High Frontier

by John M Stater

GRIT & VIGOR

High Frontier

Adventures in the Retrofuture!

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Welcome to the Future

Science fiction can be thought of as having two distinct flavors. On one side there is "soft" sci-fi, or science-fantasy. Ray guns, rocket ships, star empires, space princesses, sword-wielding heroes, space opera – you know the stuff, lots of fun, but not very realistic.

On the other side, there is "hard" sci-fi. Hard science fiction is not necessarily realistic, but it tries to be. The hard science-fiction authors like Isaac Asimov and Robert Heinlein were scientists and engineers. They had a grasp on current technologies and coming innovations, and a desire to make their fictional futures plausible and realistic.

Unfortunately, the best laid plans of hard sci-fi authors often went awry – items were either never completed, were surpassed by technologies they did not imagine, or took longer than they imagined to become reality. These unrealized technologies compose what is sometimes called the "retro-future".

GRIT & VIGOR: The High Frontier is a guide to setting adventures in the fabulous retro-future.

Looking ahead from 1946, learned men and women could not guess what was in store for them. Most people could not imagine an end to the budding Cold War, or a scenario in which the U.S.A. would come out on top. Scientifically planned and controlled economies were the hot new thing in politics … if only they had managed to succeed!

What they did imagine was moon landings leading to space stations leading to moon bases and finally a landing on Mars. They imagined aircraft that would get people from New York to Tokyo in a couple hours, cars that would hover, powerful computers that would drive workplace efficiency to new heights, communication via an interconnected computer network and robots that would not only labor in factories, but also in the home. As we now know, some of these ideas did become reality, though rarely as soon as people imagined they would.

"A human being should be able to change a diaper, plan an invasion, butcher a hog, conn a ship, design a building, write a sonnet, balance accounts, build a wall, set a bone, comfort the dying, take orders, give orders, cooperate, act alone, solve equations, analyze a new problem, pitch manure, program a computer, cook a tasty meal, fight efficiently, die gallantly. Specialization is for insects."

— Robert Heinlein, *Time Enough for Love*

Our retro-future is set in the futuristic year 2000 … but a year 2000 that harkens back to the 1980's, 1970's and even 1960's in style, and a the early to mid-2000's in technology.

Characters

Adventures in *High Frontier* take place on Earth, the Moon, Mars and in space. The focus on space means that the space man subclass (we can call them astronauts and cosmonauts here to ground them a bit more in hard science fiction as opposed to pulp sci-fi) are prominent in the game, but they cannot reach the wild blue yonder alone. Technicians, engineers and scientists keep the world of the future running and spies and soldiers barely keep the global peace.

Character Classes

Many of the existing character classes and subclasses in *GRIT & VIGOR* work fine in the *High Frontier* setting without any changes.

Class	Subclasses
Daredevil	Ace Reporter, Aviator, Grease Monkey, Medic, Spaceman
Fighter	Commando, Ranger
Rogue	Assassin, Grifter, Private Eye
Scholar	Detective, Inventor, Psionicist

To maintain the correct feel for the setting, call spaceman characters either astronauts, taikonauts or cosmonauts. Psionicists might be called "espers".

New Subclasses

Two new subclasses are provided to fill niches in the setting – the Computech and Engineer – as well as some additional options for Aviators and Fighters.

Aviator (Daredevil Sub-Class)

Pilots can be represented with the aviator sub-class of the Daredevil. Since *High Frontier* is often aerospace focused and thus might have a plethora of aviator characters, aviators in the game can choose to pursue one of the following sub-sub-classes.

Rocket Jockey—To qualify as a rocket jockey, an aviator must have a Constitution score of 11 or higher. Rocket jockeys cannot apply combat feats to their aircraft in dogfights, but they can increase their vehicle's top speed by 20%, and enjoy a +2 bonus to maneuverability at top speed.

Stunt Pilot—A stunt pilot cannot apply combat feats to their aircraft during a dogfight, but they do enjoy an additional +2 bonus to all maneuvers, and they can re-roll one failed maneuver check per day.

Test Pilot—To qualify as a test pilot, an aviator must have a Wisdom score of 11 or higher. The test pilot is immune to fear and always gets a free Reflex saving throw to bail out of their airplane before a crash.

Computech (Scholar Sub-Class)

The introduction of computers and the internet (in essence if not in name) to *GRIT & VIGOR* means the rise of a new kind of scholar, the computer technician, or computech. Computechs are maestros of the computer console, capable of writing and modifying existing programs, accessing secret databanks and introducing bugs to enemy networks.

The computech has all the abilities of the scholar, with the following alterations and additions:

Minimum Ability Scores: Int 9

Computechs are skilled at the following tasks: Appraise Value*, Crack Code, Display Knowledge*, Electronics, Mechanics and Use Computer, plus two additional skills of the player's choice.

Computechs are as skilled at research as other scholars, but only when researching information on data banks. A computech's "major" is always in the area of computer hardware, software and networks. They do all of their research on computers.

A computech can improvise like other scholars, but they have no ability to improvise with chemicals, only

United States Space Force

Established in 1985 to coordinate the space activities and assets of the United States military, Space Force often works in cooperation with NASA and allied space agencies. As a member of the Space Force, you undertake missions to further the scientific and security interests of the U.S. and its allies. If you're lucky, you might even get to participate in the first Mars landing!

The Space Force is a branch of the U.S. military, like the Navy or Air Force. All U.S. military space assets, including its bases on the Moon, are under its command.

Space Force dress uniforms are grey, as are the jumpsuits worn on missions. Rank structure is the same as in the U.S. Air Force, except that the airman rank is replaced with the rank of spaceman.

Most starting characters begin as Spacemen (E-2) if enlisted or First Lieutenants (O-2) if officers. The officer player character with the highest total ability scores begins as a Captain (O-3). On missions, the highest ranked officer is in command.

When a character advances in level, they have their level's chance in 6 of also advancing in rank (maximum 5 in 6 chance). Thus, a 2nd level character has a 2 in 6 chance of advancing in rank.

electronics and mechanical devices. They can get maximum performance only from computers.

While any character with the Use Computer skill can run existing programs or access non-restricted data banks on computers, computechs are capable of four additional computer operations:

1) They can defeat computer security systems to access restricted data banks and systems

2) They can access the "under-net", the illegal internet used by criminals and spies

3) They can write and execute new programs – treat these like inventions in terms of their plausibility

4) They can tie into computers from various devices and transmit command codes to them

Transmitting command codes – essentially, taking control over other computers – applies a modifier to their Use Computer task check based on the device they are using to transmit the command codes

Computer Type	Modifier
Smart phone	-3
Tablet	-1
Microcomputer, Laptop	0
Minicomputer	+1
Mid-size	+3
Mainframe	+5
Supercomputer	+7

Engineer (Scholar Sub-Class)

The Scholar class is a perfect fit for the engineers that keep the *High Frontier* moving, and needs only one modification. In place of the invention ability, which is more designed for "mad scientist" types in fictional works, the engineer has the following ability:

Engineers can use their shrewd minds to make repairs and improve systems, but they can also turn their logical minds to solving non-mechanical problems. In essence, this works like the detective's ability to collect clues, with the engineer getting to pose one possible solution per three levels to the VM about a particular problem. The VM may answer with "less than 50% chance of success", "better than 50% chance of success" or "no chance of success".

Engineers can add +1 to their engineering-related task checks if they carry a slide rule, +2 if they have an electronic calculator and +3 if they have a larger computer console at hand.

Fighter

Fighters in *High Frontier* have three feats added to the list of those they can take at 2nd level: Jetman, Paratrooper, Zero-Gravity.

Feats

The following new feats are appropriate for a campaign set in the *High Frontier*.

Jetman: You gain a knack at piloting jetpacks and small, one-man VTOL aircraft.

Paratrooper: You gain a knack at sky diving.

Teams

Adventurers are organized into teams, serving under the auspices of Space Force or a similar organization. A team is a stable unit that is assigned to trouble-shoot whatever problems might need solving.

When assembling a team, make sure the members have a wide array of skills and abilities. A good action team for a *High Frontier* campaign should have some capacity at aviation and space travel, science, engineering, espionage and combat.

Requisitioning Equipment

If characters are private citizens they must break out their wallet and purchase equipment using their own money. Often, though, a *High Frontier* campaign revolves around employees of a government – special agents, astronauts, members of the military – engaged on missions for their government. In these cases, the characters can requisition equipment (in addition to purchasing items themselves).

Characters can requisition personal equipment, weapons and ammunition for a mission worth up to $100 per character level. This is usually pooled together among all the characters in the party. Requisitioning vehicles is handled differently.

The party nominates the top two vehicles in each "role" their mission requires that they would like to use. The Venture Master then nominates a third vehi-

cle – usually less expensive or less advanced – that could conceivably work as well.

The vehicles the players and VM can nominate are limited by the characters' employer and possibly by the location of the adventure. Soviet characters, for example, would be limited to equipment used by the Soviet Union. U.S. characters would likewise be limited to equipment in the United States' arsenal. Characters on a mission for N.A.T.O., on the other hand, should be able to choose equipment owned and operated by any of the members of N.A.T.O.

Once the three vehicles are chosen and ranked by the VM in order of desirability, the most charismatic member of the party rolls 1d20 + their Charisma bonus + their level. If this number is higher than 18, they get the top vehicle on their list. If the number is between 14 and 17, they the second most desired vehicle on their list. If the roll is lower than 14, they get the least desirable item on their list.

Example: A team is undertaking a mission in Tokyo to retrieve stolen plans for a forthcoming Moon mission. To do this they need a car, and obviously they would prefer a very cool car. The adventure is set in Tokyo, so that limits their choices to Japanese cars. The players nominate their two favorite vehicles, the Mitsubishi ESR and Toyota 4500GT. The VM nominates the more affordable generic. The most charismatic character has a Charisma bonus of +2 and she is 5th level. She rolls an 8. Adding +7 to the roll (+2 for Charisma, +5 for level), she gets a total of 15 and thus is able to requisition the #2 car on their list, the Mitsubishi ESR.

Technology

The timeline of inventions and achievements on the next page is assumed in *High Frontier*. Most of the technology used in this setting is known to modern people, and understood by them. Computers and automobiles require more explanation.

Computers

Computers in *High Frontier* serve four primary functions: Calculation of complex mathematical problems (often to solve engineering and naviga-

1951	Office computer consoles
1952	Computer speech recognition, UK nuclear bomb
1953	Televised education begins
1954	Transistor radios, nuclear submarines
1955	Microwave ovens
1956	Hard data discs and in-car stereos
1957	Palm-sized mobile phones
1958	Modems, video games, *Project Thor* kinetic weapon
1959	Nuclear-powered cargo ships
1961	Minicomputer consoles, French nuclear bomb, nuclear aircraft carrier
1962	Space station *Mercury* (USA), Telstar satellite, USSR All-State Automated System (internet), USA graphic-user interface and computer mouse, Supercomputers
1963	USA Galactic Network (i.e. internet)
1964	Videophones, robot vacuum cleaners, Chinese nuclear bomb
1965	Geodesic dome cities, U.S. ballistic missile defense laser
1969	USA lands on Moon, invents spaceplanes, Video cassettes and video discs, Maglev trains (Japan)
1970	Project Horizon (U.S. Army Moon base), Prefab plastic houses, mini-computer consoles for the home
1971	Dome city constructed in Antarctica
1972	Project Lunex (USAF Moon base), Microcomputers, Digital watches, Cable TV, Swedish nuclear bomb
1973	USA space shuttle, China's first manned space launch, Laptop computers, UAV's
1974	Indian nuclear bomb
1975	People movers, digital cameras
1977	USA science base in Sea of Tranquility, MassDriver 1 test
1978	USSR's first moon landing
1979	Digital music player, Israeli and South African nuclear bombs
1980	Chinese high-power anti-missile laser *Divine Light*
1981	USA solar-power generating satellite, Channel Tunnel completed
1982	USSR *LEK Lunar Expeditionary Complex*, touchscreens
1985	US Space Force established
1989	USSR space shuttle
1991	Digital books
1993	Tablet computers, internet talk radio
1994	First maglev space-launch system
1996	USSR Zvezda Moon base, smart phones
1998	Space colony *Atlantis*, Pakistani nuclear bomb

tion problems), access to information from data-banks, transmission of information to databanks or directly to other users, and physical (in the form of computer locks) and digital security. Most people in *High Frontier* can use computers just as you and I do in the modern era.

Most computers take the form of consoles, or micro-computers, which arrived on the scene in the early 1970's. Laptop computers were invented soon after, and tablet computers came along in the early 1990's. Larger minicomputers are still used by the government and other large institutions.

Computer consoles combine computer, keyboard and monitor into a single unit. These computers are always hooked into one of the major computer networks – The Galactic Network in the United States, the All-State Automated System in the USSR and other national networks elsewhere. Most databanks these networks use are controlled by local, state and national governments or by one of a few commercial interests in the United States. Think of these commercial networks as being analogous to the "big three" television networks that existed in the United States from the 1940's to the 1980's.

Access to computer networks is restricted and tracked. Most people have a unique I.D. and password supplied by the authorities – essentially an operators' license. Naturally, the criminal element makes sure they have fake identities to access information, especially on the secret databanks that allow communication beyond the reach of the authorities.

There are two operations most characters can perform with a Use Computer task check:

1) Access Information—accessing information from a local databank (i.e. gathering information that would be available in a modest local library or from local government) requires about 1d6 minutes and does not require any special rolls of the dice. Getting information from state, national or international networks takes longer – 1d6 x 5 minutes for state databanks, 1d6 x 10 minutes for national and 1d6 x 15 minutes for databanks located outside a person's home country. The VM determines where sought after information is located on the network.

2) Formulate Solution—using a computer to formulate mathematical solutions to complex problems; if successful, it provides a +3 bonus to engineering, navigation and science-related task checks.

Automobiles

Cars in *High Frontier* differ from the actual vehicles that existed from 1950 to 2000 in a few ways:

In the 1950s, when the United States was working on its national highway system, the decision was made to incorporate wires in the asphalt that would allow vehicles to practically drive themselves. This allows drivers to cruise along the highways at a fast clip without steering or controlling their speed. Relay stations located every 100 miles along the highway keep vehicles running relatively smoothly.

Electric vehicles started selling in high numbers in the 1960s. Assume that all of the cars in the Vehicle section at the end of the book can be purchased in gasoline or electric versions. The electric versions have less range, but otherwise work the same. Since we don't get into range in this game – cars in *GRIT & VIGOR* are for chases and other dramatic nonsense – don't worry too much about electric vs. gasoline.

Most cars in *High Frontier* are either very rounded (i.e. the bubble-style) or very angular.

By the 1960's, most cars are equipped with on-board computers that can connect with the "internet" of whatever country they are in. This allows maps to be called up automatically, with GPS (i.e. mapping and navigation) systems following by the 1970's. Anti-lock brakes were standard by the 1960's.

The 1970's saw the introduction of compact discs as standard equipment in cars and digital music played through the onboard computer by the early 1980's.

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Life on Earth

In the year 2000, life on Earth is the way our elders imagined it would be. Let's take for example the Jones family. Roger Jones is an architect, his wife Sandy Jones is an engineer who primarily works for the space program. Roger and Sandy have one child, a son, named Jimmy. Families in the retrofuture tend to be smaller than in the past.

In the morning, when the Joneses roll out of bed, a wall-mounted video screen turns on automatically and displays the latest weather reports and news headlines. While Sandy showers, Roger heads to the kitchen and dials up the daily newspaper, which prints from a fax machine installed on the wall by the local news publisher. Breakfast might be the traditional re-hydrated fare, or it might take the form of food capsules or dried food bars.

While Roger reads the paper, Sandy finishes getting ready for work and wakes Jimmy. Roger will get Jimmy started on school, which is done most days via the family's video station, a computer console that permits them access to the central computer banks in their town or state or nation, depending on their clearance. Roger usually works from home on a larger console, with a video phone set-up that permits him to attend meetings all over the world.

Sandy usually works in an office in the city. She might get there in the family's electric automated car, stopping at a monorail station to take the monorail into the city proper. Cities in the future are more open than in the 1950s, with less congestion due to wide roads, automated vehicles controlled by the central traffic computer and numerous forms of very rapid transit. The buildings are tall and broad. They are clad in glass to let the sunshine in and most have rooftop helipads. Buildings are separated by green zones.

With factories powered by atomic energy and electric cars, smog and pollution are largely a thing of the past. Factories are staffed by robots and human maintenance engineers, and most freight is hauled by robot trucks, trains and ships.

On this particular day, Sandy must attend a meeting in person in London. She hops on a monorail to the municipal airport and glides to her departure gate on a moving sidewalk. In no time at all she and dozens of other passengers are on board a large supersonic jet which makes its trip to London in a few hours. Once there, she nails down some design issues with the Royal Air Force for their new spaceplane design and by that evening is back home to tuck Jimmy into bed and play a story on the video screen.

