2300 AD ™

MAN'S BATTLE FOR THE STARS

FREE
Kafer
Dawn
Module
INSIDE

GDW

A realistic science-fiction role-playing game by
Marc W. Miller, Timothy B. Brown,
Lester W. Smith, & Frank Chadwick

The following errata should be noted for **2300 AD**.

ADVENTURER'S GUIDE

On page 54, the statement in the sidebar identifies the BH-21 Combat Walker as the first walker ever produced. That is incorrect.

On page 60, the speeds of the *First-Line Multipurpose Fighter* should be "kph," not "mph."

On page 81, the sidebar concerning Manchuria mentions DM + 4 123 as the Eber home system; it is, rather, the Sung home system.

DIRECTOR'S GUIDE

On page 50, under "Fire Combat," note that weapon rate of fire is the number of aimed shots or area fire bursts that a weapon can fire in a combat *round* (initiative point), not combat *turn*.

On page 59, in the "Optional Wound Rules" box of the "Target Hits" diagram, "Arm" was not listed. An arm hit should give a die modifier of + 0. (This correction should be made on page 9 of the "Play Aids" book as well.)

On pages 60 and 61, a few changes should be made to the combat

example:

First, treat Frank as having an FAM-90, not an SK-19.

Second, note that characters with Combat Rifleman-3 need a 3 to hit at close range (Routine task = 6, −3 for skill), not a 4.

Third, when Angela performs a diving blow toward Georgette, Angela rolls 1D6 and adds it to her Size × 2, but Georgette (as receiver) should just add her own Strength and Size together. As long as the resultant totals are equal, both characters will suffer damage.

Fourth, the information about the potential light wound that results for Angela should say "a 4 is rolled for its effect," not a 9.

Last, Angela's final strike attack occurs in turn five, at initiative point 1 (which is half of her adjusted initiative of 3). Turn six never occurs, and even if it did, Angela would not act until initiative point 3.

On page 74, the *Anjou*-class cargo vessel has life support enough for 25 people, not 24 as is indicated in the third paragraph.

On page 82, the *Kafer X-ray Missile* should have a Movement of 6, not 11.

On page 87, the first column of the Life Zones table should read "Luminosity," not "Distance."

Current copies of **2300 AD** contain, as a bonus, a free adventure module, **Kafer Dawn.**

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ADVENTURER'S GUIDE

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The **2300 AD** *Director's Guide* includes Aliens, Animal Encounters, The Colonies of the Earth Table, Combat, Combat Examples, Combat Resolution Tables, Experience and Renown, Event Resolution, Introduction, Map of the American Arm, Map of the Chinese Arm, Map of the Fench Arm, Near Star Map, Non-Player Characters, NPC Data Form, Organizations, Running Adventures, Ship Listings, Space Combat, Star/World/Colony Form, Star Travel, Task Resolution Table, Weapons Data Form, World Generation, World Generation Tables, and World Mapping.

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"There can be no thought of finishing, for 'aiming at the stars,' both literally and figuratively, is a problem to occupy generations, so that no matter how much progress one makes, there is always the thrill of just beginning."

—Dr. Robert Goddard (in a letter to H. G. Wells)

THE 2300 AD DESIGN STAFF

Marc W. Miller. The designer of the best-selling **Traveller** science-fiction role-playing game and many historical and science-fiction boardgames, including **Imperium** and **Triplanetary**. His games have been recognized across the entire spectrum of gaming; they have won the Charles Roberts Award, the H. G. Wells Award, the Strategists' Club Award, and the Game Designers' Guild Award. Marc was elected to the Adventure Gaming Hall of Fame in 1981.

Frank Chadwick. Designer of the best-selling **Twilight: 2000** role-playing game. Frank is one of the great systems designers in modern gaming; he is responsible for game systems for more than 50 titles, including the **Third World War** series, the **Assault** series, and much of the **Europa** series. Frank has designed award winners in boardgames, role playing, and miniatures. He was elected to the Adventure Gaming Hall of Fame in 1985.

Timothy B. Brown. Experienced writer, developer, editor, and designer. He worked his way up through the GDW organization, showing his talents and making himself indispensable. He naturally gravitated to development, where he made his mark on **Twilight: 2000** and **Traveller** products.

Lester W. Smith. A relative newcomer to the GDW staff, originally a proofreader. His wide experience with RPGs soon led him into design and development, where he has taken over many duties connected with **2300 AD**, including the game's revision.

The background history for **2300 AD** was developed over the course of 1985-86 using a grand social-political-economic-military-diplomatic simulation known fondly here as *The Game*. The future course of history depended not on just one person's ideas of what the future would be like, but on the interaction of many people's ideas—the ones that survived were the ones that withstood the conflict and diplomacy of *The Game*. Beginning with the conduct of World War III, players manipulated their nations on five- or 10-year turns to bring them into the future of the year 2300. Players in *The Game* were:

John Astell (Mexico, Romania, and India).
Rich Banner (Russia, Zimbabwe, and Canada).
Kevin Brown (Cuba, the Ukraine, and Australia).
Timothy B. Brown (United Kingdom, Algeria, and Manchuria).
Larry Butz (Venezuela, Italy, Iran, and Angola).
John Harshman (France, Argentina, and Israel).
Dr. David MacDonald (Military Government of the United States, Poland, and Canton).
Marc W. Miller (Azania, Japan, Bolivia, and Egypt).
Matt Renner (Civilian Government of the United States, Sweden, and Nigeria).
Wayne Roth (Brazil, Spain, and Turkey).
Loren Wiseman (New America, Germany, and Indonesia).
Frank Chadwick (referee and kibbitzing player).

SIGNIFICANT CONTRIBUTIONS

Additional help in the design, development, and production of **2300 AD** came from many quarters. They included: Loren Wiseman for basic science-fiction conceptualizations and background development; Gary Thomas and Joe Fugate of Digest Group for their initial task system design and development; John Harshman for some basic science-fiction conceptualizations; Matt Renner and Kevin Brown for character generation systems; Steve Venters for the **2300 AD** logo, equipment and weapons conceptualizations, and the box cover painting; Bryan Gibson for vehicle designs; Deb Zeigler for the Sung, the Xiang, and the IEX; and William H. Keith, Jr. for the Kafers.

Artists contributing to this game: *Illustrations:* D. J. Barr, Steve Venters, Liz Danforth, A.C. Farley, Bryan Gibson, Tom Peters, Tim Bradstreet, Rob Caswell, Jeff Dee; *Cover Illustration:* A.C. Farley; *Art Director:* Barbie Pratt; *Graphic Design and Production:* Lauretta Oblinger, Dana Reischauer, James R. Kuntz, Kelly Walsh.

The GDW production staff includes: *Text Manager:* Michelle Sturgeon; *Typesetting:* Michelle Sturgeon, Kelly Walsh, Robbi Garner; *Text Processing:* Tim Ryan, Julia Martin, Chuck Fossler, Shena Salzmann, Elysabeth Dzik, Carol Etter, Karen Lumb.

THE INTELLIGENT RACES
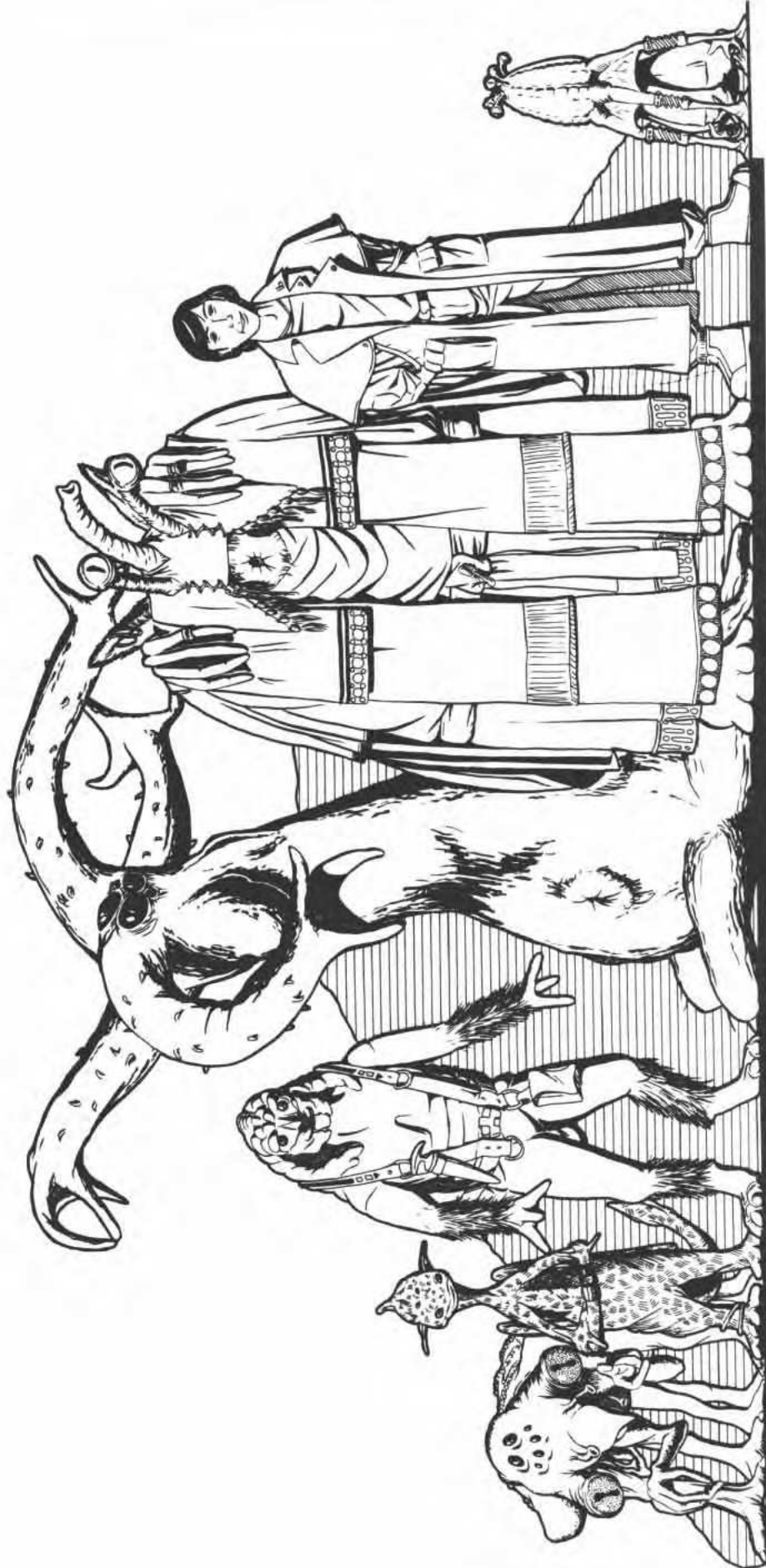
Introduction

The year is 2300 AD—a future that is at the same time vastly different from the 20th century and very much the same.

There is no world government, for example. Individual nations still rule their own territories, and they still fight among themselves. On the other hand, there have been no nuclear wars since World War III, the Twilight War (during which period the role-playing game **Twilight: 2000** is set), and all nations agree fairly well that their homeworld cannot again be contaminated with radioactivity. The last 300 years have seen humanity's collective wisdom grow, at least in certain areas, allowing the world to survive, flourish, and embrace a new age in which humans travel among the stars and live on other worlds. An interstellar human culture is just in the first stages of blooming.

But new crises threaten. The savage Kafers, an alien race from beyond Arcturus, have launched a vicious assault on one branch of human colony worlds. An underground society of anarchists wage a war of terrorism on a second branch. And on a third, human colonial expansion has stagnated in a dead end that scientists labor to breach in order to open the way to strange and exotic new systems where untold dangers may lurk. Meanwhile, throughout human space, police forces battle incessantly with smugglers, thieves, and pirates.

2300 AD is a science-fiction role-playing game set in the early years of the 24th century. Players become characters who live in this futuristic world, travelling to star systems that the Earth has colonized, warring with implacable aliens, battling high-tech criminals, exploring new systems, hunting bizarre and dangerous alien animals, or any of a multitude of other possibilities.

WHAT IS A ROLE-PLAYING GAME?

A role-playing game is a game in which a group of players join together and, with the help of a referee, play through adventures which involve the imagination and the mental resources of everyone present. In many ways, it is like living through an adventure novel, performing the actions that make up its plot, rather than simply reading what someone else has written. It is also like performing a play with only the outline of a script and filling in the dialogue and action for yourself. Most importantly, it is a setting in which you and your friends work together in a world of your imaginations, creating shared memories of excitement and adventure that you can carry with you for years to come.

THE ROLE OF THE PLAYER

The way in which a player interacts with this world of imagination is through a character. A player character is a role that the player acts out in much the same way that a movie or television actor plays a role, but with the addition of a set of defined characteristics that determine what skills and capabilities that character has. Role playing means that a player can assume the role of an individual much different than himself: A smart player can assume the role of a dumb character; a weak player can assume the role of a strong character. As a player acts out the role of his character, he strives to achieve goals that have been set for that character, usually set by the player himself. Several players together form a group in which each character's strengths and weaknesses interplay with those of the other players as they cooperate (or fail to cooperate) to reach a shared goal.

While a player's job in a role-playing game is to act out the role of his character, a player's responsibility is to play that character well and to have fun while making the game fun for the others involved, including the referee. You can judge for yourself if you are a success at this because the other people involved will want you to come back for further adventures.

If you intend to be a player, you will need to read through the book you now hold in your hands. It explains how to create a character and the basics of what you should know about the universe your character lives in. Not all of this book needs to be read at once, however; just learn how to create a character to start with, and read the other material as you have the time and interest. Some players may want to read portions of the *Director's Guide* as well, in order
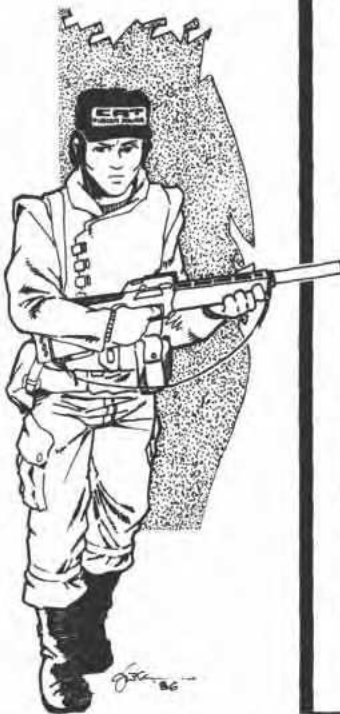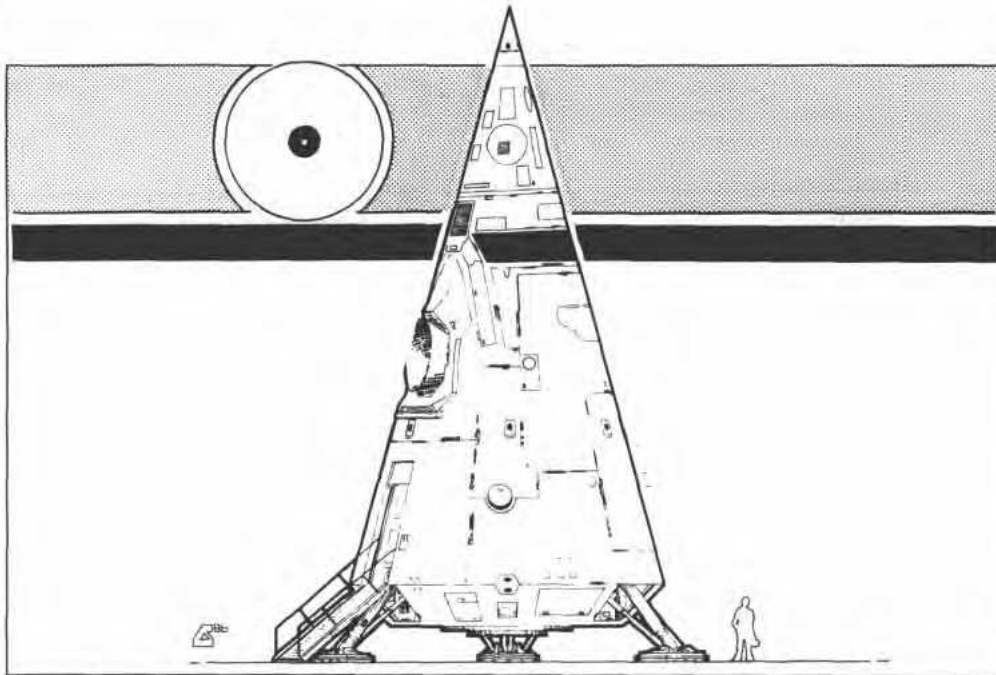
to gain a full understanding of how the rules work. But remember that the referee is the final arbiter in any rules dispute and even holds the power to countermand the rules if necessary to ensure that play proceeds smoothly and enjoyably.

THE REFEREE'S TASK

The referee is really just a special type of role-player. Instead of acting the part of one character, as a player does, the referee acts out the parts of all the characters that the player characters meet in their adventures. These characters are typically called *non-player* characters, or NPCs for short, to distinguish them from player characters (sometimes abbreviated to PCs). The referee keeps track of what is happening in the universe outside of the players' view and settles any questions of rules during play. The referee also has the responsibility of making play flow so that everyone involved has as much fun as possible. A referee can judge how well he is doing his job by how his players act after an adventure. If they are eager to come back for further sessions, that referee is a success.

As you can see, the referee must be a very resourceful person. The referee must know everything the players know and then some. Consequently, the referee must be familiar with the content of the *Adventurer's Guide*, but in order to aid him in his task, another book, the *Director's Guide*, is included in this game as well. The game rules are more fully explained in that book, and instruction and advice are also given there to prepare the referee for play.

MATERIALS NEEDED FOR PLAY

There are few requirements for playing **2300 AD**. You will, of course, need a copy of the game. Next, decide who will become the referee; the others will be players. Players will need photocopies of player-character forms on which to list characteristics, skills, and equipment. A number of pencils and dice would be helpful, as well as blank paper on which to sketch maps, write notes, and the like.

Some groups also use miniature figures to represent their characters on maps or miniature terrain, but these are not strictly necessary. It simply depends upon the style of play your group develops.

Snacks and drinks are highly recommended. Role-playing sessions are social events much like parties, and they usually take at least a couple of hours. Having something to snack on helps make for the sort of relaxed atmosphere desired.

Finally, the referee will need to have an adventure prepared. The *Director's Guide* explains how to do this.

Regardless of the detail and realism you want to put into your play, remember that it is a game, and you are supposed to have fun. We have built a universe where we can all play, with a hopeful outlook for the future of mankind, but nevertheless loaded with adventure and intrigue—the world of 2300 AD. Enjoy!

READING THE DICE

Two types of dice are included with the game: a 10-sided die and four six-sided dice. They will always be referred to in the rules in a type of shorthand notation that makes them very visible for reference during play. The 10-sided die is referred to as 1D10: the 1 being how many are rolled, the D being an abbreviation for "die," and the 10 being the number of sides. To read a roll of 1D10, simply look at the number on the top face when it stops rolling. Similarly, 3D6 means roll three six-sided dice and add the results together. Sometimes a notation will include a number to be added to or subtracted from the final total. For example, 1D10+4 means roll one 10-sided die and add four to the result; 2D6−2 means roll two six-sided dice, add them together, and subtract two from the result.

Character Generation

Every **2300 AD** player participates in the game through his character. Where the player is the actor in the drama of the game, the character is the part, literally the role in the role-playing game. And like roles in drama, the player and the character can be very different.

Characters are generated with a degree of randomness in order to make each new one unique and interesting. However, the procedure of character generation is under the direction of the player himself, and the player's decisions shape the abilities and the skills that the character has. For those who do not like to randomly generate characteristics, a point-based system is also included at the end of this chapter. At each step during the character-generation process, the player may decide to use either system.

Overview: Character generation is conducted by the player in a series of steps.

A homeworld is determined, which in turn determines the character's background and the gravity level in which he grew up.

The player determines a basic body type for the character from a selection of four builds.

Physical and psychological attributes (numerical values) are generated using dice and various modifications.

The player selects a career field and determines how long the character spends in it. The time spent in the career determines a quantity of career points, which can be spent to acquire skills for the character. It is possible to change careers once during the process.

At the end of career resolution, the player determines several secondary characteristics, including age, birthplace, mass, nationality, and native language.

Characters in **2300 AD** are defined using a series of attributes and skills, normally defined in numerical form. The exceptions to this general rule are the various background attributes, consisting of homeworld background and body type. Homeworld background is defined as Core or Frontier world and the gravity type. Body type, described more completely below, is a single word definition of the character's overall physical structure. The eight other basic attributes are divided into two distinct categories: physical and psychological. There are four physical attributes—size, strength, dexterity, and physical endurance. There are also four psychological attributes—determination, intelligence, eloquence, and education.

For ease in generating characters, a character data record is provided, both at the end of this chapter and in the forms booklet; once generation is complete, the data is recorded on the character data record.

CHARACTER BACKGROUND

The first background determination that must be made for a character is the definition of his homeworld. The choice of homeworld determines the gravity type to which the character is accustomed, as well as what kinds of background skills he will have. Homeworld will also help determine the character's nationality and language.

Homeworld

There are two broad categories of homeworlds—Core and Frontier. Core worlds are those worlds at the center and hub of human civilization. People from this background will generally have had access to better educational facilities and be better versed in urban situations. Frontier worlds represent those worlds on the edge of explored space. People from this background will have had more exposure to the survival type of activities encountered on these more primitive worlds.

A character's homeworld also determines what gravity type that character developed in. Gravity type is divided into four headings: high (1.4 G or more), normal (less than 1.4 G but greater than 0.8 G), low (0.8 G to 0.4), and zero-G (anything less than 0.4 G). A character from the Core can choose either normal or zero-G. One from the Frontier can choose from any of the four categories. Gravity type limits body type choice, as well as determining a character's physical performance in different gravitational environments.

Inhabited worlds in **2300 AD** are listed in the Earth's Colonies chart on page 86 by star, world name, importance (homeworld, colony, enclave, or outpost), nationality, year established, and gravity type. Earth and Tirane (Alpha Centauri) are Core worlds; all others are Frontier Worlds. All of this information will be of help to the player when creating a character.

To determine a character's homeworld classification and gravity type, roll 1D10 twice and consult the Homeworld table on the Character Generation chart. The first roll will determine Core or Frontier, and the second will indicate gravity type.

Body Type

The creating player must determine which of four different categories of body type applies to his character. These body types are very general descriptions of human physical makeup, and are termed mesomorph, ectomorph, endomorph, and normal.

Mesomorph: A mesomorph tends toward being very muscular and husky. Mesomorphs will be quite strong, but usually make up for this with a slight deficiency in physical dexterity. The generally tall and wide stature of a mesomorph makes him especially adept at such tasks as lifting and threatening, but unacceptable as aircraft pilots and many other space, air, and ground vehicle operations.

Ectomorph: The opposite of a mesomorph, an ectomorph tends toward being tall and slender, possessing very slight muscle mass. Ectomorphic individuals are usually quite agile, able to maneuver themselves and manipulate objects with great skill. Typical professions for ectomorphs include starship personnel, engineers and mechanics.

Endomorph: Endomorphs are short and stocky, often possessed of increased constitution, though at the expense of dexterity. Endomorphs display great physical endurance and are able to put their bulk and size to good use. Endomorphs do not do well in the confines of space and air vehicles, but are quite adept at most other tasks. However, since endomorphs suffer less from the effects of extreme gravity and acceleration than other body types, they do at times make excellent fighter pilots.

Normal: A normal individual is just that. He is average in all respects, and can be expected to perform nearly every task with some degree of success.

Body type is partly dependent upon the homeworld gravity type chosen above. A character from a zero-G environment can be an Ectomorph or Normal. One from a low gravity world can be an Ectomorph, Normal, or a Mesomorph. A character from a heavy gravity world can be Normal, an Endomorph, or a Mesomorph. A normal gravity world will allow the character to choose from all four body types.

JASON ANDERSSON

Using the example of Jason Andersson again, we proceed to generate his attributes and skills. Rolling dice for his physical attributes, we roll Jason a 15 for size, a 12 for dexterity, and an 8 for endurance. His strength is therefore a 13: size 15, −2 for his ectomorphic body type. Jason's dexterity and endurance are also modified by his body type, giving him a final dexterity of 15 (12+3) and a final endurance of 8 (8+0).

Rolling for his psychological attributes, we get a 14 for determination, a 10 for intelligence, an 11 for eloquence, and an 8 for education. The Education Modifiers table gives adjustments of +2 for determination and +0 for intelligence, yielding a final education of 10.

Knowing that we can reroll one physical and one psychological attribute, we decide to reroll Jason's endurance and his eloquence. We roll a 7 for endurance and opt to keep the original roll of 8; but for eloquence, we roll a 13 and keep it instead of the original roll of 11.

Jason has 5 background skill points (his education of 10 divided by 2), and we decide to spend 1 on Combat Rifleman (bringing it to level 0), 3 on P-suit (bringing it to level 2), and 1 on Melee (giving him level 0). (Continued.)

CHARACTER ATTRIBUTES

Character attributes are divided into two main types: physical and psychological.

Physical Attributes

Physical attributes are size, strength, dexterity, and endurance, ranging in value from 1 to 20. (A 4D6−4 roll produces a range of 0 to 20. Disregard 0 and roll again.)

Size: Throw 4D6−4 for size. This gives the bulk of the individual relative to his body type. A mesomorph or endomorph will mass more than an ectomorph if all have the same size number.

Strength: Strength is determined using size plus the value from the Physical Attributes table for body type. A size 12 mesomorph will have a strength attribute of 16 (12+4).

Dexterity: Roll 4D6−4 and add any value for body type from the Physical Attributes table. For example, an endomorphic character rolling 6 would have 5 (6−1) for dexterity.

Endurance: Roll 4D6−4 and add any modifier for body type from the Physical Attributes table. An endomorphic character rolling 9 would have 12 (9+3) for his endurance attribute.

Psychological Attributes

Psychological attributes reflect a character's mental abilities. They range in value from 1 to 20.

Determination: Perhaps the single most important psychological attribute, determination is generated using 4D6−4. There are no modifiers for determination.

Intelligence: Intelligence is rolled with 4D6−4. There are no modifiers for intelligence.

Eloquence: The ability to communicate one's ideas by a variety of media, eloquence is determined by rolling 4D6−4. There are no modifiers for eloquence.

Education: Education is rolled using 4D6−4 and is modified by the Education Modifiers table. For example, an intelligence of 16 would modify education by +4, and a determination of 8 would modify it by −2, yielding a total change of +2. In this case, an education roll of 7 would be adjusted to 9 (7 + +2). Education is not a strict equivalence to the amount of time spent in school; very motivated people (high determination) and very intelligent people get more out of the educational process than do others.

Finalizing Attributes

Once attributes have been generated, they must be finalized.

Rerolling Attributes: The random luck of the die may generate some disappointing numbers, but a few rerolls are allowed. After all eight attributes have been generated, the player may reroll any one physical and any one psychological attribute. Either the new number or the old may be kept. Note that strength cannot be rerolled but will change if size changes. Rerolled attributes may change the modifiers to other attributes.

Filling in Strength and Dexterity: Once the value has been established for the gravity of the character's homeworld, strength and dexterity numbers must be filled out for the other gravity types. This is accomplished by using the Gravity table on the Character Generation chart.

SKILLS

Beyond their basic attributes, characters will have a variety of skills. Skills are used when characters are called upon to perform tasks and resolve problems. In **2300 AD**, skills are represented by a number from 0 to 10, with 0 indicating only a bare familiarization with a particular area and 10 representing extreme proficiency in the area in question. Characters with no rating at all for a skill may still attempt to perform tasks requiring that skill, but it is more difficult to succeed. (The referee will explain how skills work when the time comes.)

Skill Purchase

Characters buy skills using skill points that they receive during their careers and training. Background skills are purchased using points provided by education—the number of background skill points a character has equals his education divided by two (round fractions up). Career skills are purchased using points provided by the character's career; one point is received for each year spent in the career (but this is modified by the character's determination and intelligence). Skill levels are bought independently, and each requires the previous level as a prerequisite. For example, a character must have Unarmed Combat-2 before he can buy Unarmed Combat-3.

Background Skills

Background skill points equal the character's education divided by two (round fractions up). Characters from Core worlds can spend the points on any Core skills; characters from Frontier worlds can spend them on any Frontier skills. Points not spent are lost; they cannot be applied to other skills. (Referees may permit players to spend career skill points on background skills.) Each skill level costs one half its rating in background skill points (round fractions up). For example, to go from Melee-4 to Melee-5 costs three points (five divided by two equals two and a half, rounded up to three). Rounding up also means that skill level 0 costs 1 skill point.

Career Skills

Career skills are purchased by a character who is pursuing a specific career. Each career description lists the skills that can be learned in that career, plus restrictions on acquisition of those skills.

Initial Training: When a character first enters a career, he undergoes initial training and is provided skill points to use on specified skills. These skill points must be spent immediately on the skills indicated. They may not be spent on other skills, and if they are not used at this time, they are lost. In effect, initial training raises skill levels to a minimum level, but rarely higher.

Further Training: A career is divided into a series of periods, each separated from the next by a turning point. When a turning point is reached, available career skill points are counted and must then be spent on career skills.

A character receives one career skill point for each year since beginning the career or since the last turning point. If the sum of intelligence and determination is less than 10, reduce the career skill points by 2 (but never to less than 1). If the sum of intelligence and determination is greater than 30, increase the career skill points by 2.

The *Careers* chapter lists skills as either primary to a career or related to it. Skills not mentioned are unrelated skills. Primary skills represent those skills that make up the lion's share of a career. Related skills are those skills that are more auxiliary in nature, but still useful to a career. Unrelated skills are all other skills.

Primary skills are purchased at the same cost as background skills: one half of the skill level, rounded up. Related skills cost twice that: Cost is equal to the skill level. Unrelated skills cost three times as much as primary skills: Cost is equal to one and a half times the skill level, rounded up. For example, to go from Computer-4 to Computer-5, if purchased as an unrelated skill, would cost 8 points ($5 \times 1.5 = 7.5$, rounded up to 8).

Turning Points

Turning points occur every 1D10 years during a character's career. Upon starting a career, the player throws 1D10 to discover the number of years spent in the career until the first turning point. That number for years equals the number of skill points that are available for skill purchase (modified by intelligence and determination, remember). Once the skills have been bought, the turning point must be resolved. This is a task, as given in the sidebar. (Your referee will explain how to roll tasks).

Successfully passing a turning point allows the character to continue in the career; failure forces the character to end the career and end character generation.

Each turning point after the second becomes successively more difficult. The first and second are easy, the third is routine, the fourth is difficult, the fifth is formidable, and the sixth is impossible. No character can pass the sixth turning point.

After each turning point is passed, the character rolls 1D10 to determine the number of years until the next turning point. Skill points are counted and spent, and the task of passing the next turning point is undertaken.

Career Changes: A character can change careers once in a lifetime. The individual must successfully pass a turning point. He can then state that he is starting a new career, select it, and begin its initial training.

A character who has failed to pass a turning point cannot select a new career.

Final Career: Whatever career a character is in when he finally fails to pass a turning point is considered the character's career during play from then on. This does not mean that during an adventure a character in space military cannot hire on as a colonial troubleshooter; it does mean that for purposes of classification and experience, the character is a specialist in space military.

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FINALIZING THE CHARACTER

When a player decides to terminate character generation (by choice, or because a turning point was not successfully passed), the character can then be finalized. The following secondary attributes can then be filled out:

Mass: A character's mass in kilograms is figured by multiplying his size by 3, adding 50, and applying the following final modifiers: Mesomorph +35, Ectomorph −20, Endomorph +20, Normal +0.

Consciousness and Life Levels: Consciousness level for a character is equal to his mass divided by 20 (round results down); life level is equal to his mass divided by 10 (round results down).

Encumbrance: A character has a carrying capacity, in kilograms, of twice the sum of his size and strength.

Throw Range: A character can throw a one kilogram object a distance, in meters, of eight times his strength.

Coolness Under Fire: A character's coolness under fire is equal to the roll of 1D6, +1 for each turning point passed in a military, law enforcement, field agent, or extralegal career.

Homeworld, Nationality, and Languages Known: A character's homeworld is, of course, chosen early during character generation in order to define the character's body type. The player may now select as the character's nationality any human nationality present on the character's homeworld. This will also determine the character's native language. (Languages are listed by nation on the Nations of Earth chart on page 87.) If the character has been in a Government and Civilian career, he will also know French. If he has been in a Mercantile, Space Military, Exploratory, or Ship Crew career, he will also know English. A character in an Academic career gets one other language of choice. Linguistics skill provides an additional language per skill level.

Eyesight, Hearing, and Appearance: Eyesight, hearing, and appearance are each rolled on the Secondary Attributes table of the Character Generation chart.

Age: A character's age is equal to his length of time spent in careers, plus 18. Add one year if the character changed careers.

Money: Upon mustering out of any career, a character receives an amount of money based on years in service. Add all the years spent in service, and multiply by Lv1000. This is the amount of money that the character begins the game with. This money may be used to purchase equipment, subject to the referee's approval.

EXPERIENCE

As a character lives his life in **2300 AD**, he can gain experience at what he does. This is reflected in the accumulation of experience points. After an adventure, or in some cases, at some point during it, the referee may award experience points to a character. These points can be spent by the player to increase his character's skills, or to learn new ones.

Increasing Skills: It costs, in experience points, twice as much to raise a skill as it did in career skill points during character creation. In other words, to raise a primary skill (which includes initial training skills, for purposes of experience points) one level costs a number of experience points equal to the new level. For example, it would cost seven points to raise a primary skill from level 6 to level 7. Each related skill costs twice this much, i.e., it would cost 14 points to raise a skill from level 6 to level 7. Each unrelated skill costs three times as much, so it would take 21 experience points to raise a level 6 skill to level 7.

Learning New Skills: Any new skill, in other words one that a character has no skill level for, can be learned by receiving training, by reading instructional materials, by receiving tutoring from another character who knows the skill, or by trial and error.

Receiving training is the easiest way of the three. To receive training in a skill the character does not know, he must find and enter an official training program. A character involved in a training program will not be available for adventuring for a period of time. The referee will explain where such programs can be found, what the monetary cost is, and how long they last. The experience point cost for learning a new skill by training is one half (rounded up) what it would normally cost (for example, a related skill raised from level 6 to level 7 would only cost four points rather than seven), and the character can learn any number of skill levels by this method (at further costs in time and money, of course).

When learning a new skill by using instructional materials, a character must first find the materials. The referee will explain how this is done. The experience point cost for learning such a skill to level 0 is five points.

A character who is being tutored also pays five experience points to gain a skill level 0 in a new skill. The referee will explain when and how such tutoring can be performed during the role-playing campaign.

A character who wishes to learn a skill by trial and error does so by attempting tasks relating to that skill during an adventure. The referee will explain particulars, but the player should note that in most cases it is hazardous for a character to attempt to do something for which he has no skill. Experience point cost for gaining a level 0 in a new skill in this way is four points.

After level 0 has been learned in any fashion, the character may increase levels with that skill at the normal experience point cost.

Increasing Coolness Under Fire: If the referee allows, a character's coolness under fire can be increased by use of experience points. Usually this will be allowed if characters have been experiencing combat in their adventures. Coolness under fire is always considered an unrelated skill for purposes of figuring experience point costs. The maximum coolness under fire rating for any character is 10.

RENOWN

On occasion, the referee may award a character *Renown* points for the fame or infamy that character may have gained as the result of an adventure. These points can work as modifiers (either positive or negative, depending upon the situation) to task rolls involving interaction with non-player characters.

For example, if the player character has become famous as a photojournalist because of his work on a well-known documentary concerning the research station at Arcturus, it will be easier for him to gain interviews with anyone who enjoys publicity, but harder to meet with those who do not. A politician running for reelection might be very willing to speak to the player character, while a corrupt politician will avoid him.

Renown points would be used as a modifier to the roll versus the task to gain an interview with each. In the first case, renown points would be a positive modifier to the roll; in the second case, they would be a negative modifier.

The awarding and use of renown points in your role-playing campaign will be decided by your referee.

CHARACTER GENERATION: THE POINT-BASED SYSTEM

For players who wish to use it, this point-based system is provided.

Initial Characteristics: A player may, if he wishes, simply choose his character's homeworld type (Core or Frontier), gravity type (high-, normal-, low-, or zero-G), and body type (ectomorph, endomorph, mesomorph, or normal), rather than rolling for them, provided that the guidelines given for which body types are permissible in which gravities, and which gravity types are permissible for which homeworld types, are followed.

Attributes: While we highly recommend that players roll for the physical and psychological attributes, it is true that some people do not like to trust to random die rolls when generating characters. If such a player prefers, a total of 67 points may be divided among size, dexterity, physical endurance, determination, intelligence, eloquence, and education. No attribute may be rated less than 1 or more than 20. Once seven attributes have been set, strength is calculated normally and the usual modifiers are applied to dexterity, physical endurance, and education.

Careers and Skills: Players who do not wish to roll for the number of years in a career and for passing turning points may simply state what career their characters are following and spend 10 years in that career, gaining 10 skill points, plus any bonuses or subtractions indicated by the character's intelligence and determination.

Finalizing the Character: If the player prefers, coolness under fire may be established as 3, with the usual modifiers for turning points passed in a military, law enforcement, field agent, or extralegal career. Also, a total of 16 points may be divided up into any three numbers to use as rolls for eyesight, hearing, and appearance. For example, a 10, a 2, and a 4 would give a character exceptional eyesight, average hearing, and good looks. (The effects of these three attributes on play will be determined by your referee.)

Character Generation

HOMEWORLD

1D10	Gravity	Core/Frontier
1	Zero-G	Core
2	Zero-G	Core
3	Low-G	Core
4	Low-G	Frontier
5	Low-G	Frontier
6	Normal	Frontier
7	Normal	Frontier
8	Normal	Frontier
9	High-G	Frontier
10	High-G	Frontier

BODY TYPE

1D10	Zero	Low	Normal	High
1	Ecto	Ecto	Ecto	Endo
2	Ecto	Ecto	Ecto	Endo
3	Ecto	Ecto	Endo	Endo
4	Ecto	Normal	Endo	Normal
5	Ecto	Normal	Normal	Normal
6	Normal	Normal	Normal	Normal
7	Normal	Normal	Normal	Normal
8	Normal	Meso	Normal	Meso
9	Normal	Meso	Meso	Meso
10	Normal	Meso	Meso	Meso

PHYSICAL ATTRIBUTES

Body Type	Str	Dex	End
Mesomorph	+4	−2	+2
Ectomorph	−2	+3	0
Endomorph	+1	−1	+3
Normal	0	0	0

EDUCATION MODIFIERS

If Intelligence or Determination is...	Change Education by...
1 to 4	−4
5 or 6	−3
7 or 8	−2
9 or 10	0
11 or 12	+1
13 or 14	+2
15 to 20	+4

Note: Consult this table once for intelligence and once for determination.

SECONDARY ATTRIBUTES

1D10	Eyesight/Hearing	Appearance
1	Poor	Unattractive
2	Average	Plain
3	Average	Plain
4	Average	Good-Looking
5	Average	Good-Looking
6	Average	Good-Looking
7	Average	Good-Looking
8	Excellent	Attractive
9	Excellent	Attractive
10	Exceptional	Sensational

GRAVITY TABLE (STR/DEX)

Gravity of Homeworld

	Zero-G	Low-G	Normal	High-G
Zero-G	+0/+0	+1/−1	+2/−2	+4/−4
Low-G	−1/+1	+0/+0	+1/−1	+2/−2
Normal	−2/+2	−1/+1	+0/+0	+1/−1
High-G	−4/+4	−2/+2	−1/+1	+0/+0

Note: The first number in each column is the strength modifier, and the second is the dexterity modifier.

BACKGROUND SKILLS

Background skill points equal education divided by 2 (round fractions up).

Frontier Skills: Combat Rifleman, Sidearm, Melee, Ground Vehicle, Hover Vehicle, Sea Vehicle, First Aid, Survival, Electronic, Mechanical, Riding, Prospecting, Swim, P-Suit.

Core Skills: Computer, Ground Vehicle, Hover Vehicle, Sea Vehicle, Bureaucracy, Information Gathering.

SPECIAL ATTRIBUTES

Special attributes are figured as follows:

Mass: Mass (in kilograms) begins with a base of 50 plus (3 times size). If mesomorph, add +35; if endomorph, add +20; if ectomorph, add −20.

Consciousness and Life Level: Consciousness level equals mass divided by 20; life level equals mass divided by 10. Round results down.

Encumbrance: Twice the sum of size plus strength is the limit of carrying capacity in kilograms.

Throw Range: Strength times 8 gives throw range (for a one-kg object) in meters.

Coolness Under Fire: Throw 1D6 and add +1 for each turning point in a Military, Law Enforcement, Field Agent, or Extralegal career.

Nationality: Taken from any available on homeworld.

Homeworld: Choose one to match gravity type and Frontier or Core designation.

Eyesight, Hearing, and Appearance: Roll on Secondary Attributes table.

Age: Add 18 years to the number of years in careers, +1 if the character changed careers.

Money: Character has Lv1000 times the number of years spent in service.

CAREER SKILL POINTS

A character receives one skill point for each year spent prior to a turning point.

If intelligence plus determination is less than 10, subtract two career skill points (but the number available is never less than 1).

If intelligence plus determination is more than 30, add two career skill points.

CHARACTER GENERATION CHECKLIST

1. Select homeworld.
A. Determine if Core or Frontier.
B. Find homeworld gravity.
2. Select body type.
3. Generate attributes.
A. Physical attributes.
(1) Size. 4D6 − 4.
(2) Strength. Size + Physical Attributes table.
(3) Dexterity. 4D6 − 4 + Physical Attributes table.
(4) Endurance. 4D6 − 4 + Physical Attributes table.
B. Psychological attributes.
(1) Determination. 4D6 − 4.
(2) Intelligence. 4D6 − 4.
(3) Eloquence. 4D6 − 4.
(4) Education. 4D6 − 4 + Education Modifiers table.
C. Rerolling. Any one physical and one psychological attribute may be rerolled and the old or the new die roll may be selected.
D. Determine strength and dexterity values in alternate gravities.
4. Background skills.
A. Background skill points equal education divided by 2.
B. Select background skills.
5. Career skills.
A. Select career.
B. Receive initial training.
C. Throw years to turning point (1D10).
(1) Career skill points equal years.
(2) Apply career skill point modifiers.
(3) Select skills.
(4) Resolve turning point.
(5) If success, go to next turning point.
(6) If failure, go to character finalization.
6. Character finalization.
A. Mass.
B. Consciousness and life level.
C. Encumbrance.
D. Throw range (in meters).
E. Coolness under fire.
F. Homeworld, nationality, and languages known.
G. Eyesight, hearing, and appearance.
H. Age.
I. Money.

LANGUAGES

Native language is determined by nationality. Government and Civilian careers also provide French. Mercantile, Space Military, Exploratory, and Ship Crew receive English. Academics receive one additional language of choice. Linguistics provides one language per level of skill.

Character Data

Name		Nationality	Homeworld	Gravity	Frontier/Core?
Gender & Looks	Birthdate & Age	Mass	Eyesight	Hearing	Body Type
Throw Range	Coolness Under Fire	Encumbrance	Native Language	Other Languages	

First Career	Second Career
Notes:	Notes:

Attributes

	High-G	High-G					
Size	Normal Str	Normal Dex	End	Det	Int	Elo	Edu
	Low-G	Low-G			Con	Life	
	Zero-G	Zero-G					

Attribute Task Modifiers

Size	Str	Dex	End	Det	Int	Elo	Edu

Money & Equipment

Skills

Experience:　　　　Renown:

Weapons	Mass/Wt.	Bulk	ROF	Rate of Fire RPB	Rounds per Burst Mag	Magazine Capacity Aimed	Area	AFV	Area Fire Value DPV	Damage Point Value

Ammunition / **Range**

Careers

During the character creation process, once basic attributes and background skills have been determined, the player will need to decide upon a career for the character to enter in order to learn further skills. When choosing a career for his character, a player should look at several things. For example, basic attributes should be considered. Obviously, a character with a high strength and very low intelligence would not be suited to an Academic career. Another point to consider is how the character's background would influence his career.

Career choice predisposes a character toward certain occupations once the character generation process is completed. Most of the time, characters will be employed by one organization or another. For some, this will be a fairly permanent arrangement (such as a life-time stint in a mercenary unit); for others, the relationship will be temporary (such as a starship crewmember who hires on from vessel to vessel).

These career listings serve two functions, then. The first is to define what skills a character learns during his career training, before play begins. Each career has skills listed in terms of those acquired during initial training, primary skills that are very likely to be picked up during the character's tour of duty, and related skills that can be learned but are not as common. Initial training skills are followed by a number—this is the number of points to be spent on learning or developing that skill. For some characters, initial training skills will be completely new. For others, a skill or two might have been part of his background. Rules for the use of skill points are explained in the previous chapter.

