль «Прогресс-1». Космический комплекс совершал очередной рабочий виток. Для станции он был уже 1819-м, а для пассажирского корабля—189-м. В расчетное время к космическому причалу пришвартовался «Прогресс-1». На околоземной орбите стала функционировать система из трех аппаратов. Что стоит за этим фактом? Как подсчитали специалисты, на сутки работы в космосе экипажу станции «Салют-6» необходимо 20—30 килограммов различных материалов. Для полетов продолжительностью порядка года потребуется уже до 10 тонн дополнительного груза! Объем же станции ограничен. Значит, нужно что-то доставлять, а что-то снимать со станции. В то же время за один пуск пилотируемого корабля можно доставлять всего 50 килограммов груза, а с помощью автоматического грузового корабля типа «Прогресс» уже 2300 килограммов. Грузовые корабли стали незаменимыми тружениками на трассе Земля — космос — Земля. И вот над вечерним Каспийским морем летит на встречу со станцией «Салют-6» очередной посланец из Байконура. [Year 1978. January 20. The new automatic machine - a cargo ship Progress-1 is launching to the spacecraft Soyuz-27 with the docked station Salyut-6. The space complex has made another round of work, already the 1819th for the station, and the 189th for a passenger spaceship. Progress-1 has moored to a berthing mechanism in the estimated time. The operational system made of three vehicles began functioning in the Earth's orbit. What are the consequences of this fact? As experts estimate, the crew of Salyut-6 need 20-30 kilograms of various materials for a day of work in space. Long-duration flights need to have up to 10 tons of extra cargo and space within the station is limited. So, something needs to deliver something from the station. Normally, a total of 50 kilograms of cargo can be delivered with a single launch of the manned spacecraft, yet with the help of an automatic cargo ship like Progress it is possible to deliver 2,300 kilograms. Cargo ships have become indispensable toilers on the route Earth - space - Earth. And now another messenger from Baikonur is flying over the evening Caspian Sea to meet with the station Salyut-6.]