Transportation

Transportation throughout the developed world is highly centralized in transportation hubs, which combine air, rail, road and sea travel into single massive campuses of giant buildings. Transportation hubs are rated as follows:

Class A Hubs

Class A hubs are located in the world's largest cities and combine sea port facilities with all other forms of travel. Most have their sea port facilities connected to the air/road/rail (ARR) hub via a high-speed tram, as the sea port facilities also have commercial and industrial users and need space for warehousing. The ARR hubs are usually laid out in a series of circular buildings, with some serving as gates for jetliners that require a runway, especially the large supersonic jetliners but also small regional craft, others serving

VTOL aircraft for more local air transport, and still others providing access to mag-lev, regional and local rail and road transit. Most rail and road transit begins underground, to make room for runways, with the trains and buses then emerging a mile to two away from the ARR hub into the open air.

Class B Hubs

Class B hubs are much like Class A hubs, but they lack sea port facilities. They are still located in large inland metropolitan centers, such as St. Louis and Denver in the United States. These hubs also provide connections from the continental mag-level trains to the more traditional trains that link Class B with Class C hubs. Many Class B hubs have access to rivers, and thus have hovercraft facilities. The Mississippi River in the *High Frontier* setting is plied by numerous hovercrafts that carry the names and gambling halls of the riverboats of yore.

Class C Hubs

C hubs are located in smaller regional centers. They lack facilities for supersonic jets, but provide access to regional jetliners and airliners, VTOL aircraft, traditional railways and bus lines and sometimes river travel and coastal shipping. Class C hubs are guarded by 1d6 security guards without body armor and armed with revolvers and truncheons.

Class D Hubs

D hubs are located within large cities, even cities that have Class A or B hubs. They are designed for metropolitan travel, and therefore lack runways, but provide access to municipal monorail and automated bus lines and V.T.O.L. aircraft. They are usually connected by monorail or subway to the larger hubs in the local area, and to smaller suburban stations to facilitate travel into the city center by suburbanites.

It is through Class D hubs that most citizens commute to work, so they incorporate dining facilities, small hotels, convenience stores, post offices and the like.

Class E Hubs

Airport and rail facilities in small towns are classed as 'E' hubs. They rarely integrate more than one form of travel into a single complex.

Chuck Yeager

Charles Elwood Yeager gained fame as the first pilot to have exceeded the speed of sound in level flight in the Bell X-1. During World War II and the Korean War he became a flying ace. After the Korean War, he became a test pilot, and then later went back to work as a squadron commander in the Vietnam War.

N Aviator LVL 8

S11 I12 W16 D16 Cn13 Ch11

HP 40 AC 12 MV 30 ATK +5 SV F8 R7 W9

SP—Fearless, boost ability score, delay damage, maximize performance (aircraft), coax speed +10% (aircraft)

KN—Climb Sheer Surfaces, Mechanics

SK—Appraise Value (aircraft), Bomb Target, Mechanics, Pilot Aircraft, Search

FT—Ace Shot, Point Blank Shot, Precise Shot

Class X Hubs

Class X hubs are the rarest of all, for they provide spaceplane facilities for civilian astronauts, as well as launch facilities for commercial satellites. Class X hubs are usually connected to Class A, B, C and D hubs via rail and VTOL aircraft facilities.

Civilian astronauts must have licenses issued by national governments to allow them to travel into space. They must meet certain health requirements (a Constitution score of 11 or higher is usually required, with those of a more feeble constitution requiring special permits related to high value work in space) and they receive basic training on space travel. Such a license costs in the neighborhood of $15,000 and takes a month to earn. Most people with such licenses are either independently wealthy or connected with a business or institution that can pay for their license and requires it for their job.

Geopolitics

Because the point of *High Frontier* is to play adventure games, and not waste copious amounts of time and effort on learning an imaginary history, the political future of High Frontier is not terribly different from our own with two key exceptions.

Atomic Energy

The first is technological. In *High Frontier*, nuclear power plants reign supreme. The dream in the 1950s of the peaceful use of atomic energy is reality in *High Frontier*. All large and mid-sized communities have one or several nuclear power plants or hydroelectric dams serving their energy needs in developed countries. Some less-developed countries still rely on coal and oil-fueled power plants.

Because of nuclear energy and electric vehicles, demand for fossil fuels is much lower in *High Frontier*, and this has made oil-driven economies less prosperous than they otherwise would be. This has had a big impact on the geopolitics of the *High Frontier*.

The relative lack of oil prosperity made Arab nationalist movements stronger. As a result, the United Arab Republic was established in 1963 and originally included Egypt, Syria and Iraq. The union was joined by Yemen in 1964, Libya in 1971 and Jordan in 1972. Each state holds great autonomy within the union, with its own head of state, but there is a unified military command structure and parliament, and a rotating presidency and vice presidency occupied by the different heads of state.

Nations with large uranium reserves are having a bonanza in the *High Frontier*. At the top of this list are Australia, the Soviet Union, Canada, South Africa, Niger, Brazil, China and Grenada.

The Soviet Union

High Frontier is based on the predictions of the 1950s. Most futurists in those days, Robert Heinlein being a notable exception, thought that communism would not only last, but might well outlast free markets. After all, an economy that was planned by experts had to be more productive than the chaotic, greedy mess offered by free market economies. For engineers and academics, the notion of "rule by experts" had to seem like the best course, and the U.S.A. saw a great deal more centralization by government and industry in the period.

In the end, though, free markets proved to be the more productive. By the 1980s, this lesson was being noted in the Soviet Union. Soviet Premier Mikhail Gorbachev took a stab at liberalizing the Soviet economy with his policies of *glasnost* ("openness") and *perestroika* ("restructuring"). This was a bold move for a centralized, military government, and ultimately proved too much for their government to take. In short order, the Soviet Union was gone.

Not long after, the communist Chinese did essentially the same thing with much different results. China is now a much more productive economy than it used to be, and the communist party is still in power.

But what if *glasnost* and *perestroika* had produced their desired results, but left the communists in power and the Soviet Union intact? In *High Frontier*, this is what happened. Gorbachev remained in power as the president of the Soviet Union until 1999 when he was succeeded by Vladimir Putin.

Powers and Emerging Powers

Nation	Population
Argentina	37,000,000
Brazil	170,000,000
China	1,242,000,000
Comecon*	188,000,000
European Community	431,000,000
France	59,000,000
Germany (BRD)	82,000,000
Italy	57,000,000
Spain	41,000,000
United Kingdom	59,000,000
India	1,030,000,000
Iran	65,000,000
Israel	6,000,000
Japan	127,000,000
Korea, North	22,000,000
Korea, South	47,000,000
Pakistan	145,000,000
South Africa	45,000,000
United Arab Republic	128,000,000
United States of America	281,000,000
Union of Soviet Socialist Republics	287,000,000

* Includes members of the former Warsaw Pact, Cuba, Vietnam and Mongolia

Otherwise, most of the events that occurred in the real timeline occurred in *High Frontier*, perhaps with minor differences. There was still war in Korea and Vietnam. The presidents, premiers and prime ministers are the same as in the real world with minor differences. You do not need to learn a long, alternate history to play games in the *High Frontier* setting, just remember that in the year 2000 there are many more nuclear power plants and the U.S.S.R. still exists.

Adventures on Earth

The Boys from Buenos Aires

Escaped Nazis in Argentina are planning to launch a modified and improved V-2 rocket with a nuclear warhead at Washington D.C., Moscow or another major capital (or maybe even a lunar target). A multi-millionaire is financing the project and has a private army and small air force equipped with German wonder weapons. The adventurers must penetrate his mountain fastness and destroy the missile before it can be fueled and launched.

Close, But No Cigar

Adventurers are participating in a launch to orbit, but there is a malfunction that results in their capsule landing in hostile territory. They must find their way back to friendly territory after first destroying their capsule to keep its secrets out of enemy hands.

Murder on the Mag-Lev Express

The *New Orient Express* is a mag-lev train that travels from London to Venice at over 300 miles per hour, making the trip in only 3 hours (as opposed to the 19 hour trip required in the real world). Once it has left the station, it does not stop and it is impossible to get on or off. What a swell place for a murder mystery, but one that must be investigated quickly.

One of Our Drones Is Missing

A spy drone has been shot down or otherwise crashed in enemy territory. The place probably depends on the time period in which the adventure is set and the national origin of the characters. The drone should have been gathering intelligence that is time critical – the adventurers need to get into enemy territory, find the drone before the enemy, and get the intelligence back out to avert disaster.

The Railgun Rally

In the future, continental road rallies aren't compared to old-fashioned cannonballs, but rather to super futuristic railguns! In this adventure, the players break into two-person teams, pick out cars from the vehicle section, and then cut loose in a road race from coast to coast. The Venture Master can combine random table and set encounters in cities across the USA for the players to encounter on their race. The player and non-player teams should roll dice to see in what order they choose their vehicles, because no vehicle can be chosen twice. Because the *High Frontier*'s highway system is strictly monitored, computechs will be just as necessary to get from coast to coast as drivers.

3

Life in Orbit

In the *High Frontier*, man's wanderings are no longer restricted to planet Earth. Beyond the atmosphere, mankind travels around his home world in space-ships, space stations and even a space colony. Earth orbit is not only a destination, but also a launch point for exploration of Earth's only satellite, the Moon.

Getting into Orbit

A launch into orbit from Earth is hard on the body, though over the years many people not astronauts by trade have made the trip with basic training.

The force of gravity is measured in "g's". Human beings are capable of surviving 3 to 6 g's. To simulate this in game, characters experiencing a liftoff from the Earth must pass a Fortitude saving throw. If they fail, they suffer the following effects based on the g-force they experience:

G	Effect
3g	Blindness for one minute
4g	Unconsciousness for 1d6 minutes
5g	Unconsciousness for 2d6 minutes, possible medical emergency
6g	Unconsciousness for 3d6 minutes, possible medical emergency

If a character fails their saving throw vs. liftoff by rolling a "1", they suffer a medical emergency. A medical emergency inflicts 1d6 points of damage per round until the victim is stabilized with a Treat Injury task.

Characters must undergo a 24 month training regimen to qualify as astronauts or cosmonauts. With 3 months of basic training, a character can apply a +2 bonus to their saving throw vs. liftoff. Wearing a G-suit applies an additional +2 bonus to this save.

Zero-Gravity

Life in a zero-gravity environment takes some getting used to for characters who are not astronauts or cos-monauts. One must re-learn how to move around and perform simple tasks, and they must learn to cope with the sensation of zero-gravity and its effects on the human body.

The first time a character experiences zero-gravity, they must pass a Fortitude saving throw or be sickened for 1d6 rounds and then fatigued for 1d6 turns.

Characters without astronaut training initially suffer a -5 penalty to all task checks and attack rolls while in a zero-gravity environment. This penalty is reduced as they become more used to their surroundings. The following table uses their cumulative time in zero-gravity to determine the penalty they suffer:

Time in Zero-Gravity	Penalty
None	-5
One hour	-4
One day	-3
One week	-2
One month	-1

Zero-Gravity Movement

Movement in zero gravity is difficult without training. In order to get from one place to another, a character must launch themselves – in essence, they must make

Yuri Gagarin

Yuri Alekseyevich Gagarin was the first human being to journey into outer space. Originally a pilot in the Soviet air force, he entered the Soviet space program in 1959. He only made one foray into space, as the Soviet government feared the bad publicity that would come from his being killed on a space mission.

N Aviator/Cosmonaut LVL 6/5

S13 I13 W15 D14 Cn13 Ch10

HP 30 AC 11 MV 35 ATK +3 SV F7 R9 W11

SP—Fearless, boost ability score, delay damage, maximize performance (aircraft), coax speed +10% (aircraft, spacecraft), operate in zero-gravity

KN—Athletics, Mechanics

SK—Aviator (Appraise Value (aircraft), Bomb Target, Mechanics, Pilot Aircraft, Search), Cosmonaut (Acrobatics, Chemistry, Display Knowledge, Electronics, Endure, Jump, Mechanics, Pilot Aircraft, Treat Injury)

FT—Diehard, Fast, Great Fortitude

a ranged attack with themselves, using just enough pressure not to hurt themselves or others.

This "ranged attack" suffers the penalties shown on the table above. A failed attack means the person misses their target location by five feet (roll randomly to find if they miss to the left, right, up to down). An attack roll of "1" means that the characters bumps into something solid and suffers 1 point of damage. This damage cannot kill the character, but can knock them unconscious for one minute.

After one week in space, the character need no longer make ranged attack rolls to move.

Zero-Gravity Combat

Ranged combat in zero-gravity can be conducted as normal ranged combat. Melee combat is trickier.

A successful melee attack against a body in zero-gravity has the effect of moving each body backwards from the point of contact by one foot for every point of damage inflicted unless a person is anchored to something or wears magnetic boots. If this movement pushes a person into a physical object, they suffer 1 point of damage from the impact. Trained astronauts and cosmonauts move one foot per two points of

damage inflicted, and do not suffer damage if they make contact with a physical object.

Trained zero-gravity combatants prefer to grapple in combat, so as not to lose contact with their enemy.

Effects of Zero-Gravity

For every week a character spends in zero-gravity, they must pass a Fortitude saving throw or suffer either one point of Constitution damage, or one point of Strength damage (flip a coin to determine which). Two hours of resistance exercise per day grants a +2 bonus to saving throws made on a weekly basis.

For every month a character spends in zero-gravity, they must pass a Fortitude saving throw or suffer either one point of Intelligence, or one point of Wisdom damage (flip a coin to determine which).

This ability damage cannot be healed while a character is still in zero-gravity.

Launching into Space

High Frontier divides space into Orbital Zones (OZ, or O-zone) based on their distance from the Earth, and therefore the speed needed to maintain one's position in the orbital zone.

Orbit	Distance (mi)	Orbit Period (min.)	Time to Reach	Fuel Units	Mod.
LEO I	120	88	10 min.	1	+5
LEO II*	240	92	12 min.	2	+4
LEO III	620	105	15 min.	5	+3
LEO IV	1,060	120	20 min.	10	+2
MEO I	4,120	326	30 min.	20	+1
MEO II	10,500	600	35 min.	50	-
MEO III**	12,600	720	40 min.	60	-
MEO IV	18,100	1,110	45 min.	80	-1
HEO I***	22,200	1,436	50 min.	100	-2
HEO II	27,300	1,870	1 hour	120	-3
HEO III	48,600	4,080	3 hours	200	-4
HEO IV	92,100	10,084	6 hours	400	-5
LT	238,900	40,520	4 days	750	-10
MT	34,797,000		266 days		-15

* Normal orbit of space stations and satellites
** Semi-synchronous orbit (SSO)
*** Geo-synchronous orbit (GEO)

The table above shows the different OZs, noting whether they are in Low Earth Orbit (LEO), Middle Earth Orbit (MEO), High Earth Orbit (HEO) or beyond.

For each OZ, the average distance from earth, orbital velocity and orbital period is given, along with the number of fuel units necessary to achieve that orbit. LT stands for Lunar Transit, meaning traveling to and land on the Moon. MT stands for Martian Transit.

Survival in Space

The vacuum of space is deadly to human beings without special space suits. If a character is exposed to the vacuum of space without a space suit, they have one round in which to escape it without any damage. In round two, they suffer 10d6 points of damage as well as blindness when their eyes explode. In round three they die. If the character is brought back into normal air pressure before they die, they are deafened when their ear drums explode inward.

Space Agencies

There are six major space agencies on Earth, each with its own set of assets. While it is assumed that players will represent the U.S. Space Force or NASA, there is no reason they cannot be a member of a different agency, or use a different agency's assets.

European Space Agency (ESA)

The ESA is the European Community's primary space agency, supplanting several national space agencies when it was formed in 1975. ESA space men are officially called astronauts. The ESA operates a full suite of space assets, including the space station *Columbus*. The ESA is headquartered in Paris, France.

Heavy Rockets	Ariane 4, Ariane 5
Spaceplanes	Skylon, Raumtransport-9, Sänger II, Hermes
Space Stations	Columbus

Ministry of Aerospace Agency

The MAA is the government ministry responsible for space exploration in the People's Republic of China formed in 1956. Spacemen employed by the PRC are officially called *taikonauts*. The Ministry is mostly responsible for satellite launches, as they do not yet have heavy rockets, spaceplanes or space stations. The Ministry is headquartered in Beijing.

National Space Development Agency (NASDA)

The NASDA was established in 1969 to oversee Japanese efforts to explore and development space for peaceful purposes. It works with the Institute of Space and Astronautical Science (ISAS) and the National Aerospace Laboratory of Japan. Their spacemen are called astronauts.

Heavy Rockets	H-II
Spaceplanes	HOPE
Space Stations	-

NASA

The National Aeronautics and Space Administration was founded in 1958 to serve as a civilian agency for space exploration and science. It often works with the U.S. Space Force, which combines America's military space assets. NASA's spacemen are called astronauts.

Heavy Rockets	Saturn V, Sea Dragon
Spaceplanes	X-20 Dyna-Soar, X-23, X-24A/B, X-30, Space Shuttle, DC-3
Space Stations	Skylab (1 and 2), Freedom ISF

Space Launch Centers

UAR Sphere
Soviet Sphere
Western Sphere
Neutrals

Soviet Space Program

Officially the "Space program of the Union of Soviet Socialist Republics", the Soviet space program began operations in the 1930's and was responsible for many milestones in space exploration. Soviet space-men are officially called cosmonauts. The Soviets maintain several satellites and two bases on the Moon, and are in a heated competition with the USA to make the first manned landing on Mars.