The second function that career listings serve is to identify organizations that the character might be able to work for after character generation is completed. A number of organizations are listed by career field in the sidebars. The referee has details of these organizations, and will explain how they may be contacted—possibly the source of an adventure.

MILITARY CAREERS

For most nations of Earth, the military has been an honored career choice since the beginnings of history. (In many, in fact, it has been a requirement that their citizens spend some portion of their lives as members of a military organization.) In **2300 AD**, the military is still a viable option for many young people. Although there are no major human conflicts, a number of colony worlds require an occasional demonstration of force, and there is a war with the alien Kafers on the French Arm as well.

Ground Military: Ground military organizations are those military forces restricted to operations on the surfaces of worlds. They also include marine forces that are stationed on starships but are used as ground-attack forces. Ground military units give their members training in combat, ground vehicle use, and basic survival skills.

Initial Training: Combat Rifleman: 3, Heavy Weapons: 2, Melee: 3, Ground Vehicle: 2, Demolitions: 1, Survival: 1.
Primary Skills: All Combat Skills, Ground Vehicle, Hover Vehicle, all General Skills.
Related Skills: Aircraft Pilot, Bureaucracy.

Sea Military: Concerned with operations on oceans of water, sea military personnel can pick up a variety of skills. Their duties involve the operations of water vehicles, most of which are of hydrofoil design, requiring very specialized skills for operation.

Initial Training: Combat Rifleman: 2, Heavy Weapons: 3, Melee: 2, Sea Vehicle: 3, Survival: 1.
Primary Skills: All Combat Skills, Sea Vehicle, Hover Vehicle, all General Skills.
Related Skills: Aircraft Pilot, Bureaucracy.

Interface Military: The interface is that space between a world's surface and its orbit. Personnel assigned to such operations will be familiar with various air and interface vehicles. Fighter pilots are considered to be interface military positions as are such fields as shuttle and space plane pilots.

Initial Training: Combat Rifleman: 1, Sidearm: 2, Aircraft Pilot: 2, Mechanical: 1, Electronic: 1, Survival: 2.

There are at least as many different military organizations as there are nations— even moreso, as most nations divide their military forces into ground, sea, interface, and space forces. Even many colonies have their own militias, quite apart from the forces of their mother countries. Add to this the fact that there are a number of free mercenary groups, and the list becomes even longer. Suffice it to say that wherever a character goes, he will almost certainly be able to find a military unit to apply to for entrance. Players can work out with the referee the details of what unit their characters are members of.

2 | **12**

This is the standard military symbol for a hovertank battalion, in this case, the second battalion of the 12th brigade.

Primary Skills: All Combat Skills, Aircraft Pilot, all General Skills, Hover Vehicle.
Related Skills: Ground Vehicle, Bureaucracy.

Space Military: This includes all positions on spacecraft of a military nature. Gunners, pilots, remote pilots, engineers, medics, navigators, and computer operators are required on all military vessels. Also, security and ship's troops are assigned to ships—these will be heavily trained in advanced weaponry and zero-G combat methods.

Initial Training: Combat Rifleman: 1, Sidearm: 1, Melee: 1, Mechanical: 1, Electronic: 1, P-suit: 2.
Primary Skills: All Combat Skills, all Space Crew Skills.
Related Skills: Computer, all General Skills.

EXPLORATORY CAREERS

Much of the impetus for mankind to go to the stars was from the simple desire to know what secrets lie hidden beyond Earth and its solar system. The people in whom this desire is strongest take exploratory careers. In expanding the realm of humanity's knowledge, they also open new worlds for exploration and, occasionally, meet a sapient alien race.

Scout: Initial survey of a system is done by scouts. These scouts use their ships and ships' sensors to detect the large scale characteristics of systems and worlds. Mapping and starcharting are their specialties, breaking new ground for exploratory teams and settlers. Scouts are also often the first to contact high-technology alien races.

Initial Training: Combat Rifleman: 1, Sidearm: 1, Melee: 1, Mechanical: 1, Electronic: 1, P-suit: 2.
Primary Skills: All Space Crew Skills, Chemistry, Biology, Geology, Astronomy, Physics, Survival.
Related Skills: All Combat Skills, all Vehicle Skills, all Mercantile Skills, Linguistics, History, Anthropology, Psychology, all General Skills.

Contact: Contact teams are sent to worlds which are particularly interesting as determined by a scout team. Contact personnel are well versed in various scientific areas such as biology, chemistry, linguistics, and anthropology. However, these skills are put to use in the field on an unknown world far away from the academic life of a business or university.

Initial Training: Sidearm: 1, Survival: 3, Linguistics: 2, Anthropology: 1, Psychology: 1, P-suit: 2.
Primary Skills: Ground Vehicle, Hover Vehicle, Sea Vehicle, all Academic Skills.
Related Skills: all Intellectual Skills, all Journalistic Skills, all General Skills.

Any number of governments, universities, and businesses maintain research programs where a character could be hired. One of the most well-known research organizations is listed here.

Foundation for Practical Knowledge: *Founded at Alpha Centauri in what is now the Commonwealth Nation of Wellon, the Foundation for Practical Knowledge finances research on Frontier worlds.*

FRONTIER WORLD ORGANIZATIONS

This career group is divided into colonizing organizations and troubleshooting organizations.

Colonizing Organizations

Looking at the Earth's colonies list reveals what nations actively colonize. In addition, a few well-known organizations should be mentioned.

Alberta Farmers' Cooperative: *A Canadian organization, the Alberta Farmers' Cooperative was, at one time, about the only government remaining in Canada. Today it actively pursues colonization of planets on the Canadian branch of the Chinese Arm.*

The Life Foundation: *Always independent, the Life Foundation began by offering its services to nations colonizing other worlds. It now also promotes some colonization of its own.*

Zapamoga: *Zapamoga originated in Poland just after the Twilight War, providing food and shelter to refugees. Now it supports colonization throughout human space.*

(Continued.)

ACADEMIC CAREERS

Academics involves all forms of higher learning—specifically astronomy, biology, chemistry, geology, physics, linguistics, psychology, history, and anthropology. The academic pursuits usually involve grants from some government, business, foundation, or university which allow the individual to perform in-depth studies or practical applications of knowledge already accumulated.

Initial Training: Computer: 1, Bureaucracy: 1, Information Gathering: 2, Writing: 1.

Primary Skills: One academic skill (note below), all Intellectual Skills.

Related Skills: Two other academic skills (note below), Writing.

Note: The primary skill represents a major field of study which is chosen by the player upon hiring on, and is the only academic skill that can be purchased as a primary skill. The related academic skills represent minor fields of study and are also picked by the player upon hiring on.

FRONTIER WORLD CAREERS

Colony worlds make up a new frontier for humanity, and like the frontiers of the past, when it was Earth's continents that were being explored, they demand a tough breed of people to tame them. Such people are likely to be fiercely individualistic, this being the motivation that has driven them from the "overly civilized" Core worlds.

(Note: A character need not have been born on a Frontier world to follow a Frontier World Career.)

Colonist: Life as a colonist on the Frontier is in many ways like that of a pioneer in the New World. Luxuries are comparatively few, and one must rely heavily on one's own skills to make a home in a newfound environment.

Initial Training: Sidearm: 1, Melee: 2, Ground Vehicle: 2, Sea Vehicle: 1, Survival: 2, First Aid: 1, Swim: 1, P-suit: 1.

Primary Skills: All General Skills, all Vehicle Skills.

Related Skills: All Combat Skills, Biology, Chemistry, Geology, all Mercantile Skills.

Troubleshooter: Many corporations have interests on the frontier worlds. However, keeping in touch with them involves direct contact, which is quite unpalatable to an executive used to his metro-office complex lifestyle on Earth. Troubleshooters are employed to bridge this gap—to investigate problems on the Frontier worlds and report back to corporation headquarters.

Initial Training: Combat Rifleman: 1, Sidearm: 1, Melee: 3, Streetwise: 2, Survival: 1, Stealth: 1, P-suit: 2.

Primary Skills: All Combat Skills, all Vehicle Skills, all Underworld Skills, all General Skills, Information Gathering.

Related Skills: Computer, Bureaucracy, all Space Crew Skills, Psychology.

CORE WORLD CAREERS

Life on a Core world is very different from that on a Frontier world. Computer technology is a daily fact in the lives of Core world inhabitants. At birth, they are entered into computer files. If they make a purchase, funds are exchanged by computer. When they marry, it is entered into the files in order to keep track of the effects on their bank accounts and their benefits when they retire. Only the very, very rich or the very criminal escape this codification.

This type of environment gives rise to a very different set of skills from those learned by Frontiersmen. Most Core world careers involve providing some sort of service to the community at large.

(Note: A character need not be from a Core world in order to be trained in a Core World Career, but he must, at least, be from a very large center of population, such as the capitol of a long-standing colony.)

Initial Training: Computer: 2, Ground Vehicle: 2, Bureaucracy: 2, Information Gathering: 1, Electronic or Mechanical (player's choice): 3.

Primary Skills: All Intellectual Skills, all Mercantile Skills, Streetwise, First Aid, Electronic, Mechanical, and Swim.

Related Skills: All Journalistic Skills, all Underworld skills, all Academic Skills.

GOVERNMENT AND CIVILIAN CAREERS

There are a number of careers available that work in some way to serve society in general.

Some are in government, others are not. Likewise, some are more dangerous than others.

Administrator: A government or corporate administrator leads a very cerebral life, usually in the Core or in the bigger cities on the Frontier. Their jobs range from information gathering and dissemination to business forecasting to product management.

Initial Training: Bureaucracy: 3, Information Gathering: 2, Writing: 2, Psychology: 1.

Primary Skills: All Intellectual Skills, Psychology.

Related Skills: All Journalistic Skills, all Underworld Skills, Appraisal.

Field Agent: For particularly nasty business, governments and corporations alike employ field agents. These are spies and information/disinformation experts used to enhance their employer's standing, often at the expense of their competitors.

Initial Training: Streetwise: 2, Forgery: 1, Information Gathering: 2, Computer: 2, Sidearm: 1, Melee: 2, Bureaucracy: 1, Stealth: 1.

Primary Skills: All Underworld Skills, all Intellectual Skills, Melee, Sidearm, Psychology.

Related Skills: All Journalistic Skills, all General Skills, Demolitions, all Vehicle Skills.

Law Enforcement: Keeping the peace, whether in the Core or on the Frontier, requires a special type of law enforcement agent. Law enforcement officials are trained to handle dangerous situations using either psychology or weaponry.

Initial Training: Sidearm: 2, Melee: 2, Streetwise: 1, Ground Vehicle: 2, Psychology: 1, Stealth: 1.

Primary Skills: All Underworld Skills, all Intellectual Skills, all General Skills, Sidearm, Melee.

Related Skills: All Vehicle Skills, Psychology, all Journalistic Skills.

Journalist: Journalism has become much more sophisticated—imagers are shoulder-mounted and microphones can be very easily concealed for either cosmetic or fraudulent purposes. However, the journalist's function remains virtually unchanged. Large broadcasting firms and foundations employ large numbers of journalists to bring in exotic news from human space.

Initial Training: Writing: 3, Imaging: 1, Information Gathering: 2, Streetwise: 1, Bureaucracy: 1.

Primary Skills: All Journalistic Skills, all Intellectual Skills, Psychology.

Related Skills: All Underworld Skills, Linguistics, History.

Independent Trader: An independent trader either uses his own ship, or rents space on other ships, for mercantile activities. The merchant's goals are to purchase strange, exotic materials on the fringes of human space for sale to the hungry masses at the Core.

Initial Training: Appraisal: 2, Trader: 2, Bargain: 2, Bureaucracy: 1, Streetwise: 1.

Primary Skills: All Mercantile Skills, all Space Crew Skills.

Related Skills: All Underworld Skills, all Intellectual Skills, all General Skills, Sidearm, Melee.

SHIP CREW CAREERS

Spacecraft travel routinely between stars in the year 2300. Because there is a great deal of time involved in space travel, most crews on starships learn to serve many different functions.

Initial Training: Pilot: 1, Ship Drive Engineering: 1, Computer: 1, Melee: 2, Survival: 1, P-suit: 2.

Primary Skills: All Space Crew Skills, all General Skills, Melee, Sidearm.

Related Skills: All Underworld Skills, Combat Rifleman, all Mercantile Skills, Aircraft Pilot.

EXTRALEGAL CAREERS

Extralegal careers will usually only be followed by NPCs, but PCs may receive training in them.

Thief: Wherever there are laws to define ownership, there are those who try to circumvent such laws by burglary, swindling, embezzlement, or other means.

Initial Training: Sidearm: 2, Melee: 2, Streetwise: 3, Forgery: 2, Computer: 2.

Primary Skills: All Intellectual Skills, all Underworld Skills, all Mercantile Skills.

Related Skills: All Combat Skills, all General Skills.

Smuggler/Pirate: Hijacking and smuggling among the stars can have very rich rewards, but the risks are great, as well.

Initial Training: Combat Rifleman: 1, Sidearm: 2, Melee: 2, Streetwise: 2, Forgery: 1, Computer: 1, Survival: 1.

Primary Skills: All Space Crew Skills, all Underworld Skills, all Mercantile Skills.

Related Skills: All Combat Skills, all General Skills, Information Gathering.

After deciding on a career, a player will need to purchase skills for his character, using the career as a guide. The skills that a player purchases during character generation, and later by use of experience points, determine that character's abilities for occupations during his life. The following skill descriptions list the skills by type of occupation and explain what each skill entails.

COMBAT SKILLS

Military occupations require that a person be able to perform a number of functions well under the intense psychological pressure of combat. Some other occupations require a knowledge of some combat skills as well. Not everyone involved in such occupations will be accomplished at many of these skills, but most will have some acquaintance with a number of them.

Combat Rifleman: The character is familiar with the operation of infantry weapons. Combat rifleman applies to all rifles, grenade launchers, lasers, machineguns, and shotguns.

Combat Walker: Combat walker pilots require special training to learn to operate the equipment smoothly. If this skill is purchased as a Ground Military skill, it allows the use of common combat walkers; if as a Space Military skill, it allows the use of walkers intended for use in low gravity environments.

Demolitions: The character can use explosives. This includes the ability to select, place, and tamp the proper explosives to do a specific job.

Forward Observer: The character has the ability to locate targets and relay the information to a rear-firing position. A forward observer often uses a laser to "paint" a target for remote attack.

Heavy Weapons: The character can operate infantry support weapons. Heavy Weapons applies to plasma guns, auto guns, and missiles.

Leader: The character has the ability to lead men. He can make them do his bidding, and perhaps even make them want to do his bidding. A leader has an ability to handle numbers of people in such a way as to better perform cooperative or teamwork tasks.

Melee: The character can engage in unarmed combat. Particularly high levels of unarmed combat skill represent training in very advanced methods of the martial arts.

Reconnaissance: The character knows how to use terrain in such a way as to observe potentially hostile units without being seen himself. He also knows how to estimate enemy strength from a number of small clues.

Sidearm: The character can operate small arms such as pistols. Sidearm applies to all handguns and stun guns.

Tactics: The character knows how to control and plan battles. Tactics allows a character some knowledge of what goes on in a modern hostile environment, and how to deal with it.

Thrown Weapon: The character is trained in throwing weapons, such as knives or spears.

VEHICLE SKILLS

Vehicle skills include both civilian and military uses of vehicles. In a time when colonization of other planets is common, surplus military vehicles are often used by civilian organizations, due to their durability. As a result, the line dividing civilian vehicle designs from military vehicle designs is often somewhat blurred.

Aircraft Pilot: An aircraft pilot is trained in the use of any winged or heavier-than-air craft. While they may specialize, they can handle any aircraft including interface shuttles or rocket planes.

Ground Vehicle: Ground vehicles include automobiles, motorcycles, trucks, and any vehicle which operates on tracks. Most run on battery or hydrogen power cells.

Hover Vehicle: Hover vehicles are air cushion vehicles. Hover vehicles can cross any reasonably flat terrain and carry almost any load. Hover tanks are the most mobile vehicles in modern combat, on land or at sea (although heavy weather is still a problem for them).

LTA Vehicle: Lighter-than-air craft have gained prominence in cargo service, especially on high gravity worlds with dense atmospheres, and on dry worlds (where they replace sea transport).

Sea Vehicle: Water vehicles do more than float. While there are many slow-moving craft

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plying the water oceans of many worlds, alternatives such as hydrofoils are fast, mobile, and useful.

INTELLECTUAL SKILLS

Intellectual skills are those skills likely to be learned and used by well educated members of human society.

Bureaucracy: The character has experience in dealing with such complex organizations as governments and large corporations. Bureaucracy may be used to "cut through the red tape" of anything from dodging the starport officials to getting an appointment with just the right government official.

Computer: Computers are so commonplace that everyone can operate one. Computer skill is the ability to make a computer perform special functions, such as programming or reprogramming, or the ability to understand very complex machines, such as alien computers.

Information Gathering: The character has knowledge of where and how to look when he needs some particular piece of information. For example, information gathering is employed when trying to get information from institutions such as libraries or government offices.

JOURNALISTIC SKILLS

Journalistic skills are, of course, most commonly used by members of a society's press. Other publishing concerns, such as entertainment or special interest magazines, also require the use of people with journalistic skills.

Imaging: The character knows operation and maintenance of general photographic equipment (including video and holographic devices), as well as the artistic aspect of their use.

Interviewing: The character knows how to phrase questions and lead conversations so as to discover important information that might not otherwise be revealed.

Writing: The character has the ability to organize his thoughts coherently into words. Writing is a valuable skill in the academic, journalistic, and administrative fields.

UNDERWORLD SKILLS

Underworld skills involve performing activities that are often less than legal. However, these skills are also important to undercover law enforcement persons and some troubleshooters.

Disguise: The character can alter his appearance in some way either to make himself seem as though he were another specific person or simply to not look like himself. In addition, the disguise skill will also help to detect or penetrate someone else's disguise.

Forgery: The character has the ability to fake or alter important documents or papers so that they may pass inspection unnoticed. Skill in both electronics and forgery might allow bypassing certain security devices (such as retina scans). The character will have some chance of spotting another forgery.

Security Systems: The character has knowledge of how to use, locate, and bypass security systems ranging from simple mechanical locks to pressure-sensitive alarms. He also has some knowledge of typical patrol techniques and the like.

Recognizing that a security system is in place is, of course, much easier than bypassing it.

Stealth: The character is skilled in the fine art of moving quietly, hiding in shadows, and generally avoiding attention. This skill is useful in anything from sneaking past a sleeping Kafer to evading a patrol of security officers.

Streetwise: The character is skilled in understanding the local customs of a particular area or region. This gives the character a better chance of accomplishing tasks like finding out "the word on the street" or knowing where to find a particular person in a city.

SPACE CREW SKILLS

Space crew skills are, of course, skills necessary for the operation of space vessels.

Communications: The character can operate the communications work station on a starship effectively.

Gunner: The character can operate laser or particle weapons in space combat.

Remote Pilot: The character can pilot a remote object, such as a missile or sensor drone. This skill is used during space combat.

Pilot: The character is familiar with the operation of interstellar and interplanetary ships, but not interface vehicles.

Sensors: The character has the ability to operate any sensor work station on a starship effectively.

Ship Drive Engineering: The character is skilled in the operation and maintenance of the powerful machinery necessary to propel starships through space.

ACADEMIC SKILLS

Academic skills indicate that a character has a quantity of acquired knowledge in a particular area.

Anthropology: The study of civilizations. The discovery of alien species marks this as the greatest age for this field.

Astronomy: The study of stellar bodies, through observation and firsthand experience.

Biology: The study of life, terrestrial and extraterrestrial.

Chemistry: The study of chemical building blocks for alloy, material, and energy production purposes.

Engineering: The knowledge of the use of tools and technology to attain a desired end.

Geology: The study of planetary bodies and their components, plates, and makeup.

History: The study of human civilization. Branches are now studying alien histories, as well.

Linguistics: The study of language, its uses, its components, and how they come into use.

Medical: The study of human anatomy and health, used in the prevention of illness through chemical use or bioengineering.

Physics: The study of Newtonian and relativistic physics and means of getting around them.

Psychology: The study of the mind, both human and nonhuman.

Theoretical Sciences: The study of the cutting edge of technology, knowing something of what future possibilities hold, and having a better grasp of alien technology.

GENERAL SKILLS

General skills are those skills that are not common to a particular occupation, but can be learned by nearly anyone.

Electronic: The character can operate, repair, and manipulate electronic equipment.

First Aid: The character can carry out initial treatment of wounds, such as bandaging or setting fractures. The first aid skill is the equivalent of the medical skill, but it can be purchased to a maximum level of 2.

Hunting: The character knows how to trap or kill nonsapient mobile life forms.

Mechanical: The character can maintain and repair certain pieces of mechanical equipment.

Prospecting: The character can use modern equipment to locate and process mineral deposits, either on a world's surface or in a belt or ring system.

Riding: The character can ride and control various types of live mounts.

Survival: The character is trained to be able to live and operate in different hostile environments.

Swim: Swimming has become a pastime of a bygone era. It is a specialized skill learned by only a few.

Tracking: The character can follow and find life forms by the signs they leave on the terrain they travel over.

P-suit: The character can handle himself very well in emergency situations in vacuum.

MERCANTILE SKILLS

Mercantile skills are those skills commonly associated with the business of trade. They are, however, commonly practiced by members of other occupations as well.

Appraisal: The character can evaluate the probable fair market price of an object.

Bargain: The character has the ability to haggle or bargain with either a potential buyer or vendor.

Trader: The characters can manipulate buying and selling cargoes through knowledge of the system.

OTHER SKILLS

New skills can be added to these lists by the referee and players as they see fit. If certain situations continuously appear in your game which are not covered by one of these skills, a new skill might be in order. However, the creation of new skill categories should be considered carefully before implementation into your campaign.
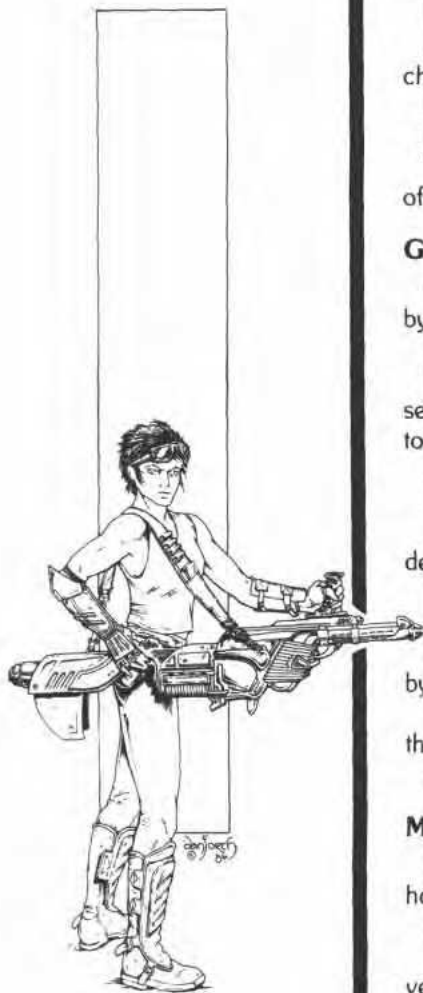
Upkeep

Paper currency and coins are used in the 24th century because of the difficulty in establishing an interplanetary electronic exchange system. Following are typical prices in the 24th century.

ACCOMMODATIONS

Overnight accommodations range from Lv10 for a single bed in an austere but clean hostel to Lv60 for a luxury suite at an exclusive resort or metropolitan hotel. Monthly rent for a single-unit apartment runs from Lv100 in rural areas to Lv250 in metropolitan areas.

GOODS

For cost in livres of manufactured goods, a convenient rule of thumb is to divide the 1980s price, in dollars, by three. On Frontier worlds which do not have local manufacturing facilities, manufactured goods must be imported and are more expensive. Multiply their livre cost by two or three, depending on how far away from a major manufacturing center the world. Locally produced goods are much cheaper. Colonies tend to price these goods low to encourage their export. Multiply the livre price of local goods by 0.9 down to 0.5 to reflect this.

SERVICES

Restaurant food varies in price depending on quality, service, and atmosphere. Short-order, convenience restaurants provide nourishing meals for about Lv1. Better restaurants provide personal service and better food for Lv5. Exclusive restaurants provide exotic meals for up to Lv30.

TRAVEL

Commuter train service within a metropolitan area costs less than Lv1. Travel between cities is calculated in price per 100 kilometers travelled: Train or surface ship service costs Lv5 per 100 kilometers; airship, Lv10; aircraft, Lv15; supersonic air, Lv20; and transatmospheric high speed, Lv25. Cargo costs per ton are twice the cost for one passenger.

Getting into orbit is reasonably expensive on most worlds. Where a beanstalk is available, the price to orbit is Lv500 for one ton of cargo. Three other means of moving from the ground to orbit are catapults, shuttles, and scramjet space planes. On low gravity worlds, the price per ton of cargo to orbit is Lv600 for a catapult, Lv2000 for a rocket plane or scramjet, and Lv3000 for a shuttle. Multiply these by 1.5 for normal gravity worlds and by two on high gravity worlds. Price per passenger is the same as the price per ton, except passengers cannot survive travel by catapult. Space planes cannot be used on airless worlds.

Getting cargo and passengers down from orbit costs 10 percent of the price of getting into orbit. This varies depending on commerce patterns, and economic incentives keep movement to and from orbit balanced. Worlds with a high level of immigration and imports will multiply their cost-to-orbit by 0.5 and their cost-from-orbit by two. Worlds with few imports or immigrants but massive exports multiply their cost-to-orbit by 1.5 and their cost-from-orbit by 0.5.

Travel between the stars is, by comparison, cheap. The average cost per ton per light-year is Lv5, climbing to Lv20 per ton on high-volume, low-density cargo, and dropping to Lv3 per ton for high-density bulk cargo. Passenger accommodations average Lv100 per light-year. Cheap, crowded accommodations can sometimes be purchased on merchant vessels for as little as Lv50 per light-year, while exclusive accommodations on a luxury liner can run as much as Lv500 per light-year.

WAGES

The average unskilled laborer earns Lv1 per hour. Skilled workers make from Lv5 to Lv10 per hour, while workers with rare or particularly skills make up to Lv50 per hour. Office workers, enlisted soldiers, and starship crews earn between Lv10,000 and Lv15,000 per year. Middle management, commissioned officers, and senior officers on starships earn between Lv20,000 and Lv50,000 per year. Upper echelon management types earn up to Lv200,000 per year.

Technology

One of the fascinations of the future is the startling new technology that will become not only available but commonplace. New technology makes it possible to travel to the stars, survive in hostile environments, or call up mountains of information on handheld computers.

THE BIOLOGICAL SCIENCES

Modern biological science has made great advances in genetic engineering, medical treatment, and life prolongation.

Genetic Engineering: The basic genetic structure of many organisms has been tailored to produce specific results. The major emphasis has been in crop management; modern crops are true-breeding, self-fertilizing (nitrogen-fixing), high-yield plants, well adapted to specific climates and soils. Special use plants are employed for environmental cleanup because they thrive on specific pollutants or contaminants.

Genetic engineering companies enjoyed a period of tremendous growth on Earth between 2050 and 2200, but recent growth has been extra-solar: each of the new colony worlds needs a wide variety of crop types adapted to specific world conditions.

Medicine has used genetic engineering to eliminate most inherited diseases and to allow parental selection of characteristics such as gender, eye color and hair color. Selection for aptitudes and intelligence has been less successful. Current research has focussed on remedies for genetic disorders. The patient is infected with tailored viruses which then replace his inferior or radiation damaged genetic patterns with new ones. Genetic engineering also allows replacement organs to be force-grown from a patient's own tissues.

Medicine: The major diseases of Earth are environmentally induced: UV damage, radiation, and tumors/cancer. Bodies deteriorate from aging beyond basic life span. On colony worlds, diseases are caused by local bacterial/viral infections, variants of known diseases, and unexpected environmental effects. In space there is heart degeneration and bone decalcification.

The greatest advance in medicine has been the automed—computerized automated medical treatment. Automated tests determine precise results to a battery of standardized tests, while expert systems analyze the results and produce high reliability diagnoses. Chemical or pharmaceutical treatment can be administered automatically and without attendance. Life support is also an automatic function. The automed can handle most nonsurgical treatments and many surgical ones (setting some broken bones, removing dead tissue). A skilled operator can manage resuscitation and most major treatments with an automed.

A recent advance in medicine has been the *anagathic regimen*—a series of treatments which effectively ward off aging. Announced and approved in 2264 after decades of testing, the anagathic regimen remains an expensive but effective treatment available only to the rich. Without the anagathic regimen, normal life span (excluding violent or accidental death) is about 100 years. The anagathic regimen is expected to more than double that, although it has not been in use long enough to determine the complete extent of its life-prolongation abilities.

DATA PROCESSING

Computers are commonplace, accepted as an appliance like the telephone or running water. In developed countries, the information processing bill comes monthly, just like the power and cable bills. Computers are extremely easy to use, sporting voice recognition, plain language instructions, or taking keyboard input. Computers normally present information using flat screens, but can create voice or holographic presentations.

Computer programming is an automated process; most programs can be produced just by describing the input, the processing, and the results, and then checking the computer's sample outputs. Computers are extremely fast and accurate. The concept of expert systems is extensively used, and many computers can mimic humans, for example, in sales or reservation clerk situations. True artificial intelligence has eluded the computer makers. Seemingly successful systems self-destruct within a few years of activation; the cause is usually diagnosed as a psychosis.
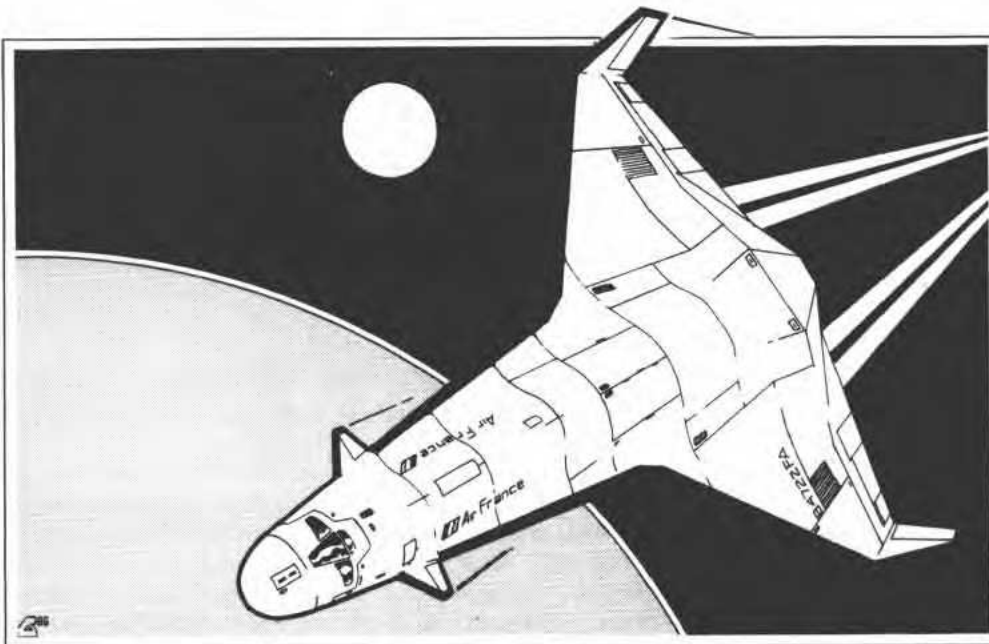
MATERIAL SCIENCE

Material science has been successful at producing increasingly sophisticated synthetic materials for fabrication and construction, and in developing advanced methods of refining metals. Recent breakthroughs in electrically and magnetically stabilized metals have produced metal-fiber synthetic matrices that allow beanstalk cables which can connect a world surface to orbit—beanstalks have been built on two worlds: Beta Canum Venaticorum (at Premiere), and Earth (at Libreville). While metals are still used for fabrications in space and on Frontier worlds (where metal ores are plentiful and cheap), synthetics can now do most jobs more efficiently, and are used almost exclusively in vehicle construction, power plant components, and all machinery requiring high strength and low weight. On Earth, metal is seldom used except in a few electrical components.

TRANSPORTATION

As noted above, most personal vehicles are either hydrogenburners or battery powered. On Earth, people and cargo are moved by several layers of transport based upon competing needs for speed and cost-effectiveness. On the surface, most cargo and people are moved by high speed airfilm trains which travel through underground tunnels. Major lines travel between large terminals centered in metropolitan areas. Smaller feeder and commuter lines radiate from these central terminals. Generally well suited to meeting peak commuter loads (there are always exceptions), the "tube" systems allow metropolitan areas to be very dispersed, and it is not uncommon for workers to commute 150 kilometers to and from work.

While proposals have been made for transoceanic tube service, travel across oceans tends to be by ship, airship, or aircraft. Most passenger and cargo ships are of the over/under type: a completely submerged streamlined flotation hull containing the vessel's power plant and fuel bunkers linked by pylons to the upper passenger and cargo decks, which ride considerably above the waterline. This design makes for an extremely efficient ship as there is virtually no surface contact, and thus drag is much reduced. The tremendous power needed to lift a large ship onto hydrofoils is also unnecessary. Unlike hydrofoils (which are still used for a variety of high speed naval and pleasure craft), this is a deep-water vessel only.

Airships are only slightly more expensive than surface vessels and largely make up for this by their greater flexibility. Large capacity airships carry both cargo and passengers across the oceans of the Earth and can land them at a variety of inland destinations. For passengers and cargo which need to travel quickly, there is always TAC (Transatmospheric Cruiser) service, which can move a passenger from one side of the world to the other in a couple of hours.

ENERGY

The near exhaustion of fossil fuels prompted the development of alternatives. Fusion power is efficient and cheap, but practical only in large installations. On Earth, it has been replaced by solar power satellites which beam their energy down to the ground.

Vehicles require a portable energy system because they cannot hook into the electric power grid. After experimentation with alcohol fuels, Earth transitioned to hydrogen in the 22nd century, and hydrogen fuel stations are as common as gasoline stations were in the 20th century. Most hydrogen-powered vehicles utilize hydrogen-burning fuel cells. Large vehicles, or those requiring very high energy levels, can benefit from the scale efficiencies of magnetohydrodynamic (MHD) turbines. Battery technology has improved to the point that electric cars are also possible and cost-effective. Approximately 20 percent of the ground vehicles (wheeled, hover, or tracked) on Earth are battery powered.

Equipment

Biosampler: *The bio-sampler is among the first Pentapod mass-produced, bioengineered products for human consumption. It is an animal biochemically similar to a human being. It is pro-grammed to determine edibility of plant and animal tissue, and communicate that information to its owner. Communication is simple: If it eats the material, it is safe; if it refuses it, it is toxic.*

Although its appearance is unimportant to its function, the Pentapods have, for marketing reasons, made it furry and programmed a limited pattern of semi-random behavior to make it more appealing. This pattern becomes predictable after long viewing, but the creatures have become popular as children's pets on many Frontier worlds. Weight: 0.5 kg Price: Lv20

Wherever adventurers go, whatever their mission is, and whatever their occupation happens to be, they will certainly find that some type of equipment is necessary to enable them to complete their objectives. The following is a list of equipment that is generally available on human worlds.

WILDERNESS SURVIVAL GEAR

Wilderness survival gear includes equipment which is usually used by exploratory teams, but this equipment might be stored in a starship's escape pod or used by a military mission team as well.

Compact Rations: Each ration pack is a complete, prepackaged, fortified meal in its own serving tray. The meal is self-heating (or self-chilling for some dishes), the heating/cooling process being activated by breaking the seals, and taking about 30 seconds. *Weight:* 1 kg *Price:* Lv5

Cold Climate Clothing: A lightweight, adjustable body suit with hood, goggles and lower face cover. The suit contains a battery pack and internal heating elements with the ability to maintain a stable temperature down to temperatures of −20 degrees centigrade. Battery life is about eight hours under coldest conditions, but closer to 36 hours under more typical cool-weather conditions. *Weight:* 2 kg *Price:* Lv100 (More expensive versions are available for the fashion-conscious.)

P-Suit: A close-fitting flexible pressure suit with bubble helmet and battery-powered, heating and air recycling, life support system. Life support unit duration is eight hours, but bottled oxygen can extend this up to 20 hours (maximum battery life). *Weight:* 15 kg *Armor:* 0.1 *Initiative:* −1 *Price:* Lv1000

Hostile Environment Suit: A P-suit designed for use in particularly hostile environments (such as corrosive atmospheres, or radiological and toxic environments). The helmet is solid, with audio and visual sensors linked to helmet monitors. *Weight:* 20 kg *Armor:* 0.4 *Initiative:* −2 *Price:* Lv2000

Pressure Tent: An inflatable hemispheric tent with a radius of two meters. The tent includes a small airlock and life support system. The airlock can be detached for use on worlds with breathable atmospheres. *Weight:* 2 kg *Price:* Lv1000

Biomonitor: The biomonitor is a broad-purpose monitor about eight centimeters square and usually carried on the belt. It can give body function readouts for medical diagnosis, will monitor breathability of atmospheres (noting presence of various gasses, harmful pollens, and other toxins), and can give a good analysis of edibility of local plant and animal tissue. *Weight:* 0.5 kg *Price:* Lv500

Goggles: Goggles come in two different types: the first being nothing more than an inexpensive piece of protective eyeware, and the second being a photosensitive, autodarkening piece of equipment to protect against steady bright light or sudden flares. *Weight:* Insignificant *Price:* Lv1 (normal goggles) or Lv100 (photosensitive)

Water Purifier: A battery-operated microfilter and chemical treatment machine for purifying natural water sources. It can also be used to recycle biological waste water. *Weight:* 5 kg *Price:* Lv750

Backpack: A backpack is used to carry equipment (as well as protect it) while keeping hands free. Small items can also be suspended from its frame. *Weight:* 1 kg *Price:* Lv10

Flares: Flares are used to signal at a distance, such as in the marking of temporary landing areas. They typically come six to a set. *Weight:* 2 kg *Price:* Lv3

Respirator: Often an entire protective suit is unnecessary and unwieldy. In such situations, people commonly use a simple respirator mask to filter the air they breathe. Typically, the filters in such a mask must be changed every six to 12 hours, depending upon the amount of pollutant in the air. *Weight:* 1 kg *Price:* Lv350

Diving Gear: The term diving gear is used here to denote a flexible, warm, wetsuit with swim fins, goggles, and an airtank. *Weight:* 10 kg *Price:* Lv700

Biomonitor

Backpack

Flares

Respirator

Goggles
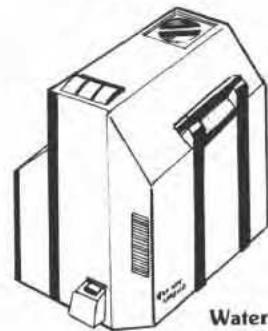
Water Purifier
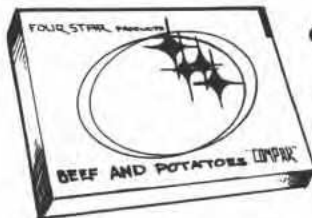
Pressure Tent

Compact Rations

Cold Climate Clothing

Diving Gear

P-Suit

Hostile Environment Suit
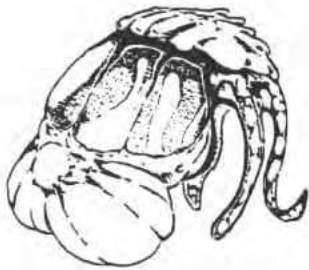
Water Breather: *Just recently, the Pentapods have released a new product on the market, the water breather. It is a shelled creature that fits tightly to the human face, with a clear section over the eyes, a tube that projects into the mouth, and an expandable sac at the chin. The sac expands as the wearer exhales and contracts as the wearer inhales. Meanwhile, the creature filters oxygen out of the surrounding water and exudes it into the sac, while filtering carbon dioxide out of the exhaled air.*

It is very popular for casual diving, but some fear the results of tearing the sac while working at deep levels. Others feel suffocated to have a living creature covering their faces. Weight: 0.5 kg Price: Lv75

TOOLS

The listing which follows includes the tools which are commonly available for use in the 24th century.

Basic Tool Kit: Small hand tools suitable for a variety of purposes, including wrenches, pliers, screwdrivers, etc. *Weight:* 5 kg *Price:* Lv75

Power Hand Tools: A selection of power tools, including a chainsaw, rotary saw, and drill, as well as other electrical tools. Must have a power source to operate these. *Weight:* 35 kg *Price:* Lv150

Vehicle Maintenance Tools: Specialized tools for repair and maintenance of vehicles. Includes torque wrenches, grease guns, engine calibration tools, and other specialized tools. *Weight:* 10 kg *Price:* Lv150

Excavating Tools: Picks, shovels, mattocks, and other such tools. *Weight:* 20 kg *Price:* Lv100

Construction Tools: Hammers, saws, squares, hatchets, chisels, and other woodworking tools. *Weight:* 30 kg *Price:* Lv100

Electronic Repair Tools: Specialized tools for work on electronic and photonic equipment. *Weight:* 3 kg *Price:* Lv300

Climbing Kit: A climbing kit includes such tools as pitons, rope, small hammers, and locking rings. *Weight:* 12 kg *Price:* Lv150

Autograpnel: An autograpnel is an extremely useful piece of equipment for scaling vertical surfaces of 15 meters or less. It consists of a handheld battery powered unit which can fire a small grapnel as much as 15 meters in the air, then pull as much as 100 kilograms up the trailing rope. *Weight:* 7 kg *Price:* Lv200

Locksmith Kit: A locksmith kit contains tools for opening mechanical locks. On most worlds it is illegal for an individual to possess a locksmith kit without a local license. *Weight:* 2 kg *Price:* Lv450

Electronic Security System Kit: An electronic security system kit is not intended to provide electronic security, but to circumvent it. It is usually even more illegal to own than a locksmith kit. *Weight:* 3 kg *Price:* Lv1000 minimum

SPECIAL EQUIPMENT

Major expeditions and military teams are often able to acquire equipment that is state-of-the-art—equipment unavailable to the general populace of most worlds. Often, however, this special equipment can be found for sale at the Core worlds—available to those who are able to pay the price.

Mul-T-tool: Many tools throughout history have been designed for one purpose—to fasten things together. Recently, builders of new vehicles have agreed to begin use of a uniform set of fasteners in their construction processes. For work on these vehicles, a mechanic need not have several different types of wrenches and screwdrivers; he just needs a Mul-T-tool. This is a self-powered unit with a flexible head that automatically adjusts to fit the fastener size. Mul-T-tools come in three gauges for three ranges of fastener sizes. *Weight:* 0.5 kg, 1 kg, and 2 kg sizes *Price:* Lv300 each

Stik-kit: A stik-kit is an adhesive patch which is about the size of a normal human hand. One side of the stik-kit patch (color-coded black) is a ridged, flexible plastic sheet; the other side of the patch is smooth and white. Between these two sides is a chemical interior. By grasping the ridged side of the stik-kit, the user can flex the patch, which releases the inner chemical onto the white side. The white side then becomes very sticky. Stik-kits will adhere to almost anything except teflon in almost any environment, including zero-G. Application of a small electric charge inactivates the adhesive—a small battery is included in the stik-kit for this purpose—and the user may then discard the patch. A stik-kit is not reusable.