Heavy Rockets	Energia, NI-L3, Proton, Proton K, Soyuz, Zenit
Spaceplanes	MiG-155, Buran, MAKS
Space Stations	Cosmos 557, DOS-2, Salyut 1 to 7, Mir and Mir 2, OPSEK

Spaceports and Cosmodromes

Earth has many operational space launch centers and cosmodromes from which launches into low Earth orbit (LEO) or beyond can take place. Space launch centers are either military or commercial.

Name	Class	Weight Limit
1 Pacific Spaceport	A	95 tons
2 Vandenberg SFB	A	810 tons
3 Edwards SFB	B	105 tons
4 Mojave Air & Space Port	B	1 ton
5 White Sands Harbor	B	105 tons
6 Mid-Atlantic Spaceport	A	100 tons
7 Kennedy Space Center	C	3310 tons
Cape Canaveral AFS	C	1035 tons
8 Guiana Space Centre	A	520 tons
9 CIEES	A	20 tons
10 Shaba North	A	2 tons
11 Broglio Space Centre	A	22 tons
12 Plesetsk Cosmodrome	A	310 tons
13 Kapustin Yar	A	85 tons
14 Yasny Cosmodrome	A	235 tons
15 Baikonur Cosmodrome	C	2645 tons
16 Svobodny Cosmodrome	A	50 tons
17 Jiuquan SLC	C	510 tons
18 Taiyuan SLC	A	275 tons
19 Musudan-ri	A	33 tons
20 Tanegashima SC	A	490 tons
Uchinoura Space Center	A	153 tons
21 Xichang SLC	A	505 tons
22 Satish Dhawan	A	440 tons
23 Vikram Sarabhai	A	325 tons

* Classes are as follows: A) Satellite launches; B) As A, plus manned horizontal landings; C) As A and B, plus manned vertical launches

Space Stations

Most space stations are relatively small tubes equipped with jets to keep their orbit from decaying. They usually house anywhere from three to twelve people and are dedicated either to defense or science. Each space-faring nation has numerous space stations orbiting the planet – too numerous to name here.

The largest space station in orbit, aside from the recently completed L5 space colony, is the one designed by Werner von Braun and constructed by the United States in 1962. Designated Space Station *Mercury*, it is operated by the U.S. Space Force as an orbiting space force base, but has extensive scientific facilities for use by NASA and allied space programs.

Mercury looks something like a wagon wheel 200 feet in diameter. It is powered by a nuclear reactor, which keeps it rotating at 3 rpm to maintain artificial gravity in the outer wheel, where its 50 resident crew live and work. This outer tube is composed of ten sections. Each section is attached to the others, but can be sealed from them in the event that one section's outer hull is pierced. Two sections, 1 and 6, have access to the "spokes" of the wheel that lead to the center, where the nuclear reactor is kept.

Mercury has the following sections:

1   Command and communications
2   Weather observation
3   Military observation
4   Emergency medicine
5   Astronomy lab
6   Computer banks
7   Maintenance
8   Air conditioning
9   Living quarters
10   Botanical and zoological laboratories

Space Colonies

Both the Earth-Moon system and the Earth-Sun system have five equilibrium points in their orbits called Lagrangian points, named in honor of Joseph-Louis Lagrange. Each of these equilibrium points permits an object to orbit a larger body with little or no station keeping, meaning a major reduction in the energy needed to maintain large objects in orbit.

L1 is an excellent location for monitoring the nearside of the Moon and maintaining communications between that side of the Moon and Earth, as well as serving as a way station for Earth travelers heading to the Moon. L2, shielded from Earth by the Moon, is excellent for use by radio telescopes.

Travel between L1 and L2 and the Lunar surface could take anywhere from a few hours to a day. Neither of these points is completely stable, and thus both require some station-keeping.

L4 and L5 require no station-keeping, and they require less energy for ingress and egress than the Moon because they lack that body's gravity. It is for this reason that both have been selected to host space colonies constructed by the United States and its Western allies. The first space colony, *Atlantis*, was completed in the late 1990's.

Atlantis actually orbits its Lagrangian point, L5, at a distance of 90,000 miles. It is built in a similar configuration as *Freedom*, but is much larger. Atlantis consists of 10 million tons of mass, most of that mass coming from radiation shielding in the form of almost six feet thick of lunar soil. The outer ring is 1.11 miles in diameter and rotates once each minute to provide artificial gravity. The colony has a circumference of 3.48 miles. The outer habitation ring has a diameter of 430 feet. The outer ring is connected to the hub via six spokes, each 49 feet in diameter. Gravity decreases the closer one gets to the hub. A zero-gravity module is attached to the hub to permit special industry. Power is provided by a nuclear reactor.

Atlantis can house 10,000 people, with a population density about the same as a modern American suburb. Part of the outer ring is residential, and part is agricultural. There are facilities for school, recreation and security. People get around on foot, using people movers, and with small electric vehicles.

With the success of Space Colony *Atlantis*, a much larger space colony designed to house up to 140,000 people, is planned for the L4 point.

Adventures

The Asteroid

An asteroid will soon approach close to Earth, and the adventurers must launch a mission to rendezvous with it. The mission may be to alter the asteroid's course, destroy it or simply explore it. In any event, the asteroid should prove to be more than it seems.

Marooned

A space capsule has suffered a fault. The adventurers must launch into orbit, rendezvous with the disabled craft and either repair it or rescue the crew. You can add a complication to the plot in the form of very sensitive or valuable information on the capsule that other nations might wish to seize or an uncooperative occupant, maybe even a spy.

Space for Spacers

With Space Colony *Atlantis* in operation, a faction of scientists and technocrats in the colony has plans to not only declare their independence, but their domination of Earth. Utilizing the high technology of the station and their own scientific genius, they have constructed a super weapon that will allow them to devastate any nation that opposes them. The PC's must journey to the station and work to uncover the people behind the plot, stopping it before it can even begin.

Sun of a Gun

A small town is mysteriously burned to a crisp. Characters investigate and discover that a space station equipped with a giant lens and believed by all to be an orbiting telescope is actually a "sun gun" as envisioned by German scientists during the Second World War. Who was really behind its construction, what do they want, and how are they to be stopped?

Terror at 20,000 Feet

Islamist elements within the government of the United Arab Republic have been given access to the Soviet Space Program as a gesture of good will. They have concocted a plan to send two Soviet space stations, *Mir* and *Mir 2*, crashing into Moscow and Washington D.C. The adventurers must launch into space with KGB operatives to overpower the terrorist agents on those space stations, rescue the crews (if possible) and, if necessary, destroy the space stations before they can be used as the ultimate terrorist weapon.

U.F.O.

A rocket or spaceplane returning to Earth from orbit detects a small object moving around space that should not be there. The Space Force sends up a spacecraft to investigate. As it approaches the U.F.O., the rocket explodes. What could be doing this? Sounds like a job for the adventurers. Hopefully, it won't be their last.

Lagrange Points

4

Life on the Moon

Long has mankind looked up at the Moon and wondered what they might find there. In the age of the *High Frontier*, they know.

The Moon is a barren hunk of rock and dust orbiting Earth. It is marked by lava plains and craters.

Decorating the Moon's lava plains are large mountains created by meteor impacts. The tallest of these mountains is 3.4 miles tall, roughly the same size as Mount St. Elias on the border of Alaska and Canada. The lava plains are punctured by holes where lava probably drained into sub-lunar caverns.

The Moon's craters can be very large, since there is no wind or rain to erode them, as on Earth. The 25-mile wide Aristarchus Crater is the largest; the view from the rim dwarfs the Grand Canyon.

A day on the Moon is 28 Earth days long.

In the *High Frontier* the United States made it to the Moon in 1965 with the U.S. Army's Project Horizon. This was followed two years later with the construction of Horizon Base on the "shores" of *Mare Imbrium*.

Buzz Aldrin

Edwin Eugene Aldrin Jr. was a fighter pilot, astronaut and engineer, famous for making three spacewalks as pilot of the *Gemini 12* mission, and as the lunar module pilot on the *Apollo 11* mission. He and Neil Armstrong were the first humans to land on the Moon.

N Aviator/Astronaut LVL 7/6

S11 I14 W13 D13 Cn13 Ch11

HP 35 AC 10 MV 30 ATK +4 SV F7 R9 W11

SP—Fearless, boost ability score, delay damage, maximize performance (aircraft), coax speed +10% (aircraft, spacecraft), operate in zero-gravity

KN—Great Fortitude, Mechanics, Survive Outdoors

SK—Aviator (Appraise Value (aircraft), Bomb Target, Mechanics, Pilot Aircraft, Search), Cosmonaut (Acrobatics, Chemistry, Display Knowledge, Electronics, Endure, Jump, Mechanics, Pilot Aircraft, Treat Injury)

FT—Ace Shot, Point Blank Shot, Precise Shot

The USAF got in on the act in 1972, constructing the Lunex base near Copernicus Crater. This base houses 21 airmen (or spacemen), who use it to monitor missile activity on Earth (and some say UFO activity). Both U.S. moon bases are now controlled by the U.S. Space Force.

The Soviet moon mission finally got off the ground in the 1970's with the completion of their lunar base Zvezda in 1974. Zvezda was located to the west of Mare Imbrium and is garrisoned by 12 cosmonauts.

The first civilian landing on the Moon took place in 1977 with a large scientific expedition and the construction of the DeNike-Zahn sub-surface lunar research station, now called Tranquility Station. This station is manned by 60 scientists and engineers working under the auspices of NASA.

As yet, war has not broken out on the Moon, but it remains a possibility with the Soviets and Americans in such close proximity.

Lunar Landings

While the first Moon landings in 1965 and 1967 were launched from Earth, subsequent landings originated

in space at space stations. All such launches involve lunar modules attached to disposable rockets.

These modules are small and cramped, designed for economy rather than comfort. They hold enough supplies for a short stay on the Moon and the return trip.

Landing on the Moon requires a pilot task check at a penalty of -5 to the roll.

Lunar Survival

The Moon offers many challenges to survival:

Air: The Moon has no breathable air. Characters caught on the surface without some sort of breathing apparatus begin to suffocate.

Food & Water: There is no life on the moon, and thus no source of food. Likewise, the Moon has no potable water outside of some ice in deep craters.

Gravity: Gravity on the Moon is 1/6 that of Earth, so reduce weight of all objects accordingly for purpose of encumbrance. Characters can jump and throw six times farther on the Moon.

Moonquakes: Although rare, quakes of up to 5.5 on the Richter scale can strike the Moon.

Radiation: Creatures without space suits on the Moon's surface are exposed to elevated levels of galactic cosmic rays (GCR).

Temperature: During the daytime, the Moon's surface is 253° F, inflicting 1d6 points of damage per round to exposed flesh. At night, the temperature drops to -387° F, dealing 6d6 points of damage per round to exposed flesh. At the poles it is always 32° F, dealing 1d6 points of damage.

Weather: The Moon's surface is struck by meteor particles that can be as large as golf balls, and particles pushed by solar flares.

Lunar Bases

Life in a lunar base is mostly work with only a small amount of time for recreation (and not much room in which to do it). The bases consist of one or two half-cylinders (pieces of the supply rockets that brought them there) located in deep crevasses to protect them from cosmic rays and meteorites.

Horizon Space Force Base

"The lunar outpost is required to develop and protect potential United States interests on the moon; to de-

velop techniques in moon-based surveillance of the earth and space, in communications relay, and in operations on the surface of the moon; to serve as a base for exploration of the moon, for further exploration into space and for military operations on the moon if required; and to support scientific investigations on the moon." - 1959 study by the U.S. Army

The Horizon lunar outpost is constructed from cylindrical metal tanks 10 feet in diameter and 20 feet long. It is powered by two nuclear reactors located in pits dug into the Lunar soil for radiation shielding. Empty cargo and propellant containers that were used in the construction of the station are used for storage space. The original construction camp was converted upon completion into laboratories for bioscience and physical science studies.

The outpost has a light-weight parabolic antenna for communication with Earth. Defense is provided by unguided Davy Crockett rockets with low-yield nuclear warheads and numerous Claymore mines modified to puncture pressure suits.

Construction involved two surface vehicles, one for lifting and excavation and the other for hauling, reconnaissance and rescue operations.

The outpost is designed for a crew of 12 astronauts.

Lunex Space Force Base

While the U.S. Army created Project Horizon, the U.S. Air Force created a more ambitious plan involving a reusable lunar lander, not unlike the space shuttle.

The primary goal of the plan was the Lunex AFB, an underground base for 21 astronauts. Now operated by the U.S. Space Force, Lunex continues with its operations of monitoring Earth for trouble and performing scientific experiments. Its design is similar to the Horizon Space Force Base.

Lunar Roving Vehicle (USA 1971)

Utility; SZ M HD 1 HP 4 AC 16 SP 165 M -2 ACC 20 CP 1/3 SP none

Barmingrad Base

Barmingrad is the Soviet moon base. It consists of nine habitation modules, each assigned a different use, including control, laboratory, medicine, dining,

storage and living quarters. Each module is 28 feet long and 11 feet in diameter. It is crewed by anywhere from nine to twelve cosmonauts.

The base was constructed using a 8-ton vehicle operated by four cosmonauts. The vehicle had drilling, excavation and hauling modules, and since the end of construction also has science modules. It is also equipped with a manipulator arm. Each module of the "moon train" has eight wheels.

Lunokhod II Moon Rover (USSR 1970)

Utility; SZ M HD 2 HP 7 AC 16 SP 155 M -2 ACC 20 CP 1/3

Lunar Adventures

Alien Artifact

Related perhaps to the Moon Crawl scenario (see below), an astronaut exploring a rock formation believes he has found an alien artifact consisting of glyphs engraved in the moon rock. The Americans have the artifact, but the Soviets want it, and are prepared to do whatever is necessary to get their hands on it. The race is on between the Americans and Soviets to get the sample back to Earth for testing and some Cold War-style publicity. Of course, if the artifact turns out to be a fake, planted by the other side, perhaps, or a third party, the publicity from falling for a hoax could be devastating!

Blackmail

A rogue astronaut or cosmonaut on the Moon has taken control of a satellite killer orbiting earth. This could be a low-level threat, like a satellite designed to destroy other satellites and orbiting vehicles, thus giving the rogue a way to blackmail the world by knocking out their communications network. It could also be a more dire threat, like a satellite equipped with nuclear missiles, a railgun or kinetic bombardment that could destroy targets on Earth (or a large chunk of the Earth with a barrage of nukes).

The adventurers must cut off the control, either by attempting to rendezvous with and disable the satellite, or at the source, by storming the moon base.

The Lunatic

In this scenario, the adventurers are stationed at a moon base and discover that one of their number (not necessarily a player character) has gone mad. The madness should have an outside source, perhaps some interesting artifact discovered on the moon or a plant or fungus being studied that has mutated due to exposure to cosmic rays.

Naturally, the lunatic is dangerous to others and must be rooted out and stopped. This scenario can be paired with the lunar blackmail scenario.

Moon Crawl

The Moon, despite having numerous human bases located on it and having had many satellite explorations of its surface, remains a largely unexplored body. The simplest though by no means least exciting adventure on the Moon is one of exploration. The adventurers begin at a moon base and explore the area around it. Naturally, they might find important resources, rival adventuring parties, wilderness dangers and maybe even signs of alien life.

You can keep this realistic or make it fantastic, introducing the alien Selenites predicted by Jules Verne in *The First Men in the Moon* (1901) or perhaps a hidden base of the Zeta Reticulans.

5

Life on Mars

In the year 2000, with the Moon explored and a permanent space colony in place, Mars is the prize – the next focus of competition between East and West.

Martian Landings

The key, of course, is a landing of human beings on the red planet, because Earth spaceships have been to Mars already. The earliest missions were attempted by the Soviets, but ended in launch failures. The Soviet Mars 1 craft succeeded at a flyby in 1962, but communications failed.

The first successful mission to Mars took place in 1964, with the Mariner 4 flyby of Mars by NASA. This was followed by Mariner 6 and Mariner 7.

The Soviets scored the first landing on Mars in 1971, with the Mars 3 lander. It transmitted the first partial image of the Martian surface, but contact with the lander was lost before the transmission completed.

The first orbiter of Mars was NASA's Mariner 9 in 1971. It orbited the planet for 516 days. The USA's first landing on Mars was by the Viking 1 lander in 1975, followed by Viking 2 the same year.

Manned missions to Mars will require optimal conditions to succeed. The optimal launch window opens every 780 days (or 26 months). The year 2000 offers a prime opportunity, as will 2002, 2004, etc.

Martian Survival

If you thought life on the Moon was tough, just wait until you land on Mars. The red planet offers many of the same challenges as the Moon, plus a couple more.

Air: Mars has an atmosphere, but no breathable air. Characters caught on the surface without some sort of breathing apparatus are poisoned, suffering 6d6 points of damage per round.

Communication: Messages take 15 minutes to travel between Earth and Mars.

Food & Water: There is no life on Mars, and thus no source of food. Mars may have water, but it is less common than in the driest deserts on Earth. It, like the planet's soil, is poisonous without special filtering.

Gravity: Gravity on Mars is 1/3 that of Earth, so reduce weight of all objects accordingly for purpose of encumbrance. Characters can jump and throw three times farther on Mars.

Radiation: Creatures without space suits on Mars' surface are exposed to elevated levels of galactic cosmic rays (GCR).

Temperature: Mars is colder than Earth. Temperatures range from -195° F in winter at the poles (3d6 points of damage per round) to 68° F in summer on the equator.

Weather: Mars is subject to periodic global dust storms. During these storms, visibility is reduced significantly and solar panels do not generate electricity.

Martian Adventures

The big Martian adventure is simply the first landing and exploration of the planet by human beings. Milestones of exploration are the creation of the first permanent manned base, the first exploration to the Olympus Mons and the Martian poles, etc.

Attempts at getting to Mars should involve a successful launch from Earth and multiple stages of piloting to reach Mars, ending in piloting checks to successfully enter orbit and finally land on the planet. The players attempting the landing do so with the full backing and support of their government, so they should be able to get all the supplies and equipment they need within the limits of their government. Their task is to decide what they need and in what quantities to successfully land, communicate and return to Earth.

6

Life Beyond

While the ultimate mission in *High Frontier* is a manned landing on Mars, the red planet is not the end of the adventure. There is no reason why adventurers cannot plot more ambitious missions, and more to the point, no reason why an error in navigation might not throw adventurers wildly off course. When adventurers move past Mars, they might discover that human beings are not alone in the universe. Of course, our distant neighbors might also visit us.

There are several tacks one might take with aliens in a *High Frontier* campaign. The key is to keep the extraterrestrials believable and mysterious. Aliens are meant as an unknown to explore rather than a commonplace occurrence in daily life. Communication, and more importantly trust, should be very difficult to obtain and be the subject of multiple encounters.

Invaders from Beyond

Several science-fiction stories have involved aliens coming to Earth and taking human shape. This could be for observation, survival after an unplanned landing on our planet or an invasion.

Invasion is the most likely way to run such a campaign, as it provides mystery, action and danger. It is also a good way to surprise the players, who might be expecting science-fiction without aliens.

Aliens in such a scheme are not necessarily any more powerful than human beings physically, though they are certainly more scientifically advanced. High technology and surprise should be their more potent weapons, although one may also give them strange mental powers or greater physical strength.

A few beings from ufology are described below.

Alpha Draconian (Reptilian Alien)

Type: Monstrous Humanoid
Size: Medium (4.6′ to 6.5′ tall)
Intelligence: Average (9-12)
Hit Dice: 2
Movement: 45/220 (Swim 25/150)
Armor Class: 13
Attacks: 2 claws (1d4) or by weapon
Saving Throws: F12, R12, W15
Environment: Any
No. Appearing: 1d10
Alignment: Lawful Evil
XP Value: 100 (CL 2)

The Reptilians are a species that resembles humanoid lizards. They are sometimes credited with the power of changing their shape; some conspiracy theories hold that many of Earth's political and social leaders are actually reptilians in disguise or are human beings controlled by the reptilians.

Alpha Draconians look like bipedal humanoids with scaled skin and the facial features of a lizard. They can

surprise their foes in areas for which they are camouflaged on a roll of 1-2 on 1d6. They are skilled at jumping, swimming and balancing, and they can hold their breath for up to 2 minutes.

The reptilian aliens come from Alpha Draconis. Conspiracy theorists place them in underground bases all over Earth; one could take this tack in *High Frontier*, or they could place an advance base for them on the Moon, allowing the adventurers to discover it and the Reptilian plot while exploring.

Pleiadean (Space Brother, Nordic Alien)

Type: Humanoid
Size: Medium (5.6′ to 6.6′ tall)
Intelligence: Average (9-12)
Hit Dice: 1+1
Movement: 40/200
Armor Class: 10
Attacks: Fists (1d6) or by weapon
Saving Throws: F12, R12, W15
Environment: Any
No. Appearing: 1d10
Alignment: Neutral Good
XP Value: 100 (CL 2)

The Space Brothers, who hail from worlds in the Pleiades star cluster and Orion, are also known as Nordic aliens. They are described as humanoid beings of great beauty and benevolence. They are known to have psionic powers, especially telepathic abilities.

Reports of the Space Brothers may be partially inspired by the movie *The Day the Earth Stood Still*, released in 1951. In this film, Klaatu brings a warning from the other inhabited planets of the Milky Way Galaxy that they are worried about the way human beings are playing with atomic weapons.

Abductees of the Space Brothers claim that they are benevolent people who come to help humanity. Their use in *High Frontier* might run along similar lines – observers who wish to guide humanity. They are opposed to the hostile grey and reptilian aliens.

Space Brothers can communicate telepathically. They might have other psychic abilities as well, as determined by the Venture Master.

Zeta Reticulan (Grey Alien)

Worker

Type: Monstrous Humanoid
Size: Small (4′ tall)
Intelligence: High (13-18)
Hit Dice: 1
Movement: 30/150
Armor Class: 10 [Silver]
Attacks: *Ego whip* (see psychic powers) or slam (1d2)
Saving Throws: F16, R13, W12
Environment: Any
No. Appearing: 1d20
Alignment: Neutral Evil
XP Value: 100 (CL 2)

Leader

Type: Monstrous Humanoid
Size: Medium (6′ tall)
Intelligence: Super (19+)
Hit Dice: 3
Movement: 40/200
Armor Class: 12 [Silver]
Attacks: *Ego whip*, *id insinuation* or *psychic crush* or slam (1d2)
Saving Throws: F14, R12, W9
Environment: Any
No. Appearing: 1d4 + 15 workers each
Alignment: Neutral Evil
XP Value: 300 (CL 4)

Although typically referred to as Zeta Reticulans, the grey aliens also come from Rigel and Barnard's Star. All greys have thin arms and legs, oversized heads and eyes, and extremely long fingers. Their purpose in visiting Earth is to extract genetic material for use in creating hybrids of humans and greys in an attempt to save their dying civilization.

Because of their long association with conspiracy theories, and thus a sort of science-fiction removed from "space opera" and its myriad alien races, the greys are an excellent alien for the *High Frontier,* either as friends or foes.

Zeta Reticulan technology is far more advanced than human technology; one can substitute the psychic powers in *GRIT & VIGOR* for their technology or come up with specific devices that might come into the pos-

session of Earth people, maybe with devastating or dangerous results.

Greys have a psychic aura which forces those who approach within 10′ of them to pass a Will saving throw vs. fear or become frightened. It is believed that greys are not evil, but merely alien in motivation. Individuals that have claimed to meet the greys have wildly different stories to tell about them.

Greys travel in flying saucers. For every 15 greys there is always at least one leader type. A leader must be present for transport of any mortals or livestock.

UFOs

Numerous types of Unidentified Flying Object have been reported in sightings over the years.

Black Triangle

A black triangle appears as a large, silent, black object with a roughly triangular shape. They often have bright, pulsing lights on the triangle's corners. Some claim that the first sighting of a Black Triangle was in 1561 in Nuremberg, Germany, but the first modern sighting was in 1989 in Belgium. The black triangles are operated by the Space Brothers.

Flying Saucer

The spaceships of the Zeta Reticulans, flying saucers are one of the oldest sighted UFO's. There are reports of flying saucers dating to the medieval period, though the term was coined in 1930 to describe a meteor sighting in Oklahoma and Texas.

Flying saucers look like circular objects, sometimes spinning, sometimes covered with pulsing lights. They come in various sizes, with large mother ships and smaller vessels used for landings on Earth to capture humans for study or genetic extraction.

Green Fireball

Sightings of "green fireballs" began in the late 1940's, primarily in the Southwestern United States, and particularly around sensitive research facilities. Most are described as very bright, green lights, and have been suggested to be psychically projected probes from spaceships in LEO or actual spaceships, perhaps formed from asteroids. For our purposes, we will use the latter explanation of shaped asteroids turned into spaceships by the Alpha Draconians.

7

Vehicles

Even though good stories and games are character-driven, high technology is key to the hard sci-fi genre.

This section of the book is divided into several parts, each dedicated to a different type of vehicle. Many of the devices described herein are real, produced between 1946 and the modern day. Others were proposed designs that were never made real.

Note: Damage for weapons that is followed by an asterisk is multiplied by 10. Damage followed by two asterisks is multiplied by 100.

Aircraft

The first word in *High Frontier* aircraft is the supersonic jet. The 1950s was the "jet age" and all the go-go guys and gals of the time wanted to be part of the "jet set". Jets were sleek, modern and fast, and made the world seem like a smaller place.

Jet aircraft originated in Germany in the late 1930's and finally found practical use at the end of World War II with jet interceptors. Jets rapidly replaced traditional propeller-driven aircraft in military and many civilian uses in the 1950s. Along the way, many aircraft concepts did not manage to make it off the drawing board, or into actual production.

The main technological innovations that were sought during this period were:

Supersonic Flight

As soon as jet power revolutionized aircraft, the race was on for supersonic and then hypersonic flight. Supersonic flight would find a major obstacle in the form of sonic booms, which were not popular with the public and which could cause property damage. In the "scientific progress first" *High Frontier*, sonic booms are not a problem, so supersonic flight is relatively common, especially in long-distance airliners.

VTOL

The quest for jet planes that could take off and land vertically (i.e. vertical take-off and landing, or VTOL) was immense during the 1950s through 1960s, and even in the real modern world there are only a few aircraft that do it well. In *High Frontier*, VTOL technology arrives earlier and is more wide-spread, allowing for more efficient airports and for military aircraft capable of operating in less-than-idea places.

Wing Shape

Odd wing shapes were being played with as early as the 1930s, and as men competed to create faster and more maneuverable aircraft, just about every sort of wing you could imagine was tried, from the lenticular (i.e. saucer-shaped) 'Flying Pancake' to forward swept wings to the very useful delta wing.

Avionics

The aircraft described in this section benefit not only from powerful engines and weapons, but also from on-board aviation electronics (i.e. avionics) and other mechanical advancements. They give the aircraft the following special abilities:

Afterburner (AB): By engaging his afterburner, a pilot gains a one round +4 bonus to maneuver.

Carrier-Borne (CV): Aircraft can be launched from and land on an aircraft carrier.

Countermeasures (CM): Countermeasures eliminate the fire control bonus of guided missiles.

Fire Control (FC): Fire control gives a pilot a +2 bonus to attack with his aircraft's weapons.

Radar (RAD): Radar reduces a pilot's chance of being surprised to 1 in 10 and increase AC by +2.

Stealth (ST): Stealth removes the benefit of radar.

Additional Abbreviations Used

BRD = Bundesrepublik Deutschland / West Germany

EC = European Community

GDR = German Democratic Republic / East Germany

KW = Vehicle served during the Korean War

PRC = People's Republic of China / Communist China

VW = Vehicle served during the Vietnam War

Airliners and Transports

Air travel in the *High Frontier* setting has retained the charm of air travel known in the mid-20th century, since airlines have to compete with mag-lev trains and robot cars. Regional (medium-range) flights use the jetliners common in the real world, both narrow-body and wide-body, and business jets. Trans-continental and trans-oceanic flights, on the other hand, use supersonic jetliners such as the Concorde and Tu-114.

For most air travel, assume the following average specifications:

Aircraft	Passengers	Speed (mph)	Range (miles)
Airliner-Light*	25	300	1,000
Airliner-Medium*	60	300	1,000
Airliner-Heavy*	120	400	4,500
Business Jet	12	550	2,500
Jetliner, Narrow-body	115	550	2,500
Jetliner, Wide-body	350	620	6,000
Jetliner, Wide-body Double-decker	500	650	9,000
Jetliner, Supersonic Gen 1	130	1,500	4,500
Jetliner, Supersonic Gen 2	290	1,900	5,000

* In the *High Frontier* setting, piston engine airliners would largely be phased out of service in wealthy nations by the 1960's and 1970's. In poor nations, they would continue to serve.

The chart below shows travel time in hours between major cities by supersonic jetliner.

	BEI	CAI	HON	LON	LA	MOS	ND	NY	PAR	RIO	SYD	TOK
Beijing	-	3	3	3	-	2	1	-	3	-	-	-
Cairo	3	-	-	1	-	1	2	-	1	-	-	-
Honolulu	3	-	-	-	1	-	-	3	-	-	3	2
London	3	1	-	-	-	1	2	2	-	-	-	-
L.A.	-	-	1	-	-	-	-	1	-	-	-	-
Moscow	2	1	-	1	-	-	1	3	1	-	-	2
N. Delhi	1	2	-	2	-	1	-	-	2	-	-	2
N.Y	-	-	3	2	1	3	-	-	2	3	-	-
Paris	-	1	-	-	-	1	2	2	-	-	-	-
Rio	-	-	-	-	-	-	-	3	-	-	-	-
Sydney	-	-	3	-	-	-	-	-	-	-	-	3
Tokyo	-	-	2	-	-	2	2	-	-	-	3	-

Routes marked with a dash (-) are either too long or too short for effective supersonic flight. Travel between these markets requires connecting flights which may not be supersonic.

Airliners and Jetliners

Aerospatiale-BAC Concorde (UK/FR 1965)

SZ C HD 76 HP 226 AC 13 SPD 1350 mph ROC 800' CNG 60,000' MVR +5 CP 3/120 SP none

Armstrong-Whitworth Aurora Flying Wing (UK 1950)

SZ H HD 26 HP 65 AC 17 SPD 500 mph ROC 800' CNG 36,000' MVR +4 CP 2/30 SP none

Boeing 2707 Supersonic (USA 1976)

SZ C HD 96 HP 240 AC 8 SPD 1800 mph ROC 3000' CNG 75,000' MVR +2 CP 3/277 SP none

Bristol Brabazon (UK 1952)

SZ C HD 70 HP 175 AC 7 SPD 300 mph ROC 120' CNG 25,000' MVR -1 CP 12/100 SP none | *Designed for luxury, these airliners had onboard cinemas, cocktail bars and lounge areas*

Convair 550 Supersonic (USA 1966)

SZ C HD 88 HP 220 AC 13 SPD 2100 mph ROC 1800' CNG 74,000' MVR +5 CP 3/150 SP none

Aerospatiale-BAC Concorde supersonic jetliner

Apollo capsule being loaded on a 'Super Guppy'

Bell-Boeing V-22 Osprey V/STOL

Boeing C-14 Samson STOL

Canadair CL-84 Dynavert

Focke-Wulf Fw.260 Flamingo VTOL (BRD 1967)

SZ G HD 44 HP 154 AC 16 SPD 570 mph ROC 700' CNG 45,000' MVR +4 CP 3/98 SP none

Hawker Siddeley Torquay V/STOL (UK 1984)

SZ G HD 62 HP 155 AC 15 SPD 500 mph ROC 600' CNG 55,000' MVR +5 CP 3/119 SP none

Lockheed L-2000 Astroliner (USA 1977)

SZ C HD 91 HP 228 AC 13 SPD 2300 mph ROC 1900' CNG 77,000' MVR +5 CP 3/273 SP none

Tupolev Tu-144 'Convex' Supersonic (USSR 1962)

SZ C HD 87 HP 218 AC 13 SPD 1600 mph ROC 1600' CNG 66,000' MVR +5 CP 3/140 SP none

Tupolev Tu-244 'Constant' Supersonic (USSR 1983)

SZ C HD 91 HP 228 AC 13 SPD 2300 mph ROC 1900' CNG 77,000' MVR +5 CP 3/273 SP none

Transports

Aero 'Super Guppy' Super Heavy (USA 1965)

SZ G HD 60 HP 210 AC 11 SPD 290 mph ROC 200' CNG 55,000' MVR +1 CP 4/0 SP 27 ton payload

Antonov An-225 Mirya Super Heavy (USSR 1960)

SZ SC HD 97 HP 430 AC 8 SPD 530 mph ROC 300' CNG 36,000' MVR +4 CP 6/0 SP 210 ton payload

Armstrong-Whitworth Argonaut VTOL (UK 1960)

SZ G HD 59 HP 207 AC 15 SPD 500 mph ROC 400' CNG 35,000' MVR +5 CP 2/0 SP 12 ton payload

Bell Boeing V-22 Osprey V/STOL (USA 1992)

SZ H HD 26 HP 65 AC 17 SPD 500 mph ROC 800' CNG 36,000' MVR +4 CP 2/30 SP none

Boeing C-14 Samson STOL (USA 1978)

SZ C HD 63 HP 221 AC 16 SPD 500 mph ROC 1100' CNG 45,000' MVR +5 CP 3/150 SP 34 ton payload

Boeing RC-1 Brute Lifter Super-Heavy (USA 1975)

SZ SC HD 97 HP 340 AC 7 SPD 460 mph ROC 400' CNG 35,000' MVR +3 CP 3/0 SP 125 ton payload

Burnelli CBY-3 Loadmaster (Canada 1958)

SZ H HD 24 HP 60 AC 15 SPD 240 mph ROC 200' CNG 24,000' MVR +2 CP 2/24 SP none

Canadair CL-84 Dynavert (Canada 1968)

SZ H HD 16 HP 56 AC 17 SPD 400 mph ROC 700' CNG 30,000' MVR +3 CP 2/12 SP none

Conroy Virtus Super-Heavy (USA 1979)