Stik-kits can be used for anything from patching hulls to mounting wall fixtures, creating ladders, joining items, or suffocating creatures. Each stik-kit patch has a color-coded band that indicates its holding strength: Red 10 gm, orange 100 gm, yellow 1 kg, green 10 kg, blue 100 kg, violet 1 ton, ultraviolet 10 tons. *Weight:* 0.25 kg per patch *Price:* Red, Lv20; orange, Lv40; yellow, Lv80; green, Lv160; blue, Lv320; violet, Lv640; ultraviolet strength patches are not normally available

Power Hand Tools
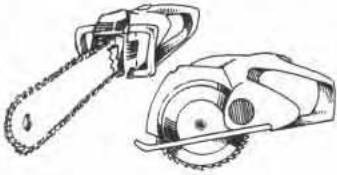
Basic Tool Kit
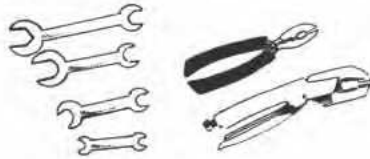
Excavating Tools
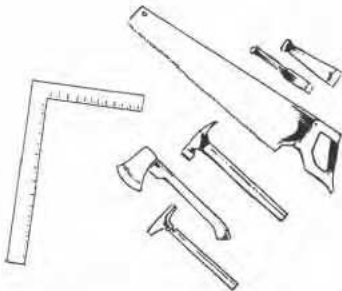
Construction Tools
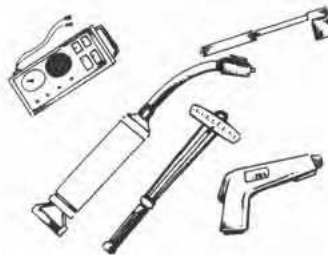
Vehicle Maintenance Tools
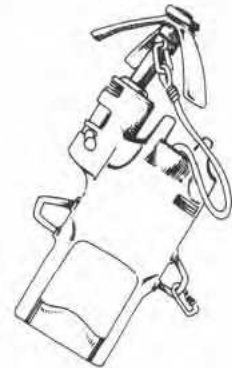
Autograpnel

Electronic Repair Tools

Locksmith Kit
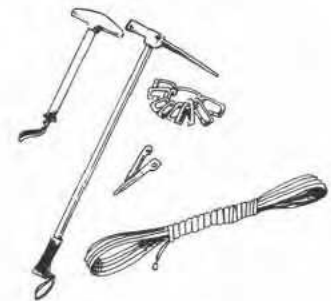
Climbing Kit

Electronic Security System Kit

Mul-T-tool

Stik-kit

Biocontacts: *These are among the first Pentapod mass-produced bioengineered products for human consumption, and are widely distributed at fairly low prices, both as a marketing experiment and as a means of developing a distribution system for additional products. Biocontacts are transparent lenses worn in the eye. When purchased they are dormant and opaque. The purchaser must insert them, keep his eyes closed, and remain at rest for eight hours to activate the contacts and allow them to adapt to his body chemistry. (This is normally done during a sleep period.) Once activated, the biocontacts are specific to the owner and will not function for anyone else. They can be removed and stored or kept in the eyes indefinitely. They draw nourishment from the owner's tears, and so must be stored in a special solution. The wearer needs to increase his fluid consumption slightly while wearing them for extended periods of time.*

Biocontacts give the wearer enhanced infrared vision (for night vision) and squinting will give up to a 5× magnification. Weight: Insignificant Price: Lv500

SENSORS

Sensors run the gamut from simple sense enhancers to computer watchdogs. All have a basic purpose of either actively or passively making environmental information more easily gained. Several examples are listed below.

Binoculars: Visual binoculars which incorporate thermal imaging for night visibility and limited visibility in fog, gyrostabilization for high magnification steadiness, and adjustable magnification from 1× through 20×. *Weight:* 1 kg *Price:* Lv200

FarSeer: This is a newly marketed product that magnifies objects and/or allows night vision by internally enhancing the light received. The main lens is composed of oil, electrostatically-held and manipulated for focus. A readout of the charge gives approximate distance to the object focused upon. A backup system, consisting of a pulse laser, gives more accurate readings of any object lined up with cross hairs in front of the lens. The only problems with the system are that the laser is visible to instruments watching for it, and the electrostatic lens will not hold focus in a strong outside electrical field, such as a nearby lightning storm. The FarSeer magnifies from 1× to 50×. *Weight:* 1 kg *Price:* Lv350

Large Life Form Detector: Actually, this is a moving point IR sensor which works as well on vehicles as life forms. Its short range makes it largely ineffective for military purposes, however. It is designed to be cheap and portable for zoological field teams. *Weight:* 2 kg *Sensor Range:* 1000 m (+1) *Price:* Lv100

Remote Piloted Drone: This is a small, battery-powered, rotor-driven aerial sensor. It incorporates a video imager with up to 5× magnification and thermal imaging for night vision. The video imager outputs directly to a monitor and a video recorder. The drone also includes a microphone for audio data and a large life form detector as described above. *Weight:* 10 kg *Sensor Range:* 1000 m (+1) *Signature:* 1 *Maximum Speed:* 200 kph *Cruise Speed:* 150 kph *Combat Movement:* 400 m *Endurance:* 2 hr *Price:* Lv1000

Basecamp Security Sensor: This is a multipurpose active/passive sensor suite designed to provide warning against intruders at remote sites. It must be attached to a vehicle powerplant or other power source. *Weight:* 50 kg *Sensor Range:* 5 km (ground targets), 50 km (aircraft) *Signature:* 3 *Price:* Lv20,000

SCIENTIFIC EQUIPMENT

A variety of equipment is generally available to aid scientific teams in their work. The most common pieces are listed here.

Imagers: A wide variety of still and video imagers are available to record observations. Imagers in the 24th century produce two types of images: a nearly grainless BIT (Binary Image Trace) image (which is a totally faithful picture of the object or scene, but requires extensive memory), or an EFR (Encoded Formula Reduced) image which uses algorithms and templates to analyze the image and translate it into a set of formulae. Images are stored on a small memory chip and can be displayed on any computer. A single chip holds approximately 3000 images (each BIT image counts as 100 EFR images). *Weight:* 1 kg *Price:* Lv300 (extra video chip costs Lv20)

Sampling Kit: A small kit carried by means of a shoulder strap used to take field samples and conduct quick analysis of any of a variety of substances. Sampling kits are available for soil, minerals, plants, and gas (atmosphere). *Weight:* 4 kg *Price:* Lv400

Remote Meteorological Station: A small data collection station for monitoring rainfall, humidity, atmospheric pressure, wind speed and direction, and other meteorological and climatological data. These are generally cheap, unmanned sensors which record their data on a memory chip. Each chip can record a year's worth of data, although the station is usually visited more often than that. These are very useful in the early stages of a survey of a habitable world. *Weight:* 5 kg *Price:* Lv200

Autoinjector Gun: This is a compressed air rifle which fires an autoinjector or radio microtransponder. It is used to subdue or tag animals. The radio microtransponder has a range of five kilometers and can be monitored from a radio direction finder. It broadcasts a simple noise signal useful for determining direction and range. The associated direction finder weighs 3 kilograms and costs Lv50. *Weight:* 2 kg *Length:* 75 cm (bulk=2) *Aimed Fire Range:* 300 m *ROF:* 2 *DPV:* 3 (stun damage only) *Price:* Lv200
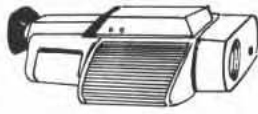
Imager
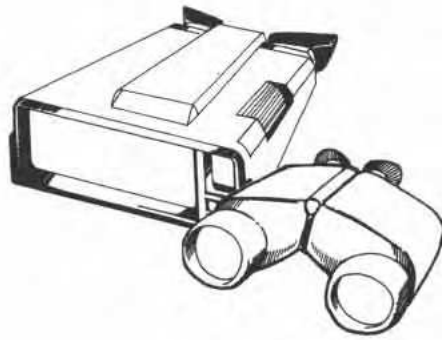
Binoculars

FarSeer
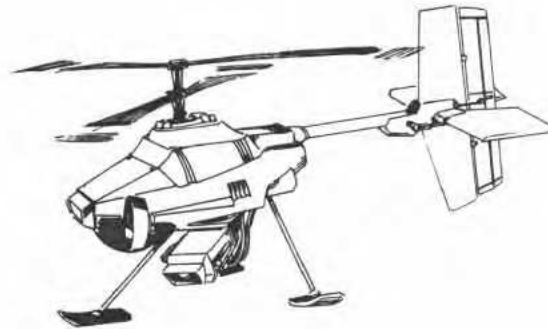
Remote Piloted Drone

Remote Meteorological Station

Basecamp Security Sensor
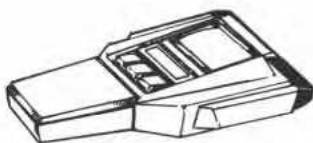
Large Life Form Detector

Sampling Kit

Autoinjector Gun
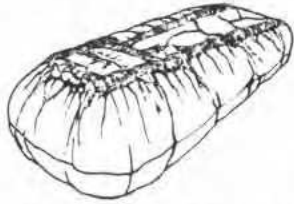
Stabilizer: *The stabilizer is an organic cocoon nearly two meters long and a meter in diameter. Its tough, opaque, outer shell protects delicate organs inside that can function in place of those of a comatose human being for an indefinite period of time—as long as it takes to get the patient to a medical facility able to treat him.*

The stabilizer splits along one side to open, and the patient is placed naked inside, upon which, the stabilizer closes once again. Tiny projections pierce the patient's circulatory and nervous systems, providing nutrients, removing wastes, and controlling pain. A chemical released into the blood halts the patient's respirations while he is inside the stabilizer.

As long as the construct has oxygenated air to breathe, water to drink, and food to consume (about twice that required by a single human), it will remain in operation; patients left inside for more than a week begin to rapidly lose muscle tone, body weight, and joint flexibility due to lack of active or passive exercise. Of course, this is a small price to pay for remaining alive while critically wounded. Weight: 400 kg Price: Lv5000

MEDICAL EQUIPMENT

When a job is being performed, it is not at all uncommon for people to receive injuries, either minor or serious. In the 24th century, high quality medical aid is generally very close at hand.

Medkit: A portable first aid kit containing spray-on bandages and autoinjectors of antishock, antitoxin, antibiotic, stimulant, and anaesthetic. Given medical skill, the Medkit contains everything needed to treat minor injuries and stabilize serious conditions. *Weight:* 1 kg *Price:* Lv500

Lightweight Automed: Portable and inexpensive, this unit is popular with emergency teams and is often used in large numbers for disaster relief. *Weight:* 300 kg *Med Skill:* 1 *Price:* Lv2000

Static Automed: This static automed is designed for permanent emplacement in a hospital ward on a starship. *Weight:* 1000 kg *Med Skill:* 3 *Price:* Lv8000

COMMUNICATORS

Communicators allow the transmittal of information over long distances. Civilian ones tend to be lower powered and broadcast in a wider arc than do their military counterparts.

Hand Communicator: A battery-powered, handheld radio which broadcasts voice signals at relatively low power. *Weight:* 1 kg *Range:* 20 km *Signature:* +1 *Price:* Lv50

Backpack or Vehicle Communicator: A heavier version of the hand communicator. In a vehicle it is generally linked to the vehicle's power plant. *Weight:* 3 kg *Range:* 200 km *Signature:* +3 *Price:* Lv100

Tight Beam Up-Link Communicator: A tight beam communicator designed to provide secure communication between a ship in orbit and a ground party. The communicator must be emplaced to work (it cannot be used while moving). The communicator's microprocessor is programmed with the ship's orbit prior to landing, and its inertial locator will constantly update its position relative to the ship's. When activated, it will point its dish antenna toward the location of the ship and establish a tight beam communication link, provided the ship is above the horizon and in effective communication range. (In most orbits the ship will be in an acceptable comm-link position roughly 20 percent of the time. The higher the orbit, the longer the period of possible commlink, but the greater the time between commlink periods.) Two up-link communicators can be used for secure ground communication if a communication satellite is overhead and if both communicators are linked to the satellite at the same time. *Weight:* 15 kg *Range:* Orbital *Signature:* 0 *Price:* Lv500

SATELLITES

Satellites are generally placed in orbit by ships already in orbit around a world. Survey and exploratory ships routinely use satellites to augment information gained by ground parties.

Communication Satellite: A solar-powered orbital receiver and retransmitter of tight beam or broadcast communication. Each provides 20 percent coverage (see discussion of up-link communicators) while five satellites evenly spaced in the same orbit will provide 100 percent coverage. *Weight:* 20 kg *Signature:* −3 *Price:* Lv50,000

Navigation Satellite: A solar-powered orbital broadcast transmitter. Five satellites are required to provide good coverage of a planetary surface. Each satellite continuously broadcasts its identification and current position. A down-link receiver and microprocessor in a vehicle or carried by a person can, by triangulation with the satellites currently transmitting, establish its correct surface location to within 10 meters. *Weight:* 100 kg *Signature:* Autodetection *Price:* Lv100,000 (each)

Down-Link Navigation Receiver: *Weight:* 5 kg *Signature:* None (receiver only) *Price:* Lv500

Surveillance Satellite: A solar-powered, low-orbit satellite designed to detect vehicular movement on the surface or atmosphere of a world. Each satellite will orbit an earth-sized planet roughly three times a day and will scan the area directly below and 50 kilometers either side of its orbit. (This amounts to scanning each 100-kilometer hex along its orbit three times a day.) *Weight:* 150 kg *Signature:* +4 *Sensor Range:* Orbital (surface targets count as regular range; airborne targets count as half range) *Price:* Lv500,000

Survey Satellite: A solar-powered photographic satellite for mapping and collecting meteorological data. It is placed in geosynchronous orbit to provide surface mapping and data on atmospheric weather conditions. *Weight:* 50 kg *Signature:* −1 *Price:* Lv250,000

Medkit
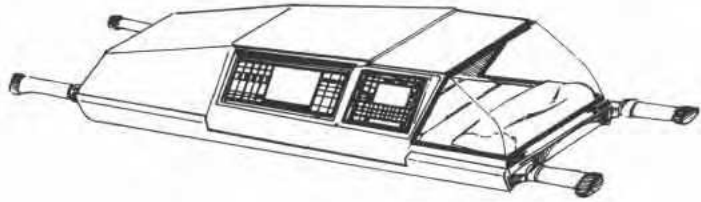
Lightweight Automed
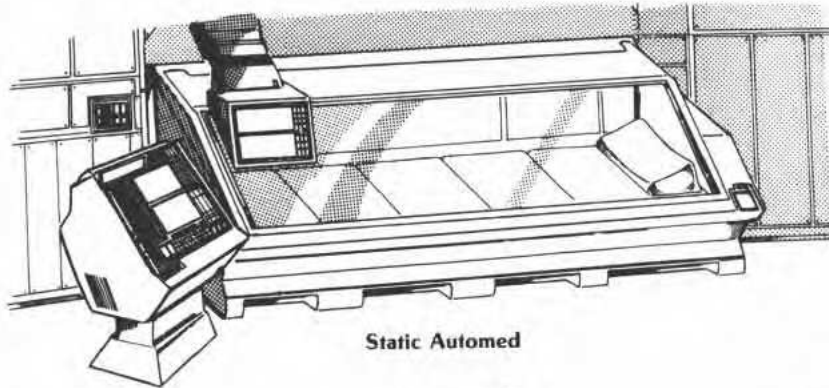
Static Automed

Hand Communicator

Tight Beam Up-link Communicator

Backpack or Vehicle Communicator
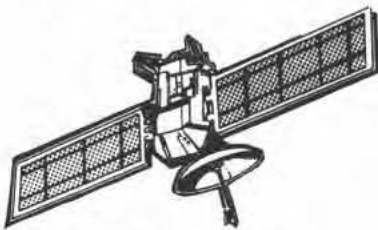
Communication Satellite
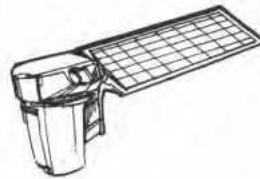
Surveillance Satellite
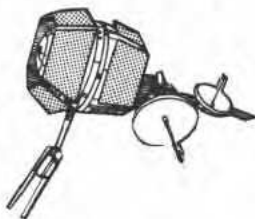
Navigation Satellite
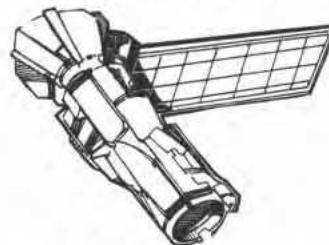
Survey Satellite

Direction Finder: One product produced by the Pentapods that did not have widespread success among humans was their first direction finder. In form, it was a slimy green translucent creature with metallic bronze flecks inside, setting on a gray-brown, shell-like base. Regardless of how the creature was turned, the bronze flecks would always congregate toward planetary north. Needless to say, humans neglected to rush out and purchase this product in volume, choosing instead to rely upon the old-fashioned magnetic compass.

The Pentapod compass can be acquired wherever other Pentapod products are sold, usually for free. Weight: *1 kg* Price: *None*

COMPUTERS

Computers make up a part of daily life for citizens of the Core worlds in the 24th century, and they are an essential part of nearly any mission group as well. The two most commonly encountered configurations are detailed here.

Portacomp

The portacomp is a small handheld programmable computer, usually carried in a plastic case on the belt or on a shoulder strap. A wide variety of makes and models are available, of which the following is a representative model. The keyboard is a one-handed five-key hemisphere, roughly 10 centimeters in diameter, designed to be held in the right hand. The monitor is on the back of the hemisphere and is touch-sensitive, allowing an expanded range of inputs while programs are running. Voice input and output are also used, but the keyboard and monitor are useful for a variety of precision inputs and graphic outputs. A flexible 30cm × 20cm monitor expansion (also touch-sensitive) is carried rolled in a tube in a carrying case. The machine has 10 megabytes of internal memory and is designed to run off of a single 200 megabyte memory/program chip. *Weight:* 0.5 kg *Price:* Lv500

Portacomp Program/Memory Chips

A 200 megabyte chip contains roughly the same volume of data as a good encyclopedia. This is sufficient to provide a good working linguistic translation program or a fairly comprehensive reference guide for a single area of scientific specialization. A scientific reference chip does not make the user an expert in a field, however, any more than a pile of chemistry reference books makes the owner an expert chemist.

Translation Chip: The chip will translate spoken or written known languages. It is purchased with two complete languages on the chip (English-German, or Taijik-Farsi, for example) and will translate from one to the other at command. *Price:* Lv10

Reference Guide: A fairly comprehensive reference guide on any one subject is available on chip for a modest price. Possible subjects include (but are not limited to): biochemistry, physical chemistry, geology of the Earth (or any other well-explored world), political history of the Earth (or any other inhabited world), etc. *Price:* Lv50

Language Cracker: A program which will analyze a spoken or written language and attempt to discover contextual similarities between it and the native language of the program. This is generally a slow and painstaking process with considerable trial and error involved. *Price:* Lv600

Computer Station

Similar fixed computer stations can be found on board starships, in businesses, in hospitals, and even in some ground vehicles. Anywhere that complex or delicate machinery must be operated, or bulk information must be processed, a typical computer station can be found. These units can easily interact with any others on the same network, allowing information to be freely accessed from one unit by any other.

Most cities have a multitude of individual networks, each devoted to a single type of function (banking, company communications, tax accounting, transportation, and information nets are a few common examples). Even with dedicated networks, it is easy enough to access a computer on one network by another on a different network.

One common problem in an age where information is stored and manipulated by computer is the frequency of information theft. Unshielded computers can be monitored, although not controlled, by the radio waves they emanate as a normal effect of their operation. Shielded machines cannot be read in this way, but communication between shielded computers at different locations requires some sort of interface, usually a cable system; and if the cables can be found, they can be tapped easily enough.

In the 24th century there is an ongoing war of technology between those who wish to preserve the sanctity of their computer files and those who wish to access it. Penalties for electronic theft are high, but so are the sums that can be gained by blackmail or the sale of secret information. All that is needed is a quick mind, a thorough knowledge of computer systems, and a computer station from which to work. Such a system typically can be described as follows. *Weight:* 250 kg *Price:* Lv30,000
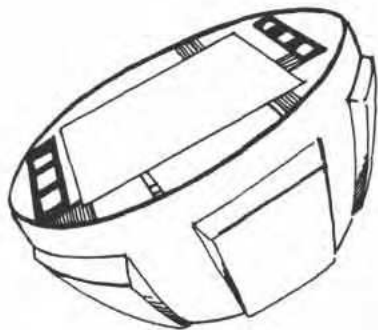
Portacomp
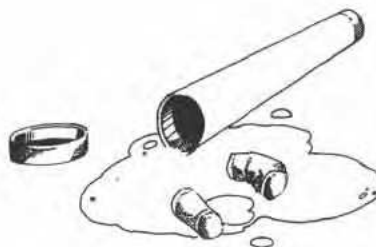
Pentapod Earplugs

Computer Station

Pod Plants: Pod plants are a Pentapod creation that has become a very common crop on colony worlds, particularly along the French Arm. In form, it is a hardy, dark green, vining plant that produces pods similar to Terran gourds, but with much stronger shells (stronger than Terran ironwood). Pods are harvestable when they reach a size of one quarter of a liter interior volume, but if left to grow, can attain volumes of up to 500 liters. While growing, they are very sensitive to long-term outside pressure, and as a consequence, if a wire-mesh form is built around a developing pod, the pod will grow to fill the space the form marks out. Pods can be grown to nearly any shape and size before harvesting, making them of great use as crates, barrels, furniture, canteens, or many other commonly needed items (pod plants are sometimes grown as sculptures).

Once the pod is harvested, one end is opened and the pulp inside is scooped out. Then the shell is allowed to air cure for several hours. Fittings such as reclosable necks are then affixed if the pod is to become a reusable container. If the pod is to be used as a shipping crate, the item to be packed is placed inside, and packing material is inserted. Two common packing materials are a substance similar to "SofStuf" and a Pentapod product known as "Packing Seed" (see page 35). The opening is then reclosed by gluing the piece removed back into place, making an airtight seal. Weight: Variable Price: Up to Lv60 for a large crate, more if made into furniture, etc.

PERSONAL POWER

The most common portable power generator is described here.

Fuel Station: A solar-powered processor that produces electricity from light and then uses it to crack water into hydrogen for vehicle fuel.

The complete station consists of a central unit and 10 panels. A tank in the unit can hold 20 kilograms of liquid hydrogen. The oxygen vent can be connected to a separate oxygen storage tank.

Each solar panel unfolds into a flat square 10 meters × 10 meters. In sunlight (average intensity in the life zone), each panel generates 0.2 MW and produces one kilogram of liquid hydrogen per hour (about 40 kg of oxygen are also produced and normally vented). The station only works during daylight hours.

The station can also be used to produce direct electrical power (at 0.2 MW per panel deployed). *Weight:* 20 kg (with tank empty) *Price:* Lv1200

EXPLOSIVES

The most prevalent noncombat explosives in the 24th century are industrially produced blocks of plastic explosive. These plastic explosive blocks are all of a uniform weight—one kilogram—but their explosive power depends upon the rating they hold. The most commonly used rating for plastic explosive blocks is Plastique-9. Multiple blocks of this explosive can be used together to create larger explosions, or a single block can be broken down to a fragment of its size for smaller blasts.

It should be noted that possession of explosives requires a local license on most worlds, and the penalties for noncompliance are severe. *Weight:* 1 kg *DP Value:* As explosion (EP = 10) *Price:* Lv15

MISCELLANEOUS

Other common equipment in the 24th century includes the following.

Burrowvarg: Easily domesticated omnivorous hunters indigenous to Beta Canum Venaticorum. A burrowvarg is a short-furred quadruped with extended incisors and a long, flexible tail.

Trained burrowvargs are used for tracking humans and animals alike. They are also frequently trained by drug-enforcement agencies to sniff out illegal substances, and are highly valued as security and guard animals. Although temperamental and cross, they are fiercely loyal and protective of their handlers. *Initiative:* 4 *Hit:* Routine *Size:* 20 kg *Speed:* 100 *Armor:* 0.1 *Wound Potential:* −3 *Consciousness:* 1 *Life:* 2 *DPV:* 0.2 *Signature:* −6 *Price:* Lv500

Makeup Kit: The term makeup kit actually can be applied to two very similar items with different purposes. Most makeup kits are used by people in the public eye—actors and the like—to augment their appearance. But makeup kits are also very handy in undercover or criminal endeavors as well to create disguises.

These kits typically include—but are not limited to—hair-coloring dye, modeling putty for altering facial features, colored contact lenses, false eyelashes and artificial facial hair, necessary adhesives and solvents, colored facial powder and pencils for toning and highlighting, setting powder, necessary applicators and brushes, and a variety of basic skin tone foundation makeup.

When a character disguises himself using this makeup kit, any attempt to penetrate that disguise is done at one level higher on the task roll. (Your referee will determine the exact difficulty level of such a task, based upon the situation at the time the task is attempted.) *Weight:* 5 kg *Price:* Lv250

SofStuf: SofStuf was originally the brand name for a particular brand of foam tissue, but the product became so popular that, as often happens, the brand name became the common public term. SofStuf is a soft, absorbent substance which foams up and cures to a fluffy consistency upon contact with atmospheric nitrogen. It is widely used as a facial tissue; as the foamy part is torn from the top of the box which it is packaged in, the substance below comes in contact with the atmosphere and foams up to replace it. It takes less than two seconds for curing to finish.

SofStuf is also used as bandages, rags, bathing cloths, and towels. It comes in a variety of decorator colors. *Weight:* 0.25kg/package *Price:* Lv3

Pod Plants

Fuel Station

Makeup Kit

SofStuf

Burrowvarg
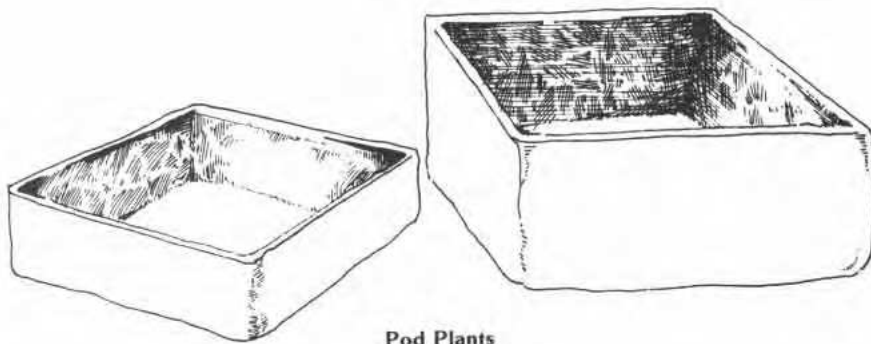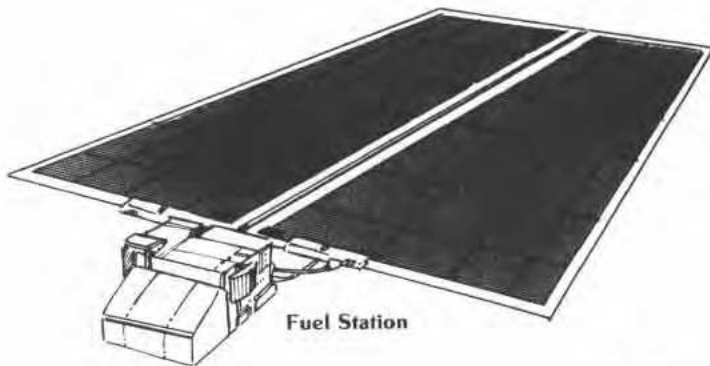
Packing Seed: "Packing seed" is an agricultural product created by the Pentapods and commonly used with pod plants. Packing seed plants are small, hardy bushes that produce a fruit with a tough skin that shrinks when dried, placing the fibrous meat inside under considerable pressure. When using packing seed as a packing material, an item is placed inside a container, packing seed is dumped in around it, and a sharpened stick is run forcefully down through the fruit, rupturing the skin and allowing the meat inside to expand and fill the container. Packing seed can be a little difficult to remove, but it absorbs shock well, making it an excellent packing material for items shipped by orbital catapult. Weight (Ruptured): *3 kg per m³* Price: *Lv1 per m³*

Weapons

In this chapter, the descriptions and vital statistics for weapons are listed.

CURRENT SERVICE RIFLES

The following rifles are currently being used by major military forces in the 24th century.

FAM-90 (Fusil Automatique Magnetique-2090): The standard infantry weapon of first-line French infantry, the FAM-90 Gauss rifle fires single shots at high velocity, giving good aimed fire accuracy, and fires bursts at a much lower velocity, giving the rifle excellent controllability on automatic fire. The optic sights incorporate a low-power laser range finder for aimed fire. An HR-17 30mm grenade launcher is mounted below the barrel.

Type: 4.5mm Gauss rifle with integral 30mm grenade launcher *Country:* France *Weight (Empty):* 4.5 kg *Length:* 76 cm (bulk=2) *Action:* Single shot or bursts *Ammunition:* 4.5×20mm flechette *Muzzle Velocity:* 1600 mps (area fire 550 mps) *Magazine:* 60-round box magazine with integral power cell *Magazine Weight:* 0.3 kg *ROF:* 3 (area fire 5) *Aimed Fire Range:* 900 m *Area Fire Burst:* 10 rounds (AF=1.5) *Area Fire Range:* 400 *DP Value:* 0.6 (area fire 0.3) *Price:* Lv490 (Lv2 for 60-round disposable magazine)

AS-89 (Automat Segetov 2289): The standard Soviet Russian infantry weapon, the AS-89 incorporates a reliable optic sight and an integral 30mm G-2 grenade launcher. The AS-89 found a home for a time in the hands of hired mercenaries of the French Arm. In fact, this weapon became the trademark of men who were for hire, and as such is an institution in and of itself.

Type: 4.54mm Gauss rifle with integral 30 mm grenade launcher *Country:* RSFSR *Weight (Empty):* 4 kg *Length:* 73 cm (bulk=2) *Action:* Single shot or burst *Ammunition:* 4.54×21 mm flechette *Muzzle Velocity:* 1530 mps *Magazine:* 60-round box magazine with integral power cell *Magazine Weight:* 0.3 kg *ROF:* 3 *Aimed Fire Range:* 800 m *Area Fire Burst:* 10 rounds (AF=1) *Area Fire Range:* 480 *DP Value:* 0.5 *Price:* Lv420 (Lv2 for 60-round disposability)

FTE-10 (Fusil Tiralleur d'Elite-10): Generally, each French squad contains one FTE-10 (or similar) sniper rifle to use for long-range aimed fire. The Fusil Tiralleur d'Elite-10 is a very low-noise weapon, which makes it excellent for harassment fire from concealment. The FTE-10 can also penetrate light armor at reasonable ranges.

Due to its great physical length, the FTE-10 has gained the nickname "Kentucky long rifle" among American soldiers. Soldiers who are assigned to use the FTE-10 often carry it under protest.

Type: 10mm Gauss sniper rifle *Country:* France *Weight (Empty):* 12.5 kg *Length:* 184 cm (bulk=6) *Action:* Single shot *Ammunition:* 10×37mm flechette *Muzzle Velocity:* 1400 mps *Magazine:* 10-round box magazine. Separately loaded 30-round power cell. *Magazine Weight:* 0.2 kg *Power Cell Weight:* 0.2 kg *ROF:* 1 *Aimed Fire Range:* 1400 m *DP Value:* 3 *Price:* Lv450 (Lv2 for box of 100 flechettes; Lv1 for disposable power cell)

Type-81 Storm Gun: Shortly before the Central Asian War, there was a flurry of interest in man-carried heavy caliber "storm guns," mostly brought on by Manchuria's adoption of the Type-81. The storm gun was intended to provide light antivehicle and antibunker fire, and the exploding round was expected to give a good area fire capability. In service, however, the weapon proved disappointing so although it is still in service, no replacement is planned, and private interest in this type of weapon has largely dried up. One problem with early versions involved the exposed recoil cylinder of the telescoping shock absorbing shoulder stock. Sand and grit contaminated the lubricants of the cylinder, fouling it to the point that Manchurian troops (those not discarding the weapon altogether) were often forced to brace the shoulder stock against a rock or tree when firing. After the Central Asian War, most Type-81s were fitted with a flexible fabric stock cover to prevent this.

Type: 20mm binary propellant storm gun *Country:* Manchuria *Weight (Empty):* 12 kg *Length:* 163 cm (Bulk=5) *Action:* Single shot *Ammunition:* 20×31mm APHE *Muzzle Velocity:* 840 mps *Magazine:* 10-round box magazine; separately loaded internal gas bottles with charge for 100 rounds *Magazine Weight:* 2 kg *Recharge Bottle Weight:* 2 kg *ROF:* 1 *Aimed Fire Range:* 700 m *DP Value:* 4 *Price:* Lv520 (Lv2 for box of 20 rounds; Lv2 for recharge bottle)
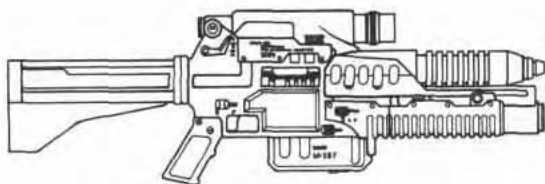
FAM-90 (Fusil Automatique Magnetique-2090)

AS-89 (Automat Segetov 2289)

FTE-10 (Fusil Tiralleur d'Elite-10)
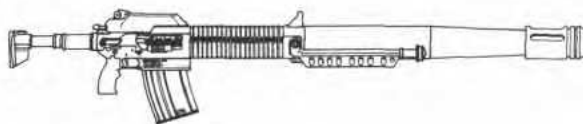
Type-81 Storm Gun

Binary propellant rifles fire a bullet identical in design to that fired from a conventional rifle, but there is no propellant directly associated with the round. Much of the bulk of the propellant in a conventional round is a stabilizer which makes the ammunition safe to store and use in the field. The binary propellant rifle eliminated this bulk and instead uses two gasses (a variety of types are used) which separately are stable but, when combined, are volatile. Stored apart they are safe, and are not combined until injected into the ignition chamber.

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GAUSS RIFLES

Gauss rifles are linear magnetic accelerators which fire finstabilized flechettes. Usually the magazine for the Gauss rifle also contains a battery pack which powers the gun.

Virtually all rifles incorporate optic sights to assist in aimed fire. Also, as muzzle velocities have increased, weapons have incorporated more elaborate recoil-absorbing features, such as telescoping stocks. Most combat weapons capable of automatic fire have gyrostabilization to assist the soldier in keeping the weapon on target. Most long-range rifles also have a gunner-activated laser range finder.

SURPLUS SERVICE RIFLES

The surplus service rifles described below are no longer the primary small arms of their countries' military forces. Nonetheless, the weapons are still in widespread use by a number of smaller forces.

SG-77 (Sturmgewehr-2277): The Sturmgewehr-2277 has now been replaced by more modern types of weapons in Germany's arsenal; however, the weapon was once widely exported, and it can still be found in private hands, as well as in the hands of many smaller armed forces and militias.

The Sturmgewehr-2277 was originally produced under license in Japan as the Type-79 assault rifle, and it remains in use as Japan's standard service weapon. However, Kurita Arms is now rumored to be working on the development of a Gauss rifle of exceptional performance as a replacement for the Sturmgewehr-2277. At this time, it remains to be seen if this Kurita Arms replacement model for the Sturmgewehr-2277 will be put on the world market and made generally available.

Type: 5.5mm conventional assault rifle *Country:* Germany *Weight (Empty):* 3 kg *Length:* 75 cm (Bulk = 2) *Action:* Single shot or bursts *Ammunition:* 5.5 × 40mm fixed cartridge ball *Muzzle Velocity:* 1200 mps *Magazine:* 40 rounds *Magazine Weight:* 0.3 kg *ROF:* 3 *Aimed Fire Range:* 700 m *Area Fire Burst:* 10 (AFV = 1) *Area Fire Range:* 500 m *DP Value:* 0.6 *Price:* Lv280 (Lv2 for box of 100 rounds)

Wu-Beijing Type-49 Assault Rifle: The Wu-Beijing Type-49 Assault Rifle is unique among modern military arms, its uniqueness stemming from a return to an older design which uses a trigger-magazine-barrel design layout rather than the more efficient "bullpup" layout (a magazine-trigger-barrel design).

The Type-49 trigger-magazine-barrel design layout results in a longer rifle with no gain in effective barrel length, a shortcoming the Type-95 dealt with by shortening the barrel to carbine length and providing the weapon with a folding stock. With the stock folded, the weapon is very handy, but aimed fire is effectively impossible.

Type: 7.5mm conventional assault rifle *Country:* Manchuria *Weight (Empty):* 3 kg *Length:* 86 cm (Bulk = 3); 58 cm with stock folded (Bulk = 1) *Action:* Single shot or bursts *Ammunition:* 7.5 × 32mm fixed cartridge ball *Muzzle Velocity:* 880 mps *Magazine:* 25 rounds *Magazine Weight:* 0.4 kg *ROF:* 2 *Aimed Fire Range:* 700 m (stock must be extended for aimed fire) *Area Fire Burst:* 10 (AFV = 1) *Area Fire Range:* 500 *DP Value:* 0.7 *Price:* Lv210 (Lv2 for box of 100 rounds)

Ramirez-Abruggo BF-1: The Ramirez-Abruggo BF-1 was the first mass-produced binary propellant rifle in use, but it has now been replaced by more modern weapon designs. Even when in firstline service, the Ramirez-Abruggo BF-1 binary propellant weapon's performance was always considered to be disappointing.

The Ramirez-Abruggo BF-1 currently remains widely used only because it was originally produced in extremely large numbers. While the Ramirez-Abruggo BF-1 was initially quite expensive to produce, surplus models are now generally available for purchase at a fairly inexpensive price.

Type: 7.5mm binary propellant assault rifle *Country:* Brazil *Weight (Empty):* 3.5 kg *Length:* 81 cm (Bulk = 3) *Action:* Single shot or bursts *Ammunition:* 7.5 × 11mm ball *Muzzle Velocity:* 900 mps *Magazine:* 40-round box magazine with separately loaded internal gas bottles with charges for 200 aimed shots or 20 bursts *Magazine Weight:* 0.3 kg *Recharge Bottle Weight:* 0.3 kg *ROF:* 2 *Aimed Fire Range:* 800 m *Area Fire Burst:* 10 (AFV = 0.5) *Area Fire Range:* 560 m *DP Value:* 0.7 *Price:* Lv200 (Lv2 for box of 100 rounds)

M-2 Assault Rifle: The Traylor Arms M-2 "nine-forty-four" assault rifle was one of the most popular weapons of its day in U.S. service and is still a favorite among paramilitary organizations on the fringes of human space. Simple and reliable, the M-2 was the first mass-produced weapon to use a 9mm APHE round.

Type: 9mm conventional assault rifle *Country:* USA *Weight (Empty):* 3 kg *Length:* 79 cm *Action:* Single shot or bursts *Ammunition:* 9 × 44mm fixed cartridge APHE *Muzzle Velocity:* 800 mps *Magazine:* 30 rounds *Magazine Weight:* 0.4 kg *ROF:* 3 *Aimed Fire Range:* 500 *Area Fire Burst:* 10 (AFV = 1) *Area Fire Range:* 400 m *DP Value:* 1 *Price:* Lv260 (Lv4 for box of 100 rounds)

SG-77 (Sturmgewehr-2277)

Wu-Beijing Type-49 Assault Rifle
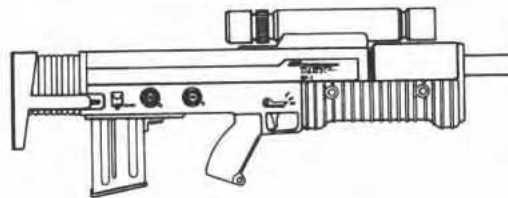
Ramirez-Abruggo BF-1
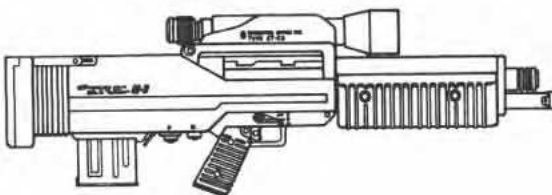
M-2 Assault Rifle

MELEE WEAPONS

*Melee weapons can come in handy in **2300 AD** combat. The most common are listed below.*

Axe: Length: *100 cm (Bulk = 4)* Weight: *4 kg* Melee Range: *Long* Melee Skill Modifier: *−2* DP: *0.6* Price: *Lv4*

Machete: Length: *60 cm (Bulk = 1)* Weight: *2 kg* Melee Range: *Long* Melee Skill Modifier: *+1* DP: *0.3* Price: *Lv4*

Bayonet: Length: *25 cm (Bulk = 0) (unless attached to rifle, in which case use bulk of rifle)* Weight: *0.5 kg* Melee Range: *Long (if attached to rifle, otherwise as knife)* Melee Skill Modifier: *+1 (if attached to rifle, otherwise as knife)* DP: *0.2 (if attached to rifle, otherwise as knife)* Price: *Lv4*

CIVILIAN AND HUNTING WEAPONS

Of the numerous civilian rifles available in the 24th century, some of the most common are listed here.

Stracher SS-7 (Scharfshutzen Model 7): The Stracher SS-7 is the only mass-produced air rifle currently in use as a hunting weapon (although a variety of low-power air rifles are used for recreation target shooting). The weapon is powered by compressed air from a central reservoir, which holds sufficient pressure for 20 shots at high pressure and 30 more at low pressure. The weapon can be recharged by hand, but only to the low pressure level.

Type: 4mm sporting rifle *Country:* Austrovenia *Weight (Empty):* 1 kg *Length:* 72 cm (Bulk = 2) *Action:* Single shot *Ammunition:* 4mm flechette *Muzzle Velocity:* 480 mps *Magazine:* 20-round box *Magazine Weight:* 0.1 kg *Air Recharge Bottle:* 0.5 kg *ROF:* 5 *Aimed Fire Range:* 400 m (high pressure), 200 m (low pressure) *Area Fire Burst:* 5 (AFV = 0.5) *Area Fire Range:* 300 m (high pressure), 200 m (low pressure) *DP Value:* 0.2 (high pressure), 0.1 (low pressure) *Price:* Lv140 (Lv1 for box of 1000 rounds; Lv1 for recharge bottle)

Guiscard FC-68 (Fusil Chasseur 2268): The FC-68 was designed with the Frontier colonist in mind, and is widely used by French civilians on a variety of worlds. It combines a bullpup configuration (giving it a distinctly military look—one of its strongest selling features) with full-automatic fire.

Type: 5mm sporting rifle *Country:* France *Weight (Empty):* 1 kg *Length:* 75 cm (Bulk = 2) *Action:* Single shot or bursts *Ammunition:* 5 × 15mm fixed cartridge ball *Muzzle Velocity:* 630 mps *Magazine:* 70-round box *Magazine Weight:* 0.3 kg *ROF:* 5 *Aimed Fire Range:* 500 m *Area Fire Burst:* 10 (AFV = 1.5) *Area Fire Range:* 400 m *DP Value:* 0.2 *Price:* Lv240 (Lv2 for box of 300 rounds)

Guiscard FC-70 (Fusil Chasseur 2270): The FC-70 was designed to make use of the large quantities of 7.5mm surplus ammunition available on the open market, and low firing cost has made it (and other similar rifles) popular. It is widely used both as a target rifle and for medium-sized game hunting.

Type: 7.5mm hunting rifle *Country:* France *Weight (Empty):* 3 kg *Length:* 102 cm (Bulk = 3) *Action:* Single shot *Ammunition:* 7.5 × 40mm fixed cartridge ball *Muzzle Velocity:* 910 mps *Magazine:* 5-round box *Magazine Weight:* 0.2 kg *ROF:* 2 *Aimed Fire Range:* 800 m *Area Fire Burst:* 3 (AFV = 0.25) *Area Fire Range:* 600 m *DP Value:* 0.7 *Price:* Lv220 (Lv2 for box of 100 rounds)

Rockwell "Twelve-Eighty-One Magnum": Deservedly enjoying a reputation as the most powerful sporting rifle in known space, the 12-81 can only be fired from a rest with the integral bipod extended, and even then the provision of an in-stock shock absorber is necessary to avoid injury to the firer. The rifle was originally designed to provide a weapon with a high first-round killing capability against the giant lizards of Wolf-424B-1, but has since enjoyed wide use in the armed forces of several nations as a long-range sniper rifle. The French FTE-10 Gaus rifle is in many ways a more modern version of the Rockwell 12-81 Magnum.

Type: 12mm big game and sniper rifle *Country:* United Kingdom *Weight (Empty):* 14 kg *Length:* 144 cm (bulk = 5) *Action:* Single shot *Ammunition:* 12 × 81mm fixed cartridge ball *Muzzle Velocity:* 1100 mps *Magazine:* 6 rounds *Magazine Weight:* 0.5 kg *ROF:* 1 *Aimed Fire Range:* 1100 m *DP Value:* 4 *Price:* Lv400 (Lv5 for box of 100 rounds)

SHOTGUNS

Two examples of shotguns, one pump and one automatic, are listed below.