SZ C HD 96 HP 336 AC 9 SPD 300 mph ROC 300' CNG 35,000'
MVR +3 CP 6/0 SP 2,000 ton payload | *This super heavy
transport was designed for launching space shuttles and similar
spacecraft from altitude*

Curtiss-Wright CV-19 VTOL (USA 1968)

SZ H HD 17 HP 60 AC 16 SPD 455 mph ROC 300' CNG 30,000'
MVR +4 CP 2/0 SP 1200 lb payload

DINFIA IA 38 Flying Wing (Argentina 1963)

SZ H HD 26 HP 91 AC 14 SPD 160 mph ROC 130' CNG 15,000'
MVR +1 CP 2/0 SP 1 ton payload

Dornier Do.31E VTOL (BRD 1973)

SZ H HD 30 HP 105 AC 10 SPD 450 mph ROC 600' CNG 35,000'
MVR -2 CP 2/36 SP none

LTV C-142 Downtowner V/STOL (USA 1967)

SZ H HD 28 HP 98 AC 17 SPD 430 mph ROC 1100' CNG 25,000'
MVR +4 CP 3/32 SP none

OMAC Laser 300 (USA 1986)

SZ L HD 11 HP 39 AC 18 SPD 290 mph ROC 300' CNG 30,000'
MVR +3 CP 2/5 SP none

Attack Aircraft

BAC Kestrel II GR.7 V/STOL (UK 1979)

SZ H HD 20 HP 70 AC 23 SPD 660 mph ROC 2500' CNG 50,000'
MVR +8 CP 1/0 ATK 2 x 25mm ADEN (8d6) and 8 hard points
(8,000 lb) SP none | *Also called the McDonnell Douglas FV-8A*

Convair A-44 Conqueror (USA 1950) `KW`

SZ H HD 35 HP 123 AC 20 SPD 580 mph ROC 2500' CNG
43,000' MVR +7 CP 4/0 ATK 40 x HVAR 5" rockets (2d6*) and
12 x 1000 lb bombs (10d6**) SP none

Convair OV-9 Charger COIN (USA 1967) `VW`

SZ L HD 11 HP 39 AC 21 SPD 320 mph ROC 300' CNG 21,000'
MVR +6 CP 2/6 ATK 4 x 30cal Browning M1919 (1d10) and 5
hard points (5,000 lb) SP none

Douglas A-2 Skyshark (USA 1953)

SZ H HD 20 HP 70 AC 19 SPD 500 mph ROC 1200' CNG 48,000'
MVR +5 CP 1/0 ATK 2 x 20mm T-31 (6d6), 2 x 18 x SNEB 68mm
rockets (12d6) and 11 x 500 lb (5d6**) SP none

Douglas A-42 Strikemaster (USA 1949) `KW`

SZ H HD 29 HP 102 AC 18 SPD 510 mph ROC 400' CNG 39,000'
MVR +5 CP 3/0 ATK 16 x 50 cal. Browning M2 (3d6) and 2 x 18
x HVAR 5" rockets (2d6*) SP none

Conroy Virtus Super-Heavy

LTV C-142 Downtowner V/SOL

OMAC Laser 300

Convair A-44 Conqueror

Convair OV-9 Charger COIN (USA 1967)

Douglas A-2 Skyshark

Lockheed F-19 Nighthawk

Martin B-51 Dragon

Northrop A-9 Vandal

FFA P-16 (Switzerland 1958)

SZ H HD 23 HP 81 AC 22 SPD 690 mph ROC 2100' CNG 46,000' MVR +8 CP 1/0 ATK 2 x 30mm HS.404 (5d6) and 1 x 44 x SNEB 68mm rockets (12d6) SP none

Hawker Siddeley Kestrel FGA.2 V/STOL (UK 1979)

SZ H HD 17 HP 60 AC 22 SPD 710 mph ROC 5000' CNG 50,000' MVR +8 CP 1/0 ATK 2 x 30mm ADEN (8d6) and 4 x 18 x SNEB 68mm rockets (12d6) or 2 x AIM-9 Sidewinder AAM (1d10**) or 4 x 1200 lb bombs (12d6**) SP none | *Also manufactured as the McDonnell Douglas FV-6A*

Ilyushin Il-40 'Brawny' (USSR 1956)

SZ H HD 26 HP 91 AC 20 SPD 620 mph ROC 500' CNG 38,000' MVR +7 CP 2/0 ATK 4 x 23mm AM-23 (6d6) and 3 x 1000 lb bombs (10d6**) SP AB

Lockheed F-19 Nighthawk (USA 1983)

SZ H HD 34 HP 119 AC 22 SPD 620 mph ROC 500' CNG 45,000' MVR +9 CP 1/0 ATK 2 x 2,000 lb (20d6**) or 2 x 500 lb bombs (5d6**) SP CM, RDR, ST

Martin B-51 Dragon (USA 1952) KW

SZ H HD 35 HP 123 AC 21 SPD 640 mph ROC 1100' CNG 42,000' MVR +8 CP 2/0 ATK 8 x 20mm M24A1 (6d6), 8 x HVAR 5" rockets (2d6*) and 10,400 lb of bombs SP none

Northrop A-9 Vandal (USA 1975) VW

SZ H HD 23 HP 81 AC 21 SPD 520 mph ROC 800' CNG 35,000' MVR +7 CP 1/0 ATK 1 x 20mm M61A1 Vulcan (6d6) plus one of the following: 4 x 19 x Hydra 70 rockets (2d4*) or 6 x 4 x Zuni rockets (7d6*) or 2 x AIM-9 Sidewinder AAM (1d10**) or 6 x AGM-65 Maverick ASM (1d8**) or up to 16,000 lb of bombs

Republic F-84H Thunderscreech (USA 1958)

SZ H HD 25 HP 88 AC 18 SPD 520 mph ROC 800' CNG 40,000' MVR +5 CP 1/0 ATK 6 x Browning M2 (3d6) plus one of the following: 4 x 1100 lb bombs (11d6**) or 1 x Mark 7 nuclear bomb (2 mile radius) | *The loudest airplane ever manufactured*

SNCAC Faucon (France 1951)

SZ H HD 25 HP 88 AC 17 SPD 360 mph ROC 400' CNG 33,000' MVR +4 CP 3/0 ATK 4 x 7.5mm MAC 1934 (2d4, 4/day) and 1 x 1,000 lb torpedo (11d6*) SP none

Sud Aviation Grognard (France 1953)

SZ H HD 24 HP 84 AC 20 SPD 650 mph ROC 600' CNG 38,000' MVR +7 CP 1/0 ATK 2 x 30mm DEFA (8d6) and 16 x HVAR 5" rockets (2d6*) or 2 x Matra AAM (2d6**) or 4 x 550 lb bombs (6d6**) SP none

Sud Aviation Vautour (France 1958)

SZ H HD 28 HP 98 AC 21 SPD 690 mph ROC 2000' CNG 50,000' MVR +8 CP 1/0 ATK 4 x 30mm DEFA cannon (8d6) and 1 x 116 x SNEB 68mm rockets (12d6) or 6 x 450 lb bombs (4d6**)

Tupolev Tu-91 'Boot' (USSR 1958)

SZ H HD 25 HP 88 AC 18 SPD 500 mph ROC 600' CNG 36,000' MVR +5 CP 2/0 ATK 4 x 23mm NR-23 (5d6) and 1 torpedo or 3,300 lb of bombs SP none

VFW VAK 1918 Komet (BRD 1974)

SZ H HD 20 HP 70 AC 25 SPD 680 mph ROC 6600' CNG 49,000' MVR +12 CP 1/0 ATK 2 x 27mm Mauser BK-27 (8d6) and 4 hard points (1,100 lb capacity) SP none

Vought A-7F Strikefighter (USA 1992)

SZ H HD 29 HP 102 AC 22 SPD 920 mph ROC 8000' CNG 55,000' MVR +9 CP 1/0 ATK 1 x 20mm M61A1 (6d6) and 6 hard points (17,000 lb) SP FC, RDR

Yakovlev Yak-26 'Flashlight' (USSR 1959) VW

SZ H HD 22 HP 77 AC 21 SPD 750 mph ROC 900' CNG 52,000' MVR +7 CP 2/0 ATK 1 x 23mm NR-23 (5d6) and 2 x 1,100 lb bombs (11d6**) SP RDR

Bombers

Avro Vulcan (UK 1956)

SZ G HD 56 HP 196 AC 16 SPD 650 mph ROC 2000' CNG 55,000' MVR +3 CP 5/0 ATK 6 x GAM-87 Skybolt nuclear missiles (5 mile radius) or 1 x Blue Danube nuclear bomb (1 mile radius) **or** 21 x 1,000 lb bombs (10d6**) SP CM, FC, RDR

Avro Wizard (UK 1962)

SZ G HD 62 HP 217 AC 16 SPD 1990 mph ROC 2500' CNG 66,000' MVR +6 CP 2/0 ATK 6 x GAM-87 Skybolt nuclear missiles (5 mile radius) or 21 x 1,000 lb bombs (10d6**) SP CM, FC, RDR

Baade Ba-1 'Bombard' (GDR 1949)

SZ G HD 53 HP 186 AC 15 SPD 580 mph ROC 500' CNG 34,000' MVR +5 CP 5/0 ATK 3 x 23mm NR-23 (5d6) and 11 x 1000 lb bombs (10d6**) SP none

BAC TSR-2 (UK 1967)

SZ G HD 47 HP 165 AC 15 SPD 1800 mph ROC 2500' CNG 40,000' MVR +3 CP 2/0 ATK 4 x RP-3 (2d6*) or 1 x Red Beard nuclear bomb (1 mile) SP none

Republic F-84H Thunderscreech

Sud Aviation Grognard

Yakovlev Yak-26 'Flashlight'

BAC TSR-2

Convair B-58 Hustler

Convair B-60 Titan

Douglas B-43 Jetmaster

Keldysh Kel-1 'Big Top'

Convair B-58 Hustler (USA 1962) `VW`

SZ G HD 47 HP 165 AC 16 SPD 1300 mph ROC 2900' CNG 63,000' MVR +3 CP 3/0 ATK 1 x 20mm T171 (6d6) and 1 x B53 nuclear bomb (9 mile radius) SP AB, FC, RDR

Convair B-60 Titan (USA 1955)

SZ C HD 71 HP 249 AC 14 SPD 510 mph ROC 200' CNG 53,000' MVR +6 RNG 2900 miles CP 5/0 ATK 2 x 20mm T171 (6d6) and 72,000 lb of bombs SP none

Convair NB-6 Prometheus (USA 1958)

SZ C HD 96 HP 336 AC 16 SPD 390 mph ROC 300' CNG 40,000' MVR +2 CP 5/0 ATK 2 x 20mm HS.404 (5d6) and 72,000 lb bombs SP AB, FC, RDR | *Nuclear-powered strategic bomber*

Dassault Mirage 2000 D/N (France 1986)

SZ H HD 24 HP 84 AC 22 SPD 1500 mph ROC 9300' CNG 59,000' MVR +9 CP 2/0 ATK 9 hard points (13,900 lb) SP none

Dassault Mirage IV (France 1964)

SZ H HD 35 HP 123 AC 19 SPD 1450 mph ROC 1400' CNG 66,000' MVR +6 CP 2/0 ATK 2 x 20mm M24 (6d6) and 12 x 1200 lb bombs (12d6**) SP none

Douglas B-43 Jetmaster (USA 1949) `KW`

SZ H HD 29 HP 102 AC 18 SPD 510 mph ROC 400' CNG 39,000' MVR +5 CP 3/0 ATK 2 x 50 cal. Browning M2 (3d6) and 8 x 1000 lb bombs (10d6**) SP none

Douglas B-66 Destroyer (USA 1956)

SZ G HD 39 HP 137 AC 16 SPD 610 mph ROC 800' CNG 41,000' MVR +3 CP 3/0 ATK 2 x 20mm M24 (6d6) and 12 x 1200 lb bombs (12d6**) SP AB, CM, FC, RDR

Ilyushin Il-30 'Brawler' (USSR 1955)

SZ G HD 38 HP 133 AC 18 SPD 560 mph ROC 4100' CNG 43,000' MVR +6 CP 4/0 ATK 6 x 23mm NR-23 (5d6) and 8 x 1,100 lb bombs (11d6**) SP none

Keldysh Kel-1 'Big Top' (USSR 1962) `VW`

SZ C HD 80 HP 280 AC 14 SPD 11,000 mph ROC 9300' CNG 90,000' MVR +6 CP 4/0 ATK 20,000 lb of bombs SP Sub-orbital bomber

Korolev K-3 'Bandit' (USSR 1951) `KW`

SZ G HD 36 HP 126 AC 18 SPD 520 mph ROC 2400' CNG 46,000' MVR +7 CP 4/0 ATK 4 x 23mm GSh-23 (6d6) and 8 x 110 lb bombs (10d6*) SP none

Lockheed F-19 Nighthawk (USA 1983)

SZ H HD 34 HP 119 AC 22 SPD 620 mph ROC 4000' CNG 45,000' MVR +9 CP 1/0 ATK 2 x 2,000 lb (20d6**) or 2 x 500 lb bombs (5d6**) SP CM, RDR, ST

Martin B-48 Ravager (USA 1950) KW

SZ G HD 49 HP 172 AC 18 SPD 520 mph ROC 700' CNG 39,000' MVR +6 CP 3/0 ATK 2 x 50 cal. Browning M2 (3d6) and either 10 x 2,000 lb bomb (20d6**) or 36 x 250 lb bombs (3d6**)

Myasishchev M-50 'Bounder' (USSR 1962) VW

SZ C HD 79 HP 277 AC 14 SPD 1200 mph ROC 1000' CNG 54,000' MVR +6 CP 2/0 ATK 33 x 2,000 lb bombs (20d6**) SP CM, FC, RDR

North American B-70 Valkyrie (USA 1967) VW

SZ C HD 95 HP 333 AC 15 SPD 2100 mph ROC 3400' CNG 77,000' MVR +7 CP 2/0 ATK 10 x Pye Wacket lenticular AAM (11d6**/146,000 yard range) and 45,000 lb of bombs SP AB, CM, FC, RDR

Northrop B-49 Super Patriot Flying Wing (USA 1952) KW

SZ G HD 57 HP 200 AC 14 SPD 630 mph ROC 2000' CNG 50,000' MVR +6 CP 2/0 ATK 50,000 lb of bombs SP CM, FC, RDR

Sukhoi Su-100 Sotka 'Bullet' (USSR 1975) VW

SZ G HD 64 HP 224 AC 16 SPD 1990 mph ROC 29000' CNG 79,000' MVR +7 CP 2/0 ATK 40,000 lb payload of bombs and cruise missiles SP CM, FC, RDR

Tupolev Tu-125 'Blaster' (USSR 1952) KW

SZ C HD 79 HP 277 AC 14 SPD 1200 mph ROC 1000' CNG 54,000' MVR +6 CP 2/0 ATK 66,000 lb of bombs

Xian H-8 'Blocker' (PRC 1981)

SZ G HD 65 HP 228 AC 17 SPD 620 mph ROC 2800' CNG 46,000' MVR +7 CP 6/0 ATK 2 x 23mm NR-23 (5d6) and 40,000 lb payload SP RDR

Yakovlev Yak-26 'Flashlight' (USSR 1959)

SZ H HD 22 HP 77 AC 21 SPD 750 mph ROC 900' CNG 52,000' MVR +7 CP 2/0 ATK 1 x 23mm NR-23 (5d6) and either 2 x 1,100 lb bombs (11d6**) or 1 x RDS-4 nuclear bomb (2 mile radius) SP RDR

North American B-70 Valkyrie

Northrop B-49 Super Patriot Flying Wing (USA 1952)

Avro Canada CF-105 Arrow

Douglas B-66 Destroyer

Bell FV-18 Verticobra VTOL

Fighters

Aerfer Sagittario 2 (Italy 1959)

SZ L HD 12 HP 42 AC 25 SPD 650 mph ROC 1300' CNG 39,000' MVR +10 CP 1/0 ATK 2 x 30mm HS.404 (5d6) and either 2 x 6 x SNEB 68mm rockets (12d6) or 2 x 550 lb bombs (5d6**) SP none

Alekseyev Al-5 'Fodder' (USSR 1952) KW

SZ H HD 19 HP 67 AC 24 SPD 620 mph ROC 2100' CNG 46,000' MVR +10 CP 1/0 ATK 4 x 23mm NS-23 (5d6), 2 x 20mm B-20 (4d6) and 2 x 1,100 lb bombs (11d6**) SP none

Avro Canada CF-105 Arrow (Canada 1961)

SZ G HD 44 HP 154 AC 22 SPD 1300 mph ROC 9300' CNG 53,000' MVR +10 CP 2/0 ATK 8 x AIM-4 Falcon AAM (2d4**) and 4 x AIR-2 Genie nuclear rockets (900 yard radius) SP AB, FC, RDR

Avro Canada CFV-1 Dragonfly VTOL (Canada 1966)