Traylor Model 10 Riot Gun: *Type:* 18mm pump shotgun *Country:* USA *Weight (Empty):* 3 kg *Length:* 96 cm (Bulk = 3) *Action:* Single shot *Ammunition:* 18 × 60mm fixed cartridge buckshot (10 6mm slugs) *Muzzle Velocity:* 428 mps *Magazine:* 8-round tubular *ROF:* 2 *Aimed Fire Range:* 120 m *Area Fire Burst:* 3 rounds (AFV = 0.5) *Area Fire Range:* 80 m *DP Value:* 0.3 (× 10) *Price:* Lv300 (Lv2 for box of 100 rounds)

DunArmCo Close Assault Gun: *Type:* 18mm automatic shotgun *Country:* Australia *Weight (Empty):* 4 kg *Length:* 68 cm (Bulk = 2) *Action:* Single shot or bursts *Ammunition:* 18 × 60mm fixed cartridge buckshot (10 6mm slugs) *Muzzle Velocity:* 410 mps *Magazine:* 10-round box *Magazine Weight:* 0.5 kg *ROF:* 2 *Aimed Fire Range:* 100 m *Area Fire Burst:* 5 rounds (AFV = 1) *Area Fire Range:* 80 m *DP Value:* 0.3 (× 10) *Price:* Lv330 (Lv2 for box of 100 rounds)

Stracher SS-7 (Scharfshutzen Model 7)

Guiscard FC-68 (Fusil Chasseur 2268)
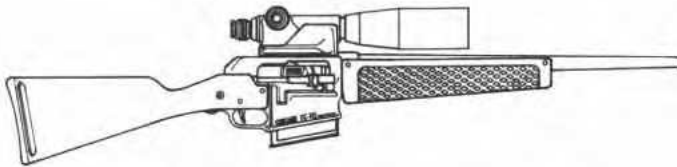
Guiscard FC-70 (Fusil Chasseur 2270)
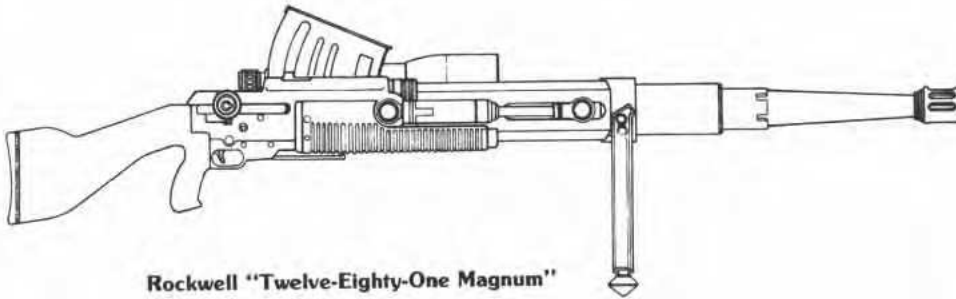
Rockwell "Twelve-Eighty-One Magnum"
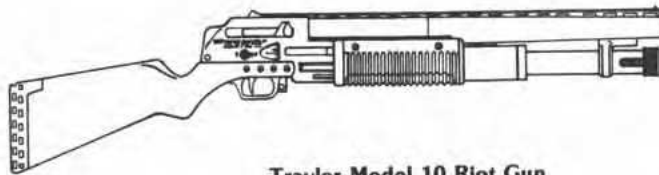
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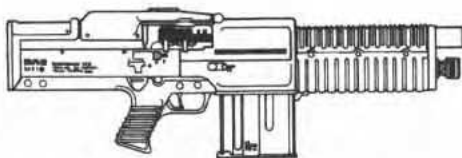
DunArmCo Close Assault Gun

Knife: Length: *25 cm (Bulk=0)* Weight: *2 kg* Melee Range: *Short* Melee Skill Modifier: *+2 if using blades and +0 if attempting knuckle strike* DP: *0.1* Price: *Lv5*
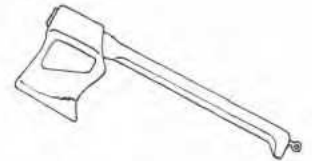
Hatchet: Length: *40 cm (Bulk=1)* Weight: *2 kg* Melee Range: *Short* Melee Skill Modifier: *-1* DP: *0.4* Price: *Lv3*
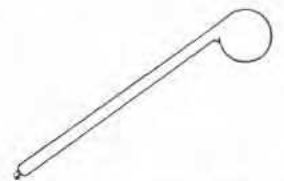
Club: Length: *Variable (average Bulk=2)* Weight: *Variable* Melee Range: *Long* Melee Skill Modifier: *-1* DP: *0.4 (blunt trauma only)* Price: *None (generally found lying around)*

MELEE WEAPON NOTES

The melee weapons listed in this chapter are not the only such weapons available, of course. But they are a good, representative sample. Players who wish to have their characters use weapons not listed here should consult with their referee, who can extrapolate others from this information.

HANDGUN NOTES

The principal types of handguns are revolvers and automatics. Revolvers are fed from a revolving cylinder, while automatics are clip-fed. Automatics are more efficient, but revolvers are more safe. (A revolver is carried with the firing pin resting on an empty chamber, which is not possible for an automatic unless the pistol is carried without a round in the chamber, in which case, it must have the slide worked to chamber a round from the magazine before firing.)

All handguns listed in this chapter fire conventional fixed cartridge ammunition. Although some experimental work has been done with binary propellant and Gauss pistols, the expense was not deemed worth the results, and no large-scale production has been undertaken. Referees are free to include a few limited issue (expensive) binary or Gauss pistols.

Because of their short range and limited stopping power, pistols are not generally issued to combat troops. Officers often carry a pistol as a badge of rank more than an actual weapon; a combat rifle is generally carried as well. Some troops buy heavy pistols and value them for their handiness at close range, their low bulk often enabling the firer to get off the critical first round.

AUTOGUN NOTES

Autoguns are a category of crew-served light automatic weapons fed from large-capacity drums or flexible cassettes, and fired from mounts. They are similar to rifles but heavier construction enables them to sustain a higher rate of fire over time.

HANDGUNS

As with civilian rifles, a plethora of handgun types can be found in the 24th century. The weapons which are listed below represent some of the range of capabilities in 24th-century handguns.

Arno Five-Fifteen: *Type:* 5mm automatic *Country:* Brazil *Weight (Empty):* 1 kg *Length:* 24 cm (Bulk=0) *Action:* Single shot *Ammunition:* 5×15mm *Muzzle Velocity:* 600 mps *Magazine:* 14-round box *Magazine Weight:* 0.1 kg *ROF:* 5 *Aimed Fire Range:* 50 m *Area Fire Burst:* 3 rounds (AFV=0.25) *Area Fire Range:* 30 m *DP Value:* 0.2 *Price:* Lv130 (Lv2 for box of 300 rounds)

Hancock Nine-Twenty-Three Enforcer: *Type:* 9mm police revolver *Country:* USA *Weight (Empty):* 0.5 kg *Length:* 21 cm (Bulk=0) *Action:* Single shot *Ammunition:* 9×23mm fixed cartridge ball *Muzzle Velocity:* 390 mps *Magazine:* 6-round cylinder *Weight of 6 rounds in reloader:* 0.1 kg *ROF:* 4 *Aimed Fire Range:* 40 m *Area Fire Burst:* 3 rounds (AFV=0.25) *Area Fire Range:* 20 m *DP Value:* 0.3 *Price:* Lv170 (Lv2 for box of 100 rounds)

Traylor Model 57 (Chip Traylor Special): *Type:* 9mm automatic *Country:* USA *Weight (Empty):* 0.6 kg *Length:* 20 cm (Bulk=0) *Action:* Single shot *Ammunition:* 9×24mm fixed cartridge ball *Muzzle Velocity:* 460 mps *Magazine:* 10-round box *Magazine Weight:* 0.1 kg *ROF:* 3 *Aimed Fire Range:* 60 m *Area Fire Burst:* 3 rounds (AFV=0.25) *Area Fire Range:* 30 m *DP Value:* 0.4 *Price:* Lv150 (Lv2 for box of 100 rounds)

Stracher P-11mm (Pistole 11mm Magnum): *Type:* 11mm automatic *Country:* Austrovenia *Weight (Empty):* 1.5 kg *Length:* 35 cm (Bulk=0) *Action:* Single shot *Ammunition:* 11×35mm fixed cartridge ball *Muzzle Velocity:* 580 mps *Magazine:* 7-round box *Magazine Weight:* 0.2 kg *ROF:* 1 *Aimed Fire Range:* 80 m *Area Fire Burst:* 3 rounds (AFV=0.25) *Area Fire Range:* 40 m *DP Value:* 0.8 *Price:* Lv350 (Lv4 for box of 100 rounds)

AUTOGUNS

Autoguns provide a fireteam with more range and power than rifles provide, yet the autoguns remain more portable than the rifles. The following listing includes a few examples of these autoguns.

MG-7 (Maschinengewehr Model 7): *Type:* 5.5mm conventional machine gun *Country:* Germany *Weight (Empty):* 4 kg *Length:* 107 cm *Action:* Single shot or bursts *Ammunition:* 5.5×40mm fixed cartridge ball *Muzzle Velocity:* 1200 mps *Magazine:* 75-round drum or 200-round cassette *Magazine Weight:* 0.6 kg (drum), 1 kg (cassette) *ROF:* 5 *Aimed Fire Range:* 700 m (900 on mount) *Area Fire Burst:* 20 rounds (AFV=2) *Area Fire Range:* 500 m (700 on mount) *DP Value:* 0.6 *Price:* Lv870 (Lv2 for box of 100 rounds; Lv5 for empty drum or cassette)

Wu-Beijing Type 381 Machinegun: *Type:* 7.5mm conventional machine gun *Country:* Manchuria *Weight (Empty):* 7 kg *Length:* 122 cm *Action:* Single shot or bursts *Ammunition:* 7.5×32mm fixed cartridge ball *Muzzle Velocity:* 940 mps *Magazine:* 150-round cassette *Magazine Weight:* 2 kg *ROF:* 5 *Aimed Fire Range:* 800 m (1000 on mount) *Area Fire Burst:* 20 (AFV=2) *Area Fire Range:* 600 m (760 on mount) *DP Value:* 0.7 *Price:* Lv870 (Lv2 for box of 100 rounds; Lv5 for empty cassette)

DunArmCo Mini-12: *Type:* 12mm conventional machine gun *Country:* Australia *Weight (Empty):* 24 kg *Length:* 144 cm *Action:* Single shot or bursts *Ammunition:* 12×95mm fixed cartridge ball *Muzzle Velocity:* 940 mps *Magazine:* 100-round cassette *Magazine Weight:* 7 kg *ROF:* 5 *Aimed Fire Range:* 800 m (1000 on mount) *Area Fire Burst:* 15 (AFV=1.5) *Area Fire Range:* 600 m (760 on mount) *DP Value:* 3 *Price:* Lv910 (Lv3 for box of 100 rounds; Lv5 for empty cassette)

Type 12 Autocannon: *Type:* 25mm conventional autocannon *Country:* Japan *Weight (Empty):* 600 kg on field mount *Length:* 190 cm *Action:* Single shot or bursts *Ammunition:* 25×161mm fixed cartridge APHE *Muzzle Velocity:* 1100 mps *Magazine:* 50-round drums *Magazine Weight:* 15 kg *ROF:* 5 *Aimed Fire Range:* 1000 m *Area Fire Burst:* 10 (AFV=1) *Area Fire Range:* 800 m *DP Value:* 6 (+fragmentation burst radius=5 m) *Price:* Lv1000 (Lv2 for box of 50 rounds; Lv5 for empty drum)

Arno Five-Fifteen

Hancock Nine-Twenty-Three Enforcer

Stracher P-11mm (Pistole 11mm Magnum)

Traylor Model 57 (Chip Traylor Special)
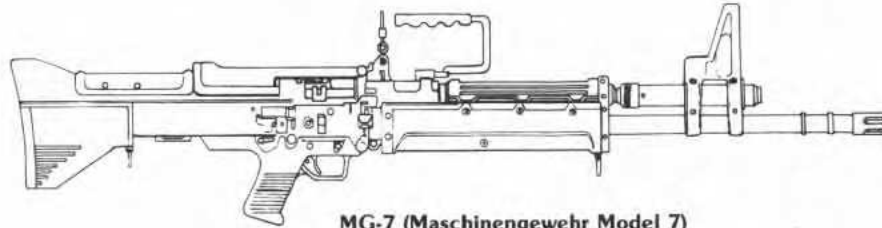
MG-7 (Maschinengewehr Model 7)
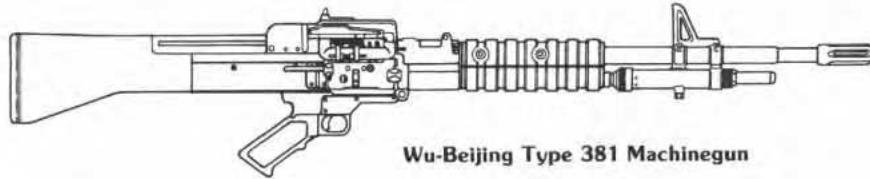
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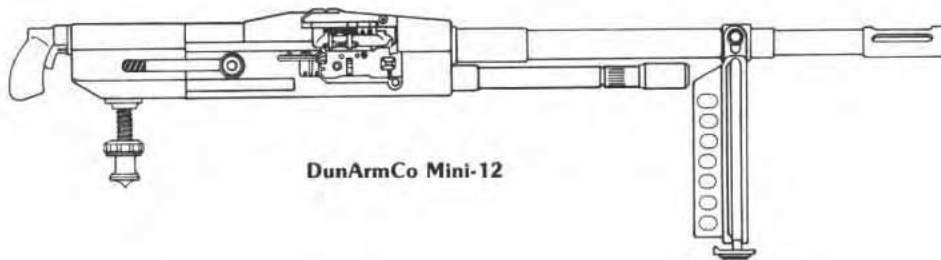
DunArmCo Mini-12

Type 12 Autocannon

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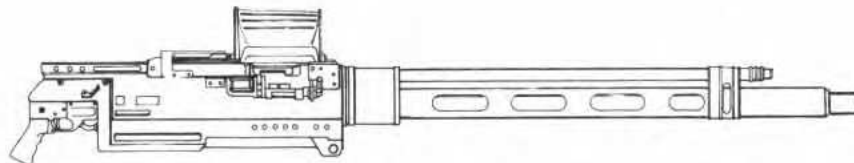
LASER NOTES

Lasers emit beams of coherent light which can cause damage to a target. A kilogram of TNT produces five million joules of energy (five megajoules). Since one watt for one second equals one joule, a one-second, five-megawatt beam produces the energy equivalent of one kilogram of TNT.

In combat it is very difficult to maintain a laser on a target for one second, and in any event, a five-megawatt beam lasting one second requires more power than a man can carry with him. However, a short-duration, high-energy beam produces such a rapid temperature change in a target's surface that it explosively vaporizes, causing shock damage to the target.

Lasers are powered by high-efficiency liquid metallic suspension (LMS) battery packs. Since a battery's discharge rate is insufficient to directly power a strong beam, the battery "pumps" a fast-discharge homopolar generator, which comprises most of the laser mechanism. The generator stores energy in a rapidly spinning flywheel (about 50,000 rpm) until it has enough for a pulse.

Lasers are generally referred to by their output power (in megawatts) and their pulse duration (in hundredths of a second). Thus a 40-01 laser would have an output of 40 megawatts for one one-hundredth of a second. Actual beam energy is a function of the power output multiplied by the pulse duration. Since one watt for one second produces one joule, a 40-megawatt pulse for one one-hundredth of a second would produce four-tenths of a megajoule.

LASERS

A number of laser weapons are available in the 24th century. Several are listed here.

Mueller-Rivera P-3 (Pistole-3): The P-3 is a very handy lightweight laser. The combination of a low power output and the high discharge rate of the Quinn seven-megajoule FDLMS power cell makes for a high cyclic rate of fire and a reasonable area fire capability.

The pistol's power cell is worn on the belt and connected to the pistol by means of a 50-gauge teleflex photonic link cable.

Type: 20-01 laser pistol Country: Argentina Weight: 1 kg Length: 27 cm (Bulk=0) Action: Single shot Pulse Energy: 0.2 megajoules Muzzle Velocity: C Magazine: 7mj FDLMS cell (35 pulses) Magazine Weight: 1 kg ROF: 5 Aimed Fire Range: 200 m Area Fire Range: 100 m Area Fire Burst: 4 pulses (AFV=0.5) DP Value: 0.6 Price: Lv750 (Lv5 for disposable power cell)

Mueller-Rivera F-7 (Fusile-7): The F-7 was one of the first practical handheld laser weapons and the first to use the now-standard 0.01-second pulse. Although superceded by more modern types in the armed forces of the major powers, it remains in widespread use by secondline troops.

Type: 30-01 laser rifle Country: Argentina Weight: 2 kg Length: 76 cm (Bulk=2) Action: Single shot Pulse Energy: 0.3 megajoules Muzzle Velocity: C Magazine: 5mj LMS cell (16 pulses) Magazine Weight: 1 kg ROF: 5 Aimed Fire Range: 1000 m DP Value: 0.9 Price: Lv760 (Lv5 for disposable power cell)

Rorttmann LK-1 (Laserkarabiner-1): A very modern and deadly assault weapon, the LK-1 uses the now-popular combination of a 30mm grenade launcher for area fire and a precision weapon for aimed fire. The 35-01 power laser is optimized for maximum damage consistent with a reasonable power cell duration.

Type: 35-01 laser rifle Country: Germany Weight (Empty): 2.5 kg Length: 65 cm (Bulk=1) Action: Single shot Pulse Energy: 0.35 megajoules Muzzle Velocity: C Magazine: 7 mj FDLMS cell (20 pulses) Magazine Weight: 1 kg ROF: 5 Aimed Fire Range: 1000 m DP Value: 1 Price: Lv850 (Lv5 for disposable cell)

Gonzalves-Brazilia "Luce-3": One of the oldest laser weapons still in service, the Luce-3 was a fairly clumsy and inefficient design which remains in use primarily because very large numbers were produced. Captured Luce-3s, for example, are the main sniping weapon used by the armed forces of the Incan Republic.

Type: 45-02 laser rifle Country: Brazil Weight: 4 kg Length: 95 cm (Bulk=3) Action: Single shot Pulse Energy: 0.9 megajoules Muzzle Velocity: C Magazine: 5mj LMS cell (5 pulses) Magazine Weight: 1 kg ROF: 3 Aimed Fire Range: 1000 m DP Value: 1 Price: LV620 (Lv5 for disposable power cell)

Gonzalves-Brazilia "Luce-7B": The Luce-7B replaced the Luce-4 in Brazilian service. Although lower powered than most laser rifles, it has enough punch to deal with most targets, and an integral 30mm GB-30B grenade launcher gives it a good area fire capability.

Type: 40-01 laser rifle with integral 30mm grenade launcher Country: Brazil Weight (Empty): 3kg Length: 69 cm (Bulk=2) Action: Single shot Pulse Energy: 0.4 megajoules Muzzle Velocity: C Magazine: 5 mj LMS cell (12 pulses) Magazine Weight: 1 kg ROF: 5 Aimed Fire Range: 1000 DP Value: 1 Price: Lv720 (Lv5 for disposable power cell)

Mueller-Rivera F-19 (Fusile-19): The Mueller-Rivera F-19 is the current service laser with Argentine troops and is widely exported as well. It pioneered the use of the Quinn Optronics fast-discharge seven-megajoule LMS cell and is a powerful, accurate, and efficient weapon.

Type: 70-01 laser rifle Country: Argentina Weight: 1.5 kg Length: 69 cm (Bulk=2) Action: Single shot Pulse Energy: 0.7 megajoules Muzzle Velocity: C Magazine: 7 mj FDLMS cell (10 pulses) Magazine Weight: 1 kg ROF: 5 Aimed Fire Range: 1200 DP Value: 2 Price: Lv730 (Lv5 for disposable power cell)

SVB (Snayperskaya Vintovka Belnikarpov): Although the Belnikarpov is the highest energy man-portable laser in service with any army, more modern designs produce the same damage at lower power levels. Nevertheless, the SVB remains effective and is the standard service laser in use by the RFSFR, wehre it serves as the squad sniper weapon.

Type: 80-01 laser rifle Country: RFSFR Weight: 2 kg Length: 83 cm (Bulk=2) Action: Single shot Pulse Energy: 0.8 megajoules Muzzle Velocity: C Magazine: 5mj LMS cell (6 pulses) Magazine Weight: 1 kg ROF: 3 Aimed Fire Range: 1400 DP Value: 2 Price: Lv770 (Lv5 for disposable power cell)

Mueller-Rivera P-3 (Pistole-3)

Mueller-Rivera F-7 (Fusile-7)
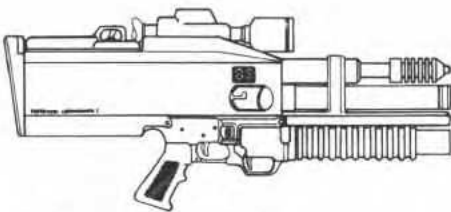
Rorttmann LK-1 (Laserkarabiner-1)

Gonzalves-Brazilia "Luce-3"

Gonzalves-Brazilia "Luce-7B"
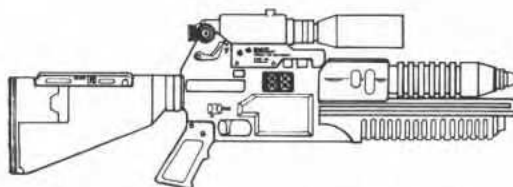
Mueller-Rivera F-19 (Fusile-19)

SVB (Snayperskaya Vintovka Belnikarpov)

The plasma gun contains a laser ignition system in the weapon which super-heats a hydrogen fuel pellet to a plasma state. The plasma is contained in the ignition chamber briefly and then allowed to escape through a magnetically focused field along the weapon's barrel. The high velocity plasma bolt is initially about two millimeters in diameter but tends to begin to dissipate at once. Dissipation is minimized by having the bolt ride a "tunnel" of heated air generated by a laser beam from the weapon. Because the plasma bolt rides a laser beam to its target, plasma guns are also sometimes referred to as plasers.

The ammunition for the weapon consists of photonic core plaser cells, each containing a fast discharge battery to pump the weapon's laser ignition and pathfinder beam, and the fuel pellet for the plasma bolt. After firing, the spent cells are ejected and are not reusable. Some care must be exercised in the selection of the location of the plasma gunner as the ejected cells are extremely hot, with semimolten centers, and can cause minor burn injuries to other troops in the way.

PLASMA GUNS, MAN-PORTABLE

Some of the most powerful man-portable weapons in the 24th century are plasma guns.

Jaschonek Fabrikant A-9 Sturmgewehr: The A-9 is the newest man-portable plasma gun intended as an assault rifle instead of a squad support weapon. While not seriously considered as an SK-19 replacement, the A-9 is issued on an experimental basis to back up the SK-19.

Type: Man-portable 5-MW plasma gun *Country:* Germany *Weight (Empty):* 4.5 kg *Length:* 83 cm (Bulk = 3) *Action:* Single shot *Ammunition:* 10 × 70mm 5-MW photonic core plaser cell *Ammunition Weight:* 0.3 kg *Magazine:* 6 cells in rotating cylinder magazine. *ROF:* 3 *Aimed Fire Range:* 900 m *DP Value:* As tamped explosion (EP = 1) *Price:* Lv1600 (Lv8 per disposable cell)

Type 1 High Energy Assault Gun: The Type 1 was the first man-portable plasma gun to see service. Although outclassed by many new types, it is still popular and extensively exported.

Type: Man-portable 10-MW plasma gun *Country* Manchuria *Weight (Empty):* 12 kg *Length:* 137 cm (Bulk = 5) *Action:* Single shot *Ammunition:* 12 × 120mm 10-MW photonic core plaser cell *Ammunition Weight:* 0.4 kg *Magazine:* 4 cells in internal tubular magazine *ROF:* 2 *Aimed Fire Range:* 750 m *DP Value:* As tamped explosion (EP = 2) *Price:* Lv 1300 (Lv12 per disposable cell)

Kurita Type-21F: The Type-21F man-portable plasma gun incorporates more punch in a very efficient design. It is the standard squad heavy support weapon with the Japanese Army. The Type-21F also serves in many other armies, and Sumatro-Fabrique recently concluded a license production agreement with Kurita for equipping the Indonesian Army with the weapon.

Type: Man-portable 15-MW plasma gun *Country:* Japan *Weight (Empty):* 9 kg *Length:* 121 cm (Bulk = 4) *Action:* Single shot *Ammunition:* 12 × 121mm 15-MW photonic core plaser cell *Ammunition Weight:* 0.4 kg *Magazine:* 4 cells in internal tubular magazine *ROF:* 2 *Aimed Fire Range:* 1000 m *DP Value:* As tamped explosion (EP = 3) *Price:* Lv1400 (Lv14 per disposable cell)

Quinn-Darlan Mk 2-A2 PGMP (Plasma Gun, Man-portable): The result of a joint venture by Quinn Optronics, Inc. and Darlan Optophysique, the Mk 2-A2 is the heaviest of the man-portable plasma weapons now in service with American and French armed forces and is used as a heavy point fire weapon against hard targets at the squad level. The impact of the plasma bolt can cause considerable concussion and fragmentation effects.

Type: Man-portable 20-MW plasma gun *Country:* France/USA *Weight (Empty):* 12 kg *Length:* 166 cm (Bulk = 6) *Action:* Single shot *Ammunition:* 17 × 91mm 20-MW photonic core plaser cell *Ammunition Weight:* 0.8 kg *Magazine:* 10 cells in internal tubular magazine *ROF:* 1 *Aimed Fire Range:* 1700 m *DP Value:* As tamped explosion (EP = 4) *Price:* Lv1800 (Lv18 per disposable cell)

HEAVY PLASMA GUNS

Although less mobile, the following provide heavy firepower in more fixed locations.

CLP-1A (Cannon Legere Pyrotechnique-1A) Field-mounted Plasma Gun: The first field-mounted plasma gun to enter service, it incorporates a complex cruciform mount to allow more stable, accurate and rapid fire for a weapon of this type. Because it is virtually immobile on the battlefield, it has been withdrawn from front-line service, but can often be found in fixed locations. Many CLP-1As have been exported, often as light vehicle armament upgrades.

Type: Field-mounted 175-MW plasma gun *Country:* France *Weight (Empty):* 344 kg *Length (Gun Tube Only):* 274 cm (Bulk = 8) *Action:* Single shot *Ammunition Weight:* 3.5 kg *Magazine:* 10-cell clip fed into overhead hopper *Magazine Weight:* 38 kg *ROF:* 5 *Aimed Fire Range:* 1600 m *DP Value:* As tamped explosion (EP = 15) *Price:* Lv9300 (Lv500 for disposable 10-cell clip)

Jaschonek Fabrikant A-4T Sturmgewehr: The A-4T is a modification of the A-4 plasma gun mounted in the Kz-7 Combat Walker. Specifications for the two weapons are the same, but the A-4T is a crew-served, tripod-mounted regular infantry version. The A-4T proved very effective in the German War of Reunification and has since become standard issue.

Type: 30-MW plasma gun *Country:* Germany *Weight (Empty):* 20 kg *Length:* 166 cm (Bulk = 6) *Action:* Single shot *Ammunition:* 20 × 107mm 30MW photonic core plaser cell *Ammunition Weight:* 1 kg *Magazine:* 5-round box *Magazine Weight:* 5 kg *ROF:* 1 *Aimed Fire Range:* 1700 m *DP Value:* As tamped explosion (EP = 6) *Ammo Price:* Lv24 per disposable cell
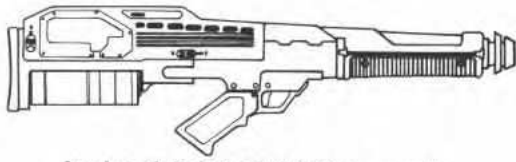
Jaschonek Fabrikant A-9 Sturmgewehr

Type 1 High Energy Assault Gun
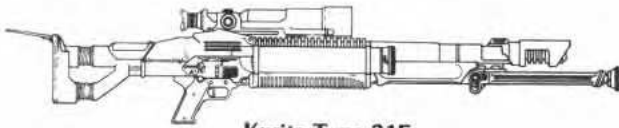
Kurita Type-21F
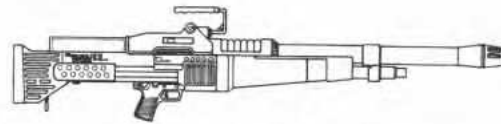
Quinn-Darlan Mk 2-A2 PGMP (Plasma Gun, Man-portable)
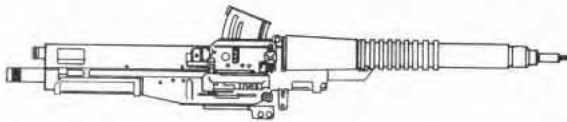
CLP-1A (Cannon Legere Pyrotechnique-1A) Field-mounted Plasma Gun
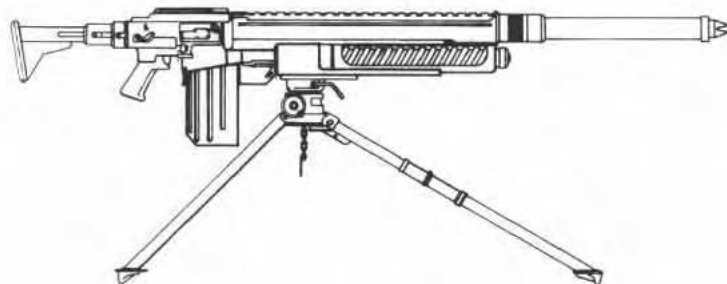
Jaschonek Fabrikant A-4T Sturmgewehr

SONIC STUNNERS

Sonic stunners project focused sound energy, usually in the ultrahigh frequency range, with sufficient energy to stun the target. They are only effective in atmospheres and against targets not wearing heavy armor (particularly airtight armored helmets). As a result of these limitations and the fact that the sonic bursts merely stun an opponent, they are of limited combat value. However, they are highly effective, nonlethal control weapons and are used extensively by police and security forces.

Brandt Audionique AS-3: *Type:* Sonic stun pistol *Country:* France *Weight (Empty):* 2 kg *Length:* 47 cm (Bulk = 1) *Action:* Single shot *Muzzle Velocity:* 330 mps *Magazine:* 5mj LMS cell (40 pulses) *ROF:* 3 *Aimed Fire Range:* 40 m *Area Fire Burst:* 1 (AFV = 0.5) *Area Fire Range:* 20 m *DP Value:* 0.5 (0.2 area fire), stun damage only *Price:* Lv140 (Lv5 for 1 5mj disposable LMS cell)

Quinn Optronics Restraint Carbine: *Type:* Sonic stun police carbine *Country:* America *Weight (Empty):* 4 kg *Length:* 73 kg (Bulk = 2) *Action:* Single shot *Muzzle Velocity:* 330 mps *Magazine:* 5mj LMS cell (15 pulses) *ROF:* 3 *Aimed Fire Range:* 100 m *Area Fire Burst:* 3 pulses (AFV = 1) *Area Fire Range:* 40 m *DP Value:* 0.8 (0.4 area fire), stun damage only *Price:* Lv150 (Lv5 for 1 5mj disposable LMS cell)

GRENADE LAUNCHERS

A variety of 30mm grenade launchers are currently found mounted integral to combat rifles. All of these grenade launchers have roughly similar performance. In addition, a few older magazine-loading grenade launchers are also available, although they are seldom used now by firstline troops. Below are listed grenade launchers and propelled grenades which are currently in use.

Combat Rifle Integral Grenade Launcher: *Type:* 30mm grenade launcher (integral to rifle) *Country:* Generic *Action:* single shot *Ammunition:* Any 30mm propelled grenade *Muzzle Velocity:* 400 mps *Magazine:* 3-round internal tubular magazine *ROF:* 1 *Aimed Fire Range:* 500 m *DP Value:* Dependent on grenade used

GW-12 Grenade Launcher: The GW-12 (Granatenwerfer-12) grenade launcher is typical of several of the older models of magazine-fed grenade launchers which are seldom found on the frontline.

Type: 30mm grenade launcher *Country:* Germany *Action:* Single shot *Ammunition:* Any 30mm propelled grenade *Muzzle Velocity:* 400 mps *Magazine:* 6-round box magazine *ROF:* 2 *Aimed Fire Range:* 500 m *DP Value:* Dependent on grenade used

PROPELLED GRENADES

The following propelled grenades are suitable for use with the grenade launchers which are listed above.

30mm High Explosive Propelled Grenade: *DP:* As explosion (EP = 4) *Price:* Lv5

30mm High Explosive Armor Piercing Propelled Grenade: *DP:* As tamped explosion (EP = 4) *Price:* Lv6

30mm Flechette Propelled Grenade: *Area Fire Value:* 2 *DP:* 0.5

30mm Concealment Propelled Grenade: *DP:* As explosion (EP = 1) but no fragmentation. Creates a thick obscuration cloud, which blocks visual and thermal images, for 4 minutes. The cloud is 20 m long and 10 m high. *Price:* Lv10

HAND GRENADES

The following three examples are representative of the common range of grenade types which are available.

High Explosive Fragmentation Grenade: *Weight:* 0.3 kg *DP:* As explosion (EP = 2) *Price:* Lv3

Concussion Grenade: *Weight:* 0.2 kg *DP:* As explosion (EP = 2) but no fragmentation *Price:* Lv3

Concealment Grenade: *Weight:* 0.3 kg *DP:* As explosion (EP = 1) but no fragmentation. Creates a thick obscuration cloud which blocks visual and thermal images for 2 minutes. The cloud is 10 m long and 10 m high. *Price:* Lv6
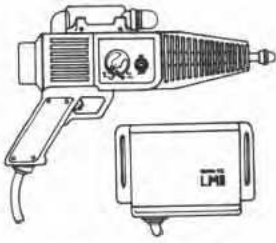
Brandt Audionique AS-3

GW-12 Grenade Launcher

30mm Concealment Propelled Grenade

30mm Flechette Propelled Grenade

High Explosive Fragmentation Grenade

Concussion Grenade

30mm High Explosive Propelled Grenade

Concealment Grenade

30mm High Explosive Armor Piercing Propelled Grenade

Quinn Optronics Restraint Carbine

GUIDED ORDNANCE

Two general types of guided ordnance are in use: these are free-fall and powered. An unpowered ordnance is referred to as a bomb, a powered ordnance as a missile. Both types of ordnance obey the same rules except that bombs may only be launched from aircraft relatively close to the target and glide to it rather than fly to it under their own power.

Virtually every major power produces a variety of guided ordnance. These weapons incorporate various means to make mid-course changes while on the way to their targets (for example: movable fins and vectored thrust). A representative selection from the arsenals of France and Germany are presented in the list below.

Referees may generate more types of missiles and bombs using the statistics presented below as they are needed.

Guiscard Martel: *Type:* Hand-carried light air defense missile *Nation:* France *Launcher Weight:* 6 kg *Missile Weight:* 2 kg *Range:* 7000 m *Guidance:* Automatic following gunner lock-on *Homing Value:* 23 *Attack Angle:* Direct *DP:* As tamped explosion (EP = 3) *Launcher Price:* Lv2000 *Missile Price:* Lv8000

Guiscard Blindicide-9: *Type:* Hand-carried light antivehicle missile *Nation:* France *Launcher Weight:* 12 kg *Missile Weight:* 3 kg *Range:* 1500 m *Guidance:* Automatic following gunner lock-on *Homing Value:* 14 *Attack Angle:* Selectable *DP:* As tamped explosion (EP = 25) *Launcher Price:* Lv3000 *Missile Price:* Lv2000

Guiscard Blindicide-3: *Type:* Obsolete hand-carried light antivehicle missile *Nation:* France *Launcher Weight:* 15 kg *Missile Weight:* 3 kg *Range:* 1000 m *Guidance:* Automatic following gunner lock-on *Homing Value:* 12 *Attack Angle:* Overhead *DP:* As tamped explosion (EP = 20) *Launcher Price:* Lv1500 *Missile Price:* Lv1000

Guiscard Manta-1: *Type:* Vehicle-mounted antivehicle missile *Nation:* France *Launcher Weight:* 100 kg *Missile Weight:* 20 kg *Range:* 8000 m *Guidance:* Automatic *Homing Value:* 16 *Attack Angle:* Selectable *DP:* As tamped explosion (EP = 40) *Launcher Price:* Lv4500 *Missile Price:* Lv6000

Guiscard Aero-12: *Type:* Obsolete vehicle-mounted antivehicle missile *Nation:* France *Launcher Weight:* 90 kg *Missile Weight:* 30 kg *Range:* 14,000 m *Guidance:* Automatic *Homing Value:* 15 *Attack Angle:* Overhead *DP:* As tamped explosion (EP = 35) *Launcher Price:* Lv3000 *Missile Price:* Lv4000

Guiscard Aero-27: *Type:* Vehicle-mounted air defense missile *Nation:* France *Launcher Weight:* 90 kg *Missile Weight:* 200 kg *Range:* 400 km (flight time to maximum range is 5 min.) *Guidance:* Automatic following gunner lock-on *Homing Value:* 27 *Attack Angle:* Direct *DP:* As tamped explosion (EP = 10) *Launcher Price:* Lv3000 *Missile Price:* Lv25,000

Panzerfaust 93: *Type:* Hand-carried antivehicle missile *Nation:* Germany *Launcher Weight:* 12 *Missile Weight:* 11 *Range:* 4000 m *Guidance:* Automatic following gunner lock-on *Homing Value:* 15 *Attack Angle:* Selectable *DP:* As tamped explosion (EP = 30) *Launcher Price:* Lv3000 *Missile Price:* Lv3000

Luchs: *Type:* Vehicle-mounted antivehicle missile *Nation:* Germany *Launcher Weight:* 120 kg *Missile Weight:* 18 kg *Range:* 7000 m *Guidance:* Automatic *Homing Value:* 17 *Attack Angle:* Selectable *DP:* As tamped explosion (EP = 40) *Launcher Price:* Lv4000 *Missile Price:* Lv5000

Hornisse: *Type:* Man-carried light air defense missile *Nation:* Germany *Launcher Weight:* 6 kg *Missile Weight:* 17 kg *Range:* 9000 m *Guidance:* Automatic or automatic following gunner lock-on *Homing Value:* 24 *Attack Angle:* Direct *DP:* As tamped explosion (EP = 4) *Launcher Price:* Lv2000 *Missile Price:* Lv7000

Ohu: *Type:* Vehicle-mounted air defense missile *Nation:* Germany *Launcher Weight:* 90 kg *Missile Weight:* 100 kg *Range:* 200 km (flight time to maximum range is 3 min.) *Guidance:* Automatic following gunner lock-on *Homing Value:* 29 *Attack Angle:* Direct *DP:* As tamped explosion (EP = 10) *Launcher Price:* Lv3000 *Missile Price:* Lv20,000

200-Kilogram WASP Bomb: *Type:* Aircraft-guided bomb *Nation:* Generic *Launcher Weight:* 0 *Bomb Weight:* 200 kg *Range:* 5 km *Guidance:* Automatic following gunner lock-on *Homing Value:* 10 *Attack Angle:* Direct *Burst Radius:* 1000 m *DPV:* 7 *Price:* Lv3000

200-Kilogram High-Explosive Bomb: *Type:* Aircraft-guided bomb *Nation:* Generic *Launcher Weight:* 0 *Bomb Weight:* 200 kg *Range:* 5 km *Guidance:* Automatic following gunner lock-on *Homing Value:* 10 *Attack Angle:* Direct *DP:* As explosion (EP = 150) *Price:* Lv2000

Guiscard Martel
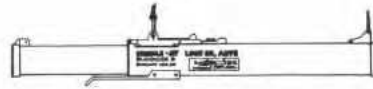
Guiscard Blindicide-9
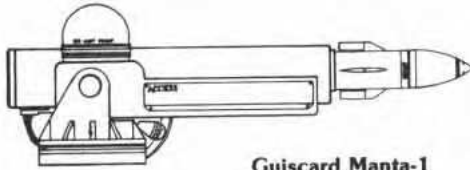
Guiscard Manta-1

Guiscard Blindicide-3
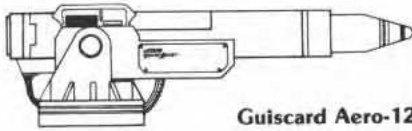
Guiscard Aero-12
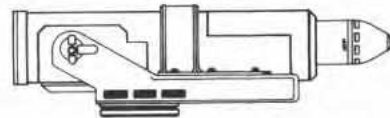
Guiscard Aero-27

Panzerfaust 93
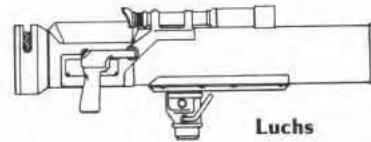
Luchs

Hornisse
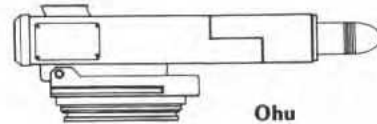
Ohu
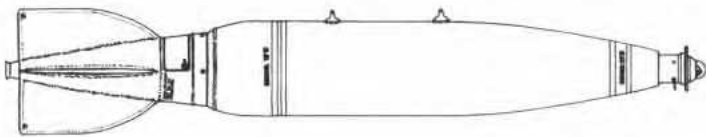
200-Kilogram WASP Bomb

200-Kilogram High-Explosive Bomb
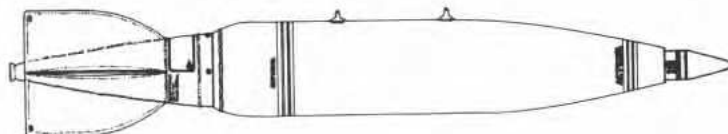
ARMOR MATERIALS

There are three different types of body armor: nonrigid, rigid, and inertial. Nonrigid armor is made of flexible material which is tough and resists puncture by a bullet or energy beam. It doesn't inhibit the wearer's movement as much as rigid armor does. Rigid armor is made of solid pieces. Inertial armor is flexible like nonrigid armor but becomes rigid when struck by a fast-moving projectile (such as a bullet or a piece of shrapnel). The differences among nonrigid, rigid, and inertial armor are only important when resolving blunt trauma injuries (as explained in the Combat chapter of the Director's Guide). In case of normal damage, the armor's value is subtracted from the DP value of the attack, and the difference is used to determine the seriousness of the wound.
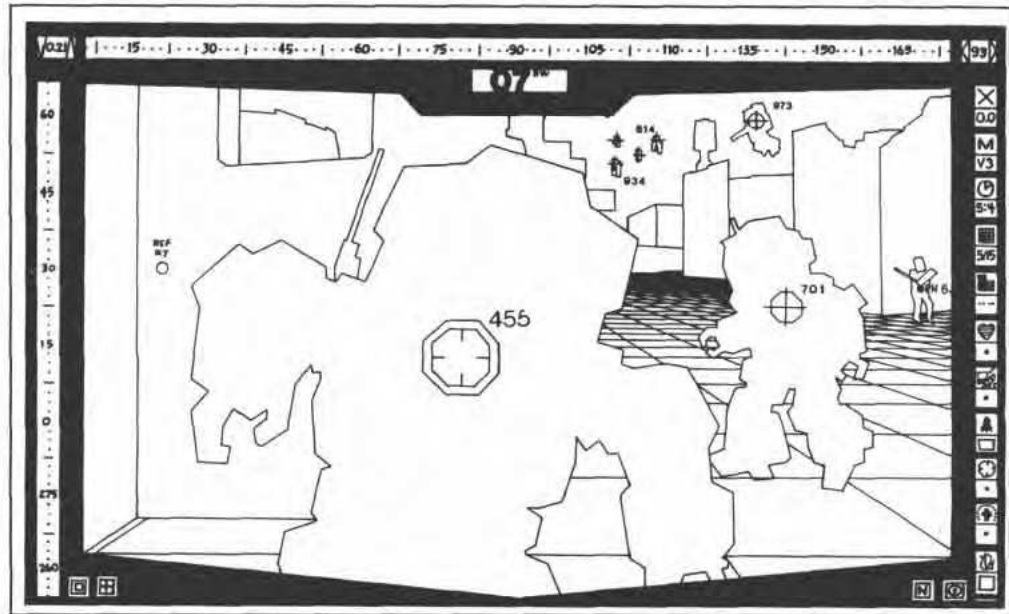
ARMOR TYPES

In some occupations, body armor may be useful at times. The following examples of body armor are available for characters who expect to need it in their line of work. Several different items may be worn at one time (for instance, a helmet and a vest), to give protection to different areas of the body.