SZ H HD 18 HP 63 AC 24 SPD 1300 mph ROC 9300' CNG 60,000' MVR +11 CP 1/0 ATK 4 x AIM-9 Sidewinder AAM (1d10**) SP none

Bell FV-18 Verticobra VTOL (USA 1966) VW

SZ H HD 21 HP 74 AC 24 SPD 1800 mph ROC 7700' CNG 60,000' MVR +11 CP 1/0 ATK 4 x 20mm Colt Mk 12 (6d6) and 8 hard points (4,000 lb) SP none

Chengdu J-9 (PRC 1978)

SZ H HD 31 HP 109 AC 24 SPD 2100 mph ROC 5000' CNG 92,000' MVR +11 CP 1/0 ATK 2 x 23mm Type-23-III (5d6) and 4 x PL-4A AAM (1d10**) SP AB, FC, RDR

Convair F-7 Sea Dart (USA 1956)

SZ H HD 20 HP 70 AC 24 SPD 830 mph ROC 2900' CNG 55,000' MVR +10 CP 1/0 ATK 4 x 20mm Colt Mk 12 (6d6) and 1 x AIM-4 Falcon (2d4**) SP AB

Convair FV-14 Pogo VTOL (USA 1957)

SZ H HD 19 HP 67 AC 22 SPD 470 mph ROC 1700' CNG 38,000' MVR +8 CP 1/0 ATK 4 x 20mm Colt Mk 12 (6d6) SP none

Dassault/BAC Vortex (France 1968) VW

SZ G HD 34 HP 119 AC 23 SPD 1900 mph ROC 5500' CNG 60,000' MVR +10 CP 1/0 ATK 2 x 30mm ADEN (8d6) and 11 hard points (19,800 lb) SP FC, RDR

Douglas F-3 Stiletto (USA 1955)

SZ H HD 24 HP 84 AC 22 SPD 2000 mph ROC 6000' CNG 50,000' MVR +10 CP 1/0 ATK 1 x 20mm M61A1 (6d6) and 4 x AIM-9 Sidewinder AAM (1d10**) SP AB, RDR

Convair F-7 Sea Dart

Convair FV-14 Pogo VTOL

Douglas F-6 Missileer

Grumman F-29 Puma

Douglas F-6 Missileer (USA 1966) VW

SZ G HD 45 HP 158 AC 21 SPD 550 mph ROC 7500' CNG 40,000' MVR +9 CP 3/0 ATK 6 x AAM-N-10 Eagle AAM (1d12**) SP FC, RDR

EWR VJ-101C Vektor VTOL (EC 1966)

SZ L HD 14 HP 49 AC 25 SPD 800 mph ROC 6100' CNG 55,000' MVR +11 CP 1/0 ATK 1 x 27mm Mauser BK-27 (8d6) and 2 x AIM-9 Sidewinder AAM (1d10**) SP AB

FMA IAe 27 Pulqui (Argentina 1950)

SZ L HD 12 HP 42 AC 25 SPD 450 mph ROC 800' CNG 51,000' MVR +10 CP 1/0 ATK 4 x 20mm HS.404 (5d6) SP none

Grumman F-10 (F10F) Jaguar (USA 1955)

SZ H HD 27 HP 95 AC 22 SPD 710 mph ROC 1000' CNG 42,000' MVR +9 CP 1/0 ATK 4 x 20mm HS.404 cannon (5d6) and 4 x AIM-9 Sidewinder AAM (1d10**) or 2 x 1000 lb bombs (10d6**) SP none

Grumman F-29 Puma (USA 1987)

SZ H HD 21 HP 74 AC 25 SPD 1100 mph ROC 5000' CNG 55,000' MVR +12 CP 1/0 ATK 2 x 20mm M39A2 cannon (6d6) and 4 x AIM-9 Sidewinder AAM (1d10**) SP AB, FC, RDR

Hawker Hellfire F.1 (UK 1953)

SZ H HD 19 HP 67 AC 24 SPD 700 mph ROC 1000' CNG 46,000' MVR +10 CP 1/0 ATK 4 x 30mm ADEN (8d6) and 4 x 18 x SNEB 68mm rockets (12d6) SP none

Helwan HA-3000 Saqr (UAR 1967)

SZ L HD 12 HP 42 AC 25 SPD 1200 mph ROC 1000' CNG 59,000' MVR +10 CP 1/0 ATK 2 x 30mm HS.404 (5d6) and 4 x K-5 AAM (2d4**) SP none

Lavochkin La-21 Anakonda (USSR 1959)

SZ G HD 40 HP 140 AC 22 SPD 1100 mph ROC 9000' CNG 56,000' MVR +10 CP 2/0 ATK 2 x K-5 AAM (2d4**) SP none

Lockheed F-12B Raven (USR 1966) VW

SZ G HD 50 HP 175 AC 22 SPD 2300 mph ROC 15000' CNG 90,000' MVR +10 CP 2/0 ATK 3 x AIM-4 Falcon AAM (6d6**) SP AB, FC, RDR

Lockheed F-15 Lancer (USR 1975) VW

SZ H HD 25 HP 88 AC 23 SPD 1500 mph ROC 10000' CNG 61,000' MVR +11 CP 1/0 ATK 1 x 20mm M61A1 cannon (6d6) and 7 hard points (12,000 lb) SP AB, FC, RDR

Helwan HA-3000 Saqr

Lockheed F-12B Raven

Lockheed F-90 Starhawk

Lockheed F-133 Starjet

Mikoyan-Gurevich MiG-23 'Flashpoint'

McDonnell F-85 Goblin

Nord Super Griffon

North American F-108 Rapier

Lockheed F-90 Starhawk (USA 1952) KW

SZ H HD 25 HP 88 AC 21 SPD 670 mph ROC 900' CNG 39,000' MVR +10 CP 1/0 ATK 6 x 20mm M39A1 (6d6), 8 x HVAR 5" rockets (2d6*) and 2,000 lb of bombs SP none

Lockheed F-133 Starjet (USA 1944) KW

SZ H HD 18 HP 63 AC 24 SPD 610 mph ROC 4600' CNG 45,000' MVR +10 CP 1/0 ATK 4 x 20mm Colt Mk 12 (6d6) SP none

McDonnell F-85 Goblin (USA 1951) KW

SZ L HD 11 HP 39 AC 25 SPD 650 mph ROC 2100' CNG 48,000' MVR +10 CP 1/0 ATK 4 x 50 cal. Browning M3 (3d6) SP none | *The Goblin was designed to be launched from a bomber*

Mikoyan-Gurevich MiG-17 'Footloose' (USSR 1962) VW

SZ H HD 25 HP 88 AC 23 SPD 1400 mph ROC 4600' CNG 63,000' MVR +10 CP 1/0 ATK 2 x 30mm NR-30 (6d6) and 4 x 16 x S-5 rockets (9d6) SP AB

Mikoyan-Gurevich MiG-23 'Flashpoint' (USSR 1966) VW

SZ H HD 18 HP 63 AC 25 SPD 1400 mph ROC 3800' CNG 66,000' MVR +10 CP 1/0 ATK 2 x K-13 AAM (1d8**) SP AB, FC, RDR

Mikoyan-Gurevich MiG-33 'Figment' (USSR 1985)

SZ H HD 25 HP 88 AC 24 SPD 900 mph ROC 2500' CNG 50,000' MVR +11 CP 1/0 ATK 1 x 30mm GSh-30 (7d6) and 9 hard points (15,000 lb) SP AB, FC, RDR

Nanchang J-12 (PRC 1975) VW

SZ L HD 14 HP 49 AC 25 SPD 810 mph ROC 5900' CNG 56,000' MVR +10 CP 1/0 ATK 1 x 30mm GSh-30 (7d6), 1 x 23mm GSh-23 (6d6) and 3 hard points (2,000 lb) SP none

Nord Super Griffon (France 1960)

SZ H HD 16 HP 56 AC 24 SPD 1700 mph ROC 4700' CNG 58,000' MVR +10 CP 1/0 ATK 2 x 30mm DEFA (8d6) and 2 x 18 x SNEB 68mm rockets (12d6) SP AB, FC

North American F-108 Rapier (USA 1962) VW

SZ G HD 45 HP 158 AC 22 SPD 1980 mph ROC 15500' CNG 80,000' MVR +10 CP 2/0 ATK 3 x AIM-47 Falcon AAM (6d6**) SP AB, FC, RDR

Northrop F-17 Cobra (USA 1977)

SZ H HD 27 HP 95 AC 24 SPD 1300 mph ROC 7200' CNG 60,000' MVR +11 CP 1/0 ATK 4 x 20mm M61A1 Vulcan (6d6) and 2 x AIM-9 Sidewinder AAM (1d10**) SP AB, CM, FC, RDR

Northrop F-20 Tigershark (USA 1985)

SZ H HD 21 HP 74 AC 25 SPD 1300 mph ROC 8000' CNG 55,000' MVR +11 CP 1/0 ATK 2 x 20mm M39 cannon (6d6) and 5 hard points (8,000 lb) SP AB, CM, FC, RDR

Northrop F-79 Manta Ray flying wing (USA 1948) KW

SZ L HD 13 HP 46 AC 24 SPD 550 mph ROC 700' CNG 40,000'
MVR +9 CP 1/0 ATK 4 x 50 cal. Browning M2 (3d6) SP none

Republic F-91 Thunderceptor (USA 1952) KW

SZ H HD 22 HP 77 AC 24 SPD 980 mph ROC 3200' CNG 55,000'
MVR +10 CP 1/0 ATK 2 x 20mm M39A2 cannon (6d6), 4 x AIM-
9 Sidewinder AAM (1d10**) SP RDR

Republic F-103 Thunderwarrior (USA 1959)

SZ H HD 30 HP 105 AC 22 SPD 3800 mph ROC 3200' CNG
80,000' MVR +10 CP 1/0 ATK 2 x 18 x FFAR 'Mighty Mouse'
rockets (2d4*) and 6 x AIM-4 Falcon AAM (2d4**) SP RDR

Rockwell FV-12 Yellowjacket VTOL (USA 1980)

SZ H HD 21 HP 74 AC 25 SPD 1800 mph ROC 9300' CNG
39,000' MVR +12 CP 1/0 ATK 1 x 20mm M61A1 (6d6), 2 x AIM-
7 Sparrow AAM (1d12**), 2 x AIM-9 Sidewinder AAM (1d10**)
SP CM, FC, RDR

Saunders-Roe Sea Dog FA.1 seaplane (UK 1950)

SZ H HD 19 HP 67 AC 22 SPD 510 mph ROC 2800' CNG 48,000'
MVR +8 CP 1/0 ATK 4 x 20mm HS.404 (5d6) and 2 x 1000 lb
bombs (10d6**) SP none

SNCASO Trident (EC 1956)

SZ L HD 15 HP 53 AC 25 SPD 1100 mph ROC 1100' CNG
60,000' MVR +10 CP 1/0 ATK 2 x 30mm DEFA (8d6) SP none

Sud-Ouest Espadon (France 1951)

SZ H HD 18 HP 63 AC 24 SPD 600 mph ROC 900' CNG 50,000'
MVR +10 CP 1/0 ATK 2 x 30mm DEFA (8d6) SP none

Sukhoi Su-19 'Firebrand' (USSR 1959)

SZ H HD 25 HP 88 AC 23 SPD 1300 mph ROC 300' CNG 59,000'
MVR +10 CP 1/0 ATK 2 x K-9 AAM (2d6**) SP AB, RDR

Supermarine Super Swift F.1 (UK 1966)

SZ H HD 19 HP 67 AC 24 SPD 890 mph ROC 2100' CNG 53,000'
MVR +10 CP 1/0 ATK 4 x 30mm ADEN (8d6) SP AB

Vickers-Armstrong Vanquisher F1 (UK 1962)

SZ G HD 40 HP 140 AC 22 SPD 1900 mph ROC 18000' CNG
60,000' MVR +10 CP 2/0 ATK 2 x Red Hebe AAM (1d12**) SP
RDR

Vought F5U Discus (USA 1950) KW

SZ H HD 21 HP 74 AC 20 SPD 550 mph ROC 500' CNG 35,000'
MVR +6 RNG 1,100 miles CP 1/0 ATK 5 x 20mm Mk 12 cannon
(6d6) and 2 x 1000 lb bombs (10d6**) SP AB, CV

Northrop F-79 Manta Ray

Republic F-103 Thunderwarrior

Rockwell FV-12 Yellowjacket VTOL

Saunders-Roe Sea Dog FA.1

SNCASO Trident

Vought F5U Discus

Vought F-7 / F7U Cutlass

Lockheed SR-71 Blackbird

Vought F-7 / F7U Cutlass (USA 1951) KW

SZ H HD 25 HP 88 AC 23 SPD 700 mph ROC 2400' CNG 41,000' MVR +10 CP 1/0 ATK 1 x Browning M3 cannon (3d6), 4 x AIM-7 Sparrow AAM (1d12**) and 4 x 1100 lb bombs (11d6**) SP AB

Vought/General Dynamics F/A-16 Viper (USA 1981)

SZ H HD 25 HP 88 AC 24 SPD 1400 mph ROC 8000' CNG 51,000' MVR +11 CP 1/0 ATK 1 x M61A1 cannon (6d6) and 11 hard points (17,000 lb) SP AB, CM, FC, RDR

Yakovlev Yak-36 'Freehand' VTOL (USSR 1966) VW

SZ H HD 19 HP 67 AC 24 SPD 560 mph ROC 4700' CNG 39,000' MVR +11 CP 1/0 ATK 1 x GSh-23 cannon (6d6), 2 x 100 lb bombs (1d6*) SP none

Yakovlev Yak-38 'Forger' VTOL (USSR 1976)

SZ H HD 24 HP 84 AC 21 SPD 800 mph ROC 2500' CNG 36,000' MVR +9 CP 1/0 ATK 1 x NR-23 cannon (5d6) and 2 x R-60 AAM (10d6*) or 2 x Kh-23 ASM (1d12**) SP none

Reconnaissance Aircraft

Lockheed SR-71 Blackbird (USA 1966) VW

SZ G HD 52 HP 182 AC 18 SPD 2200 mph ROC 2000' CNG 85,000' MVR +9 CP 2/0 ATK none SP ST

Republic RF-12 Rainbow (USA 1959)

SZ G HD 52 HP 182 AC 16 SPD 470 mph ROC 800' CNG 45,000' MVR +6 CP 2/0 ATK none SP none

Tsybin T-1 'Mango' (USSR 1962) VW

SZ H HD 22 HP 77 AC 22 SPD 2300 mph ROC 300' CNG 13,000' MVR +9 CP 1/0 ATK none SP none

V.T.O.L. Aircraft

American Helicopter UH-26 Jet Jeep (USA 1955)

SZ M HD 2 HP 7 AC 21 SPD 85 mph ROC 200' CNG 7,000' MVR +5 CP 1/0 SP none

Avro Canada VZ-9 Avrocar (Canada 1961)

SZ L HD 10 HP 35 AC 21 SPD 300 mph ROC 100' CNG 10,000' MVR +6 CP 2/1 SP 1,000 lb payload

Bell V-3 Navajo gyroplane (USA 1958)

SZ L HD 11 HP 39 AC 20 SPD 180 mph ROC 200' CNG 15,000' MVR +5 CP 1/0 SP none

Bratukhin B-11 'Hacksaw' (USSR 1954)

SZ L HD 15 HP 53 AC 21 SPD 100 mph ROC 100' CNG 9,000' MVR +6 CP 3/0 SP 1,000 lb payload

Canadair CL-84 Dynavert (Canada 1965)

SZ H HD 16 HP 56 AC 17 SPD 410 mph ROC 700' CNG 25,000' MVR +3 CP 2/12 SP none

Fairey Jet Gyrodyne (UK 1954)

SZ L HD 10 HP 35 AC 20 SPD 140 mph ROC 300' CNG 25,000' MVR +5 CP 1/3 SP none

Goodyear GA-400R Gizmo (USA 1957)

SZ M HD 2 HP 7 AC 20 SPD 55 mph ROC 100' CNG 8,000' MVR +4 CP 1/0 SP none

Gyrodyne RON Rotorcycle (USA 1958)

SZ L HD 5 HP 18 AC 19 SPD 80 mph ROC 200' CNG 12,000' MVR +4 CP 1/0 SP none

Hiller ROE Rotorcycle (USA 1960) VW

SZ M HD 2 HP 7 AC 22 SPD 70 mph ROC 200' CNG 9,000' MVR +6 CP 1/0 SP none

Hiller H-32 Hornet (USA 1953) KW

SZ L HD 5 HP 18 AC 18 SPD 80 mph ROC 120' CNG 7,000' MVR +3 CP 2/0 ATK 8 x HVAR (2d6*) SP none

Hiller VZ-1 Pawnee (USA 1960) VW

SZ M HD 3 HP 11 AC 22 SPD 16 mph ROC 5' CNG 35' MVR +6 CP 1/0 SP none

Hughes CH-17 Flying Crane (USA 1955)

SZ H HD 33 HP 116 AC 21 SPD 90 mph ROC 300' CNG 13,000' MVR +8 CP 3/0 SP 5 ton payload

HZ-1 Hoppi-Copter 102 backpack (USA 1951) KW

SZ M HD 1 HP 4 AC 23 SPD 100 mph ROC 200' CNG 12,000' MVR +7 CP 1/0 SP none

HZ-2 Aerocycle (USA 1954)

SZ M HD 1 HP 4 AC 18 SPD 75 mph ROC 100' CNG 5,000' MVR +2 RNG 15 miles CP 1/0 SP 120 lb payload | *Users can be targeted separately from the machine by attackers.*

Piasecki VZ-8 Airgeep (USA 1962) VW

SZ L HD 9 HP 32 AC 22 SPD 85 mph ROC 100' CNG 3,000' MVR +7 RNG 35 miles CP 2/3 ATK 1 x M40 recoilless rifle (2d4*/1500 yards)

Sikorsky CH-37 Mohave (USA 1956)

SZ H HD 27 HP 95 AC 20 SPD 130 mph ROC 150' CNG 9,000' MVR +7 RNG 145 miles CP 3/26 SP none

Yakovlev Yak-100 'Hocus' (USSR 1951) KW

SZ L HD 11 HP 39 AC 19 SPD 110 mph ROC 800' CNG 17,000' MVR +4 CP 4/0 SP 500 lb payload

Avro Canada VZ-9 Avrocar

Bell V-3 Navajo gyroplane

Fairey Jet Gyrodyne

Hiller ROE Rotorcycle

Hiller VZ-1 Pawnee

Piasecki VZ-8 Airgeep

HZ-2 Aerocycle

Automobiles

The automobile industry created all manner of futuristic concept cars between the 1950s and the 1980s. In the real world, they were one-offs or models, but in *High Frontier* they became the production cars that people grew to love.