Helmet: *Nation:* Generic *Weight:* 0.5 kg *Area Protected:* Head *Armor Value:* 1 *Initiative Penalty:* None *Price:* Lv5

High Threat Combat Helmet: *Nation:* Generic *Weight:* 1 kg *Area Protected:* Head *Armor Value:* 2 *Initiative Penalty:* None *Price:* Lv20

Steel Helmet: *Nation:* Primitive generic *Weight:* 2 kg *Area Protected:* Head *Armor Value:* 0.2 *Initiative Penalty:* None *Price:* Lv1

Chainmail Vest: *Nation:* Primitive generic *Weight:* 8 kg *Area Protected:* Torso *Armor Value:* 0.1 (nonrigid) *Initiative Penalty:* 1 *Price:* Lv1

Vedette Half-Armor: *Nation:* France *Weight:* 2 kg *Area Protected:* Upper torso (hit location 2) *Armor Value:* 1 *Initiative Penalty:* None *Price:* Lv20

Rigid Breastplate: *Nation:* Generic *Weight:* 8 kg *Area Protected:* Torso *Armor Value:* 1 *Initiative Penalty:* −1 *Price:* Lv20

Nonrigid Vest: *Nation:* Generic *Weight:* 2 kg *Area Protected:* Torso *Armor Value:* 0.8 *Initiative Penalty:* None *Price:* Lv20

Inertial Armor Vest: *Nation:* Generic *Weight:* 3 kg *Area Protected:* Torso *Armor Value:* 0.8 (counts as rigid for blunt trauma damage) *Initiative Penalty:* None *Price:* Lv100

Full-body Nonrigid Armor: *Nation:* Generic *Weight:* 10 kg *Area Protected:* Torso and limbs *Armor Value:* 0.3 *Signature:* −1 *Initiative Penalty:* −1 *Price:* Lv60

Full-body Inertial Armor: *Nation:* Generic *Weight:* 10 kg *Area Protected:* Torso and limbs *Armor Value:* 0.4 (counts as rigid for blunt trauma damage) *Signature:* −2 *Initiative Penalty:* −1 *Price:* Lv350

Full-body Combat Armor: *Nation:* Generic *Weight:* 20 kg *Area Protected:* Limbs (usually worn with breastplate) *Armor Value:* 1 *Signature:* −2 *Initiative Penalty:* −2 *Price:* Lv100

STEEL HELMET
Argentine Issue

HELMET
French Issue
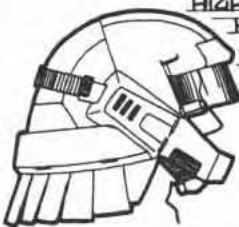
HIGH THREAT HELMET
German Issue

CHAIN MAIL VEST
Generic
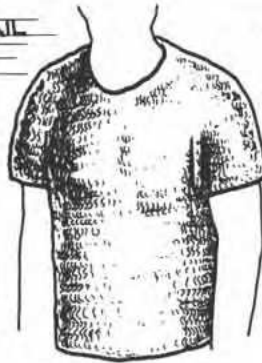
RIGID BREASTPLATE
Ukrainian Issue

VEDETTE HALF-ARMOR
American Mfgr.

INERTIAL ARMOR VEST
German Issue

FULL-BODY NON-RIGID ARMOR (W/ NON-RIGID VEST)
Daikoku Defense Force Issue

FULL-BODY INERTIAL ARMOR
American Marine Issue
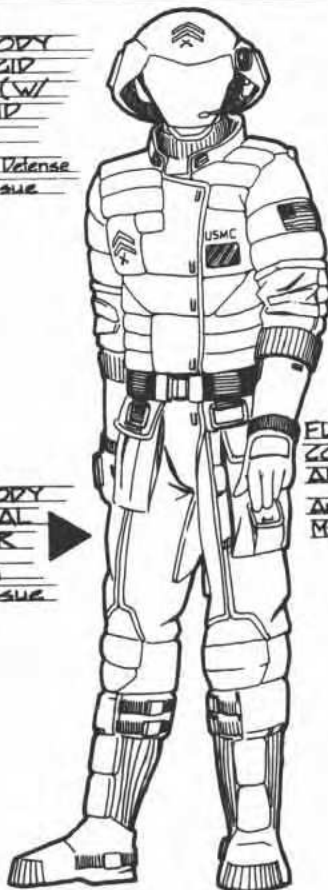
FULL-BODY COMBAT ARMOR
American Marine Issue

Rob Caswell
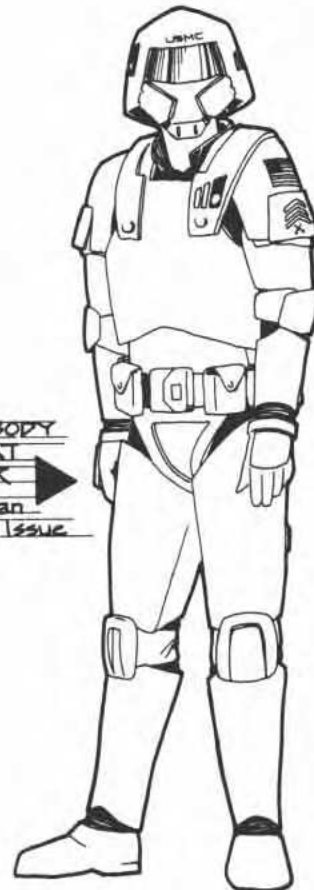
Powered combat armor, or combat walkers, are articulated powered exoskeletal machines with a tough armored covering.

The first combat walker, the French BH-21, was built near the middle of the 23rd century. Since that time, a number of other types have been created, but the French BH-21 and the German Kz-7 remain the most common types seen.

Combat walkers can come in many shapes, but on the average, they all stand about three meters tall.

BH-21 Combat Walker: The BH-21 Combat Walker is a French-made suit of powered combat armor that was first produced late in the period of the Central Asian War. It was used by French peacekeeping forces in Central Asia at the end of the war to fight Iranian-backed guerrillas in that region.

There are three different models of BH-21 Combat Walkers. The basic model has powerful motors in the limbs that are slaved to the pilot's movements, an internal monitor that can expand up to a 360-degree view of the surrounding area, heavy filters to provide clean air to the operator, and an arm-mounted plasma gun. The BH-21 is simply a normal BH-21 with airtanks added for use in noxious enviroments. The BH-21C has airtanks for vacuum and adds a jet pack for use in zero-G environments.

Nation: France *Weight:* 380 kg *Crawl:* Not allowed *Walk:* 10 m *Trot:* 20 m *Run:* Not allowed *Power Supply:* Internal rechargeable power cell *Power Duration:* 24 hr *Integral Armament:* Quinn-Darlan Mk 4-A1 PGCW *Sensor Range:* 6 km *Signature:* 2 *Area Protected:* All *Armor Value:* 8 *Signature:* 2 *Initiative Penalty:* −4 *Price:* Lv17,000

Quinn-Darlan Mk 4-A1 PGCW (Plasma Gun, Combat Walker): The Mark 4-A1 is a variant of the Quinn-Darlan Mark 2-A2 PGMP for use in the BH-21 Combat Walker. It is mounted in the left arm of the suit, which must be extended and locked to fire the weapon. The internal drum magazine is extended around the outer bicep of the walker and is protected by its armored shell. It is not possible for the occupant of the walker to reload the magazine without help.

Type: Man-portable 20-MW plasma gun *Country:* France/USA *Action:* Single shot *Ammunition:* 17×91mm 20-MW photonic core plaser cell *Ammunition Weight:* 0.8 kg *Magazine:* 30 cells in internal drum magazine. *ROF:* 1 *Aimed Fire Range:* 1700 m *DP Value:* As tamped explosion (EP = 4) *Ammo Price:* Lv18 per disposable cell

Kz-7 (Kampfanzug-7) Combat Walker: The Kz-7 Combat Walker was developed by Germany toward the end of the War of German Reunification in preparation for an invasion of France. The invasion, of course, never came. France sued for peace and accepted the reunification of the previously separate German states. Intended as a response to the French BH-21 Combat Walker, the Kz-7 was made much lighter and stronger (using more advanced material technologies), as well as much more flexible. It is actually possible to crawl in a Kz-7, something that is impossible in a BH-21.

The Kz-7's plasma gun was mounted on the walker's shoulder in order to have its considerable recoil nearer the suit's center of balance than if the weapon had been mounted on an arm. As well, extra armament was included on the walker in the form of a laser in the suit's right arm. The laser can be used against soft-skinned targets, saving energy to be used for the plasma gun.

There is currently only one model of Kz-7 Combat Walker, and given the emphasis on mobility, it is unlikely that any variants will be created with the bulky equipment needed for use in space.

Nation: Germany *Weight:* 455 kg *Crawl:* 2 m *Walk:* 15 m *Trot:* 30 m *Run:* 50 m *Power Supply:* Internal rechargeable power cell *Power Duration:* 18 hr *Integral Armament:* Jaschonek Fabrikant A-4 Sturmgewehr in torso, LK-1fKz 35-01 laser in right arm *Sensor Range:* 8 km (+ 1) *Signature:* 1 *Area Protected:* All *Armor Value:* 10 *Signature:* 1 *Initiative Penalty:* −3 *Price:* Lv33,000

Jaschonek Fabrikant A-4 Sturmgewehr: The A-4 is a very high energy plasma gun integral to the Kz-7 Combat Walker. The main gun mechanism is mounted in the chest of the walker, and the weapon itself fires from over the right shoulder. The walker must be stationary to fire the weapon due to the high recoil. The high capacity magazine is reloaded from a port located on the front of the suit's left hip and can be reloaded by the suit operator.

Type: Man-portable 30-MW plasma gun *Country:* Germany *Action:* Single shot *Ammunition:* 20×107mm 30-MW photonic core plaser cell *Ammunition Weight:* 1 kg *Magazine:* 40 cells in internal magazine *ROF:* 1 *Aimed Fire Range:* 1700 m *DP Value:* As tamped explosion (EP = 6) *Ammo Price:* Lv24 per disposable cell

**Rorttmann LK-1fKz (Laserkarabiner-1 fur Kampfanzug):** The Rorttmann LK-1fKz is a variant of the LK-1 mounted in the right arm of the Kz-7 combat walker. The laser operates off of the walker's own power supply. Each pulse fired reduces the power's duration by two minutes.

Type: 35-01 laser rifle *Country:* Germany *Action:* Single shot *Pulse Energy:* 0.35 megajoules *Muzzle Velocity:* C *ROF:* 5 *Aimed Fire Range:* 1000 m *DP Value:* 1

Kz-7

SCALE 1:27
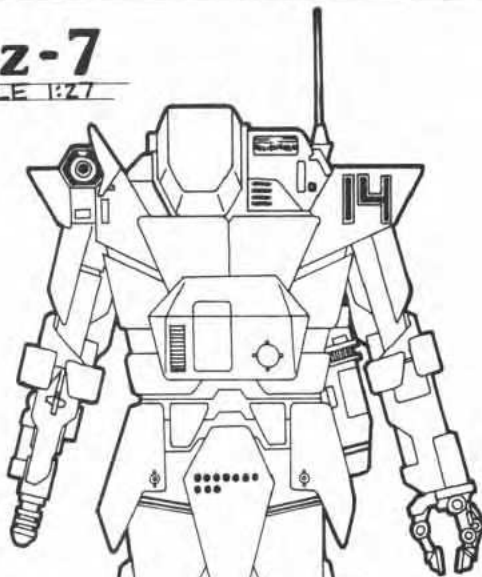
JASCHONEK FABRIKANT A-4 STURMGEWEHR
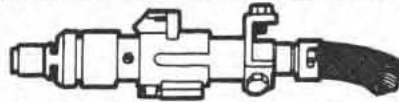
Mounted on right shoulder of Kz-7, with mechanisms in "chest" and magazine access on left hip. Mechanisms & magazine not shown.
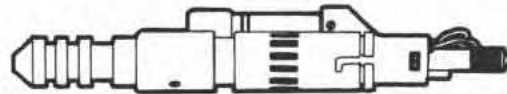
LK-1fKz 35-01 LASER

Unit located in right arm of Kz-7.

BH-21

SCALE 1:27

- BH-21A: Basic Ground Assault.
- BH21B: Noxious Atmos.
- BH21C: Zero-G Manuver.

CAPT. J. WOOD

16 784

USMC
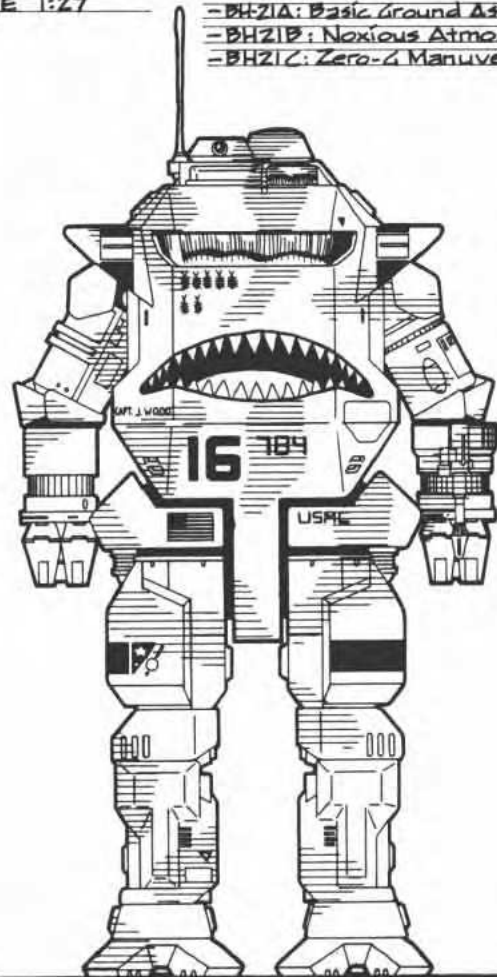
QUINN-DARLAN MK4-A1 PGCW

Unit is mounted in left arm of BH-21. Cooling jacket & assembly ommitted for clarity of illustration.

DANGER

DRAWN BY ROB CASWELL

Vehicles

VEHICLE MEDIA

Vehicles travel by interacting with one of three media: land, air, or water. Ground vehicles interact through means of wheels, tracks, rails, or air cushions. Air vehicles remain aloft by means of dynamic lifting surfaces (such as rotors or airfoil wings) or lifting cells filled with a gas lighter than the background atmosphere. Vessels rely on air-filled hulls for buoyancy in water. These hulls may be designed either to travel completely submerged, (as in a submarine), partially submerged, or lifted from the water by hydrofoils.

An even wider variety of vehicles are produced by the factories of Earth and its colonies in the 24th century than are available today. It would be impossible to completely catalog them here, but the following listings give a broad sample of the types of vehicles available and explain their performance capabilities.

LAND VEHICLES

Land vehicles are, of course, the most commonly used of all vehicles. They run the gamut from light passenger vehicles to huge engines of war.

Family Car: This represents a typical family ground car of the type in use on most worlds. It is usually a hydrogen-burner, although a few worlds with abundant petrochemicals have found it more economical to build or import gasoline-burners. In many urban areas battery-powered commuter cars (with considerably lower endurance) are used. *Type:* Wheeled ground car *Crew:* Driver *Weight:* 800 kg *Armor: Suspension:* 0.2 *All Faces:* 0.4 *Signature:* 2 *Evasion:* 1 *Cargo:* 4 passengers and 200 kg cargo *Max Speed:* 150 kph *Cruising Speed:* 100 kph *Combat Movement:* 300 m *Off-Road Mobility:* Quartered *Power Plant:* 0.06MW hydrogen fuel cell *Fuel Capacity:* 32 kg H_2 *Fuel Consumption:* 2 kg/hr *Endurance:* 16 hr *Price:* Lv2500

Range Truck: This vehicle, similar to contemporary jeeps and landrovers, is a cross-country vehicle designed to carry passengers and light cargo off-road. *Type:* Cross-country light truck *Crew:* Driver *Weight:* 800 kg *Armor: Suspension:* 0.3 *All Faces:* 0.4 *Signature:* 2 *Evasion:* 2 *Cargo:* 5 passengers and 300 kg cargo *Max Speed:* 140 kph *Cruising Speed:* 100 kph *Combat Movement:* 300 m *Off-Road Mobility:* Halved *Power Plant:* 0.1MW hydrogen fuel cell *Fuel Capacity:* 48 kg H_2 *Fuel Consumption:* 3 kg/hr *Endurance:* 16 hr *Price:* Lv3000

Utility Van: This is a general-purpose passenger or cargo hauler used for light loads on roads. *Type:* wheeled van *Crew:* driver *Weight:* 1200 kg *Armor: Suspension:* 0.2 *All Faces:* 0.4 *Signature:* 4 *Evasion:* 3 (full speed) *Cargo:* 6 passengers and 500 kg cargo *Max Speed:* 140 kph *Cruising Speed:* 100 kph *Combat Movement:* 300 m *Off-Road Mobility:* quartered *Power Plant:* 0.1MW hydrogen fuel cell *Fuel Capacity:* 48 kg H_2 *Fuel Consumption:* 3 kg/hr *Endurance:* 16 hr *Price:* Lv3000
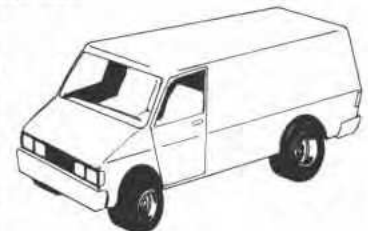
Heavy Truck: This is a specialized cargo hauler for use on frontier worlds. While at its best on roads, its large tires, high ground clearance, and all-wheel drive give it a reasonable off-road capability as well. In military service the vehicle is often equipped with a heavy ring mount on the left side of the cab for either a machinegun or autocannon. *Type:* Wheeled cargo truck *Crew:* Driver *Weight:* 4000 kg *Armor: Suspension:* 0.3 *All Faces:* 0.4 *Signature:* 6 *Evasion:* 0 *Cargo:* 2 passengers and 8000 kg *Max Speed:* 130 kph *Cruising Speed:* 100 kph *Combat Movement:* 250 m *Off-Road Mobility:* Halved *Power Plant:* 0.13 MW hydrogen fuel cell *Fuel Capacity:* 96 kg H_2 *Fuel Consumption:* 4 kg/hr *Endurance:* 24 hr *Price:* Lv10,000
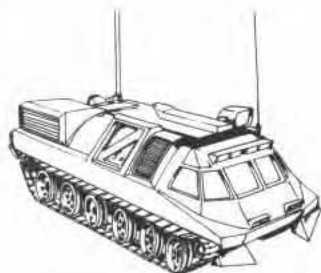
Explorer ATV: A tracked wilderness vehicle popular with scientific parties. It can double as living quarters in hostile environments and can negotiate most types of terrain. *Type:* Tracked all-terrain vehicle *Crew:* Driver *Weight:* 3000 kg *Armor: Suspension:* 1 *All Faces:* 1 *Signature:* 8 *Evasion:* 0 *Sensor Range:* None *Cargo:* 8 passenger and 3000 kg *Max Speed:* 100 kph *Cruising Speed:* 50 kph *Combat Movement:* 200 m *Off-Road Mobility:* Full *Power Plant:* 0.2MW hydrogen fuel cell *Fuel Capacity:* 192 kg H_2 *Fuel Consumption:* 6 kg/hr *Endurance:* 32 hr *Price:* Lv20,000

Bridgeport Swift Songbird: This is typical of any of a number of light hovercraft in civilian and military use. It has exceptional performance over both water and most types of land terrain, although its performance in dense woods is limited to established roads and paths; performance in heavily broken ground is nil. *Type:* Utility hovercraft *Crew:* Driver *Weight:* 1000 kg *Armor: Plenum:* 0.3 *All Faces:* 1 *Signature:* 1 *Evasion:* 9 *Cargo:* 6 passengers and 1000 kg *Max Speed:* 240 kph *Cruising Speed:* 200 kph *Combat Movement:* 500 m *Off-Road Mobility:* Full *Power Plant:* 0.25MW hydrogen fuel cell *Fuel Capacity:* 100 kg H_2 *Fuel Consumption:* 8 kg/hr *Endurance:* 12 hr *Price:* Lv20,000
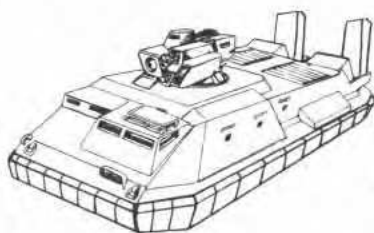
Military ACV-APC: A typical air-cushion, armored personnel carrier, the extra weight of the vehicle is carried at high speed by jet-assisted vectored thrusters. These also give the vehicle a limited jump-jet capability, enabling it to negotiate cliffs and similar obstructions. Each minute in jump-jet mode uses 10 minutes of fuel, and speed is quartered. *Type:* Hover APC *Crew:* Driver, gunner, commander *Weight:* 3000 kg *Armor: Plenum:* 2 *All Faces:* 6 *Armament:* 1 Guiscard Aero-12 missile launcher with 6 missiles carried internally, 1 25mm autocannon, 1 5.5mm machine gun (all carried in a single overhead unmanned turret) *Signature:* 4 *Evasion:* 7 *Sensor Range:* 10 km *Cargo:* 8 passengers and 2000 kg *Max Speed:* 220 kph *Cruising Speed:* 200 kph *Combat Movement:* 460 m *Off-Road Mobility:* Full *Power Plant:* 0.5MW hydrogen fuel cell *Fuel Capacity:* 270 kg H_2 *Fuel Consumption:* 15 kg/hr *Endurance:* 18 hr *Price:* Not generally available outside of military channels. The average open market price is around Lv40,000 exclusive of armament.

AC-8 (Aero-Char, 8-ton): Often called "gunplats" or "gunsleds," hovertanks are the cutting edge of heavy ground force units. The Aero-Char 8 is representative of many similar tanks of Central Asian War vintage. Mismanaged overproduction at the end of the war, coupled with bloc obsolescence, has caused the AC-8 to be widely exported, and it is still used by many French colonial troops. The vehicle uses vectored-thrust jets which give it a limited jump jet capability enabling it to negotiate cliffs and similar obstructions. Each minute in jump-jet mode uses 10 minutes of fuel and speed is quartered. *Type:* Obsolete French hovertank *Crew:* Driver, gunner, commander *Weight:* 8000 kg *Armor: Plenum:* 5 *Front Overhead:* 80 *Other Faces:* 30 *Armament:* 8cm mass driver gun in hull sponson (*Aimed Fire Range:* 2000 m *Range Finder:* +2 *ROF:* 4 *Rounds Carried:* 60 *DP:* 80), 25mm autocannon in remote turret, 7.5mm machine gun in remote turret, 1 Guiscard Aero-12 missile launcher in remote turret, with 8 missiles carried internally *Signature:* 6 *Evasion:* 6 *Sensor Range:* 12 km (+1) *Cargo:* 500 kg *Max Speed:* 210 kph *Cruising Speed:* 200 kph *Combat Movement:* 460 m *Off-Road Mobility:* Full *Power Plant:* 1.6MW MHD turbine *Fuel Capacity:* 240 kg H_2 *Fuel Consumption:* 40 kg/hr *Endurance:* 6 hr *Price:* Not generally available on the open market. The last recorded transfer was for 56 AC-8s, with

If a player wishes his character to purchase a civilian land vehicle, there will likely be very little trouble in finding one for sale on most worlds, at least at major urban areas. At major cities, any of the civilian vehicles can be found new, or, if your referee allows, you may decide to buy a used vehicle at a discount. Some vehicles may even be for rent, with a sizeable discount. In more rural areas, vehicles for sale will be harder to find, and the prices asked may well reflect this. But a good bargainer might be able to bring the price down.

Military vehicles will, of course, be much more difficult to acquire, even if you have the money to pay for them. They also consume large amounts of fuel and require frequent maintenance to assure that they remain in fighting trim. Finally, locals tend to be wary of strangers who drive up in a hovertank.

armament and spares, to the government of Chile for Lv200,000 each.
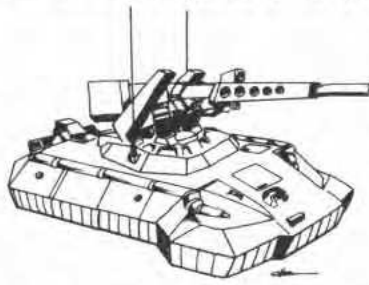
LkPz-IX (Luftkissenpanzer, Mark 9): Hovercraft (Luftkissen) are generally referred to in German service as "Lukis." The Mark IX is the most recent version in service with the German Army and possesses a very modern armament array and sensor suite. A vehicle this sophisticated is rarely encountered on the frontier except in a very hot situation. Like most combat hovercraft, it possesses a limited jump-jet capability which uses 10 minutes of endurance for every minute of flight. Speed is quartered in jump mode.

Type: Hovertank *Crew:* Command driver, gunner *Weight:* 10,000 kg *Armor: Plenum:* 25 *Front:* 90 *All Other Faces:* 60 *Armament:* 7cm mass driver gun in remote overhead mount (*Aimed Fire Range:* 2000 m *Range finder:* +3 *ROF:* 5 *Rounds Carried:* 100 *DP:* 90), 5.5mm machinegun in remote overhead mount (coaxial with main gun), 2 Luchs missile launchers with 10 missiles carried internally *Signature:* 3 *Evasion:* 8 *Sensor Range:* 12 km (+2) *Cargo:* 500 kg *Max Speed:* 220 kph *Cruising Speed:* 200 kph *Combat Movement:* 460 m *Off-Road Mobility:* Full *Power Plant:* 2MW MHD turbine *Fuel Capacity:* 275 kg H_2 *Fuel Consumption:* 45 kg/hr *Endurance:* 6 hr *Price:* Not generally available on the open market. 2298 procurement cost was 398,300 talers each (approximately Lv300,000 each).

RAIL TRANSPORTATION

In the 24th century, there are three types of rail transports. Each has its own particular applications.

Conventional Railroad: Railroads are efficient means of moving large quantities of cargo and passengers by land. Each car rides on solid wheels which in turn ride on solid tracks. This allows very high pressure loadings (much higher than for vehicles which ride on open ground). Average speed in open country is 200 kph.

Airfilm Train: Airfilm trains also ride on hard rails, but interact by means of a thin, high-pressure airfilm instead of wheels. This allows even higher pressure loadings with very little friction. Average speed in open country is 500 kph.
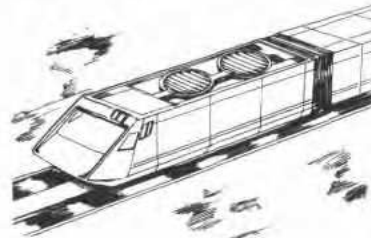
Maglev Lines: On vacuum worlds, it is unfeasible to support a train on a film of air. Instead, a strong magnetic field is generated around the rail that the train travels along. Speeds for maglev trains are equivalent to those of airfilm trains.
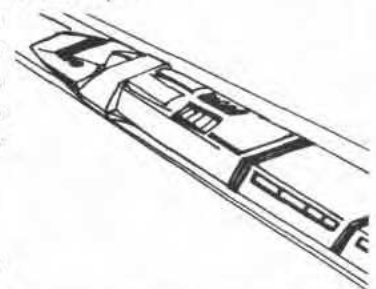
AIRCRAFT

The following brief listing gives a representative sample of the types of aircraft in widespread use in the year 2300. Virtually all aircraft are made entirely of nonmetallic synthetic components resulting in low overall weight, high structural integrity, and low radar signature. Virtually all civilian aircraft carry, by law, radio transponders to assist air traffic controllers in aircraft location.
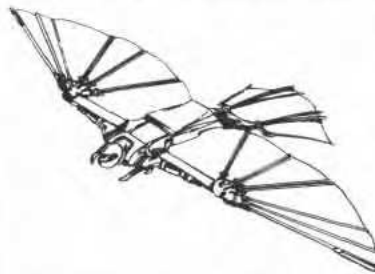
Ornithider: The ornithider is a one-man, semipowered, ultralight glider. The wings are slaved to the pilot's arms, and the small battery pack amplifies the strength of the arms sufficiently to power takeoffs and limited maneuvers. The wings can also be locked in flight for extended gliding, with trim managed by shifting the weight of the pilot. The upper surfaces of the wings are solar collectors which recharge the

battery, and given a good enough thermal updraft for extended nonpowered orbiting to recharge the battery, flight time is theoretically unlimited. In practice, pilot fatigue limits the endurance to about six or eight hours. The glider is usually stored in the open with its wings deployed (assuming good weather) to recharge the battery. *Type:* Solar battery-powered winged glider *Crew:* Pilot *Weight:* 10 kg *Armor:* None *Evasion:* 8 *Signature:* +1 *Cargo:* 110 kg (including pilot) *Max Speed:* 100 kph *Cruising Speed:* 60 kph *Combat Movement:* 200 m *Endurance:* 10 min. of maneuvering (60 min. of sunshine recharges 1 min. worth of powered flight) *Price:* Lv2000
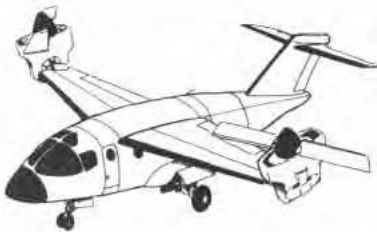
Military Liaison and Civilian Light Transport: This aircraft combines a vertical takeoff and landing capability with efficient level flight by means of two propfans which rotate on an axis through the centerline of the wings. When horizontal, they provide sufficient thrust to lift the aircraft off the ground. They are then rotated 90 degrees to provide forward thrust, the conventional wing surfaces taking over the lift function. *Type:* Tiltrotor VIP transport *Crew:* Pilot *Weight:* 4000 kg *Armor: All Faces:* 0.5 *Evasion:* 14 *Sensor Range:* 100 km *Signature:* +1 *Cargo:* 3 passengers and 500 kg *Max Speed:* 700 kph *Cruising Speed:* 600 kph *Combat Movement:* 1500 m *Endurance:* 4 hr *Price:* Lv35,000

Utility Light Transport: This aircraft operates on a principle similar to that used on the VIP transport described above. It has improved hover characteristics due to the use of two large-radius conventional propellers. As the radius is too large to fit the propellers into the wing itself, the engines are mounted on pivots on the wingtips. The characteristically high wing is to ensure propeller clearance when landed. *Type:* Tiltrotor utility transport *Crew:* Pilot *Weight:* 8000 kg *Armor: All Faces:* 1 *Evasion:* 12 *Sensor Range:* 100 km *Signature:* +2 *Cargo:* 3000 kg *Max Speed:* 600 kph *Cruising Speed:* 500 kph *Combat Movement:* 1200 m *Endurance:* 3 hr *Price:* Lv300,000
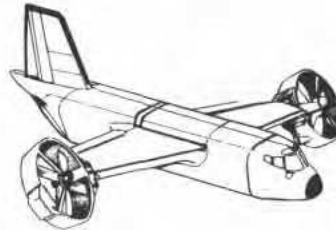
Conventional Frontier Fighter: This aircraft is optimized to perform best under primitive conditions, a feature extremely useful on Frontier worlds where massive paved airstrips are infrequent except at starports. Its vectored thrust engines, in addition to giving it a vertical takeoff capability, also make it extremely maneuverable. *Type:* Vectored thrust VSTOL fighter/Bomber *Crew:* Pilot *Weight:* 8000 kg *Armor: All Faces:* 4 *Armament:* Twin 25mm autocannons, 4 missile launcher hardpoints, 4 bomb hardpoints *Evasion:* 20 *Sensor Range:* 400 km (+2) *Signature:* −2 *Max Speed:* 1500 kph *Cruising Speed:* 1000 kph *Combat Movement:* 3000 m *Endurance:* 5 hr *Price:* Lv2,000,000
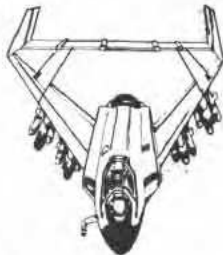
Close Support Gunship: This type of aircraft uses the X-Wing concept to achieve a very good level flight performance, full vertical takeoff and landing capability, and excellent hover characteristics. The aircraft is lifted aloft by the overhead, large diameter, four-bladed rotor. Forward thrust is provided by a shrouded conventional turbine. Once the craft is airborne and close to cruise speed, the rotor is stopped in flight and locked into place, the four blades forming an "X" (hence the name X-wing). In this position, the blades provide conventional lift (supplemented by the stub wings, which double as weapon pylons). *Type:* X-wing ground attack craft *Crew:* Pilot *Weight:* 6000 kg *Armor: All Faces:* 3 *Armament:* 25mm autocannon, 8 missile launcher hardpoints *Evasion:* 16 *Sensor Range:* 200 km *Signature:* +1 *Max Speed:* 800 kph *Cruising Speed:* 600 kph *Combat Movement:* 1600 m *Endurance:* 3 hr *Price:* Lv500,000

PUBLIC TRANSPORT

Most people in the 24th century do their daily travelling by means of public transportation. Airfilm lines, for example, offer a smooth, comfortable ride at very high speeds, making the thought of manually guiding a ground car along crowded hydrogen roads (the 24th century term for highway) very distasteful. Also, because of the air film train's high speeds, suburban areas can lie much farther from the cities they surround, and those wealthy enough to live in the suburbs enjoy an added sense of security with the increased distance.

LIGHT AIRCRAFT

New colonies spend most of their time learning to become as self-sufficient as possible in the environment in which they are located. They have none to spare for clearing and maintaining lengthy aircraft-landing strips. But quick transportation is still a necessity for emergency medical treatment, disaster relief, or simply to allow the heads of the organization sponsoring the colony to visit it without undertaking a long, arduous trip.

Aircraft capable of vertical or near-vertical takeoff have become very popular under these circumstances. And vertical takeoff capability is of great aid in military aircraft as well, allowing them to land at temporary refueling and rearming stations.

First-Line Multipurpose Fighter: This is representative of the best Mach-2 fighters available. Although it does not have a vertical takeoff capability, its vectored thrust engines give it a very short takeoff run and excellent maneuverability. It carries an excellent sensor suite and is designed to have a very low signature on enemy sensors. *Type:* Supersonic fighter-bomber *Crew:* Pilot *Weight:* 8000 kg *Armor: All Faces:* 6 *Armament:* 2 25mm autocannon, 4 missile hardpoints, 6 bomb hardpoints *Evasion:* 19 *Sensor Range:* 500 km (+3) *Signature:* −5 *Max Speed:* 2000 mph *Cruising Speed:* 1600 mph *Combat Movement:* 4000 m *Endurance:* 5 hr *Price:* Lv3,000,000

Continental Interceptor: This aircraft sacrifices a certain amount of stealth for a very high (Mach 3+) speed, enabling it to make long-range interceptions of hostile aircraft. At lower speeds the aircraft is much more difficult to detect since it does not have as pronounced an engine exhaust or the heavy IR emissions from heated wing leading edges that result from high-speed flight. *Type:* Hypersonic air superiority craft *Crew:* Pilot *Weight:* 9000 kg *Armor: All Faces:* 7 *Armament:* 6 missile hardpoints *Evasion:* 16 *Sensor Range:* 500 km (+4) *Signature:* +1 (−4 at half cruise speed) *Max Speed:* 4000 kph *Cruising Speed:* 3000 kph *Combat Movement:* 8000 m *Endurance:* 4 hr *Price:* Lv4,000,000
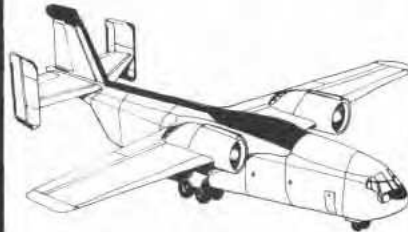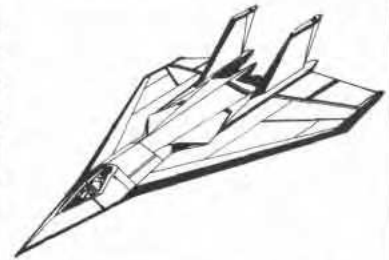
Loadmaster: Capable of carrying either passengers or freight, this type is very useful for quick transfer of large cargo loads on most worlds. The engines are mounted above and ahead of the wings increasing lift at low speeds and giving the aircraft a shorter takeoff distance than would be expected from an aircraft of this size. *Type:* Heavy lift transport aircraft *Crew:* Pilot, copilot, engineer, cargo master *Weight:* 50,000 kg *Armor: All Faces:* 1 *Evasion:* 11 *Sensor Range:* 300 km *Signature:* +8 *Cargo:* 70,000 kg *Max Speed:* 900 kph *Cruising Speed:* 800 kph *Combat Movement:* 1800 m *Endurance:* 12 hr *Price:* Lv2,500,000

Cargo Zep: This helium-filled rigid airship is an efficient and cost-effective means of hauling large cargo to inaccessible areas. Although slow, its cost-efficiency approaches that of railroads and ships without the need for rails or a navigable waterways; thus it is in widespread use. A far cry from the hydrogen-filled blimps and dirigibles of the early 20th century, airships are still nicknamed "zepps" (zeppelins). *Type:* LTA cargo carrier *Crew:* Pilot, copilot, engineer, cargo master *Gas Cell Volume:* 70,000 m³ *Armor:* 0.5 *Evasion:* 4 *Signature:* +2 *Cargo:* 32,000 kg *Max Speed:* 250 kph *Cruising Speed:* 200 kph *Combat Movement:* 500 m *Endurance:* 10 days *Price:* Lv600,000
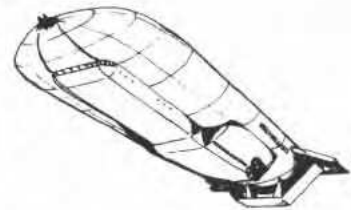
Light Passenger Zep: This handy little airship features a spherical, semirigid gasbag which, in flight, rotates around a central axis giving the vessel additional lift. The spherical gasbag also eliminates the tendency that larger cigar-shaped airships have of "weathervaning" in high winds (pointing their noses into the wind). This added stability gives it a much better all-weather flight capability. *Type:* LTA passenger craft *Crew:* Pilot *Gas Cell Volume:* 8000 m³ *Armor:* 0.5 *Evasion:* 7 *Sensor Range:* 200 km *Signature:* −2 *Cargo:* 3000 kg *Max Speed:* 300 kph *Cruising Speed:* 250 kph *Combat Movement:* 500 m *Endurance:* 7 days *Price:* Lv70,000
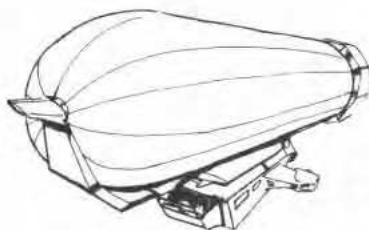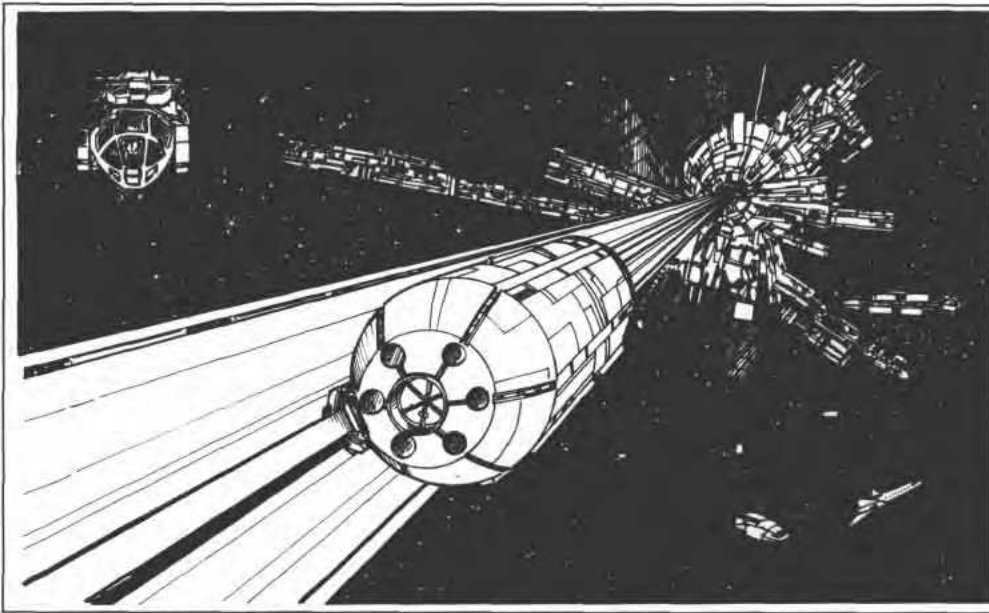
INTERFACE VEHICLES

There are several different means of moving from a planet's surface to orbit, or vice versa. Earth and Beta Canum Venaticorum-4 each have a beanstalk—a massive cable that serves as a rail for cars going from surface to orbit, and back. Catapults are available at many locations, but their acceleration is fatal to living things, and they can only be used to gain orbit, not to return. Dead gliders are commonly used in conjunction with catapults; they are an unpowered means of transport from orbit to ground, but not the reverse. Space planes, a luxurious means of travel in either direction, often operate out of metropolitan locations. Finally, shuttles are a common source of cargo transport to and from orbit.

SPACECRAFT

System ships are spacecraft without stutterwarp drives. They ply the vacuum between worlds, but do not leave the solar system. Starships have stutterwarp drives that propel them between the stars, as well as between worlds. Information about travel times for each is listed on the Travel chart on the next page.

Depending upon a player character's career, he may quite possibly spend some time on a system ship or starship. It is very unlikely that he will actually own one. Such craft are actually relatively few in the 24th century, and they are notoriously expensive. Ownership is reserved to the wealthier nations and corporations.

Crewmembers of system ships and starships generally fall into one of four categories, depending upon the purpose of the vessel. Many vessels are military. Such ships will usually have ample crew, and duties will be well defined. Pay will also be regular. Other ships may be research vessels. Again, they tend to be well-crewed, have well-defined positions, and dependable pay, although it is possible to encounter some difficulties if one hires onto a ship run by an under-funded institution. Another type of vessel commonly seen is the merchant vessel. They are often understaffed, duty positions tend to overlap heavily, and pay may depend upon the success of a voyage. On the other hand, such vessels will often provide cargo space in lieu of a portion of pay, and a canny character can sometimes turn quite a profit by using such space to transport a small quantity of a very lucrative cargo. The fourth type of vessel is the pirate vessel. Crew is usually terribly undermanned, pay depends entirely upon what is captured and is often imprisonment or death.

If your character does happen to find himself serving on a system ship or a starship, the referee will supply you with any necessary details of its layout, as well as the performance characteristics you need.

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In order to provide players with a solid understanding of the time their characters live in, this chapter describes the course of human history from 1700 AD on, including a separate description of wars fought during those centuries and the traditional cooperation and rivalry that has resulted. In this way, players will have a deeper understanding of how nationality can affect their characters' actions.

HISTORICAL AGES

By 1700, the western world had completed its transition from a Mediterranean-focused society to a global society. The first Age of Discovery was over; the outlines of the continents had been drawn on the map of Terra, and it was merely the interiors that needed to be filled in. Europe at that time was the center of the new global society. Not only was it the center of much of the planet's new surge of scientific and philosophical thought, but only European states thought of themselves in global terms and planned strategies of global expansionism. Three powers in particular struggled for supremacy: Spain, France, and Great Britain. All held extensive overseas colonies; all competed to dominate international commerce; and all were prepared to back their interests in Europe with force.

The Age of Reason (1701 to 1800)

The 18th century was an age of scientific and philosophical investigation. The foundations of chemistry, physics, astronomy, electricity, and modern mathematics were laid. At the same time, philosophers explored the basic issues of logic, reason, morality, and the relationship of the individual to society. Their thoughts and writings would have as profound an influence on society as the work of the scientists. The most obvious measure of this effect was the changing view of the nature of the state. At the opening of the century, the state was defined in terms of the possessions of a sovereign. The state was the land owned by a ruler, and the inhabitants of that land were his subjects. By the end of the century, the sovereign had been replaced by the people as essential definers of the state. France, for example, was thought of less in terms of the land that was ruled by the current sovereign and more in terms of the land that was occupied by Frenchmen.

European conflict centered around the struggle to maintain a balance of power between the major powers. The wealth of Spanish possessions in the new world was spent rather than invested, and, as the flow of silver and gold decreased, so did Spanish power. By the end of the century, Spain was a minor power. French power grew to fill the vacuum, and Britain bent its energies to checking this growth.

The Age of Industry (1801 to 1900)

The 19th century began dramatically as Napoleon led a resurgence of French power. Britain's renewed adherence to a policy of containment of French influence plunged Europe into the Napoleonic Wars. Ultimately unable to break Britain's commercial dominance, this French resurgence failed, but worked profound changes on Europe. Napoleon's repeated victories over Prussia and Austria led those states to increased reliance on mass levies of troops on the French model. This use of the nation in arms, and the appeals to native patriotism necessary for its success, increased German nationalism and laid the ground work for Bismarck's unification of Germany in the Second Reich in 1871. Russia, in successfully resisting Napoleon's invasion in 1812, established itself as a potential major power. The extent of the damage caused by the Napoleonic Wars convinced the sovereigns of Europe that a system was required to prevent major conflicts from occurring again. The Congress of Vienna (1815) confirmed the monarchic system of government and established guidelines for the resolution of conflicts short of total war. The result prevented a recurrence of a major European war for 99 years (1815 to 1914), but at the price of a dramatic decrease in governmental flexibility. When a general war finally came, it would sweep away the old order entirely.

In the New World, the American colonies expanded westward and, after the American Civil War (1861 to 1865), America joined the ranks of the world's major powers. The colonies of South America threw out their Spanish rulers (1810 to 1830) and proclaimed their own independence; the original Gran Colombia, however, soon broke up into several nations, each of which remained moribund. Spain's losses ensured that the nation would decline as a major power.

The 19th century was the age of industrialization. The names that history records in the 19th century are those of inventors: Morse, Bell, Fulton, Colt, Edison, Marconi, Bessemer....Their inventions changed the face of the world forever. Industrial power automatically translated into world power; nations that had an industrial base were able to produce products that were in demand around the world. Industrialized nations also possessed the marketing networks which allowed them to sell their products, and they held the modern arms to protect worldwide interests. The existing major world powers either industrialized, or they reverted to the ranks of the lesser powers.

The Age of Technology (1901 to 2000)

The first half of the 20th century was consumed by war and the preparations for war. The unresolved conflicts of the Crimean War, the Russo-Turkish Wars, the Balkan Wars, the Franco-Prussian War, and even the Russo-Japanese War became again the pretexts for hostilities. In 1914, all of Europe was plunged into the First World War. When the exhausted belligerents accepted an armistice in 1918, it was due more to general collapse than a clearly won victory. And with the collapse of the world's Central Powers (Germany, Austria-Hungary, and Turkey) there came the collapse of the monarchies in general, and the system of European stability embodied by the Congress of Vienna fell apart. Unfortunately, there was no effective system of stabilitiy and security to replace it, and much of the rest of the century was spent in futile search of one.

One idealized approach to solving the problem of achieving world peace was the creation of the League of Nations, but individual nations were not willing to surrender their own sovereign power to any such world-wide organization. The leap to a world-spanning democracy of nations was too great a change for a world still unaccustomed to democracy within individual nations. During the decades from 1930 to 1950, the world embraced the Strong Leader system. Hitler came to power and mobilized the resources of Germany, and Mussolini did the same with Italy. In fact, all major nations produced strong individual leaders during this period, if not immediately, then under the pressure of war. World War II (1939 to 1945) was characterized by strong leaders for each nation involved.

The Faltering Leader: By the end of World War II, the Strong Leader system had clearly demonstrated its weaknesses; provisions for succession were unclear, peaceful situations seldom produced powerful leaders, and there were few controls on the excesses to which a leader might be led. With the concentration of international power largely in the hands of two nations, the United States and the Soviet Union, the Strong Leader system was replaced by the Bloc System. Nations grouped themselves into blocs reflecting common interests: the West, the East, the Third World, the NonAligned Nations, OPEC, the European Economic Community, and NATO. Blocs established and defined policies, and members received both direction and support in international relationships.

The strongest of the blocs were arrayed around the superpowers: America and Russia. The destruction of Germany as a military and diplomatic force placed the Soviet Union and the United States squarely at odds with each other in Europe. Each nation had global power and nuclear weapons; sparring between the giants took place throughout the world: in Germany, Greece, Korea, Cuba, Southeast Asia, Afghanistan, Africa, and Central America. Diplomatic maneuvering, contributions of aid, rhetoric—all of the weapons of the Cold War—were directed by each toward manipulating or affecting the other superpower. Even the use of terrorism by smaller nations and other political groups was an attempt to bypass the overwhelming power of the superpowers.

At the end of the century, the tensions broke and the world was finally engulfed in the long-anticipated World War III. It settled nothing; instead, it shattered the superpowers and many of their allies, and lasted into the opening years of the 21st century. The Bloc System was shattered in the war as well.

The Age of Recovery (2001 to 2100)

The devastation of World War III was global in scope, and did not end with the fall of the last bomb. The slide through pestilence, famine, and anarchy continued for two decades after the war ended. The physical destruction was limited to the war zone (North America, Europe, the Indian subcontinent, and China). A disaster of equal magnitude, however, was the destruction of the world's transportation network. Vulnerable ocean shipping fell victim to naval action early in the war and could not be rebuilt due to the loss of industrial capacity. Only Japan retained a viable merchant fleet, and it dominated world trade in the immediate postwar years.

An age of recovery is not necessarily an age of unrelieved famine and despair. During recovery, populations worked hard, building for themselves and for their children. The 21st century was marked by three important movements: the end of dependence on fossil fuels, the French Peace, and the Melbourne Accords.

The Fuel Crisis: World War III destroyed oil refineries and oil fields, but its greatest effect was the destruction of the world's oil distribution network. Once World War III was over, the oil distribution networks were gradually reestablished, but great progress toward alternative fuels had been made in the interim. By 2050, rising oil consumption levels and decreased petroleum reserves had reached the point where true energy alternatives were necessary. Rationing of oil and restrictions on its use were required during the transition period, but by 2090, most of the world's industrialized nations had established their own hydrogen distribution networks, and a major portion of the world's industrial power was supplied by solar power satellites orbiting the Earth.

The French Peace: Into the power vacuum which followed World War III there stepped the only European nation that had not been ruined by the fighting. That nation was France. With its numerous and far-flung territories on the African continent and in the Pacific, France reestablished a commercial interest in peaceful world trade and calm international relations. French power was projected to resolve disputes among quarreling nations, but French national policy was not overtly imperialistic. By 2060, the French were politically involved in virtually every region in the world, and French military forces imposed peace in those regions, albeit sometimes a very uneasy one.

The Melbourne Accords: The world returned to space in the 2040s with limited surveillance, weather, and communication satellite launches, and followed in the '50s with manned missions. By the end of the century, near-Earth orbit was cluttered with solar power satellites and orbital factories. The conquest of space naturally produced disputes concerning territoriality, access to orbits, and the appropriateness of specific targets in conflicts. A continuing international discussion culminated in a series of treaties and agreements collectively known as the Melbourne Accords (first signed at Melbourne, Australia in 2099).

The Melbourne Accords had three major provisions: Certain orbits around Earth were demilitarized, power satellites properly operated and certified were classified as civilian targets (rather than as military targets), and other worlds (at that time Mars, Mercury, and the Jovian satellites) were declared open to colonization by all nations. The Melbourne Accords bound signatories to its provisions only with respect to other signatories. Many smaller nations signed immediately; holdouts among the major powers included France, Bavaria, Britain, Azania (all four cooperating as the European Space Agency), and Canton. Canton signed in 2108 while the ESA did not sign until 2163.

The Second Age of Exploration (2101 to 2200)

The conquest of space opened a new frontier to Earth, and, naturally, an age of exploration followed. Expeditions to Mars (by France) and Mercury (by Manchuria) were launched early in the century. Later expeditions visited the asteroids and the moons of Jupiter, but the Second Age of Exploration would have died rather quickly if confined to the Solar System.

In 2086, the theoretical basis for a practical star drive was established, and by 2100, several research establishments were well on their way to demonstrating a prototype. The race for a star drive occupied the technological abilities of the major world powers for the first half of the century. During that time, those same nations were gaining considerable expertise in space travel within the Solar System.

The first working starship was produced by the European Space Agency in 2136; its members

(France, Bavaria, Great Britain, and Azania) shared in the technology and jointly operated the ship and its successors. The first expedition to Alpha Centauri discovered a garden planet which was promptly claimed for the nation members of the ESA. Within short order, Argentina, China, and America built and launched their own starships on expeditions to Alpha Centauri, Barnard's Star, and Wolf 359. Expeditions over the rest of the century explored to about 20 light-years from Earth, and settlements were established on about 10 extrasolar worlds. Worlds close to Sol sprouted many national colonies (a policy decided by the Alpha Centauri War); the diversity enabled colonies to concentrate on specific industries and trade with the others for their needs. But as nations explored farther from Earth, each was able to colonize whole worlds and exploit them without competition from other nations.

The Eclipse of France: Under the French Peace, the nations of the world were able to recover and prosper. Inevitably, some would chafe under French domination, and as they become more powerful, they competed for power and influence with France. At the same time, the burdens of world leadership proved very costly to France, already economically stretched in mounting interstellar exploration missions.

By 2150, French power in the world was decaying; other nations were quick to side against France in minor disputes. In 2150, Argentina confronted France on the issue of interstellar colonization, and France was forced to back down. This humiliation marked a low point in French prestige, and brought about a collapse in the French government, as well as reorientation of government policies. It was the end of the French Peace, and the beginning of a new era of global conflict.

The opening of the stars to colonization, however, moved much of Earth's conflict beyond the solar system. Conflicts between the major (that is, the star-faring) powers took place on colony and outpost worlds where they fought for rights to prime territories, access to markets, or proper treatment of their own nationals. War on Earth was either an extension of these extrasolar conflicts, or minor wars between non star-faring nations.

By 2199, the Second Age of Exploration was drawing to a close. Earth had explored parts of a sphere out to 20 light-years and established colonies dedicated to exploiting the resources of many virgin worlds.

The Second Age of Commerce (2201 to 2300)

Exploration breeds commerce; territorial discoveries naturally reveal products that can be marketed. Even with the high cost of interstellar travel, there are always some products, services, metals, and information that can still be carried at a profit. With the discovery and settlement of star systems beyond Earth, the 23rd century was an era of trade.

The star-faring nations built fleets to service their colonies. Even a self-sufficient colony is useless if it can't provide feedback, products, information, or resources to its parent. Hulls carrying colonists to the stars are best used when they carry products and goods on their return voyages.

Developments on Earth, however, did not come to a standstill because of interstellar exploration. International rivalries, population pressures, and ideological disputes continued. The nations of Latin America struggled through three Rio Plata Wars as Argentina and Brazil fought for supremacy on their continent. Vietnam, a source of cheap labor early in the century, industrialized to the point that it was a prime plum coveted by both Canton and Indonesia. The Canton-Indonesian War (2264 to 2268) turned Southeast Asia into a war zone and made the Indochina Peninsula a restive Cantonese puppet-state.

Early in the 23rd century, France began to re-exert its power in selected regions where its interests were important: Africa, the Pacific, and the Mideast. Avoiding direct confrontation with direct rivals such as Argentina, Mexico, and China, France was able to rebuild its military strength and reputation over the course of decades. When France fought battles, it won; when it negotiated, it also won. What it couldn't win, it scrupulously avoided. By 2250, France was nearly a superpower.

First Contacts: That humanity would meet other cultures among the stars was inevitable. During the second half of the 23rd century, human explorers encountered at least five intelligent species, three of them space-faring. With these first contacts came cultural diversity. With academic investigation of alien cultures came new insights into Earth's cultures. Products and processes from these alien cultures were in demand on Earth. Basic information exchange was itself a profitable endeavor.

The Decline of Nationalism: Easy travel on and off Earth enabled many people to maintain mobile life-styles without a permanent residence. Some people (explorers, starship crew, orbital industrial workers) found themselves taxed on the basis of geography, but not receiving any real benefit from those taxes. Others found deference and status came with national citizenship rather than merit. Some interest groups created their own nations to better protect their interests. Others rejected nationality completely.

At the same time, more people came to philosophically reject nationalism, finding more in common with ethnic, religious, ethical, or professional values. The proper national citizenship remained a convenience (a wrong one could be a hindrance), but many people had come to feel that there were higher values than mere geographic allegiance.

The Rise of Germany: For centuries, the German nations of Europe (Bavaria, Hanover, Westphalia, Saxony, and Brandenburg) were content to live in the shadow of France. French-dominated Bavaria enjoyed membership in ESA, flew starships under its own national colors, and colonized worlds under other suns. The other German states alternately allied with France and Bavaria, with other powers, or chose their own paths.

In 2282, Russia and France (and Bavaria) allied against Manchuria in a dispute over territory in the Central Asian Republic. Manchuria was on the verge of victory when Japan entered the war to shift the balance, ending the war at the prewar borders. Guerrilla warfare continued for decades, not only in the Central Asian Republic, but also in Western Manchuria. A Franco-Russo-Japanese peacekeeping force remained to keep order.

French victory was not enough; it was Japanese help that saved the day, and French prestige suffered. With growing sentiment for reunification, all the German nations but Bavaria accepted a call by Hanover to unite. They then mobilized to bring Bavaria into the German nation. French objections produced a short war in which France was defeated and forced to accept the creation of a new German state.

The French Empire: The costly French victory in the Central Asian War in 2287 produced well-grounded charges of poor support and supply for the army. In 2289, the army staged a coup which threw out the 12th Republic and established a system of monopolies in vital industries. These monopolies were profitable for the contractors, but inefficient sources of supply; and with typical military thinking, the coup printed money to pay national debts. The result was runaway inflation and tremendous social unrest. When the armed forces could not stop or win the War of German Unification (2292 to 2293) or the Flemish War of Independence (2293), the army was forced to allow free elections.

Because political opposition had been suppressed, there were no organized political structures in existence to campaign. The leading personality was Nicolas Ruffin, a leading industrialist as well as a free market advocate; he and his followers were swept into office in the elections of 2294. A combined policy of free market economics (within the French Commercial Union) and stringent controls of government spending produced tangible results by 2298.

Although national elections were to be held to establish a new French constitution and republic in 2298, a popular movement to dispense with republics and regain the glory of empires gained considerable support during the period of economic recovery. The balloting of 2298 included a plebiscite on the matter of establishing a French Empire, and the issue passed handily. In later 2298, Nicolas Ruffin was crowned Emperor of France and the Third French Empire was then inaugurated.

MAJOR WARS SINCE 2000

The following wars have had a pronounced influence on human history since 2000 AD.

The Saudi War (2010 to 2013)

France, Great Britain, Bavaria, Japan, and Egypt occupied the Saudi oil fields in 2008 (to assure oil production for Europe) replacing United States forces which had been in the region since the start of World War III. Iran objected to the occupation, and the Saudi War (2010 to 2013) began with an Iranian attack on the occupation forces, and ended with the establishment of a buffer zone along the northern edge of the Saudi peninsula.

The French role in the Saudi War was an expression of its new status in the world. France was the only global power; interested in commerce and stability, it injected its presence anywhere in the world that its interests were present. France was creating the French Peace.

The Indochina Action (2030)

Canton moved to occupy Indochina for its petroleum resources, but was forced to back off by French action guaranteeing the independence of the region.

The Russo-Ukrainian War (2065-2072)

Russia vs. the Ukraine. The Soviet Union was splintered into three nation-states by World War III: the Ukraine (south of the Pripyat and west of the Urals), the Central Asian Republic (from the shores of the Caspian to the Himalayas), and Russia (European Russia north of the Pripyat Marshes). Russia included all of Siberia, but that region remained an unsettled frontier for a century afterward. The three nations lived in an uneasy peace marked by occasional border clashes. Russia retained some industry and struggled to rebuild; the Ukraine suffered from fallout-contaminated cropland, but rehabilitated its soil over a period of 50 years; the Central Asian Republic remained primarily a backward agricultural nation. All three countries were unable to make any substantial progress due to a lack of capital and direction.

In 2065, reindustrialized Russia invaded the Ukraine in a drive for its natural resources in the Caucasas. France, Poland, and Bavaria backed the Ukraine; Iran sided with Russia in exchange for a promise of part of the spoils, and Siberia remained neutral. Initial Russian gains gave them Kiev, but the war stalemated along river lines. Japan's entry into the war in 2070 turned the tide, and Russia collapsed in 2072.

Mexican-American War (2099 to 2103)

Texas (aided by America) fighting for independence from Mexico. Mexico occupied the American Southwest (Texas, New Mexico, Arizona, and southern California) in 1999 and was able to hold the territory primarily because the United States was occupied suppressing rebellious regions in the Southeast and trying to reunite its feuding military and civilian governments.

Through most of the 21st century, Mexico was able to develop the industrial potential of southern California, and Los Angeles became a rival to Mexico City in population, industrial output, and political power. The border between America (reunited in 2045) and Mexico became an armed (but stable) line drawn roughly along the Colorado River.

By the 2080s, Mexico divided into three rival geographic regions with great power: central Mexico and Mexico City, northern Mexico and Los Angeles, and Texas and Houston. After a series of tax increases, Texas declared (in 2099) its independence from Mexico and appealed to America for aid, which was promptly provided. The Mexican responses in Texas were exceptionally brutal, which only hardened the Texan resistance. America offered statehood to Texas, but settled the war with the establishment of Texas as an independent buffer nation instead.

The Mexican Civil War (2103 to 2106)

Federal Mexico vs. the former American states of California, Arizona, and New Mexico. Californian discontent with the centralized government in Mexico City was crystallized by the treatment of Texas during its succession from Mexico. California seceded from Mexico in 2103 and was quickly followed by Arizona, Baja, and New Mexico. The Peace of El Paso (2103), however, guaranteed the current Mexican-American border, and America remained neutral.

Fighting between Federal Mexico and California continued in a series of battles in Arizona and Baja, culminating in an amphibious invasion which devastated much of Los Angeles, but crushed the rebellion. In the years that followed, the assimilated Mexican-American middle class remade Mexico into an industrialized, progressive state.

The Tantalum War (2142 to 2143)

Discovery of the star drive created an intense international demand for tantalum, the metal which proved essential to the drive's construction. Nations which had tantalum could someday hope to travel to the stars, while those who did not had no such hopes. The discovery of a tantalum deposit on the Andaman Sea created an international dispute between Indonesia and Bengal, which erupted into the Tantalum War. The war was characterized by hovertank operations in the Andaman Sea and the ultimate occupation of the Andaman Island chain by Indonesia. Bengal's loss of a tantalum source permanently excluded it from the interstellar club; Indonesia, on the other hand, gained the tantalum that would allow it to become a space-exploring nation.

Nicolas Ruffin

History has created traditional rivalries between certain human nations.

Franco-German Rivalry: *Bavaria had, until recently, been an ally of France, helping her to restore world order, and participating in ESA programs. The War of German Reunification (from 2292 to 2293) changed all of this. The German victory then caused the French to lose prestige and national pride, and neither nation is likely to soon forget.*

Argentine-British Rivalry: *From disputes of hundreds of years back, the Argentine and British governments have often been at odds. Their rivalry solidified because of the Alpha Centauri War and the British denouncement of the Inca Republic (although the Incas have since become an embarrassment to their Argentine and Mexican creators).*

Manchurian-French Rivalry: *When Manchurian intervention into Central Asia erupted in war, the French (as world peacekeepers) became their main adversaries. Many Manchus living off Earth do not harbor resentment over this, but the for Terran Manchus, the French-solicited Japanese intervention was an insult they will not forget.*

American-Mexican Rivalry: *The idea that portions of the American southwest have been stolen by the Mexicans has created a strong dislike among Americans for Mexicans. Exsisting always in America's shadow has managed to affect the Mexican opinion of Americans, as well.*

The Alpha Centauri War (2162)

Argentina and Mexico vs. the European Space Agency (France, Bavaria, Great Britain, and Azania). The initial discovery of a habitable world orbiting Alpha Centauri promised the potential of such worlds around every star. In the next several years, habitable worlds proved somewhat less common than had been supposed. Argentina, unable to find a garden planet of its own, objected to ESA members being the sole owners of Tirane (Alpha Centauri's sole habitable world). When announcements of ESA settlement and colonization of Tirane were made, Argentina secretly constructed a squadron of armed cruisers and confronted the expedition in the Alpha Centauri system, prohibiting its landing until Tirane was opened to colonization by other nations as well. The colonists became a bargaining chip; world opinion supported open colonization; and ESA could not field armed cruiser squadrons soon enough to react. The war was fought primarily in the Alpha Centauri system, punctuated by long waits for instructions from Earth, and then short clashes as the two sides jockeyed for position.

Ultimately ESA was forced to accept open colonization in order to land its own expedition. France, Bavaria, and Britain signed the Melbourne Accords (which stated that newly discovered worlds are open to colonization by all, subject to some reasonable restrictions by the discoverer). Within 10 years, Tirane had colonies from some seven Terran nations.

The Rio Plata War (2203 to 2207)

Brazil vs. Argentina. During the first half of the 21st century, South America was cut off and forced to fend for itself; between 2050 and 2100, Brazil industrialized with European and Japanese capital because it was a source of cheap labor. Through most of the 22nd century, Brazil and Argentina competed for foreign markets with increasing acrimony, and, by the turn of the century, they were on the verge of open warfare.

Uruguay was originally allied with Argentina; a chance change in government made it a Brazilian puppet. In 2203, Argentina attacked through Uruguay with a drive on industrialized Rio de Janeiro. Brazil delayed by giving up territory slowly while mobilizing industry and population. Both sides declared mutually inclusive blockade zones which isolated the continent from seaborne commerce. Much of the war was fought at sea within 500 kilometers of the coast. Brazil, already a pioneer in lighter-than-air (LTA) transport for exploitation of the Amazon Valley, developed trans-oceanic LTA to bring in French electronics, fiber optics, and other war material from Africa.

Major targets throughout the war reflected the underlying theme of the war: continental ascendency. Strikes concentrated on seaports and industrial regions. Both sides worked hard to cripple their rivals, and succeeded to some extent.

Brazil turned the tide in 2205, and the front pushed almost to Buenos Aires, whereupon Argentina sued for peace. Peru was occupied by Brazil, and the Argentine capital was occupied for two years. Tensions smoldered for a generation to break out in the Second Rio Plata War.

The Second Rio Plata War (2235 to 2237)

Brazil's economic domination of South America after the First Rio Plata War placed Argentina at a severe disadvantage. However, Brazil's Portuguese language and heritage was a continuing barrier to markets in the Hispanic nations of the continent. Argentina, confident of assistance from other Hispanic nations, attacked Brazil in 2235. After several quick victories, when it became apparent that Chile and Bolivia would not join the fight, Argentina and Brazil concluded an armistice.

The Third Rio Plata War (2275 to 2279)

In the aftermath of the Second Rio Plata War, Argentina encouraged insurrection in Peru and Ecuador, playing first on Hispanic anti-Portuguese feeling and later emphasizing the nations' Inca heritages. In 2275, the seven major anti-Brazilian resistance groups united under the banner of the Inca Republic; Argentina and Mexico immediately declared their support for the new nation.

Initially, the fighting was concentrated in Inca territory with the Brazilian-Argentine border a fortified line. When it appeared that the Inca Republic would fall, Argentina crossed the border into Uruguay and pressed on to southern Brazil. Rather than risk its industry, Brazil accepted a peace which recognized the Inca Republic, ceded some territory from Uruguay to Argentina, and
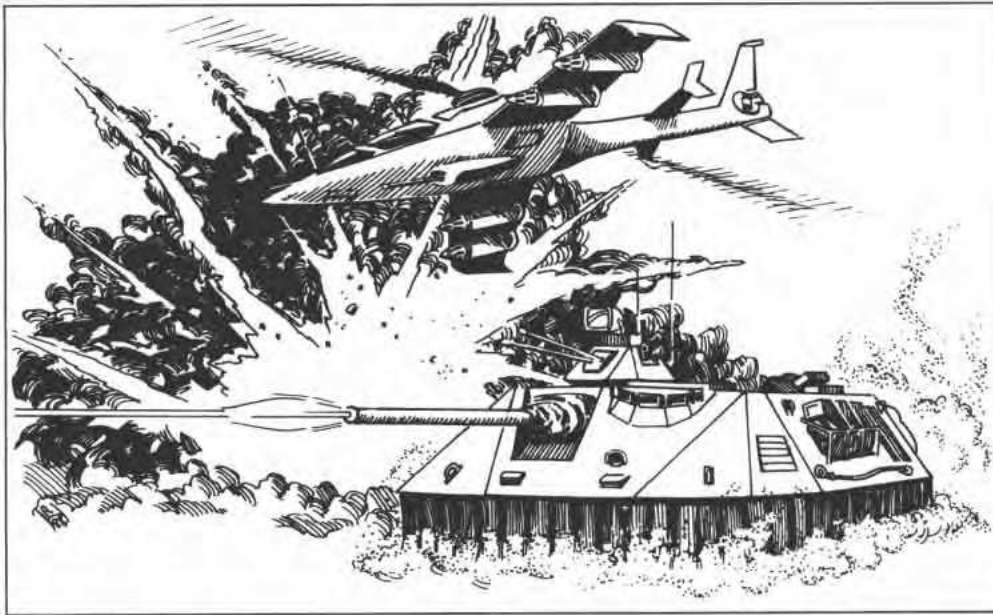
recognized Mexican occupation of parts of Central America.

The Cantonese-Indonesian War (2264 to 2268)

Canton vs. Indonesia. The rise of Indochina as a newly industrialized region made it a ripe economic target for both Canton and Indonesia. When Indonesia moved to annex the region, Canton invaded and occupied the coastal provinces. Four years of war could not dislodge Cantonese forces, and Indonesia eventually settled for a portion of Burma.

The Central Asian War (2282 to 2287)

Large mineral strikes in Central Asia and increasing Iranian efforts to export revolution led Russia, with French backing, to occupy the Central Asian Republic. Manchuria intervened ostensibly to protect the CAR, but soon announced the annexation of the Sinkiang border regions. Bavaria joined France and Russia in a war against the Manchus. After inflicting heavy losses, the Manchus were at the point of winning when Japan entered the war. Provided with advanced satellite surveillance systems, the Allies were able to turn the tide. Prewar borders were reestablished with a Franco-Russo-Japanese peacekeeping force in Central Asia. Postwar fighting by Iranian-supported guerrillas continued to drain the resources of the peacekeeping forces.

The War of German Reunification (2292 to 2293)

The French Army, drained by the Central Asian War, was unable to stop the reunification of the German states and only halted a German invasion of France itself at the Somme. Facing certain defeat, France sued for peace and accepted German unification. The Flemish War of Independence took place in the last months of the war, creating an independant Flanders.

The Kafer War (2298 to ?)

In 2295, a research station orbiting Arcturus (at the far end of the French Arm) reported contact with the starships of an unknown alien race. Attempts at communication were unsuccessful, and the alien vessels left the system. Within three years they returned and swept past the station to the Eta Bootis system. The aliens attacked and defeated the human fleets there and landed troops on the colony world of Aurore. Humankind had its first close-up look at the Kafers.

Reinforcements for the humans began to flow from further up the French Arm, and eventually, Kafer fleets were driven back to Arcturus, leaving ground troops on Aurore to harass the colonists. The fighting between the races has continued every since. It has become obvious that the Kafers do not want peace. But their motivations and their final objective are mysteries.

Political Geography

Rarely does the physical geography of the world change. A few islands might rise in the ocean; coastlines might erode a few kilometers; some climate changes might be caused by industrial pollution or by overcropping. Within human lifetimes, changes in geography are changes in political geography: changes in borders and allegiances. The state of geography in the 24th century reveals some of the complex relationships which are at work in the world.

NORTH AMERICA

North America has been dominated by America ever since its rise to world power in the late 19th century, but that domination has diminished as both Canada and Mexico have industrialized and flexed their muscles. Mexico, with its attention directed toward Latin America, is profiled under South America.

America: America was split by the chaos and aftermath of World War III into three factions: rival civilian and military governments and a reactionary isolationist New America. Territories controlled by the factions were a patchwork intermingling of all three and created constant fighting. By 2020, the military and civilian governments had settled their differences and joined in a war against New America, then concentrated in the southeast. Mexico supported New America's losing fight while taking the opportunity to seize New Mexico, Arizona, and southern California. (One of the effects of America's experiences during the last three centuries is that the term "United States" is almost never used, even though it remains a part of the nation's official name.)

Texas: An independent country from 1836 to 1845, Texas was admitted to America in 1845, seceded in 1861, and was readmitted in 1870. Conquered by Mexico in 1999, Texas was made part of Mexico in 2025. Chafing under Mexican rule, Texas rebelled in 2099 and became an independent nation.

Canada: Canada, a nation blessed with fertile land and excellent resources, made excellent use of both in the years after World War III. Relieved of the overwhelming political and economic presence of America (at least until it could reunite in 2020), Canada was able to support its own industry with its own resources at a time when world supply was scanty and unreliable. Petroleum reserves in the Northwest Territories were discovered and exploited in the late 22nd century (no longer needed for fuel, petroleum was still a vital resource for lubrication and synthesis), ensuring Canada's economic health in the following years.

SOUTH AMERICA

South America experienced a gradual economic awakening in the 21st century, primarily because World War III created new opportunities for South American markets in the Pacific and Africa. Brazil and Argentina currently dominate South American economics, with Mexico holding a close third place. As a result of the Rio Plata Wars, Argentina is now the ascendent industrial power in South America, and Brazil is in a gradual economic decline. Also, the Inca Republic, brought together by Brazilian occupation, is emerging as a strong and growing economic power on the continent.

Argentina: Argentina benefitted from its own industrialization prior to World War III, and vigorously marketed its production throughout South America. Argentine exports supplanted European, American, and Japanese products which were diverted by the war and its aftermath; the country's major competition was from its neighbor, Brazil. Differences between Argentina and Brazil increased as both competed for the markets of South America. Argentina's first major coup in this struggle was to conclude an economic assistance agreement with Chile; markets were guaranteed for Chilean mineral resources and for Argentine production. Argentine territory has remained constant over the years, although portions were occupied by Brazil in the 23rd century.

Bolivia: Bolivia suffered as an underdeveloped nation well into the 22nd century. With minerals its only export, Bolivia was at the mercy of the economic climate and the demands of neighboring industrialized nations. Brazil attacked and occupied parts of Bolivia in the First Rio Plata War.

In the Second War, Bolivia was an ally of Brazil, and was ceded a corridor to the Pacific at Arica (taken from Chile). Access to the sea made possible increased investment in Bolivian mining and industry, as well as a Bolivian merchant fleet, and a long-delayed economic boom. Access to the Pacific directed Bolivian attention westward to the extent that, when the Third Rio Plata War began, Bolivia sided with Hispanic Argentina and the Inca Republic. That step made it possible after the war for Bolivia to retain its Pacific corridor and its newfound economic success.

Brazil: Brazil was one of two industrialized powers in South America after World War III, but was always at a disadvantage because of its Portuguese language. It was a testimony to Brazilian quality and marketing that its products penetrated the Spanish language market as well as they did. Although Brazil has no need for increased territory, it did fight the Rio Plata Wars to defend or enhance its economic position on the continent. The Third Rio Plata War lost the Amazon headwaters to the Inca Republic.

Chile: Chile established an economic relationship with Argentina in 2024, and thereafter, was essentially a nation dependent on and closely allied with Argentina. In 2274, Bolivia was granted the Arica corridor from Chilean territory, giving Bolivia a long-desired and much needed route to the Pacific.

Guyana: French Guiana was selected as the site for one of two French orbital catapults in 2066, and was the only catapult on the South American continent until Brazil's became operational in 2102. Guyana and Surinam were gradually included in catapult operations and support, and the three territories merged as one nation (Guyana) in 2130. The new nation remains part of the French Empire.

The Inca Republic: Argentina, in a continuing campaign against Brazil, encouraged insurrection and revolution in Brazilian-dominated Equador and Peru. Resistance groups rose in 2275 and declared an independent Inca Republic, which was immediately recognized by Mexico and Argentina. The end of the Third Rio Plata War won Brazilian recognition as well. Columbia joined the Inca Republic in 2284.

Mexico: Mexico's seizure of Texas in 1999, and more of southwestern America in 2025, took advantage of the temporary breakup of America to recover traditionally Hispanic territory. The acquisition of Texas, New Mexico, Arizona, and southern California gave Mexico resources and manufacturing plants that were essential for proper industrialization. For the next 100 years, Mexico was able to produce manufactured goods for its own consumption and for export to the markets of South and North America.

Texas seceded from Mexico in 2099, but the other states were forced to stay within the Mexican nation as a result of the Mexican Civil War. After a generation of recriminations, California was fully integrated into the Mexican economy and social order. During the 22nd century, Mexico gradually annexed the Latin-American nations north of Panama, making them provinces of the nation.

AUSTRALIA

The island continent, always untroubled by competition by other nations on its land mass, continued its efforts to develop its potential. The concentration of population in the southeast helped promote industrialization, but hindered exploitation of other regions. Recent (since 2200) development of the northern (Darwin) shore has created a growing population center handling trade with Indonesia.

JAPAN

Japan was relatively unhurt by World War III, and it pressed its advantage in promoting a Japanese world trade empire. At the same time, America's collapse made it necessary for Japan to rearm for its own defense. The economically and militarily strong Japan was able to dominate the Pacific basin throughout the 21st century.

During the 21st century, Japan attempted an economic domination of Korea, but was expelled by Manchuria, and thereafter concentrated on territories off mainland Asia. Japanese investments industrialized the Philippine Islands, constructed an orbital catapult in 2072, and brought them into the Japanese economic community in 2120. Japanese deep ocean mining operations made the Marianas, Carolines, Marshall, and Gilbert Islands part of Japanese territory during the 22nd century, and the Gilberts were specifically developed as a model scientific community during the 23rd century.

PHILIPPINES (Japanese)

BORNEO

AUSTRALIA

NEW ZEALAND

JAPAN
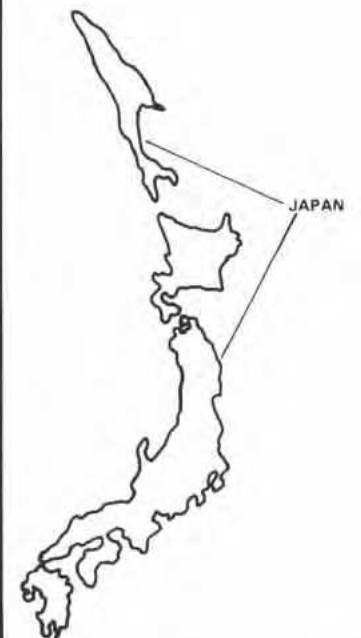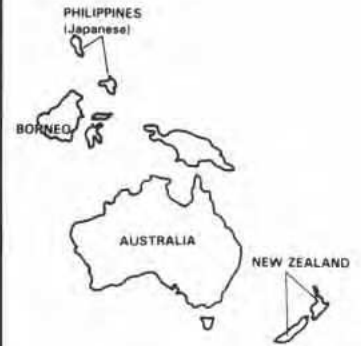
EUROPE

The center of western civilization has continued to be the focus of nearly all important international activity. France has dominated Europe since World War III, although it has experienced ebbs and flows in its power. Other nations have redefined themselves or rearranged their borders in response to economic or political considerations.

The Balkans: The borders of Balkan nations have changed somewhat as ethnic populations have worked to establish nations which reflect their political and economic needs. Austria absorbed Slovenia, becoming Austrovenia and, in the process, gaining access to the Adriatic. Portions of Yugoslavia were taken by Hungary, Romania, Bulgaria, and Albania; the remainder split into Serbia and Croatia.

European Russia: The Soviet Union lost control of the Ukraine immediately after World War III when it was forced to concentrate on its territory closer to Moscow. At the same time, Estonia was formally absorbed into Russia, Lithuania was absorbed by Poland, and Latvia broke away and reestablished itself as an independent nation. Originally, the Ukraine reached only as far east as the Don; in 2020, it forcibly extended its border to the Caspian.

France: France took advantage of postwar chaos to extend its border to the Rhine, and has maintained that boundary since; assistance to, and domination of, Bavaria has helped to maintain the border. At the same time, Belgium was placed under French protection (it was made a department of France in 2007). In the Flemish War of Independence, Flanders forced France to accept its independence.

French foreign policy involved France in all corners of the world, never overtly imperialistic, but never reluctant to involve itself diplomatically or militarily when French interests were involved. French policy was to make territories into departments of France. The nation of France has many departments which are not located in Europe: Algeria, Guyana, New Caledonia, plus Zaire and others in central Africa.

Germany: One reason World War III was fought was the attempted reunification of East and West Germany, but that was not to be. Instead, France encouraged the emergence of separate Germanic states. Bavaria enjoyed French aid and became an established French ally. Hanover, the strongest of the German states, kept the name Germany. The remaining German territory became Westphalia, Brandenburg, and Saxony; the shifting allegiances of these three states worked against any one German state becoming totally dominant, and against the the possibility of German nation reuniting.

The Iberian Peninsula: Catalan separatists took advantage of the chaotic world situation after World War III to declare (in 2013) an independent Catalan state in northern Spain. Catalan guarantees to respect the French border produced diplomatic recognition from France and forced acceptance of the situation by Spain. Spain, Portugal, and Catalonia all suffered as undeveloped nations on the fringe of Europe for the next 300 years. In 2085, the importance of tantalum for star drives gave momentary importance to Spanish deposits, but (being unable to use the metal itself) Spain allowed it to be mined (taxing the production heavily), enjoyed prosperity for a few decades, and then sank back into economic doldrums. Portugal has enjoyed high levels of investment from Brazil (who is seeking access to European markets) and is now dominated by Brazilian interests. Catalonia is primarily agricultural and is strongly tied to France.

Central Europe: It was the battlefield of the Third World War. The ruin, chaos, anarchy, and contamination of civilization-shattering war turned Poland, Czechoslovakia, and Hungary into lawless frontiers dotted by self-governing city-states. Governments existed for these nations, but they were unable to exert any real control over their territories. By 2030, however, reconstruction had begun. France channelled recovery aid funds to Poland and Czechoslovakia; Austria concentrated on assisting Hungary. As Poland recovered, it extended its borders to include Lithuania. Hungary absorbed parts of Romania. The overwhelming French presence inhibited other nations' ambitions toward the temporarily vulnerable nations.

Scandinavia: In the late 21st century, Denmark, Norway, Sweden, and Finland joined together in a commercial union in order to compete with French trading practices in Europe. The union grew in importance in regulating and promoting trade, and later in regulation of labor and technology. In 2205, the four nations (plus Lapland, carved from the northern portions of Norway, Sweden, and Finland) formally joined as semiautonomous states within the Scandinavian Union. Greenland was included in the Union as a territory of Denmark.

ASIA

The sprawling continent of Asia, settled for millennia, remained the last frontier of the world as late as the early 21st century. Russia abandoned Siberia; Central Asia and Western China were only sparsely settled. It was possible for entirely new nations (the Far Eastern Republic, for example) to emerge. The old world was becoming a new one.

China: Traditional China was virtually ungovernable in the collapse of world governments after World War III; national minorities pressed for independence while the central economy of China proved unable to handle the greater and greater demands placed on it. Monolithic China split itself into three nations: Canton (southern China), China (north of the Yangtze, but south of Beijing), and Manchuria (northern China, plus Tibet and western China). Industrialized Manchuria carefully grabbed the wasteland resource regions of western China and Tibet in a foresightful attempt to support future expansion. The rest of China split along agricultural lines: Canton has a hot wet climate; the reduced China has a cooler climate.

Indochina: Vietnam, Laos, Cambodia, and Thailand struggled among themselves for ascendancy and supremacy, with Vietnam usually holding the upper hand. Canton attempted (in 2030) to take over the region in order to seize its petroleum resources, but was repulsed by French pressure; France maintained a strong interest in the region and assisted in its development. After the Cantonese-Indonesian War (2264 to 2268), Canton consolidated the region as Indochina, a puppet-state with each of the former nations now a province.

The Indian States: During World War III, the Sikh population of the Punjab declared its independence from the central Indian government. Over the next 50 years, provinces within India also declared their independence, gradually whittling India down to a core of the subcontinent. Collectively called the Indian states, the eight nations (India, Rajasthan, Bombay, Mysore, Madras, Bengal, Bihar, and the Punjab) often war over territorial and religious differences.

Indonesia: The embryonic industries of Indonesia suffered when worldwide markets collapsed during and after World War III, and Indonesia was slow in recovering. Expansionist governments attempted to take over Indochina early in the 21st century, annexing Malaysia, but further efforts were rebuffed by the French. Through the end of the 22nd century, Indonesia used its equatorial location to support a catapult and orbital manufacturing. Without being at the leading edge of technology, Indonesia was still able to use its orbital facilities to produce inexpensive, generic versions of orbitally manufactured goods (zero-G bearings, pharmaceuticals, stress-free castings, and extrusions). Indonesia occasionally dabbled in imperialism, only to be foiled by a stronger power. Japan kept Indonesia out of the Philippines in 2092; Australia kept Indonesia out of Papua in 2140; Canton kept Indonesia out of Indochina in 2280. The only successful aggression Indonesia waged was the seizure of the Andaman Islands from Bengal in 2265; that war gave Indonesia the tantalum resources necessary for it to build starships.

Southwest Asia: Afghanistan, having reverted to local rule during World War III, fiercely maintained its independence in the years afterwards. It enjoyed amiable relations with the Central Asian Republic, and remained a remote frontier until well into the 22nd century. Pakistan absorbed Kashmir in 2007 as India was fragmenting, extending its twisting territory north to China. Pakistan's victory in the Iran-Pakistan War (2171 to 2176) forced the creation of an independent Baluch state to serve as a buffer between Pakistan and Iran. Baluchistan, feeling a mandate to incorporate all traditional Baluch territories, attacked and occupied Pakistani Baluchistan in 2212. Once hostilities with Pakistan were over (2213), the massed Baluch forces pressed north and occupied the Afghan lowlands as well. All captured territories were incorporated into Baluchistan proper in 2235.

Soviet Asia: The breakup of the Soviet Union produced two major nations in Asia: Russia and the Central Asian Republic. Russia was the traditional territory of the Soviet Union except the Ukraine and Kazakhstan. Kazakhstan became the Central Asian Republic, stretching from the Caspian Sea to Alma Ata on the Manchurian Border. Russia maintained its claim to Siberia, but virtually abandoned it north of the Trans-Siberian Railway and west of Lake Baikal. Manchuria occupied (2048) and eventually absorbed (2071) parts of Siberia along the Amur River. Ignored by Russia, Kamchatka and the Pacific coast governed themselves and finally declared their independence as the Far Eastern Republic in 2038. During the 22nd century, Russia gradually reclaimed Siberia but has been unable to reclaim the Far Eastern Republic or the territories north of the Amur lost to Manchuria.

THE MIDDLE EAST

The reshuffling of nationalities in the Middle East continued after World War III. New nations emerged, and older nations settled some of their differences.

Arabia: Saudi Arabia (now Arabia) was occupied by an alliance of Egypt, Bavaria, Britain, Japan, and France to secure the Arabian oil fields. The United States, with more pressing interests elsewhere, moved its forces back to America. Defending forces helped secure and rehabilitate the oil fields in Arabia, and protect them from revolutionary Iran. With the exhaustion of the oil fields in the early 22nd century, Arabia gained independence in 2112.

Armenia: Armenia found itself without an oppressor to fight when the Soviet government retreated during World War III; it was actively supported by the Ukraine when it absorbed the rest of the Caucasus region in 2020. With Ukrainian backing, Armenia joined with the Kurds to carve out their own nations from Turkey, Iraq, and Iran. Independent Armenia included Turkish territory within its borders, and has been fighting a Turkish separatist movement since 2190.

The Confederation of Palestine: A new nation was created over a period of decades from the nations of Israel, Jordan, and Lebanon. Four nations (Lebanon, Israel, Jordan, and Palestine) share one territory (called Palestine) without specific borders being established within the country. Individuals hold citizenship in a specific nation, and each nation has its own legislature, elected officials, and bureaucracy. Sufficient guarantees of civil rights for all have permitted individuals to live, work, and own property with relative ease. Originally, there were four distinct governments operating over the entire territory, but the success of the nation has enabled many government services to be consolidated under just one administration.

Kurdistan: Having long fought for their independence, the Kurds were surprised to find that their mountain retreats were de facto independent in the chaos of World War III. When Armenia was created in 2020, the Kurds declared their own nation, consolidating their power and incorporating parts of Iraq, Iran, and Syria.

United Arab Republic: Egypt achieved its long-held goal of creating a broadly-based Arab republic by a simple maneuver: it sided with France in its takeover of Saudi Arabia. In the early 21st century, when oil and transport were both scarce, Egypt provided its Suez Canal, participated in the operation of the Arabian Oil consortium, received French assistance in its own affairs, and generally progressed socially and economically. Libya joined with Egypt in 2043 to create the United Arab Republic. Syria joined in 2048 (but left in 2057). The Sudan, administered as a territory from 2017, was pacified in 2068 and joined the War in 2077.

AFRICA

Africa is roughly divided into three regions: North Africa, dominated by the United Arab Republic and the French department of Algeria; Central Africa, populated by many small nations and dominated by French Africa; and South Africa, dominated by Azania and its allied nations. North Africa, because of its ties to the Middle East, is profiled in that section.

Azania: The black majority in the Union of South Africa transformed that nation overnight into a representative democracy. The accompanying exodus of whites crippled the country's management ranks, but many skilled black workers were able to keep industry working and their economy from collapsing. Azania (the nation's new name) plodded along until 2080, when a theoretical basis for star drive was proposed, and the rare metal tantalum was identified as essential to its production. Azania, a major source of the metal, suddenly became rich. Keeping some tantalum in reserve for the future, Azania traded some of its supply for membership in ESA and traded still more for a space partnership with Japan. The fallout was far more than just simple access to space. Azanian money brought high technology, capital improvements, education, and improved standards of living. Azania became a valued trade partner with Europe and with Japan. Between 2090 and 2150, Azania conquered or absorbed all of its Bantu-speaking neighbors, creating a Bantu state ruling the southern portion of Africa.

French Africa: The rise of France and its importance in world markets gave a great advantage to African members of the French Commercial Union. Their relationship to France as former colonies gave them precedence over other African nations for investment, trade, and diplomatic and military defense. Throughout the 21st century, Cameroon, Chad, Zaire, and the Guinea Coast enjoyed a favored relationship with France. When France built its orbital catapults, equatorial Zaire was selected as one of two sites, producing an economic boom in the region as well as

continuing industrialization. The African interior was conquered with air and road networks; African resources were exploited to support French industry and local industry as well.