Cars in *High Frontier* might be powered with electric motors or traditional internal combustion motors. By the 1960s, they all have radios and by the 1970s they have audio disc players, an early form of GPS and radar to alert drivers when they are too close to cars in front of them. By the 1980s, highways and major thoroughfares are equipped with magnetic devices that permit cars to drive on auto-pilot. Highway centers keep these "electric roads" operating.

Large cities often permit only small "city cars" on their roads. These cities have large transport centers on their outskirts where larger vehicles can be parked (and usually washed, repaired and fueled) while people rent smaller vehicles for city driving or simply jump on monorails or mag-lev trains.

This section has statistics for some of the more futuristic designs of the *High Frontier* period.

Subcompacts and Minicars

Model	SZ	HD	HP	AC	SP	M	ACC	CP
Generic 1950s	L	8	28	15	70	-1	30	1/3
Generic 1960s	L	7	24	14	80	-1	40	1/3
Generic 1970s	L	8	28	15	90	+0	50	1/3
Generic 1980s	L	9	32	15	100	+0	50	1/3
Generic 1990s	L	9	32	15	100	-1	40	1/3

Abarth 750 Goccia (Italy 1962)

2D Coupe SZ L HD 6 HP 21 AC 13 SP 80 M +0 ACC 35 CP 1/3

AMC Electron (USA 1972)

3D Hatchback SZ L HD 6 HP 21 AC 10 SP 50 M +0 ACC 30 CP 1/1 SP EV

Autobianchi Giovani (Italy 1978)

2D Coupe SZ L HD 7 HP 25 AC 10 SP 100 M +0 ACC 50 CP 1/1

British Leyland ECV3 (UK 1987)

4D Hatchback SZ L HD 7 HP 25 AC 11 SP 110 M +0 ACC 55 CP 1/3

British Minissima (UK 1977)

1D City Car 1D SZ L HD 6 HP 21 AC 15 SP 80 M +1 ACC 40 CP 1/1

Ford Comuta (USA 1972)

2D Coupe SZ M HD 1 HP 4 AC 11 SP 40 M +4 ACC 30 CP 1/0

General Electric Centennial GE-100 (USA 1979)

3D Hatchback SZ L HD 10 HP 35 AC 11 SP 60 M -3 ACC 30 CP 1/3 SP EV

Matra M25 (France 1994)

2D Coupe SZ L HD 7 HP 25 AC 11 SP 160 M +3 ACC 130 CP 1/1

Opel Junior (France 1987)

3D Hatchback SZ L HD 9 HP 32 AC 15 SP 100 M -1 ACC 40 CP 1/3

Peel Trident (UK 1971)

1D Supermini SZ M HD 1 HP 4 AC 11 SP 50 M -1 ACC 30 CP 1/1

Simca Fulgur (France 1962)

1D Supermini SZ L HD 9 HP 32 AC 11 SP 120 M +0 ACC 50 CP 1/1

Volkswagen Scooter (BRD 1986)

2D Supermini SZ L HD 6 HP 21 AC 10 SP 140 M -1 ACC 55 CP 1/1 SP 3W, EV

Volvo EC (Sweden 1977)

3D Hatch SZ L HD 9 HP 32 AC 15 SP 45 M -3 ACC 15 CP 1/1 SP EV

Volvo LCP2000 (Sweden 1989)

3D Wagon SZ L HD 7 HP 25 AC 11 SP 110 M +0 ACC 60 CP 1/3

Roadsters / Sports Cars

Model	SZ	HD	HP	AC	SP	M	ACC	CP
Generic 1950s	L	9	32	15	120	+3	70	1/1
Generic 1960s	L	8		15	120	+3	70	1/1
Generic 1970s	L	9		15	130	+3	70	1/1
Generic 1980s	L	9		15	130	+3	80	1/1
Generic 1990s	L	9		15	150	+3	100	1/1

Alfa Romero Carabo (Italy 1973)

2D Coupe SZ L HD 9 HP 32 AC 10 SP 155 M +5 ACC 70 CP 1/1

Aston M Bulldog (UK 1984)

2D Coupe SZ L HD 11 HP 39 AC 16 SP 190 M +5 ACC 125 CP 1/3

Buick Wildcat (USA 1991)

2D Roadster SZ L HD 10 HP 35 AC 20 SP 160 M +5 ACC 100 CP 1/1

Chevrolet Astro III (USA 1969)

1D Coupe SZ L HD 8 HP 28 AC 10 SP 250 M +5 ACC 100 CP 1/1

The Astro III had a circuit TV rear-view mirror. It was designed for the system-controlled highways envisioned for the future and was powered by a gas turbine engine

Chevrolet Express (USA 1988)

2D Coupe SZ L HD 10 HP 35 AC 20 SP 150 M +2 ACC 100 CP 1/3

Chevrolet Ramarro (USA 1984)

2D Coupe SZ L HD 10 HP 35 AC 15 SP 140 M +3 ACC 70 CP 1/1

Dodge Firearrow III (USA 1959)

2D Coupe SZ L HD 9 HP 32 AC 14 SP 140 M +4 ACC 60 CP 1/1

Dome Zero (Japan 1980)

2D Coupe SZ L HD 9 HP 32 AC 16 SP 140 M +3 ACC 100 CP 1/1

Ferrari Modulo (Italy 1975)

2D Coupe SZ L HD 8 HP 28 AC 11 SP 220 M +6 ACC 200 CP 1/1

Ford Mustang I (USA 1967)

2D Coupe SZ L HD 7 HP 25 AC 14 SP 100 M +3 ACC 55 CP 1/1

GAZ SG-2 Torpedo (USSR 1956)

Racecar SZ L HD 9 HP 32 AC 16 SP 120 M +2 ACC 60 CP 1/1

GM Firebird III (USA 1963)

2D Coupe SZ L HD 12 HP 42 AC 12 SP 100 M +2 ACC 50 CP 1/1

Isuzu Bellett MX 1600 (Japan 1975)

2D Coupe SZ L HD 8 HP 28 AC 16 SP 160 M +3 ACC 120 CP 1/1

Lamborghini Athon (Italy 1980)

2D Coupe SZ L HD 9 HP 32 AC 16 SP 170 M +5 ACC 80 CP 1/1

Lamborghini Evoluzione (Italy 1972)

2D Coupe SZ L HD 9 HP 32 AC 20 SP 210 M +6 ACC 200 CP 1/1

Lotus Esprit (UK 1977)

2D Coupe SZ L HD 9 HP 32 AC 11 SP 130 M +3 ACC 75 CP 1/1

Mercedes C111 (BRD 1974)

2D Coupe SZ L HD 9 HP 32 AC 11 SP 160 M +5 ACC 120 CP 1/1

Mercedes C112 (BRD 1996)

2D Coupe SZ L HD 10 HP 35 AC 12 SP 190 M +5 ACC 125 CP 1/1

MG EX-E (UK 1990)

2D Coupe SZ L HD 9 HP 32 AC 11 SP 170 M +5 ACC 120 CP 1/1

Mitsubishi HSR (Japan 1992)

2D Coupe SZ L HD 10 HP 35 AC 12 SP 190 M +4 ACC 150 CP 1/1

Nissan MID4 (Japan 1990)

2D Coupe SZ L HD 9 HP 32 AC 12 SP 160 M +4 ACC 150 CP 1/1

Panther Six (UK 1982)

2D Coupe SZ L HD 10 HP 35 AC 16 SP 200 M +2 ACC 100 CP 1/1 SP Six wheels

Porsche 959 (BRD 1991)

2D Coupe SZ L HD 10 HP 35 AC 14 SP 200 M +5 ACC 165 CP 1/1

Toyota 800 GT (Japan 1982)

2D Coupe SZ L HD 7 HP 25 AC 16 SP 50 M +1 ACC 40 CP 1/1

Toyota Publica (Japan 1967)

1D Coupe SZ L HD 7 HP 25 AC 16 SP 90 M +2 ACC 55 CP 1/1

Vauxhall XVR (UK 1966)

2D Roadster SZ L HD 10 HP 35 AC 10 SP 100 M +1 ACC 50 CP 1/1

Vector Twin Turbo (USA 1983)

2D Coupe SZ L HD 10 HP 35 AC 11 SP 240 M +5 ACC 120 CP 1/1

Chevrolet Aero-Vette

Curtis 2500 AirCar

Ford Mustang I

Ford FX Atmos

AMC Electron

Vauxhall XVR

Compacts / Mid-Size

Model	SZ	HD	HP	AC	SP	M	ACC	CP
Generic 1950s	L	10	35	15	90	-1	30	1/3
Generic 1960s	L	10	35	15	95	+0	40	1/3
Generic 1970s	L	10	35	15	100	+0	50	1/3
Generic 1980s	L	10	35	15	115	+0	60	1/3
Generic 1990s	L	10	35	15	135	+0	70	1/3

Aerocar Aero-Plane (USA 1969)

2D Aircar TY Cm SZ L HD 6 HP 21 AC 15 SP 125 M +3 ACC 30 C 13,000 ROC 100 CP 1/3 | *These compact cars were an early attempt at flying cars*

Audi Quartz Coupe (BRD 1986)

2D Coupe SZ L HD 9 HP 32 AC 13 SP 140 M +0 ACC 85 CP 1/3

Austin Triplex 10/20 (UK 1983)

5D Estate Car SZ L HD 9 HP 32 AC 15 SP 100 M +0 ACC 40 CP 1/7

Chevrolet Citation IV (USA 1983)

2D Coupe SZ L HD 9 HP 32 AC 10 SP 150 M +0 ACC 60 CP 1/3

Chevrolet Electrovair II (USA 1971)

4D Sedan SZ L HD 9 HP 32 AC 16 SP 50 M +0 ACC 25 CP 1/3 SP EV

Chrysler ETV-1 (USA 1984)

2D Coupe SZ L HD 10 HP 35 AC 14 SP 65 M -2 ACC 40 CP 1/3

Curtis 2500 AirCar (USA 1964)

2D Hovercar SZ L HD 9 HP 32 AC 14 SP 40 M +3 ACC 20 CP 1/1

Davis Divan D2 Delta (USA 1952)

2D Coupe SZ L HD 9 HP 32 AC 14 SP 70 M -2 ACC 30 CP 1/3

Ford FX Atmos (USA 1959)

2D Coupe SZ L HD 10 HP 35 AC 16 SP 190 M +2 ACC 70 CP 1/2

Mitsubishi ESR (Japan 1998)

4D Van SZ L HD 9 HP 32 AC 12 SP 120 M +0 ACC 80 CP 1/3

Saab 900 EV-1 (Sweden 1991)

2D Coupe SZ L HD 10 HP 35 AC 16 SP 170 M +2 ACC 85 CP 1/3

Toyota 4500GT (Japan 1994)

2D Coupe SZ L HD 10 HP 35 AC 11 SP 140 M +0 ACC 80 CP 1/3

Volvo Tundra (Sweden 1984)

2D Coupe SZ L HD 9 HP 32 AC 16 SP 170 M +2 ACC 85 CP 1/3

Full-Size / Station Wagons

Model	SZ	HD	HP	AC	SP	M	ACC	CP
1950s Generic	L	11	39	15	100	+0	50	1/5
1960s Generic	L	12	42	15	110	+0	50	1/5
1970s Generic	L	12	42	15	110	+0	60	1/5
1980s Generic	L	11	39	15	110	+0	50	1/5
1990s Generic	L	11	39	15	280	+1	85	1/5

Aston Lagonda (UK 1979)

4D Saloon SZ L HD 11 HP 39 AC 15 SP 150 M +3 ACC 90 CP 1/4

Cadillac Voyage (USA 1992)

4D Sedan SZ L HD 11 HP 39 AC 16 SP 160 M +1 ACC 85 CP 1/4

Lincoln Futura (USA 1960)

4D Sedan SZ L HD 12 HP 42 AC 11 SP 150 M -5 ACC 80 CP 1/3

Trucks / Vans / Utility Vehicles

Alfa Romeo Taxi (Italy 1981)

4D Van SZ L HD 9 HP 32 AC 15 SP 125 M -1 ACC 30 CP 1/5 | *This vehicle was essentially a minivan with room for four passengers, who sat facing one another.*

Jeep Electruck (USA 1979)

1D Utility SZ L HD 10 HP 35 AC 16 SP 30 M -2 ACC 15 CP 1/3 SP EV | *The Electruck was not just a prototype EV, but one that saw service, especially with the United States Post Office.*

Jeep Cowboy (USA 1976)

2D Pickup SZ L HD 10 HP 35 AC 16 SP 110 M -1 ACC 30 CP 1/2

Volkswagen Futura (BRD 1989)

3D Minivan SZ L HD 9 HP 32 AC 10 SP 110 M -2 ACC 35 CP 1/3

Spacecraft

Spacecraft are handled differently than aircraft in *High Frontier*. The key statistic with spacecraft is how high they can travel, rated by Orbital Zones (OZ).

Orbital launch vehicles are rockets designed to take large payloads into space. Smaller carrier rockets are used for simple satellite launches. Because OLV's are designed to reach orbit, they all have a top speed of approximately 17,448 mph. Rate of climb is over 153,000 feet per round. Assume that a rocket can car-

ry half of its payload into MEO, one third into HEO or the Moon and one fifth of its payload to Mars.

Orbital Zones are ranked from 1 to 11. One travels beyond Earth orbit if they are headed for the OZ 10—Moon, or OZ 11—Mars.

Orbital Launch Vehicles

Vehicle	SZ	HD	HP	AC	Fuel	Payload #
CHINA						
Long March 2E	C	96	336	13	HEO	20,900
Long March 3B	C	96	336	13	TMI	25,400
FRANCE						
Ariane 4	C	96	336	13	HEO	15,400
Ariane 5	SC	97	340	11	HEO	35,000
INDIA						
ISRO PSLV	C	87	305	15	HEO	8,400
JAPAN						
H-II	C	96	336	13	HEO	22,200
USA						
Atlas II	G	40	140	19	HEO	14,500
Delta II	G	45	158	19	TMI	13,400
Nova	SC	97	340	11	TMI	662,000
Saturn I	SC	98	343	9	TLI	20,000
Saturn IB	SC	98	343	9	LEO	48,000
Saturn II	SC	98	343	9	LEO	146,000
Saturn C-8	SC	97	340	11	TLI	460,000
Saturn V	SC	97	340	11	TLI	310,000
Sea Dragon*	TR	99	347	7	LEO	1,210,000
Vehicle	SZ	HD	HP	AC	Fuel	Payload #
Titan II	C	71	249	15	LEO	7,900
Titan III	SC	97	340	11	TMI	28,900
Titan IV	SC	97	340	11	HEO	47,800
Titan 34D	G	62	217	17	HEO	32,000
USSR						
Energia	TR	99	347	7	TLI	220,000
NI-L3	TR	99	347	7	TLI	209,000
Proton	G	64	224	17	HEO	50,000
Proton-K	C	73	256	15	LEO	50,200
Soyuz	C	96	336	13	LEO	14,200
Voskhod	C	96	336	13	LEO	13,000
Vostok-K	C	71	249	15	LEO	10,400
Zenit-2	C	96	336	13	MEO	30,300

The Sea Dragon is a concept from the 1960's for a rocket that launches from a horizontal position while floating in water

Orbital Zones

OZ		Altitude
1	LEO 1	280 to 400 miles
2	LEO 2	400 to 620 miles
3	LEO 3	620 to 1,200 miles
4	MEO 1	1,200 to 7,500 miles
5	MEO 2	7,500 to 14,500 miles
6	MEO 3	14,500 to 22,000 miles (GSO)
7	HEO 3	22,000 to 37,000 miles
8	HEO 3	37,000 to 110,000 miles
9	HEO 3	110,000 to 202,000 miles
10	TLI	202,000 to 221,500 miles
11	TMI	141,634,900 miles

Space Planes

Antonov MAKS (USSR 1988)

SZ C HD 96 HP 336 AC 11 SPD 17,450 mph ROC 20,000' OZ 1 MVR +5 CP 2/6 WT 278 tons SP 303-ton payload | *This vehicle was designed to be launched by an An-225 Mriya.*

BAC MUSTARD (UK 1968)

SZ C HD 96 HP 336 AC 11 SPD 17,450 mph ROC 10,000' OZ 3 MVR +5 CP 2/2 WT 468 tons SP 2.5-ton payload

Boeing X-20 Dyna-Soar II (USA 1966)

SZ H HD 18 HP 63 AC 16 SPD 17,450 mph ROC 17,000' OZ 1 MVR +2 CP 1/0 WT 5.7 tons SP - | *Carried into orbit by rockets and re-enters atmosphere on its own.*

Lockheed Star Clipper (USA 1971)

SZ C HD 96 HP 336 AC 11 SPD 17,450 mph ROC 20,000' OZ 1 MVR +5 CP 2/12 WT 1,165 tons SP 25-ton payload

Lunex Lander (USA 1963)

SZ H HD 27 HP 95 AC 18 SPD 17,450 mph ROC 20,000' OZ 10 MVR +5 CP 3/0 WT 10.1 tons SP 67-ton payload

Martin Marietta Spacemaster (USA 1967)

SZ SC HD 98 HP 343 AC 7 SPD 17,450 mph ROC 15,000' OZ 1 MVR +5 CP 2/4 WT 1,750 tons SP 25-ton payload

North American DC-3 (USA 1971)

SZ SC HD 96 HP 336 AC 9 SPD 17,450 mph ROC 15,000' OZ 1 MVR +4 CP 2/0 WT 2,030 tons SP 6-ton payload

Rockwell International Star-Raker (USA 1979)

SZ SC HD 97 HP 340 AC 9 SPD 17,450 mph ROC 20,000' OZ 2 MVR +5 CP 2/8 WT 486 tons SP 110-ton payload

Rockwell X-30 (USA 1986)

SZ G HD 45 HP 158 AC 20 SPD 19,200 mph ROC 20,000' OZ 1 MVR +2 CP 2/10 WT 150 tons SP 5-ton payload | *X-30 is designed to take off from an airport*

Space Shuttle *Enterprise* (USA 1972)

SZ C HD 76 HP 266 AC 16 SPD 17,450 mph ROC 20,000' OZ 6 MVR -2 CP 2/5 WT 2,235 tons SP 30-ton payload | *The Russian* Buran *has the same basic stats as this vehicle*

Tupolev Tu-2000 (USSR 1986)

SZ C HD 96 HP 336 AC 20 SPD 18,300 mph ROC 20,000' OZ 2 MVR +5 CP 2/12 WT 386 tons SP 100-ton payload

Spacecraft

Apollo Lunar Module (USA 1968)

SZ L HD 11 HP 39 AC 16 SPD 220 mph MVR +1 CP 2/0 WT 2.2 tons SP 9-day endurance, 11,000-lb. payload | *In reality, this is the lunar module that brought the first humans to the Moon in 1969. The earlier Moon landings posited in* High Frontier *would have used a similar spacecraft.*

Big Gemini – Saturn-launched (USA 1969)

SZ G HD 60 HP 210 AC 10 SPD - MVR -4 CP 9/3 WT 17.2 tons SP 10-day endurance, 5,500-lb. payload | *This capsule was to be used for resupplying America's space stations. It could be launched with the Saturn or Titan III rocket (see above).*

LK-700 (USSR 1972)

SZ C HD 82 HP 287 AC 13 SPD - MVR +5 CP 3/0 WT 160 tons SP 40-day endurance, 10,000-lb. payload | *The LK-700 was designed for Soviet moon missions, and is launched with a Proton rocket.*

Progress (USSR 1978)

SZ H HD 17 HP 60 AC 14 SPD - MVR -2 CP 6/0 WT 7.7 tons SP 40-day endurance, 5,070-lb. payload | *Developed for re-supply missions to space stations.*

ROMBUS (USA 1986)

SZ G HD 110 HP 385 AC 6 SPD - MVR -4 CP 6/0 WT 7.1 tons SP 600-day endurance, 990,000-lb. payload | *ROMBUS (Reusable Orbital Module-Booster & Utility Shuttle) is a design for a spacecraft that could land astronauts on Mars.*

Boeing X-20 Dyna-Soar II

Lockheed Star Clipper

Martin Marietta Spacemaster

Rockwell International Star-Raker

Rockwell X-30

Soyuz-7K (USSR 1967)

SZ L HD 14 HP 49 AC 20 SPD - MVR -3 CP 3/0 WT 3.5 tons SP 30-day endurance, 14,210-lb payload

Voskhod 3KD (USSR 1965)

SZ L HD 12 HP 42 AC 20 SPD - MVR -3 CP 3/0 WT 6.3 tons SP 14-day endurance, 5,000-lb payload

Vozvraschaemyi Apparat TKS (USSR 1977)

SZ H HD 26 HP 91 AC 18 SPD - MVR -4 CP 3/0 WT 19 tons SP 7-day endurance, 27,700-lb. payload

Starships

A starship is a spacecraft designed to travel out of the Solar System to other star systems. There are two notable designs. The statistics below assume a date on which they might have been completed had they been more than just theoretical.

Daedalus **Nuclear Starship (UK 1993)**

SZ T HD 130 HP 455 AC 2 SPD 80,500,000 mph MVR +2 CP 2/0 WT 59,500 tons SP 550-ton payload

Project Daedalus was a proposal in 1973 to build a fusion rocket-propelled spacecraft that would travel for 50 years to Barnard's Star, 5.9 LY away. The vessel has a hull of molybdenum alloyed with Titanium, Zirconium and Carbon. It uses Helium-3 fuel pellets, which must be mined over a period of 20 years from either Jupiter or the Moon. The vessel has 18 autonomous probes on board. The first stage of propulsion would take the vessel to 7.1% light speed, the second stage up to 12% light speed.

Orion **Nuclear Starship (USA 1978)**

SZ G HD 110 HP 385 AC 2 SPD 220,968,000 mph MVR +7 CP 2/0 WT 51,000 tons SP 6,100-ton payload

Project Orion was a proposal in 1958 to build a nuclear-powered interstellar spacecraft. Orion was intended for travel to Saturn using 800 nuclear bombs as its power source. Super Orion would be larger and use more than 1,000 nuclear bombs. Energy Limited Orion was the largest concept (10 million tons) and was designed to reach Alpha Centauri B in 1,330 years for the low price of $3.67 trillion.

Robotics

Two robot-like machines saw service beginning in the 1970's of the *High Frontier*.

Hardiman I

Origin: USA, 1976
Type: Powered Exoskeleton
Size: Large
Hit Dice: 7 (25 hp)
Armor Class: 16
Speed: 2 mph
Maneuver: -1
Payload: 1,500 lb.
Crew/Passengers: 1/0

The Hardiman is a powered exoskeleton designed to multiply the strength of human beings, primarily to help in the loading and unloading of cargo. In the suit, a person can lift 1,500 lb. with ease.

Walking Truck

Origin: USA, 1973
Type: Quadruped Robot
Size: Large
Hit Dice: 10 (35 hp)
Armor Class: 16
Speed: 5 mph
Maneuver: -1
Payload: 750 lb.
Crew/Passengers: 1/0

The Walking Truck, or Cybernetic Walking Machine, is a quadrupedal machine designed to help infantry carry equipment over rough terrain. Operating the machine is exhausting, with operators able to use it for 1 hour + 1 hour per point of Constitution bonus.

Weapons

9A-91 carbine (USSR 1993)

CAL 35 DMG 1d6 ROF 900 SHOTS 20 (mag) RNG 660' WT 6 lb

AK-47 rifle (USSR 1949)

CAL 30 DMG 2d4 ROF 775 SHOTS 20 (mag) RNG 1650' WT 7 lb

AR-7 rifle (USA 1958)

CAL 22 DMG 1d4 ROF 800 SHOTS 15 (mag) RNG 330' WT 3 lb

Aircrew survival weapon

AR-15 / M-16 rifle (USA 1958)

CAL 22 DMG 1d8 ROF 800 SHOTS 20 (mag) RNG 1650' WT 7 lb

Beretta M9 pistol (Italy 1990)

CAL 35 DMG 1d6 ROF 60 SHOTS 15 (mag) RNG 160' WT 2 lb

Colt MEU pistol (USA 1986)

CAL 45 DMG 1d6 ROF 60 SHOTS 7 (mag) RNG 240' WT 3 lb

Colt Python revolver (USA 1955)

CAL 36 DMG 1d6 ROF 6 SHOTS 6 (cylinder) RNG 220' WT 2 lb

Dragunov sniper rifle (USSR 1963)

CAL 30 DMG 3d4 ROF 1 SHOTS 10 (mag) RNG 2600' WT 10 lb

EM-2 rifle (UK 1951)

CAL 28 DMG 2d4 ROF 600 SHOTS 20 (mag) RNG 2300' WT 8 lb

FN MAG light machine gun (USA 1958)

CAL 30 DMG 1d10 ROF 600 SHOTS 100 (belt) RNG 3900' WT 26 lb

M3/A1 'Grease Gun' submachine gun (USA 1942)

CAL 45 DMG 1d6 ROF 350 SHOTS 30 (mag) RNG 300' WT 8 lb

M4A1 carbine (USA 1993)

CAL 21 DMG 1d8 ROF 700 SHOTS 30 (mag) RNG 1650' WT 6 lb

M86 sniper rifle (USA 1986)

CAL 30 DMG 4d4 ROF 1 SHOTS 5 (mag) RNG 4950' WT 21 lb

M6 rifle/shotgun (USA 1956)

Rifle: CAL 22 DMG 1d6 ROF 1 SHOTS 1 RNG 600' WT 5 lb

Shotgun: CAL 41 DMG 1d8 ROF 1 SHOTS 1 RNG 90' WT 5 lb

American aircrew survival weapon with rifle and shotgun barrel

Makarov PM pistol (USSR 1951)

CAL 38 DMG 1d6 ROF 60 SHOTS 10 (mag) RNG 160' WT 2 lb

SG 552 commando rifle (Switz. 1990)

CAL 21 DMG 1d6 ROF 100 SHOTS 20 (mag) RNG 300' WT 9 lb

S&W Model 29 revolver (USA 1955)

CAL 44 DMG 1d8 ROF 6 SHOTS 6 (cylinder) RNG 150' WT 3 lb

TP-82 pistol/shotgun (USSR 1986)

Pistol: CAL 22 DMG 1d8 ROF 1 SHOTS 1 RNG 480' WT 5 lb

Shotgun: CAL 55 DMG 1d10 ROF 1 SHOTS 2 RNG 90' WT 5 lb

Soviet cosmonaut survival weapon with one pistol barrel, two shotgun barrels (see below) and a detachable buttstock machete

Uzi submachine (Israel 1948)

CAL 35 DMG 1d6 ROF 600 SHOTS 25 (mag) RNG 390' WT 8 lb

Low Gravity Weapons

Gas Cartridge Gun (USA)

CAL 33 DMG 1d4 ROF 10 SHOTS 25 (mag) RNG 150' WT 2 lb

Gas Operated Needle Gun (USA)

CAL 20 DMG 1d4 ROF 60 SHOTS 25 (mag) RNG 150' WT 2 lb

Sausage Gun (USA)

CAL 25 DMG 1d4 ROF 60 SHOTS 19 (mag) RNG 150' WT 1 lb

Spin Stabilized Micro Gun Pistol (USA)

CAL 14 DMG 1d6 ROF 60 SHOTS 30 (mag) RNG 200' WT 4 lb

Spring Propelled Gun (USA)

CAL 20 DMG 1d4 ROF 6 SHOTS 20 (mag) RNG 150' WT 5 lb

Missiles

Guided missiles grant pilots a bonus to attack against targets within visual range. The visual range of a vehicle or structure depends on the size of the object.

Size	Visual Range
Small	1 mile
Medium	2 miles
Large	4 miles
Huge	8 miles
Colossal	12 miles
Gargantuan	18 miles
Super Colossal	24 miles

Missile	ATK	DMG	Range (miles)	Weight (lb.)
AAM-N-10 Eagle AAM	+1	3d6**	130	650
AGM-65 Maverick ASM	+3	1d8**	7	670
AIM-4 Falcon AAM	+1	2d4**	18	135
AIM-7 Sparrow AAM	+1	1d12**	20	510
AIM-9 Sidewinder AAM	+2	1d8**	22	190
K-5 'Alkali' AAM	+1	2d4**	1	180
K-9 'Awl' AAM	+2	2d6**	22	540

Missile	ATK	DMG	Range (miles)	Weight (lb.)
K-13 'Atoll' AAM	+2	1d8**	20	200
Matra AAM	+2	2d6**	12	420
PL-4 AAM	+1	1d10**	11	330
Pye Wacket AAM	+2	10d6**	83	510
R-60 'Aphid' AAM	+2	10d6**	5	100
Red Hebe AAM	+1	1d12**	4	1330

Rockets

Rocket	DMG	Range (miles)	Weight (lb.)
FFAR 'Mighty Mouse' AAR	2d4**	2	20
HVAR 5-inch ASR	2d6*	3	135
Hydra 70 ASR	2d4*	5	15
S-5 ASR	9d6	2	10
SNEB 37mm ASR	8d6	2	2
SNEB 68mm ASR	12d6	2	15
SNEB 100mm ASR	2d6*	2	40
Zuni AAR/ASR	7d6*	5	80

Rocket attacks are handled like attacks with guns, but suffer a -4 penalty to hit.

Tools

Bell Rocket Belt

Introduced by Bell in 1960, the rocket belt can carry one person at up to 35 miles per hour at a ceiling of 60′. The pilot has a maneuver bonus of +4. The unit has AC 16 and weighs 300 lb.

Hand Laser

A Soviet weapon, it was designed to knock out optic sensors on spacecraft and potentially to blind human beings. To blind a person, one must make a ranged attack against a set Armor Class of 14 and the target can make a saving throw to negate the effect. If the attack succeeds, the target is blinded for 1d6 turns. If the target's saving throw is a natural "1", they are blinded permanently by the attack.

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Inspiration

Artists

Chesley Bonestell (1888-1986)

Ed Emshwiller (1925-1990)

Frank Tinsley (1899-1965)

Klaus Bürgle (1926-2015)

Robert McCall (1919-2010)

Syd Mead (1933-2019)

Books and Magazines

2001: A Space Odyssey (1968) by Arthur C. Clarke

A Fall of Moondust (1961) by Arthur C. Clarke

Across the Space Frontier (1952) by Joseph Kaplan, Wernher Von Braun, Heinz Haber, Willy Ley and others

The Andromeda Strain (1969) by Michael Crichton

The Conquest of Space (1950) by Willy Ley

First Men to the Moon (1960) by Wernher Von Braun

Marooned (1964) by Martin Caidin

The Mars Project (1953) by Wernher Von Braun and Henry J. White

The Moon is a Harsh Mistress (1966) by Robert A. Heinlein

The Outward Urge (1959) by John Wyndham

Prelude to Space (1947) by Arthur C. Clarke

The Right Stuff (1979), by Tom Wolfe

Solaris (1961) by Stanisław Lem

Tau Zero (1970) by Poul Anderson

Films

1999 A.D. (1967), directed by Lee Madden

2001: A Space Odyssey (1968), directed by Stanley Kubrick

Apollo 13 (1995), directed by Ron Howard

Conquest of Space (1955), directed by Byron Haskin

Destination Moon (1950), directed by Irving Pichel

Earth II (1971), directed by Tom Gries

Marooned (1969), directed by John Sturges

Moon Zero Two (1969), directed by Roy Ward Baker

Project Moonbase (1953), directed by Richard Talmadge

The Right Stuff (1983), directed by Philip Kaufman

Television

Johnny Quest (1964-1965), created by Doug Wildey

MacGyver (1985-1992), created by Lee David Zlotoff

Men into Space (1959-1960), created by Lewis J. Rachmil

Space Angel (1962-1964), created by Dik Darley

Star Trek (1966-1969), created by Gene Roddenberry

Thunderbirds (1964-1966), created by Gerry and Sylvia Anderson

UFO (1970), created by Gerry and Sylvia Anderson with Reg Hill

High Frontier

When the Second World War ended, people anticipated a bright, prosperous future. With enough time, money and brain power, the possibilities were endless. Flying cars, jet packs, giant space wheels, Moon bases, super computers ... it was not only in reach, it was without a doubt going to happen.

So what happened?

HIGH FRONTIER is a supplement for the **GRIT & VIGOR** role playing game that posits what the adventurous life might be like in the retro future that could have been. Whether you adventure on Earth, in orbit or the Moon or Mars, you will find valuable information in this tool box - the tools, vehicles, technology and, maybe most importantly, the assumptions of those generations who knew they would one day leave their home planet for the **HIGH FRONTIER!**