In 2104, Zaire first petitioned for status as a department of France; that status was granted in 2111. Through the next half century, Cameroon, Chad, Katanga, and the Guinea Coast were also made departments. By 2200, Senegal and Burkina Faso were also departments. Through the 23rd century, there were more French in Africa than in France itself; more importantly, more tax revenues for the nation came from Africa than from European France. Necessarily, the French world view became more hemispherical than European.

ANTARCTICA

The original treaty commitments against settlement of Antarctica expired prior to World War III, but tacit agreement and a lack of recoverable resources restrained most nations from mounting more than research colonies. Argentina and Australia attempted to mine petroleum from Antarctica in the 21st century, but costs and climate made the effort unprofitable.

ORBIT

All major nations have solar power satellites in orbit, each supported by an array of relay satellites at lower levels. Low Earth Orbit (LEO) is occupied by a variety of transfer stations and factories.

L-5: The European Space Agency selected the LaGrange point trailing Luna for its space settlement. The first module was thrust into place in 2061, and the original structure was completed in 2074. Populated by citizens from the ESA nations, L-5 has expanded three times to handle its own population growth as well as immigration.

L-4: America placed the first space settlement at the LaGrange point preceding Luna. Soon Japan and Argentina placed their own settlements at L-4. Originally, America objected to neighbors at L-4, but the cross-fertilization of technicians and scientists in close proximity and the natural trade that arose between the neighbors soon turned that opinion around.

THE SOLAR SYSTEM

The return to space after World War III produced a succession of interplanetary expeditions. The Manchurians established a base on Mercury; the French placed one on Mars; several nations prospected the asteroids. Until the development of stutterwarp, the solar system was the only frontier available in space. The drab planets were a haven for scientists and researchers looking for clues on the nature of the universe.

When stutterwarp opened up interstellar space, planets of the solar system became second-class locations. It was easier and cheaper to place colonists on garden planets around other stars than to exploit inhospitable planets such as Mars or Mercury. No Earth nation maintains a full-fledged colony on any solar planets. The American settlement on Mars and the Manchurian settlement on Mercury were originally established as colonies, but they are now simply commercial mines and bases, with their populations rotating in and out on a regular basis.

Mercury: Manchurian commercial interests maintain a consolidated base at the North Pole of Mercury, sending out expeditions onto the bright face of the planet to exploit pools of liquid self-smelting metals. Expeditions into the dark face recover pockets of frozen water and gas which are used for life support and chemical synthesis. Organizations and other nations rent space at the consolidated base for scientific research or prospecting.

Mars: The American base on Mars is primarily a scientific endeavor devoted to developing a greater understanding of desert worlds. It was scheduled to be abandoned in 2265, but the discovery of a small lode of tantalum near Mons Olympus prompted reconsideration, and America maintains the base in hopes of finding additional deposits.

The Asteroids: Most space-faring nations maintain mining operations in the Asteroid Belt. Supported by commercial interests offering high rewards for rare finds, the Belt attracts rugged individuals interested in getting rich quickly.

Jupiter: France maintains a scientific base on Ganymede for the study of Jupiter and its accompanying moons; it is the farthest out of the standing bases within the solar system.

Saturn and Beyond: Various nations (America, France, Azania, Argentina, Japan, and Indonesia) have established temporary bases at Saturn, Neptune, and even Pluto, and the remains of those bases mark expeditions of the past several decades, but there are no permanent settlements beyond Jupiter.

The Solar System

PLUTO

URANUS

NEPTUNE

SATURN

JUPITER

ASTEROIDS

MARS

EARTH

VENUS

MERCURY

SUN
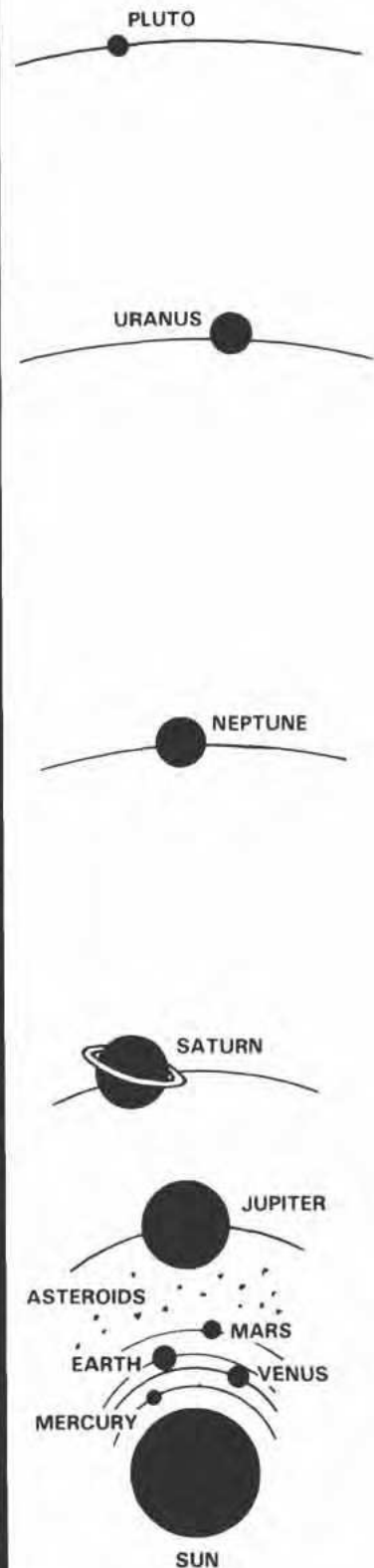
Colonies

There are a total of 55 established human colonies on 29 habitable worlds. (The term "colonies" refers to those settlements that have some sort of two-way orbital interface capacities. Most colony worlds also have a number of smaller settlements from other nations, settlements that have no means of their own to transport cargoes on- or off-world. For this reason, although a world may be listed as having a French colony, for example, it may also have minor settlements that are Azanian, Manchurian, Bazilian, American, or anthing else. And, of course, the population of colonies belonging to one nation may well contain immmigrants from other nations.) Of the 52 national colonies, three have since gained their independence and the ownership of a fourth is in dispute. The former Bavarian colony of Garten, one of the original national colonies on Tirane (Alpha Centauri 4), declared its independence after the War of German Reunification, and enjoys close relations with (and military aid from) the French Empire. The Bavarian colony on Heidelsheimat (Rho Eridani-2) has refused to recognize the authority of the central German government, but has not formally declared its independence. Negotiations between Heidelsheimat and the central German government are ongoing. The former British colony of Wellon on Tirane, another of the original colonies, was granted home rule in 2241 and complete independence in 2277. It remains a member of the British Commonwealth. The former French colony of Elysia on Joi (61 Ursae Majoris-3) gained its independence in 2291 after six years of bitter guerrilla warfare.

The remaining national colonies enjoy a wide variety of relationships with their home governments. Some remain virtual protectorates, their external affairs managed by the mother country, while the original French colony on Tirane is officially a department of Metropolitan France, with elected representatives serving in the Chamber of Deputies. (With the establishment of the Empire, this has become largely symbolic.) In addition to the colonies, there are a total of 34 manned outposts on uninhabitable worlds or in deep space orbit around star systems serving as scientific research centers and refueling waystations on important star routes. There are also four major human enclaves on worlds inhabited by indigenous intelligent races, two each on Stark (DM+4 123−3, the Sung homeworld) and Kormoran (82 Eridani-4, the Eber homeworld).

Given the large number and diversity of colonies, it is easiest to examine them in terms of explored "arms," the naturally occurring corridors of colonization that result from stellar geography. There are three such arms, and they are almost universally referred to as the American, Chinese, and French Arms, after the major powers which have dominated the exploration and colonization of the region.

THE AMERICAN ARM

The American Arm is the smallest of the three colonial regions. Although the first American outpost was established in 2160 at Barnard's Star, the opening of the American Arm proper dates from the establishment of the outpost at Broward in 2172. This waystation became the crossroad for the two main branches of the American Arm, one leading through Clarkesstar (outpost established 2187) to the rich colony systems of King, and then branching at New Melbourne into the Australian Sub-arm (to the colonies on Botany Bay and Zeta Herculis) and the American Sub-arm (to the colonies on Mu Herculis and Ellis). The second principal branch from Broward leads to DM−26 12026, the gateway to the Chinese Arm.

No indigenous intelligent races have been discovered thus far in the American Arm, although it is far from fully explored. Probes from DM−26 12026 to DM−34 11626 and DM−46 11370 indicate worlds potentially suitable for colonization, although no action has been taken along those lines as of yet.

One problem that explorers on the American Arm will eventually face is that there are only a limited number of stars that can be reached by present stutterwarp ı chnology. That is, given that stutterwarps can only travel a distance of 7.7 light-years before discharge is necessary, the American Arm forms a dead-end route. Much work is going into developing ways to extend this 7.7 light-year limit, in order that once the Arm has been fully colonized, other, more distant,

stars will be available. The two primary methods of bridging these longer distances are the use of previously undetected brown dwarfs as discharge points and the use of tugships that can tow an exploratory vessel partway to the target star. Both methods are still experimental, and both are costly in terms of time and money.

THE CHINESE ARM

The Chinese Arm begins at Delta Pavonis and extends in two branches. One reaches to Beta Hydri, Zeta Tucanae, Rho Eridani, and 82 Eridani, all prime colonization territory. The other reaches through two red dwarf systems (Xiuning and Hunjiang) to the garden worlds of Tau Ceti, Epsilon Eridani, and Omicron2 Eridani where Manchuria placed a colony in 2208 after 10 years of preliminary exploration.

Exploration and settlement of the arm proceeded smoothly until the establishment of an outpost at DM+1 4774 in 2247. Shortly thereafter, a Manchurian exploratory mission was sent to DM+4 123 and returned with the electrifying news that the star system was inhabited by an indigenous intelligent race, the first to be encountered by humanity. Most nations of the Earth hastened to open a variety of diplomatic and cultural contacts with the race the Manchurians named the Sung. (In common with all intelligent races encountered by humanity, their own name for themselves translates roughly as "human being.")

The Sung, like humankind, were divided among a wide variety of ethnic groups, linguistic groups, and political groups. Nation states vied for diplomatic and military supremacy, although at the time of contact the Akcheektoon state enjoyed a clear supremacy, to the extent that the 60 years leading up to contact with the Manchurians is now referred to in Sung history as the "Akcheektoon Peace."

The initial euphoria over contact with Sung was considerably reduced, however, when it was discovered that a satellite of the major gas giant in the DM+4 123 system contained another indigenous intelligent race (the Xiang), considerably less advanced than the Sung (roughly stone age technology), and which were being mercilessly exploited by the Akcheektoons. The documentation of forced labor camps with high death rates on the Xiang homeworld led to a widespread public outcry on Earth and precipitated the Slaver War (2252-2255 AD).

The major Terran participants in the war were Manchuria and Canada, although expeditionary forces from a number of other nations also participated. The early stages of the war consisted of a short and effective demonstration of the impact of star drive on military actions within a star system. The small Akcheektoon fleet was destroyed at virtually no loss to Terran forces. The second stage consisted of landings on the Xiang homeworld and reduction of the now-isolated Akcheekton bases there. The third phase of the war consisted of diplomatic maneuvering to forge an antiAkcheektoon coalition on the Sung homeworld strong enough to bring down the Akcheektoon government and force a peace settlement.

Following the conclusion of the war, both Manchuria and Canada established enclaves in Akcheektoon territory. Extensive educational and developmental missions have also been established on the Xiang homeworld, funded largely by Akcheektoon reparations. Several Sung nations have now begun operating star drives, and plans for Sung colonies on several of the worlds of the Chinese Arm are proceeding.

During this same period (the mid-23rd century), explorers and colonists in the Beta Hydri branch of the Chinese Arm discovered the ruins of a colony established some 4000 years previous. Another ruined colony was found at Rho Eridani a few years later.

At about the time of the conclusion of the Slaver War, an exploratory mission of the United Arab Republic visited 82 Eridani-3 and discovered the Ebers. Considerably less advanced than humankind, the Ebers were nevertheless open to limited contact. Since then, two major colonial enclaves have been established in wilderness regions of Kormoran, the Eber homeworld.

Eber civilization had reached at least three other worlds and established colonies on them, only to have the entire group of worlds embroiled in a massive thermonuclear war which destroyed two colonies and knocked the remaining colonies back to the stone age.

Colonization of the Chinese Arm has, overall, been very successful, and there are plenty of systems that have yet to be explored and colonized. One problem that has surfaced recently on the Arm has been a series of terrorist bombings at various locations. There is no discernible pattern to the attacks, and no one has claimed responsibility, nor have any demands been made. Authorities speculate that the attacks are being performed by some sort of anarchist group.

THE FRENCH ARM

The French Arm was first opened with the establishment of the Azanian outpost at Nyotekundu (Wolf 359) in 2141. Serious exploration did not begin, however, until after the ESA member states ratified the Melbourne Accords. The Arm extends from Sol to Nyotekundu, Bessieres, Neubayern, Augereau, DM+74 456, and Queen Alice's Star to Kimanjano, the first major branch in the Arm. One branch extends to Beta Canum Venaticorum, justly described as "the crossroads of the frontier." Strategically located at a travel hub on the Arm, and boasting one of the only beanstalks in existence, Beta Canum is a tremendously valuable center of trade and commerce.

From Beta Canum, the French Arm splits into two branches, one being the fertile Ursae Majoris Corridor, the other being the route through DM+36 2219 and to Vogelheim, DM+27 2219, and Ross 627. Although this second branch has not proven as fertile as the Ursae Majoris Corridor, the first surveys of DM+27 28217 resulted in contact with the Pentapods in 2251 AD. An aquatic race which has developed a bioengineering technology rather than material fabrication, the Pentapods are technologically advanced in ways not completely compatible with humans. Although previously only marginally interested in stellar exploration, the first contacts with humans sent shock waves of excitement throughout Pentapod society, and they have embraced contact with Terrans wholeheartedly. There is now a Pentapod enclave in the oceans of Beta Canum, producing the first bioengineered products for human use.

The remaining branch of the French Arm extends from Kimanjano to the colony worlds of Beta Comae Berenices, Hochbaden, and Eta Bootis. Affairs on this Arm have been dominated for the last three years by a violent war with the Kafers. Very little is known about this race. They were first contacted in 2295 by an exploratory party to the Arcturus system. Two years later, they returned and attacked the French research outpost there, and within another year, in 2298, a large Kafer invasion squadron entered Eta Bootis. Ukrainian and Imperial French naval reinforcements had been dispatched to the system as a precaution, but superior numbers gave the early battles to the Kafers, allowing them to land ground troops on the human colony world there. Despite stormy relations between Germany and France, the crisis prompted the dispatch of a German naval squadron which, along with French and Ukrainian reinforcements, managed to drive the Kafers from the system. But Kafer ground troops remain hidden on the planet, continuing to strike at outlying settlements.

Understanding an alien race is difficult enough when sufficient data is available; the Kafers present a special puzzle. Humans have never had formal contact with the race, and no Kafer has ever been captured for study and analysis. Virtually nothing is known about their society and government, and very little is understood about their physiology.

Recently, the Kafers have again begun an assault on the French Arm, and, from all indications, it looks to be the beginnings of a full-fledged invasion. Colony worlds on this Arm are gearing up for a full-scale war against an alien race whose full resources are unknown.

FINGERS

The American Arm appears to be tapped out; the stars that can be reached along it are limited. The French and Chinese Arms, however, extend infinitely. From the main branches can be found fingers that are exploited by smaller nations looking for worlds to settle and explore.

The Canadian Finger: Canadian explorers were the first to chart the system of DM+20 5046, a distant but attractive system. In order to support a colonization effort, Canada found it necessary to establish a series of outposts (DM+19 5116 and DM+15 4733) to service ships travelling there. The series of systems is called the Canadian Finger. The finger also leads to a relatively pleasant planet at AC+17 534-105.

The Latin Finger: Extending from Epsilon Eridani is a finite branch which reaches as far as Procyon before dead-ending. Paradoxically, the route to Procyon (so very close to Earth) is one of the longest in general use. The expedition to colonize Omicron2 Eridani was jointly funded and supported by Mexico and Argentina, and the world is a gateway to the Latin worlds: DM-3 1123 (the Inca Republic, Texas, and the Life Foundation), and Procyon (Brazil).

Frontiers: The French Arm is replete with fingers, together known as the Frontiers. Their reach is still uncharted and their potential is still unrealized. Explorations beyond settled systems has brought contact with the Pentapods and the Kafers; the possibility of new contacts is real and immediate. For this reason most nations exhibit caution in their explorations.

COLONY WORLD DESCRIPTIONS

In order to provide players with some basic facts about their characters' homeworlds, the following colony world descriptions are given. Outposts are not described.

The American Arm

There are five colony worlds on the American Arm.

Botany Bay—DM+33 2277: Botany Bay is the fourth of nine planets circling the K7 V star, DM+33 2277, the penultimate star on the Australian Sub-arm of exploration. The world has a gravity of 0.91 G and is approximately the same size as Earth, but over 90 percent of its surface is covered by oceans. The world's landmasses consist of a few large islands and island chains. The world is best known as an exporter of microelectronics parts.

Ellis—AC+48 1595-89: AC+48 1595-89 is a G8 V star at the extreme end of the American Sub-arm of the American Arm of explored space. Its colony world, Ellis, is the first of three planets circling the star. Ellis is a desert world with a diameter of nearly 13,000 kilometers and a surface gravity of 0.92 G. Its surface has a water coverage of only seven percent. Through the efficient use of irrigation, however, Ellis produces most of the food shipped along the American Arm, and efforts are now being made to liberate its vast petrochemical reserves.

King—DM+2 3312: King is the first of five planets circling DM+2 3312. The planet has a diameter of over 30,000 kilometers and a surface gravity of 3.08 G. King's surface is about 67 percent water, and its atmosphere is hot and laced with sulfur gasses. The planet has been colonized by both America and Australia because of the ready availability of precious metals on its surface, particularly tantalum.

Mu Herculis—Hermes: The Mu Herculis star system is a trinary grouping of two M4 V stars and a G5 IV star, Mu Herculis A. Circling Mu Herculis A are six planets, of which Hermes is the third. Hermes has a diameter of nearly 10,000 kilometers and a surface gravity of 0.73 G. Its surface is 80 percent water, all of it ice except for a narrow equatorial band. America and Australia cooperated in a joint colonial venture here, aided by funding from the Alberta Farmer's Cooperative. Initial plans were to make this an agrarian colony, but, when that failed, a private group used the world as the site of the Mule Corporation, a maker of heavy machinery.

Zeta Herculis—Kingsland: Zeta Herculis is a binary star system on the Australian Sub-arm of exploration. Circling Zeta Herculis A, a G0 IV star, are four planets, the most distant of which is Kingsland. Kingsland is a glaciated world with a diameter of 12,000 kilometers and a gravitational force of 0.99 G. Near the planet's equator, tundra replaces the ice fields, and farming can be accomplished on the equatorial band. The world exports a few mining products.

America

America presently holds colonies or outposts on eight worlds. Its colonies are at King, Mu Herculis, and Ellis, and its outposts are at Barnard's Star, Broward, New Melbourne, Vega, and Red Speck. America and Australia together have explored one entire Arm of space (albeit the smallest of the three). Reasons for America's emphasis on exploration and colonization seem to involve not only the economic benefits, but also, largely, national pride.

Australia

Australia is responsible for the upkeep of facilities on five different worlds, three of them colonies and two outposts. Australian colonies are at King, Botany Bay, and Zeta Herculis. Outposts are at New Melbourne and Ross 863. As with America, Australia seems to be in the business of colonizing space not just because it is profitable, but also because carving homes out of the wilderness is just in its people's blood.

The Chinese Arm

There are a total of 11 colony worlds on the Chinese Arm. Many of them were colonized with no specific aim at producing materials for their mother countries, but simply to enhance those nations' standings as progressive societies.

Beta Hydri—Daikoku: Daikoku is the second of 10 planets that orbit Beta Hydri, a G1 IV star that lies between Delta Pavonis and Zeta Tucanae. Daikoku is circled by three moons. The world has a diameter of nearly 21,000 kilometers, but its surface gravity is only 0.66 G. Its surface is 39 percent covered by water (including the polar ice caps). The planet is considered an old garden world. It has been colonized by Japan and Arabia and also has outposts established by the Astronomischen Rechen-Institut and the Accademia dei Lincei. It also holds a few Eber ruins. Exports from the planet include refined metal ores and some agricultural products.

Delta Pavonis—Cold Mountain: The first major branching of the Chinese Arm occurs at the Delta Pavonis system. Delta Pavonis is a G8 V star whose system consists of two rings of asteroids followed by two planets. The outermost planet is a gas giant; the other is a colony world called Cold Mountain. Cold Mountain has a diameter just short of 10,250 kilometers and a gravitational attraction of 0.83 G at its surface. Originally there were two colonies established on the world, one Manchurian and the other Japanese, but the Japanese colony eventually failed. Cold Mountain is aptly named—because of its high percentage of atmospheric oxygen (39 percent), any spark or flame can cause an incredible fire, and, furthermore, the world's water and soil are highly acidic. Colonization is only possible above 8000 feet altitude, where the thinner atmosphere somewhat ameliorates such effects. In adapting to the hazards of the environment, local life has taken some very dangerous forms ("razor flies," something like living splinters of glass that ride the winds, are one example). Because of their shared hazards, the Manchurian colonists tend to be a very clannish bunch. It is unusual for members of other nations to be accepted. Cold Mountain is a mining colony.

DM + 20 5046—Doris: DM + 20 5046 is a K5 V star at the furthest frontier of the Chinese Arm's Canadian finger. It is orbited by four planets, the second of which is Doris, a ringed planet. Doris has a diameter of 12,000 kilometers and a surface gravity of 0.81 G. Its surface is 80 percent covered by oceans. Great floating forests stretch from the coastlines of its landmasses out over the shallow waters of their continental shelves. The planet was colonized by Canada with Manchurian aid, and there is talk of having a Sung enclave established on the world.

DM – 3 1123—Austin's World: Austin's World is the first of two planets that orbit the K3 V star, DM – 3 1123, which lies at the beginning of the Latin finger. It has a surface gravity of 1.25 G and a diameter of a little over 13,500 kilometers. The world's surface is 90 percent

water, with only one continent and a few archipelagoes. It is a world of frequent storms, due to the fact that its nearly 90-degree axial tilt and its 41-day year cause rapid and marked shifts of day/night patterns on the world, making for very uneven heating. There are three colonies established on Austin's World: one from Texas, one from the Inca Republic, and one from the Life Foundation.

Epsilon Eridani—Dukou: Dukou is the first planet circling Epsilon Eridani, a K5 V star between Tau Ceti and Omicron2 Eridani. The world has a diameter of nearly 17,000 kilometers and a surface gravity of 1.57 G. It was colonized by Manchuria but has a great number of French, Mexican, and Canadian citizens as well. An ice world with an atmosphere, Dukou was first set up as a penal colony dedicated to mining a pseudofungus from underneath the planet's icy coating. The "fungus" is useful in the production of certain medicines, especially a particular group of antibiotics.

Epsilon Indi—Chengdu: Epsilon Indi, a K5 V star, lies just off a major route of the Chinese Arm and is usually reached by travelling from Xiuning. Its colony world, Chengdu, has a gravity of 1.12 G at the surface and is slightly larger than Earth. It has four major continents. Colonization was established by a joint effort of Manchuria, Canada, and Nigeria and drew individuals from a multitude of other nations as well. The world is characterized by rugged mountains, gentle rains, and giant trees. Its chief export is from mining, but some industrial and agricultural products are shipped off-world as well.

Omicron2 Eridani—Montana: Omicron2 Eridani is a K1 V star that lies between DM−3 1123 and Epsilon Eridani. Its system contains six planets and two asteroid belts. Montana is the second of the six worlds. It has a diameter of just over 11,300 kilometers and a surface gravity of 0.98 G. One moon orbits the world. Montana's surface is 90 percent covered by water, the remainder being divided between one continent and three large islands. It is a world of many active volcanoes. Both Mexico and Argentina began colonies here, but the two colonies have since merged into one.

Procyon—Paulo: Procyon is a binary star system consisting of an F5 IV star (Procyon A) and an F7 star (Procyon B). It lies at the farthest frontier of the Chinese Arm's Latin Finger. Circling Procyon A are four planets; the last two, Paulo and Pedro, also circle each other in a shared orbit around their star. Paulo has a surface gravity of 0.99 G, nearly the same size and density as Earth, and nearly the same ratio of landmass to water coverage as well. There are four major continents on Paulo, one of which lies in the northern polar region. The world holds a colony of Brazil and boasts many exotic native life forms. The colony exports a few organic products of native origin.

Rho Eridani—Heidelsheimat: Rho Eridani is a K2 V star in a binary system that also contains DM−56 328, a K5 VE star with two planets. The system lies between Zeta Tucanae and 82 Eridani, home of the Eber race. Rho Eridani holds five planets; Heidelsheimat is its second. Heidelsheimat has a diameter of just under 14,000 kilometers but a surface gravity of only 0.44 G (which means that its density is very low). It has been colonized by Bavaria (these colonists refuse to become part of reunited Germany), Texas, and the Inca Republic. The world is known for the ruins of an Eber colony once located there and for a number of plant types that are either irritating or dangerous to human colonists.

Tau Ceti—Kwantung: Kwantung is one of seven worlds that orbit Tau Ceti, a G8 V star at the branching of the Chinese Arm to Epsilon Eridani and Haifeng. It has a surface gravity of 0.93 G and a diameter of approximately 10,000 kilometers. The atmosphere holds an abundance of argon, making for beautiful fluorescent displays during lightning storms. Manchuria and Mexico have placed colonies on the planet, but there is great resistance to any other colonies being created. Conditions in Kwantung's colonies are rather primitive compared to other worlds.

Zeta Tucanae—Syuhlahm: Located two systems away from the the Eber homeworld of 82 Eridani, just between Beta Hydri and Rho Eridani, is the Zeta Tucanae system. Zeta Tucanae is a G2 V star with four planets, and Syuhlahm is its second. The world is home to two colonies—Chyuantii (Manchurian) and Lihngtou (Cantonese)—as well as a number of settlements, most notably one from Japan, one from Vietnam, and one from the Foundation for Practical Knowledge. Syuhlahm exports mining and farming products but is chiefly known for its very alien ecology in which both animal-analogues and plant-analogues arise from the random joinings of a limited range of independently living structures such as "leafs," "legs," "torsos," and "sensors."

Manchuria

Manchuria maintains a total of 14 colonies and outposts, the second largest number of all of Earth's nations. It holds colonies on five worlds: Delta Pavonis, Epsilon Indi, Zeta Tucanae, Tau Ceti, and Epsilon Eridani. Its outposts are in nine systems: DM−26 12026, Xiuning, Junjiang, Serurier, DM−15 6290, Haifeng, DM+1 4774, and DM+4 123 (an enclave on the Eber homeworld). One motivation for such a far-flung space program may be that Manchuria has always been greatly concerned with progress and expansion, even as far back as the early part of the 20th century, when it served as the industrial center of China. Not all of Manchuria's colony worlds receive the support that other nations give to their colonies, however. Manchurian colonists are often expected to strive against very primitive conditions, but they take great pride in their ability to do so.

France

At the top of the list of the nations supporting colonies and outposts off-Earth is France. This is very natural, given its role as leader of the nations on Earth. Unfortunately, very few nations can claim to really enjoy France's dominance in either area, but at least in space one can avoid French holdings by avoiding the French Arm of exploration.

France supports a total of 16 colonies and outposts. Its seven colonies are at Alpha Centauri, Queen Alice's Star, Beta Canum, Beta Comae, Kimanjano, Vogelheim, and Eta Bootes. Its nine outposts are at Bessieres, Augereau, Serurier, DM–26 12026, Davout, Nyotekundu, D'Artagnon, DM+36 2219, and DM+27 28217.

French colonies also tend to enjoy much better support in terms of facilities than do the colonies of many nations. This is not necessarily due to a greater emphasis upon colonization; instead, it is often simply because the French Empire has the money to spend on such things. One very good example is the beanstalk held by the French colony on Beta Canum.

Many nations believe that as France has more to lose to the Kafer War in the French Arm, France should bear the brunt of the fighting there. It is also common for the French to be blamed for the War, as it was a French research station that was first contacted by the Kafers just before that race began its attacks on the French Arm. Tensions mount whenever other nations suffer casualties at Kafer hands.

The French Arm

The French Arm vies with the Chinese Arm as the most developed grouping of colony worlds. The Arm contains a total of 12 colony worlds, colonized mainly by France, Britain, Germany, and Azania, but with settlements by many other nations as well. The Kafer presence has caused this Arm some trouble of late.

Beta Canum Venaticorum—Beta Canum: One major crossroads of the French Arm is the Beta Canum Venaticorum system. The star here is a G0 V circled by eight planets. The world know as Beta Canum is the fourth of these worlds. It has a diameter of roughly 12,000 kilometers and a surface gravity of 0.94 G. Sixty percent of the world is covered by oceans; the rest is divided into four major landmasses, including one in the south polar region. France, Britain, and Germany all hold colonies on the world, and these colonies are very well developed. The only Pentapod enclave on a human world is also located here, on the French Continent. The main export from Beta Canum is foodstuffs, and the beanstalk built on the western shore of the French Continent makes transporting them to orbit a relatively cheap proposal. Because of these facts, Beta Canum is typically characterized as the breadbasket of the French Arm, a position of some distinction.

Beta Comae Berenices—Nous Voila: The French Arm has its major branching at the Kimanjano system. From there, one route stretches to Beta Canum, the other through Beta Comae Berenices toward Arcturus. Beta Comae Berenices is a G0 V star orbited by six planets. Nous Voila is the third of the six. It has a diameter of 15,000 kilometers and a surface gravity of 1.05 G. When first discovered by the French, it was nearly covered in ice (despite the fact that it only has about half the water percentage that Earth does), but signs were that this was merely the result of an ice age. Local life forms were adapting to the cold as well as they could, but the world was largely barren, and humans preferred something more warm. So, a microbe was introduced that rapidly spread over the ice caps. Its dark coloring caused it to absorb the star's heat, where ice was reflecting it, and a warming trend was begun that eventually melted much of the ice and gentled the climate. Nous Voila currently exports a small amount of agricultural goods.

DM+36 2393—Dunkelheim: The third star back from Arcturus, the frontier of the French Arm's longest branch, is DM+36 2393. It is an M2 V star with three planets, the first of which is the colony world, Dunkelheim. Dunkelheim is roughly half the Earth's size in diameter but has a gravity of 0.60 G at its surface. It was established as a German penal colony for perpetrators of "victimless" crimes. The world's major export is processed ores.

Eta Bootes—Aurore: At the frontier of the French Arm's longest branch lies the Arcturus system, where humanity first encountered the Kafers. Just one system back from this lies the world of Aurore. It is part of the system of Eta Bootes, a G0 IV star orbited by five gas giants. The second of these is Tithonus, a brown giant that gives off enough heat to support life on its third moon, Aurore. Aurore has a diameter of slightly under 10,000 kilometers and a surface gravity of 0.74 G. The planet is tidally locked to its parent, resulting in a very hot side that faces Tithonus, a very cold side that faces away, and a twilight band between the two where colonization has taken place. The world contains three colonies, "Novoa Kiyev" (Ukrainian), "Aurore" (French), and "Tanstaafl" (an independent colony created jointly by America, Texas, and Germany). Conditions on the world are violent, moreso due to the fact that Aurore holds the unhappy distinction of being the first human colony world to be infested with Kafer ground troops.

Henry's Star—Crater: Henry's Star lies on one sub-branch of the French Arm, where the Arm splits at Beta Canum. The star is a G8 VI star with a companion called Catherine's Star. Crater is Henry's Star's only planet, and it earns the title of garden world, if only barely. Crater has a diameter of just over 11,000 kilometers and a surface gravity of 0.61 G. It has no satellites. Atmospheric pressure on the world is only 0.60 atm, making for difficult breathing for humans. The world is tidally locked, but, because of the presence of two stars in the system, it experiences extreme variations in temperature. Only 10 percent of the world's surface is water, and most of this is locked up in ice. Studies show that there was a fairly expansive ecology on the planet at one time, but, due to a recent (in geological terms) strike by a very large asteroid, conditions on the world changed, and many species became extinct. Those that remain are very rugged. Crater gets its name from the spot where the asteroid impacted, and it exports minerals mined from that area.
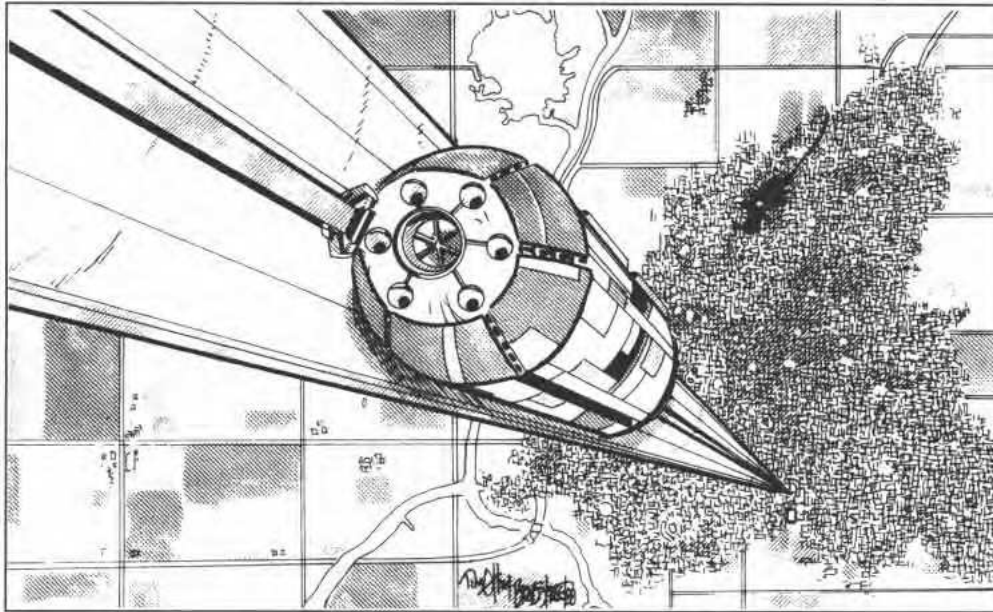
Hochbaden—DM + 2296: Hochbaden is the second star back from Arcturus, at the edge of the French Arm. It is also the name of the first planet of four in that stellar system. Hochbaden, the star, is a K6 V. Hochbaden, the planet, is a lifeless desert world much smaller than Earth and with a surface gravity of only 0.29 G. It holds a German colony with half its population on the planet itself and half in orbiting asteroid stations. The colony is well-known for its industrial products, especially for its work with weapons systems.

Kimanjano—DM + 34 2342: Kimanjano is the first of eight planets circling DM + 34 2342, a K4 V star that lies at the major branching of the French Arm. Kimanjano is therefore the hub of all travel along the Arm. The planet has a surface gravity of 0.94 G and is just over 12,000 kilometers in diameter. It has been colonized by both France and Azania. Kimanjano holds no true native life, but its oceans are rich with a chemical stew that, while poisonous to humans, is perfect for the manufacturing of a number of chemical products in demand throughout human space. The world is also of great interest to scientists seeking to understand the origins of life as there are a number of mobile collections of chemicals present that blur the definitions of living and unliving materials.

Neubayern—Nibelungen: The third system from Earth along the French Arm is Neubayern. This is a K7 V star with 11 planets, the first of which is Nibelungen. Nibelungen is circled by a ring of ice and rock, and it has a surface gravity of 0.63 G with a diameter of only 8000 kilometers—much smaller than Earth. Thirty percent of the planet's surface is covered by ocean. Being within the life zone of a dim star, Nibelungen is tidally locked to its sun, creating a hot side, a cold side, and a twilight area. As is usual with such colonizable worlds that have been discovered so far, it is only the twilight area that can be colonized. The planet was colonized by Germany, and it exports several local agricultural products, including a shimmering dyed cloth that is very popular on other worlds.

Queen Alice's Star—Beowulf: The fifth star from Earth along the French Arm is a K4 V named Queen Alice's Star. It is orbited by eight planets, the second of which is called Beowulf. Beowulf has two satellites and is a hair under 14,000 kilometers in diameter, with a surface gravity of 1.05 G. Over 78 percent of the world's surface is covered with water. The landmasses (two of them, plus a number of islands) are very rugged. As their first colony world, Beowulf is very important to Britain's national pride. One point of interest concerning the world is that its years are just under 44 Terran days long, and the local days are just half that length, making for a local year that is only two local days in length. This prohibited the use of Terran plants as crops—they just cannot cope with the long days and nights—but several local plants have proved to serve nicely instead.

Germany

Germany holds a total of six colonies off-Earth and one outpost. This makes the nation nearly equal to France in number of colonies alone. All but one of the colonies, however, was actually established by Bavaria before the War of German Reunification. As well, there were a few Bavarian colonies that refused to become part of a reunified Germany. Much of the success of Bavarian colonization was due to the work of the Astronomischen Rechen-Institut, an organization devoted to the advancement of science.

Germany has colonies at DM + 36 2393, Hochbaden, Neubayern, Beta Canum, Vogelheim, and 61 Ursae Majoris and an outpost at Augereau.

As a member nation of the European Space Agency, Britain found many opportunities to colonize on alien worlds. At present, the nation holds four colonies (at Queen Alice's Star, Beta Canum, Henry's Star, and 61 Ursae Majoris), and one outpost (at Clarkesstar). A driving reason for Britain to pursue a plan of colonization was that, historically, the country had once had great colonial holdings throughout the Earth. With France's rise to power after the Twilight War, Britain was forced to once again follow the French lead as it had in the days when French nobles were kings of England.

But British colonies on other worlds enhanced the nation's standing among the nations of Earth and won back a measure of the British pride.

61 Ursae Majoris—Joi: Just between the systems of Henry's Star and Xi Ursae Majoris rests the system of 61 Ursae Majoris. The colony world of Joi is the third of 14 worlds circling this G0 V star.

Joi has three moons. It also has a diameter just a shade under 17,000 kilometers and a surface gravity of 1.05 G. Its hydrosphere covers 58 percent of its surface, the rest being divided into three main continents and a number of islands. Colonies on the world are Halbinsel (German), Elysia (ex-French, now independent), New Cornwall (British), Lubumbashi (Azanian), and Tosashimizu (Japanese).

Joi's native ecology is rich, and some problems arise from this. One such problem is that a number of scientists now claim that one of the native creatures demonstrates definite signs of intelligence. Ecology-minded groups are pressing for the removal of colonists from areas in which these creatures live in order to protect a developing sapient race. But, as might be expected, the colonies that would be affected by such a ruling are strongly protesting the implementation of any such action.

Vogelheim—Adlerhorst: Vogelheim is a K3 V star that lies just beyond Ross 695 on a sub-branch of the Beta Canum end of the French Arm. It is circled by 10 planets, the first of which is the colony world Adlerhorst. (One other world in the Vogelheim system also holds life—Oiseau, the fourth planet—but it is a halogenaceous ecosystem based upon atmospheric fluorine.)

Adlerhorst is slightly larger than Earth, with a diameter of 14,000 kilometers and a surface gravity of 1.16 G. The world holds three continents (one over the south pole) and a long island chain. It is the site of a French colony and a German colony.

Adlerhorst is known for its two dominant patterns of life—*Xenoavia* and *Tomavia*—each of which is a variation on Terran birds.

Xi Ursae Majoris—Kie-Yuma: Xi Ursae Majoris lies at the end of one sub-branch of the French Arm, a sub-branch that begins at Beta Canum and includes Henry's Star and 61 Ursae Majoris. It consists of a quadruple system of stars, one of which is a G0 V star circled by five planets (there are nine planets total in the quadruple system). The first of these five planets is Kie-Yuma.

Kie-Yuma is large at 22,000 kilometers in diameter, has two moons, and has a gravity of 1.21 G at its surface. Sixty-eight percent of its surface is covered by oceans; the rest is divided into two major continents. It is actually a pre-garden world with a very primitive atmosphere that is unhealthy for humans, and sealed habitats are therefore required for them.

The planet was colonized by the Trilon Corporation (a multinational corporation originating in the 2100s), which sought the world's mineral ores.

The Core

Only two worlds fit into the classification of "Core Worlds"—Earth and Tirane (at Alpha Centauri). Only one of those two, of course, is a colony world. A description of that planet is given here.

Alpha Centauri A—Tirane: Tirane is the first of three planets circling Alpha Centauri A, a G2 V star that also serves as the central point of a trinary system of stars. The planet has two moons, Esa and Europos, and is largely covered by oceans. It has seven continental landmasses and a plethora of islands, nearly all populated. Tirane is nearly the same size and density as Earth and has a surface gravity of 1.01 G. The world's original biosystem was almost completely compatible with Terran life forms, and over the decades it has become nearly an even mix of native and Terran forms. Besides the regular seasons, Tirane also experiences 20-year climatic periods known as grand seasons as a result of the nearer of the other two stars in the trinary system. Colonies on Tirane are Provence Nouveau (French), Freihaven (ex-German), Tundukubwa (Azanian), New Albion (ex-British), Tirania (American—nearly extinct), New Canberra (Australian), Amaterasu (Japanese), Provincia de Brasil (Brazilian), and Tunghu (Manchurian).

Tirane was the first world to be visited and colonized by Earth, and its similarity to Earth did much toward encouraging the expansion of exploration for other worlds to colonize. The colonies on the world are now old enough that the average citizen's life on Tirane bears more resemblance to life on Earth than on any of the other colony worlds. It is as if the planet has, even in spirit, become an extension of Earth. For this reason, it is included with Earth under the designation "Core World."

The Colonies of Earth

Nationality	Year	Star Name	Type	Gravity	Nationality	Year	Star Name	Type	Gravity
America	2160	Barnard's Star	Outpost	0.71	France	2220	Beta Comae	Colony	1.05
America	2172	Broward	Outpost	0.26	France	2231	Kimanjano	Colony	0.94
America	2194	King	Colony	3.08	France	2244	Vogelheim	Colony	1.16
America	2199	New Melbourne	Outpost	0.39	France	2246	Eta Bootes	Colony	0.73
America	2215	Mu Herculis	Colony	0.73	France	2274	DM+27 28217	Outpost	0.00
America	2224	Vega	Outpost	0.00	Germany	2224	DM+36 2393	Colony	0.60
America	2225	Red Speck	Outpost	0.23	Germany	2231	Hochbaden	Colony	0.29
America	2229	Ellis	Colony	0.92	Germany	2169	Neubayern	Colony	0.63
Arabia	2245	Beta Hydri	Colony	0.66	Germany	2207	Beta Canum	Colony	0.94
Argentina	2168	Alpha Centauri	Colony	1.01	Germany	2231	Vogelheim	Colony	1.16
Argentina	2175	DM-26 12026	Outpost	0.97	Germany	2241	61 Ursae Majoris	Colony	1.05
Argentina	2245	Omicron2 Eridani	Colony	0.98	Germany	2268	Augereau	Outpost	0.47
Australia	2196	King	Colony	3.08	Inca	2289	Rho Eridani	Colony	0.44
Australia	2196	New Melbourne	Outpost	0.39	Inca	2294	DM-3 1123	Colony	1.25
Australia	2201	Ross 863	Outpost	0.00	Independent	2257	Eta Bootes	Colony	0.73
Australia	2212	Botany Bay	Colony	0.91	ex-British	2167	Alpha Centauri	Colony	1.01
Australia	2217	Zeta Herculis	Colony	0.99	ex-German	2167	Alpha Centauri	Colony	1.01
Azania	2141	Nyotekundu	Outpost	1.02	ex-French	2248	61 Ursae Majoris	Colony	1.05
Azania	2167	Alpha Centauri	Colony	1.01	Japan	2172	Alpha Centauri	Colony	1.01
Azania	2205	Kimanjano	Colony	0.94	Japan	2211	Davout	Outpost	0.76
Azania	2280	61 Ursae Majoris	Colony	1.05	Japan	2213	Beta Hydri	Colony	0.66
Bavaria	2228	Rho Eridani	Colony	0.44	Japan	2257	61 Ursae Majoris	Colony	1.05
Brazil	2184	Alpha Centauri	Colony	1.01	Life Foundation	2258	DM-3 1123	Colony	1.25
Brazil	2258	DM-21 1377	Outpost	0.69	Manchuria	2153	Barnard's Star	Outpost	0.71
Brazil	2267	Ross 614	Outpost	0.48	Manchuria	2172	DM-26 12026	Outpost	0.97
Brazil	2284	Procyon	Colony	0.99	Manchuria	2201	Delta Pavonis	Colony	0.83
Britain	2178	Queen Alice's Star	Colony	1.05	Manchuria	2204	Xiuning	Outpost	0.70
Britain	2187	Clarkesstar	Outpost	0.00	Manchuria	2208	Epsilon Indi	Colony	1.12
Britain	2207	Beta Canum	Colony	0.94	Manchuria	2213	Hunjiang	Outpost	0.33
Britain	2217	Henry's Star	Colony	0.61	Manchuria	2214	Zeta Tucanae	Colony	1.02
Britain	2254	61 Ursae Majoris	Colony	1.05	Manchuria	2218	Serurier	Outpost	0.21
Canada	2255	DM+19 5116	Outpost	0.38	Manchuria	2219	Tau Ceti	Colony	0.93
Canada	2257	DM+3 123	Enclave	0.83	Manchuria	2235	Epsilon Eridani	Colony	1.57
Canada	2267	DM+15 4733	Outpost	0.13	Manchuria	2238	DM-15 6290	Outpost	0.86
Canada	2273	DM+20 5046	Colony	0.87	Manchuria	2238	Haifeng	Outpost	0.81
Canton	2259	Zeta Tucanae	Colony	1.02	Manchuria	2247	DM+1 4774	Outpost	0.37
Eber	0000	82 Eridani	Homeworld	1.46	Manchuria	2255	DM+4 123	Enclave	0.83
France	2145	Bessieres	Outpost	0.58	Mexico	2245	Omicron2 Eridani	Colony	0.98
France	2152	Augereau	Outpost	0.47	Mexico	2265	Tau Ceti	Colony	0.93
France	2159	Serurier	Outpost	0.21	Pentapod	2267	Beta Canum	Enclave	0.94
France	2167	Alpha Centauri	Colony	1.01	Sung	0000	DM+4 123	Homeworld	0.83
France	2175	DM-26 12026	Outpost	0.97	Texas	2258	DM-3 1123	Colony	1.25
France	2184	Davout	Outpost	0.76	Texas	2258	Rho Eridani	Colony	0.44
France	2184	Nyotekundu	Outpost	1.02	Texas	2269	82 Eridani	Enclave	1.46
France	2185	D'Artagnon	Outpost	0.65	Trilon Corp	2260	Xi Ursae Majoris	Colony	1.21
France	2196	Queen Alice's Star	Colony	1.05	UAR	2261	82 Eridani	Enclave	1.46
France	2205	Beta Canum	Colony	0.94	Ukraine	2244	Eta Bootes	Colony	0.73
France	2211	DM+36 2219	Outpost	0.02	Unmanned	2245	Van Maanen's Star	Outpost	0.08

The Nations of Earth

Africa

Angola	Portuguese
Azania	English
Biafra	English
Ethiopia	Amharic
Kenya	English
Madagascar	French
Malawi	English
Mali	French
Mozambique	Portuguese
Nigeria	English
Somalia	Somali
Tanzania	English
Ubangi Shari	Ubangi Shari
Zambia	English
Zimbabwe	English

North America

America	English
Canada	English
Mexico	Spanish
Texas	English and Spanish

North Africa

Berbera	Arabic
Eritrea	French
Kanuri	Kanuri
Mauritania	French
Morocco	Arabic
Polisaria	Arabic
Tunisia	Arabic
UAR	Arabic

French Empire

Algeria	French
Burkina Faso	French
Cameroon	French
Chad	French
Djibouti	French
Gabon	French
Guinea Coast	French
Guyana	French
Katanga	French
Senegal	French
Zaire	French

South America

Argentina	Spanish
Bolivia	Spanish
Brazil	Portuguese
Chile	Spanish
Inca Republic	Spanish
Paraguay	Spanish
Uruguay	Spanish
Venezuela	Spanish

Middle East

Arabia	Arabic
Armenia	Armenia
Baluchistan	Farsi
Iran	Farsi
Iraq	Arabic
Kurdistan	Kurdish
Palestine	Hebrew, Arabic
Syria	Arabic
Turkey	Turkish

Europe

Albania	Albanian
Austrovenia	German
Britain	English
Bulgaria	Bulgarian
Catalonia	Catalan
Croatia	Serbo-Croatian
Czechoslovakia	Czech
Flanders	Flemish
France	French
Germany	German
Greece	Greek
Hungary	Hungarian
Ireland	English
Italy	Italian
Latvia	Latvian
Netherlands	Dutch
Poland	Polish
Portugal	Portuguese
Romania	Romanian
Russia	Russian
Scandinavian Union	Scandinavian
Serbia	Serbo-Croatian
Spain	Spanish
Switzerland	French
Ukraine	Russian

Antarctica

Unpopulated

Australia

Australia	English
Papua	English
Tasmania	English

Pacific

Japan	Japanese
Nauru	English
New Zealand	English
Philippines	English

India

Afghanistan	Farsi
Bengal	English
Bhutan	Dzongkha
Bihar	English
Bombay	English
India	English
Madras	English
Mysore	English
Nepal	Nepali
Pakistan	Urdu
Punjab	English
Rajastan	English
Sri Lanka	Tamil

Asia

Azerbaijan	Azerbaijani
Burma	Burmese
Canton	Cantonese
Cen Asian Rep	Russian
China	Mandarin
Far East Rep	Russian
Georgia	Russian
Indochina	French
Indonesia	Malay
Korea	Korean
Manchuria	Manchurian
Mongolia	Mongolian
Tibet	Mandarin

Weapons Data

Weapon	Mass/Wt.	Bulk	ROF	Rate of Fire	RPB	Rounds per Burst	Mag	Magazine Capacity	Aimed	Area	AFV	Area Fire Value	DPV	Damage Point Value

Vehicle Data

Type		Mass/Weight	Crew		Armor
Combat Movement		Evasion	Sensor Range		Signature
Max Speed	Cruise Speed	Cargo	Endurance	Price	
Comments					

Vehicle Data

Type		Mass/Weight	Crew		Armor
Combat Movement		Evasion	Sensor Range		Signature
Max Speed	Cruise Speed	Cargo	Endurance	Price	
Comments					

Vehicle Data

Type		Mass/Weight	Crew		Armor
Combat Movement		Evasion	Sensor Range		Signature
Max Speed	Cruise Speed	Cargo	Endurance	Price	
Comments					

Travel

TYPICAL TRAVEL TIMES (per 100km hex)

Terrain Type	Foot[7]	Horse[1,7]	Hover	Wheel	Tracked	Aircraft[10]	LTA[9]	Ship[9]	Hydrofoil[9]	Boat[9]
Flat	2d	1d	30m	1h	2h	10m	4h	—	—	—
Hilly	2d	1d	1h	2h	3h	—	—	—	—	—
Broken	3d	2d	3h	5h	6h	—	—	—	—	—
Mountain	5d	4d	no	no	no	—	—	—	—	—
Savannah	2d	1d	1h	5h	6h	—	—	—	—	—
Woods	2d	1d	8h	6h	8h	—	—	—	—	—
Forest	3d	2d	No	10h	12h	—	—	—	—	—
Swamp	2d	1d	3h	no	6h	—	—	—	—	—
Desert	2d	1d	30m	2h	2h	—	—	—	—	—
Volcano	+12h	+12h	+2h	+2h	+2h	—	—	—	—	—
Craters	4d	3d	1h	2h	4h	—	—	—	—	—
River[3]	+12h	+12h	1h[2]	+1d	+12h	—	—	—	80m[2]	10h[4]
Lake	no	no	30m	no	no	—	—	4h	1h	8h
Glacier	3d	2d	3h	no	8h	—	—	—	—	—
City, Town[5]	+12h	+12h	+12h	+12h	+12h	+6h	+6h	+6h	+6h	+6h
Cropland[6]	+12h	+12h	+12h	+12h	+12h	—	—	—	—	—
Road Grid	2d	−12h[8]	2h	2h	2h	—	—	—	—	—
Highway	2d	−12h[8]	12h	1h	2h	—	—	—	—	—
Calm Seas	—	—	—	—	—	—	—	4h	1h	8h
High Seas	—	—	—	—	—	—	—	5h	1h	—
Coastal Waters	—	—	—	—	—	—	—	6h	1h	8h

1. Horse or similar riding animal. 2. Time following river route. 3. Time to cross river (building rafts, etc.). 4. Time downstream; double time to go upstream. 5. Assumes passing through settlement, stopping for lunch, etc. 6. Assumes skirting crop fields. 7. Assumes 12 hours travel and 12 hours rest per day. 8. Decrease in usual time to traverse hex when using a highway. 9. Weather may increase time spent by up to one day. 10. Supersonic aircraft travel at twice this rate; hypersonic and scramjets at four times this rate. **Note:** Use the following special travel times per 100km hex: Railroad 1h, Airfilm 10m, Maglev 10m.

MAXIMUM SPEEDS

Vehicle Type	Max Speed kph	Max Speed per hex
Foot, walking	5	40h
Horse	10	20h
Hovercraft	200	30m
Conventional Train	200	30m
Airfilm	600	10m
Maglev	600	10m
Wheeled Car	150	40m
Tracked Vehicle	80	75m
Subsonic Air	900	6m
Supersonic Air	1800	3m
Scramjet	4000	90s
Dirigible (LTA)	30	3h
Ship	30	3h
Hydrofoil	150	40m
Boat	15	6h

Note: Walking and riding specify double travel time, assuming half the time is spent in rest/meals/sleep. Others assume constant driving and shifts of drivers.

Airfilm is common on garden worlds; maglev is common on vacuum worlds.

TIMES

1d = 1 day; 1h = 1 hour;
1m = 1 minute; 1s = 1 second.

TRAVEL TIME—INTERFACE

Going Into Orbit

Craft	Preparation	Travel Time	Cleanup	Turn Around
Rocket	1d	1h	2h	6h
Rocket Plane	6h	1h	1h	immediate
Scramjet	3h	2h	1h	immediate
Catapult	1h	2h	none	as lifting body
Beanstalk	not applicable	5d	not applicable	immediate

Returning to Surface

Craft	Preparation	Travel Time	Cleanup	Turn Around
Scramjet	none	1h	2h	3h
Parachute	1h	2h	4h	no
Deadfall	1h	1h	none	no
Rocket	none	1h	12h	1d
Lifting Body	1h	1h	2h	no
Beanstalk	not applicable	5d	not applicable	immediate

Preparation includes fueling, preflight checks, and boarding.

Travel Time includes actual flight time and maneuvering to position in orbit.

Cleanup includes postflight checks and equipment shutdown.

Turn Around is the minimum time required for a vessel to leave its destination and begin its return to its starting point.

INTERSTELLAR TRAVEL TIME

Depending on mass and drive, between 0.15 and 9.5 ly per day.

Speed Limit: 7.7 ly travel between stars; a stop in a gravity well is required for drive safety and performance. The stop requires 40 hours.

INTERPLANETARY TRAVEL TIME

Within a gravity well (where G is greater than 0.0001) stutterwarp operates at about 0.01 percent efficiency. Multiply interstellar speed (in ly per day) by 0.645 for in-system speed in au per day.

The American Arm

The American Sub-Arm

The Australian Sub-Arm

Key

- ├─┤ 1 ly
- ★ Sol
- ▬▬ Major Route
- ── Other Route

- ● 30 to 50 ly
- ● 10 to 30 ly
- • 10 to −10 ly
- · −10 to −30 ly
- · −30 to −50 ly

Z-axis distance is the value above or below the map plane. Symbols represent perspective distance, not stellar size.

Eta Cassiopei ● Wolf 47 ● ● Van Maanen's Star
Groombridg· ● DM+66 34
Beta Hydri ● Bessieres
Ross 248· ● L145-141

Proxima Centauri
Sol ★
Alpha Centauri

● DM+74 456 ● Nyotekundu
● DM+66 717 ● Bessieres
● Ross 128 • L145-141
AC+79 3888 ●
· L68-28

● AC+13 14332 ● Ross
● DM−68 1095
● DM−51 6859 ● AC+66 3955

Queen Alice's Star
● Wolf 424
● C1
● DM−51 5974

● DM+48 2108
● DM+15 2620
● DM+46 1889
· L258-146

DM−20 4125 ●
DM−11 3759 ● DM−40 9712 ·
● Xi Bootis
● DM−7 4003
Beta Trianguli Australis ·
· DM−58 5564

44 I Bootis
L339-19 ·
● DM−45 2247
Lambda Serpenti ●
● DM−37 10500
● DM+41 2695
● DM−1 3220

● L768-119
DM−57 6303 ·
AC+54 1646-56 ●
LP101-15 ●
● L480-69
● L1346-53
112 ●
● DM+39 2947

L49-19 · Lacaille 9352
● Kruger 60 ● DM+56 2966
Epsilon Indi ● ● DM+43 4305
· L24 52 · L789-6
61 Cygni ● ● DM−15 6290
Xiuning · L119-21
Sigma Draconis ● · DM−39 14192
Delta Pavonis · Gamma Pavonis ·
Chi Draconis ● ● DM+61 2068
DM+76 785 ● ● AC+65 6955
Serurier
D'Avagnon ●
AC+70 8247 ●
L347-14 · AC+17 534-105 ●
DM−45 13677 ·
DM−36 13940 ·

● DM+19 5116
● DM+57 2735
· Fomalhaut

DM+15 4733 ● ● Ross 226
DM−32 17321 ● ● DM−23 17699
● DM−21 6267

● DM−58 8327
DM−54 9222 ·
· DM−60 7821
DM+20 5046 ·
● L355-62
● Wolf 922
● DM+62 1916
DM−47 13928 ·
DM−51 12998 ·

Altair
· L115-21
● DM+66 1281
DM+4 4048 ·
70 Ophiuchi ●
Eta Cephei ●
DM−53 8617 ·

Vega
AC+32 54804
DM−58 7076
AC+20 1463-148
DM−48 12818
DM+52 2294 ●
Ross 165 ●
AC−7 342-402 ·
AC+2 2155-242 ●
L489-58 ●
AC+8 142-393 ●

DM−31 17
● Wolf 10
● AC
G2
Psi
DM−
● L1997-2
● DM+31 3

DM−32 16135 ·
DM−27 14659 ·
AC+70 14659

DM+43 2796
Mu Herculis ●
DM−3 4233
New Melbourne
King
DM−48 11837 ·
DM+38 3095
DM+45 2743
DM+51 2402 ·
DM−46 12902 ·
DM−43 12343 ·
DM−45 2688 ●

Red Speck ●
DM−26 12026 ●
DM+67 1014 ●
DM−39 11626
DM−46 11540 ·
Dasout ●
Broward ●
DM+67 935 ●
L74-13 ·
Ellis ●
Clarkesstar ●
Wolf 629 ●
26 Draconis ●
AC+61 26806 ●
DM−51 10924 ·
DM−46 11370 ●
DM−37 0765 ·
· DM−37
Zeta Draconis ·

Barnard's Star ●
DM+68 946 ●
DM+59 1915 ●
DM+48 11 ●

Zeta Herculis ●
Botany Bay ●
Ross 863 ●
Ross ●
DM+25 3173 ●
Ross 508
Mu Arae ·
AC+41 726-154 ●
Ross 868 ●
DM+5 3409 ●
DM+5 3409
● Ross 867
● DM−4 4225

The Chinese Arm

The Latin Finger

The Canadian Finger

Key

- 1 ly
- ★ Sol
- Major Route
- Other Route
- 30 to 50 ly
- 10 to 30 ly
- 10 to −10 ly
- −10 to −30 ly
- −30 to −50 ly

Z-axis distance is the value above or below the map plane. Symbols represent perspective distance, not stellar size.

DM −46 943
DM −45 1184
IM −28 69
Ross 55!
DM +2 348
AC +3 2259
DM −47 50;
DM −23 693
Theta Persei
DM −13 544
DM −44 775
Delta Trianguli
DM −54 487
DM −18 359
L1303-10
DM +32 828
DM −51 532
DM −41 328
Nu Phoenicis
Alpha Hydri
DM +19 279
DM +41
DM +42 249
DM +20 85
AC +25 7918
DM +6 398
DM +47 612
L127-97
AC +58 13565
L89-27
AC +56 13511
DM +62 274
L1724-32
DM +63 137
AC +60 3496
DM +63 229
DM +61 366
Haifeng
DM +63 238
Rho Eridani
Nu Cassiopei
DM +61 195
Van Maanen's Star
DM +66 24
Beta Cassiopei
DM +45 4408
DM −4 123
DM −28 302
DM +44 4548
DM +1 4774
L362-81
DM +19 5116
DM +57 27.
Fomalhaut
Ross 22!
DM
DM +15 4733
DM −32 1732
DM −54 9222
DM −50 7821
DM +20 5046
L355-62
AC +17 534-105
Wolf 922
DM +62 1916
Eta Cephei
DM −47 13
DM +66 1281

Omicron2 Eridani
Zeta1 Reticuli
Zeta2 Reticuli
82 Eridani
Epsilon Eridani
Tau Ceti
Eta Cassiopei
AC +71 532
Zeta Tucanae
Hunjiang
DM −15 6290
L119-21
DM +5 2966
Wolf 47
DM −68 47
DM −73 1672
Lacaille 9352
DM +43 4305
L789-6
DM −15 1047
DM +1
DM −39 14192
Gamma Pavonis
DM +61 2068
AC +65 6955
DM −45 13677
DM −36 13940
Altair
L115-21

DM +53 935
DM +52 857
DM +62 780
LP658-2
DM −3 1123
AC +12 1800-213
AC +33 25644
AC +38 23616
Ross 614
DM −5 1668
Procyon
Sirius
Kapetyn's Star
Alpha Mensae
AC +58 25001
DM +80 238
L97-12
AC +82 1111
Tau3 Eridani
AC +79 1584
Qingyuan
Groombridge 34
Ross 248
Beta Hydri
Proxima Centauri
Sol ★
Alpha Centauri
Barnard's Star
DM +68 946
DM +59 1915
Sigma Draconis
Delta Pavonis
Cei Draconis
D'Aragnon
DM +76 785
Seurier
AC +70 8247
L347-14

DM −51 5974
Wolf 424
Queen Alice's Star
AC +66 3955
Neubayern
Augereau
Nyotekundu
Bessieres
L145-141
AC +79 3888
L68-28
DM −59 2351
DM +71 482
DM +53 1320
AC +70 4337
AC +70 4336
DM +67 552
DM −21 1377
L674-15
AC +38 23616
YZ Canis Minoris
Ross 619
DM −44 3045
tP425-140
DM −32 5613
675-81

DM −51 5974
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95-
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DM +15 2620
DM −58 5564
Zeta Draconis
DM −40 9712
L74-13
DM +67 935
Ellis
Red Speck
DM −26 12026
Broward
DM −46 11540
DM +62 1916
Xi Bootis
DM −7 4003
DM −20 4125

Epsilon Indi
Kruger 60
L49-19
L24 52
6 Cygni
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The French Arm

Key

⌐ 1 ly
★ Sol
━ Major Route
— Other Route
● 30 to 50 ly
● 10 to 30 ly
● 10 to −10 ly
• −10 to −30 ly
· −30 to −50 ly

Z-axis distance is the value above or below the map plane. Symbols represent perspective distance, not stellar size.

NEAR STAR MAP

2300AD

2300AD

DIRECTOR'S GUIDE

GDW

The **2300 AD** *Adventurer's Guide* includes Armor, Careers, Character Data Form, Character Generation, Character Generation Table, Colonies, The Colonies of the Earth Table, Equipment, History, Introduction, Map of the American Arm, Map of the Chinese Arm, Map of the French Arm, The Nations of the Earth Table, Near Star Map, Political Geography, Skills, Technology, Travel Table, Upkeep, Vehicle Data Form, Vehicles, Weapons, and Weapons Data Form.

2300 AD *Director's Guide*

2300AD

DIRECTOR'S
GUIDE

GDW

Introduction

GOALS AND THEMES

One thing that is often missing in a role-playing campaign is a clear understanding of what the player characters are working for. It is an easy enough thing for a player to get excited about the purpose of the current adventure, but it is somewhat less easy to maintain that interest over a long campaign consisting of many adventures. What are required are long-term goals and themes that the players can hold to from session to session, giving further meaning to the struggles their characters are going through.

Goals: Goals are those things that a character tries to achieve over the course of time. They may be stated by the player, or they may be assumed. For example, it can be assumed that all players want their characters to become more experienced at what they do, and to establish a name for themselves in human space. But a player might specifically state that he wants his character to become the single best plasma-gunner on the French Arm. Players who are very experienced in role playing may even invent relatives that they are trying to find, vengeances that they seek, or some other goal that helps to bring their characters to life.

(Continued.)

It only makes sense that the majority of people involved in any role-playing game session are called "players"—role playing is a type of game, and that is what people who play games are called. (It is true that you will often hear them refer to themselves as gamers, but this indicates their hobby, not their function in a particular game; during the play of a game, they still refer to themselves as players.)

But not everyone directly involved in games is a player. In football, for instance, there are players, coaches, and referees. The players strive to make a goal; the coaches guide a particular team of players, keeping their direction clear and their enthusiasm strong; and the referees settle questions of rules. In role-playing games, the person who administers the rules is also most often called a referee, and due to its common usage, that is the term we use in the **2300 AD** rules. But a role-playing referee does much more than simply administer a set of rules. We have titled this book the *Director's Guide* to better reflect all of the responsibilities that a role-playing referee's job entails.

In many ways, a role-playing referee is something like the director of a play or movie. He readies a story for play, ensures that props and backgrounds are prepared, and guides the players through the plot.

PREPARING FOR PLAY

In readying a story, the referee takes into account what activities the players have been involved with in earlier adventures, as well as what is happening behind the scenes—things the players do not know about. For example, if the players decide that they have had enough of working pest control on Tirane and move on to another planet, it will affect the type of adventure they will have next, but so will the fact that, unknown to them, their equipment is infested with pest eggs that they are inadvertently carrying with them. Similarly, they may have decided to travel from one town to another, changing their surroundings, but the referee might know that the criminal syndicate they encountered three adventures ago has now taken over the town to which they are headed. This is certain to have an effect on their adventure.

The referee makes certain that props and backgrounds are ready before play. Usually this just involves becoming very familiar with the description of the area the player characters are going to, the specifications of any new equipment that might come into play, and the personalities and capabilities of any NPCs they are likely to encounter. If the referee is well-prepared in these things, play will proceed more smoothly than if he must frequently stop play to look up important information and statistics. Often, preparing props will also include sketching maps or diagrams that may be helpful for the players.

BRINGING THE ACTION TO LIFE

Once play has actually begun, the referee will guide the players through the adventure by describing to them what they see and hear, and by explaining what results their actions have. Some things will be simple cause and effect—a character flips a switch and the referee says that an overhead light comes on. Other things will have to be determined by recourse to the game's rules—a character throws a brick at an assailant, and the referee tells him what number he will have to roll to hit, referring to the rules for effects of distance, character skill, and other pertinent things.

Refereeing a role-playing game can be a challenge. It requires a thorough knowledge of all the game rules (to prevent the action from slowing down while something is looked up), a flair for drama (to make an adventure exciting), a sense of fairness (to keep the players from feeling swamped and frustrated when things go wrong for their characters), and a talent for enjoying other people's fun (the players'). But despite the work involved, there are many satisfactions to be gained, including the pure enjoyment of creativity as you blend the efforts of the players and the workings of your universe into a great story that gives you great pleasure now, and in years to come will provide you all with common memories of excitement, humor, and adventure.

USING THIS BOOK

This book provides you, the referee, with what you need to know to direct **2300 AD** adventures. The chapters here range from solid advice to clear rules to cover every aspect of the job. As you read them, you will learn everything there is to know about how to run combat (individual, group, vehicle, and starship), how tasks are performed, and how to generate new worlds. You will also learn the basic information needed to play the parts of all of the NPCs the player characters will meet, including the alien races that have been discovered by the 24th century. It is recommended that you keep this book close at hand during play, as well.

GETTING STARTED

There are a number of separate publications available that detail individual worlds or adventures, if you wish to use them, and there will be more forthcoming, as well as books of more equipment and vehicles. But all you really need to get started are the materials included in this boxed set.

Once you have read through these rules, play through the programmed solitaire adventure included in the box, in order to see how the most common rules are used in play. If desired, you can then adapt that adventure to become the first session you run for your players.

Themes: Themes are those major concepts that underlie a campaign. They provide a base upon which a campaign can be run. Individual adventure sessions may or may not deal directly with the campaign's theme, but the theme is there, nonetheless, providing a motivation for the characters and hence for the players. A good theme will hold the players' interest over the length of a campaign, and it will also provide the referee with a ready source of adventure ideas.

In **2300 AD**, the major themes are the war against the cruel Kafers on the French Arm, the battle with the evil Provolutionists on the Chinese Arm, and the hunt for smugglers, as well as the labor to open routes of exploration, on the American Arm. The referee should choose one of these as the major thrust of his campaign. Adventures that concern other things can, and should, be played, but the major theme will keep a campaign going by providing a deep sense of purpose for players.

WARNING:
WHAT FOLLOWS IS REFEREE INFORMATION.
IN ORDER TO PRESERVE SUSPENSE,
IT IS SUGGESTED THAT PLAYERS READ NO FURTHER.
PLAYERS SHOULD DEFINITELY NOT READ THE *ALIENS* CHAPTER.

3

Running Adventures

WHAT IS SCIENCE-FICTION ROLE PLAYING?

Role-playing systems can almost always be identified by the background universes they are designed to fit. Science-fiction role playing, by definition, allows players to take on the roles of people living in a futuristic environment. Yet there is much latitude even within the topic of science fiction. Some science-fiction backgrounds deal with a quasi-fantasy world of exotic beasts and strange mental powers, usually the results of mutation after a nuclear war on Earth or a blurring of the borders between diverse dimensions. Whether a particular creature or effect is scientifically possible by today's terms is not important in these worlds—anomalies, or even impossibilities, can be justified by the argument, "Sure that's how things work in our world, but this is a different dimension." This type of background is commonly termed "science fantasy."

Some other science-fiction backgrounds are more firmly based on what we now perceive to be reality, but allow starships to rumble through space and laserpistol blasts to be dodged because these backgrounds are more concerned with raw adventure than with scientific fact. In this second type of background, strong mythic qualities are often present: the side of Good is clearly

(Continued.)
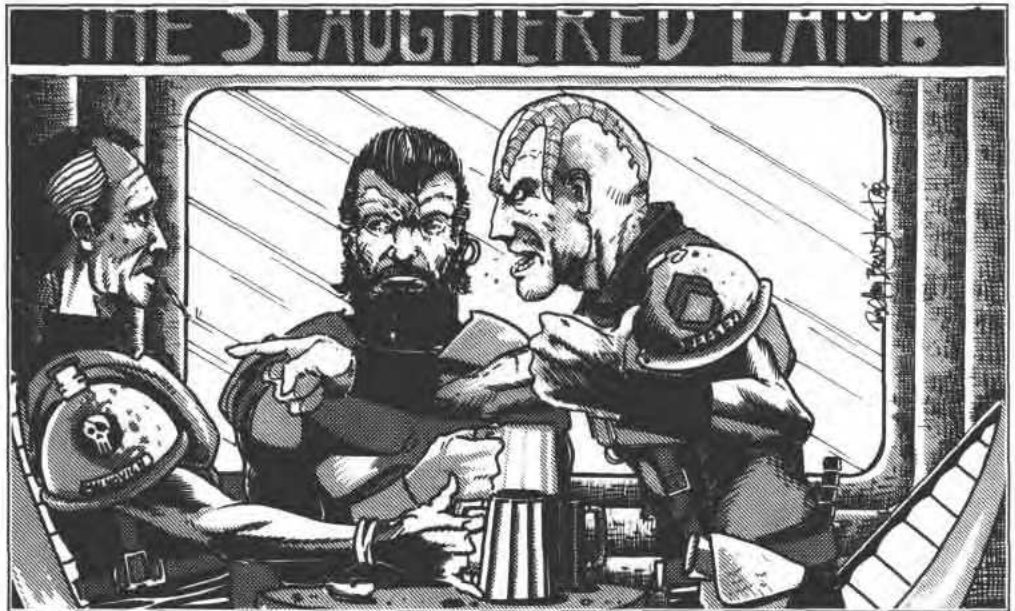
A **2300 AD** referee has a wonderful and difficult job to perform. This chapter explains just what that job entails, and how it may best be performed.

THE REFEREE'S JOB

Players in role-playing games have a much more simply defined, and hence more easy, job of things than do referees. Players can concentrate on one character's appearance, abilities, and motivations during play and bring that character to life. The referee has the task of bringing an entire universe of characters to life. When players approach that universe, they are filled with wonder at the mystery of it all; their enjoyment is in exploring those mysteries. The referee, on the other hand, knows all of the universe's secrets—there is no sense of mystery, except, perhaps, the mystery of how the players will deal with the things they encounter in a world he has created.

THE REFEREE'S SATISFACTION

Satisfaction in refereeing should come from two different things. The first is the enjoyment of acting out diverse parts and painting word pictures of a multitude of settings. The second is a knack for enjoying other people's pleasure, for seeing the players have a good time in their adventures.

A Living World

A good referee can make the players see, hear, feel, smell, and taste the world in which their characters are living. In order to do this, he first must be able to picture the scene in his own mind, then convey that same scene to the players. Painting a scene in a player's mind does not involve long, complicated descriptions, such as exactly how many meters long or high a wall is, or every detail of the paintings hanging upon it (although such a description might be important in combat, to allow players to take the best advantage of their surroundings—which is why maps can be of great use in play). Instead, it merely involves picking a few striking details and conveying them well. To understand how this is done, look closely at how a scene is described
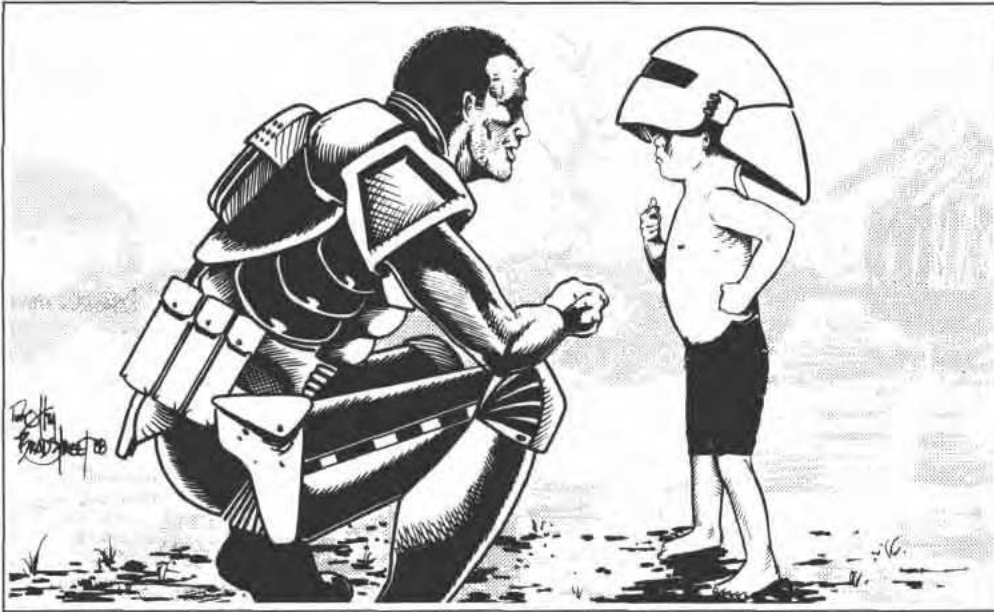
in a novel and begin to practice the same techniques.

The same principles of description hold true for portraying non-player characters (NPCs) to players. The players do not need (or want) an exact account of every freckle on an NPC's face; they merely need to hear that he has, for instance, a characteristic way of talking or dressing in order to make that character seem real. The referee should therefore speak in the NPC's characteristic way and describe the NPC's characteristic dressing style when playing the part of that NPC.

Granted, this takes some practice, but it is also what role playing is all about. Without it, characters become mere sets of statistics wandering about a world of statistics in a sort of board-game. With it, players *become* their characters within a living world the referee creates, and *adventure* takes place.

A Vicarious Pleasure

The referee's second source of enjoyment is the vicarious satisfaction of seeing the players enjoy themselves. This does not mean that everything in an adventure goes just the way the players would want it to. The greatest satisfactions in life are usually involved with overcoming great obstacles, and that is certainly true of adventure. Occasionally the players will find their characters in dangerous situations, and if they are deeply involved in playing those characters, they may feel some fear or frustration during that time. But once the danger is overcome, they will feel an equally great relief and satisfaction at having bested it.

A referee must develop a sense of balance at these points. If player characters are never in danger, or if the danger is *too easy to overcome*, there is no excitement to game play. But the players should never feel that the referee is in competition with them either. Occasionally a player character is likely to be hurt or killed, and such things make the other characters' lives more precious to their players. If player characters never suffer, there is no adventure to experience in gaming; but if characters die all of the time, it becomes too much effort to create and play new ones.

It is, however, usually best to create an *illusion* of great danger for players and their characters where just a little actually exists. This illusion is easy to construct if the referee keeps in mind that the players do not know the secrets that the referee knows. For example, they may have no way of knowing that there are only two guards in a particular building, so they fear there are a dozen of them. In the dark, a hundred enemies can be imagined where only a handful exist. Since the players do not know what the referee knows, they are, metaphorically, playing in the dark.

delineated from the side of Evil in very black and white terms, and player characters are fully on one side or the other, almost always the side of Good. No one in these worlds really worries about how antigravity plates work, or energy swords, or jump-drives, or any of the other bits of their far-future technology. What is important is that heroic adventure takes place. This type of background is commonly called "space opera."

The third type of background is, of the three, the most firmly tied to science. Gravity on a ship cannot be just created; it must, instead, be mimicked by using centrifugal force in great spin habitats. Lasers cannot be dodged, because they travel at the speed of light, leaving no time between the target perceiving them and the target being hit. Creatures encountered must have been able to evolve naturally from the ecosystem in which they live. A planet's gravity is directly tied to its mass. These are all examples of a concern that things be scientifically feasible, assuming theoretical advances of modern science. This type of background is commonly called "hard" science fiction.

2300 AD rests in the realm of the last type mentioned—"hard" science fiction. But just as in the other two types of science-fiction backgrounds, the purpose of role playing is to have adventures. Players will experience excitement, danger, and adventure as their characters move about within the realm of **2300 AD**.

5

It is helpful to view an adventure as a series of episodes which can be divided into discrete scenes. Under this system, an adventure is the overall story line the characters play.

That story can be divided into episodes, each of which involves some major portion of the story. Examples would be an episode in which the players hire on with an exploratory team and prepare equipment; an episode in which they cross a major mountain range; an episode in which they discover that one of the team members has a grudge against the leader and plans to kill him in the wilderness, along with all witnesses (everyone else on the team); an episode in which they escape the assassin and struggle back to their pickup point, finally to bring testimony against him in a court of law.

Each of these episodes can also be divided into scenes. For example, the episode on crossing the mountain range could be divided into a scene in which the team members have to climb a particularly the dangerous rock face, a scene in which they are attacked by a mountain beast, another scene in which they have lost a major portion of their provisions and must hunt in a high mountain valley, and the like.

Using this system of defining the main theme of an adventure, then breaking it down into component parts will make it easier for the referee to design interesting, believable adventures with realistic details.

THE ROLE OF REFEREE EXPERIENCE

Some referees have never run an adventure before; others have been doing so for years. As well, each person develops his own particular style of refereeing. Nonetheless, certain things remain common among referees, such as the topics mentioned in the last section. Another is the tendency to progress from *linear* to *open-ended* adventures as they gain experience in running role-playing sessions.

Defining the Terms

Linear adventures are those in which the players' realm of possible courses of action are fairly limited. A totally linear adventure would have its individual scenes laid out like a line of railroad cars. In such an adventure, a player character would get on the train at the first car and only progress through the cars in one direction (toward the other end) and by only one means (through the doors in the cars). In a slightly looser adventure, the player might be allowed to decide to have his character traverse the cars across their roofs, or go through the interiors of some of the cars and use the roofs of others. In an even freer adventure, the train might be in a train yard, and the character could start at either end, use the car's doors, roofs, walk along the ground, jump on another train entirely, or any combination of these things. In a totally open-ended adventure, the character could leave the train yard altogether, wander the city, the continent, the planet, the stars, as far as the parameters of the game rules allowed.

Considering the Effects

Obviously, the more linear the adventure, the easier the referee's job in preparing for play. When courses of action are limited, the referee can concentrate on knowing those courses very well, creating the NPCs to be encountered, and visualizing the settings. Unfortunately, this also means that the players have less freedom of decision, making them feel "railroaded" into a predetermined story line. Conversely, the more open-ended the adventure, the greater the freedom the players feel, but the harder it is for the referee to prepare for all of the things that the players *might* do. And once the players have begun a course of action, all of the referee's preparation for alternate courses can seem like wasted effort. Many referees run open-ended adventures "by the seat of their pants"; they just make things up as the players go along. Obviously, this style of play requires the referee to be very imaginative on the spot. This can be exhausting to many referees.

The best recommendation is usually to begin refereeing with fairly linear adventures, letting the players know that this is how things will be at the start. As the referee gains familiarity with the rules (freeing him from having to concentrate as much on them during play), develops confidence in his on-the-spot creative powers, and begins to understand his players well enough to know what they are *likely* to do in a given situation, he can start to allow his adventures to become more open-ended.

Combining the Concepts

There are a couple of tricks that can also be used to make open-ended adventures more easy on the referee. The first involves diverting the players rather than denying them; the second involves multiple linear adventures.

Using Method One

In the first method, the referee develops a solid background for a particular area, whether it be a city, a continent, a planet, or whatever. Published sourcebooks, such as the *Aurore Sourcebook* can fill this need, or the referee can develop his own. When using such a background, do not tell the players that their characters cannot leave the area you have outlined—this will make them feel constrained—instead, tell them it is very difficult. For example, a referee begins the players on a planet he has outlined. If he does not want the players traipsing off the planet and around the galaxy, he can simply make passage to space very infrequent, very costly, and only from particular cities, all of them far away from where the players begin. If the players really want to leave the planet, they can, but they first must raise the money and make the trip to the starport, both of which could involve a great number of adventures being run. Often, by the time they fulfill the conditions, they will have become so involved in adventuring on the planet that

it will begin to seem like home. Once this happens, the players may decide not to leave the planet after all.

Using Method Two

In the second method, the referee designs a number of fairly linear adventures, but the players can freely choose which one they take on. For example, the players are travelling toward Spaceton, where they have heard that passage off-planet can be purchased. Along the way, they pick up odd jobs to save up enough money for the tickets, and for food for their travels. They enter a village called Miner's Grief, a poor, dusty little colonial burg, and they ask around for work. The locals tell them that: (1) Old man Gimsley up in the hills north of town is looking for guards to protect his sheep from whatever it is that has been eating them; (2) the mining company still hires occasionally; and (3) the owner of the general store wants drivers for his next caravan to Wunkle, the manufacturing city 100 kilometers south of here. The players can discuss things and choose which one they want.

Actually, the referee has prepared each one of these jobs as an adventure ahead of time, and once the players choose it, they have voluntarily accepted the constraints of that adventure. But they *feel* much different than if they had simply been handed only one and told "this is what you will do."

By the way, the adventures they did not choose from the list can be used later on, when they enter another small town.

AN ADVENTURE RECIPE

Whatever the method of running adventures, whether the referee plans one out well ahead of play or makes one up on the spur of the moment, there are a few things that should be kept in mind. There are elements that should be common to all **2300 AD** adventures to ensure the maximum entertainment for everyone involved.

Mystery

All adventures should have an element of mystery. In some, it will be the central purpose of the adventure. For example, players might be asked to discover who is behind a smuggling operation, or to find the murderer of a local politician. In other adventures, it is the background that supplies the sense of mystery. The players might be asked to travel by land to deliver a package. To do so they must pass through unexplored terrain. In this case their purpose is obvious, but there is a mystery as to what they will encounter. In each instance, the sense of mystery adds to the excitement of the adventure.

Conflict

Every adventure needs to have conflict. It might be armed fighting to drive off a Kafer attack, it might be espionage to get the goods on an evil gang leader, or it might be a simple effort to evade a deadly hunting beast that has chosen the party for its prey. It is the danger involved in doing these things that keeps the players tense, and it is the thrill of succeeding, of surviving and growing, that gives them enjoyment in the end, ensuring that they will ask for further adventures.

A Personal Foe

In order to ensure that the players feel this satisfaction, it is essential that they feel they are matched up against a personal foe, not an impersonal force. No one likes to see their character drown just because a hurricane swamps a boat, or die in an avalanche simply because a mountainside chose that moment to fall. Players need to identify the being against whom they are struggling in order to feel satisfaction when they win, and a drive to try again when they fail. Note that if they are striving to overcome a foe, and he leaves them in a sinking boat or on a steep hillside, those dangers take on a new meaning, becoming part of the foe's efforts to best the players.

Usually, this foe should be defined as anthropomorphic and evil. Occasionally, it might be something less human-seeming, such as a stalking hunting beast, but even then, the referee should be careful to portray it as cunning, dangerous, and having a personal vendetta for the player characters.

7

WHERE TO GET ADVENTURES

It is obvious that you can use published modules as the source of your adventures. But you will also probably want to create your own. This section will explain a couple of ways to go about that task.

The Formula Approach

One approach to creating adventures involves using simple, yet broad, formulas. The formula presented here gives very general overviews of plot elements that should be integrated into an adventure to make it both realistic and interesting. There are five keys to the formula approach to creating well-structured adventures: the *basics*, the *push*, the *pull*, the *gimmick*, and the *enigma*. Each is explained below.

The *basics* refers to the framework on which the adventure hangs. In most cases the basics can be drawn from the historical and geographical data in **2300 AD**. The basics might also require deck plans of ships or complete star system creation as well, depending upon the subject of the adventure.

The *pull* is that element which entices the characters to get involved in the plot. Whether it be love, money, fear, extortion, the desire for justice, or what-have-you, a pull must exist to get the characters involved.

The *push* is that element of the plot which will affect the characters during play and keep them moving. There may be personal danger or a possible financial loss. An old enemy might be involved, or a new one might be made.

The *gimmick* is something that the characters do not realize at the onset of the adventure. An unexpected danger may be revealed, or a new reward might sidetrack them from the course they have planned.

The *enigma* is something the players do not understand. In science fiction, this could be a strange device, an alien artifact, an alien itself, a bizarre world, or anything else of an enigmatic nature.

Each of these elements should be addressed individually or collectively before the scenario is plotted out. Once each has been considered, you are very likely to have an interesting adventure ready for play.

Fiction Models

Science fiction is the most fascinating, adventuresome genre of modern fiction. Humanity's setbacks and advances, real and potential, are explored by some of the most imaginative writers in the business and presented to the rest of us that we might be entertained or even enlightened by what we read.

Literature: Novels in science fiction take up an entire wall in nearly every bookstore. Volumes upon volumes of material reside there in the finest tradition of science fiction. Reading everything that has been written in this literary genre is impossible—you will do well just to get started. But the ideas and thoughts contained there are enough to inspire a score of interesting scenarios and adventures, even entire campaigns of desperate adventures on distant worlds. Short stories can also inspire adventures. Many of the newest ideas in science fiction are first explored in short stories—young writers often begin here and then move on to write complete novels later. Magazines and bound anthologies of short stories can also be found in the science-fiction section of your local bookstore.

Literature is the basis of science fiction. All the greatest elements of the field have been explored there, from aliens to exotic worlds, from robots to artificial intelligence. Describing them all here is impossible, but experiencing them all is possible if you know where to look.

Movies: Science-fiction movies of the last decade have done much to set the tone of what science fiction is in the eyes of the public. Movies have two good things going for them. First, since many are made in state-of-the-art studios by the brightest and best in the movie industry, recent science-fiction movies can often thrill us with a realism never before seen on film.

Second, the movie public has to be given what they want, and they unanimously call for freewheeling high adventure in the furthest reaches of space, the very stuff of science-fiction role playing.

Movies can give you ideas for plot and subplot. But the movies are better at inspiring detail. How

There are five keys to the formula approach to creating adventures: the basics, the push, the pull, the gimmick, and the enigma.

do spaceships work, and what do they look like down to the last laser burn? What clothes do people wear? What does an alien look like, really? Details like this add color to an otherwise uninspiring scenario. Taking a trip to the moon isn't interesting; being a deckhand on the French system defense boat *Languedoc* escorting civilian ships on the Terra-Luna run amid the confusion of the colonial wars is interesting.

Television: I know, I know. But if you are really stuck for ideas, there is a veritable gold mine of them on the tube every night. Take the average TV cop show, for instance. Not very science fiction oriented, I agree. But that is where you come in. What if the gangster were instead a Pentapod agent, and, instead of drugs, he is trying to smuggle bioengineered chemicals. The plot can even be turned around from illegal to selfless—suppose the chemicals are technically illegal but must be smuggled through to stop a rampant plague on a distant colony world. Add some more elements, like being in the midst of a Kafer armada, discovering a lone Kafer vessel as it is preparing to stutterwarp out-system, or getting sidetracked by a starship malfunction in an unexplored system.

The possibilities are endless, and an otherwise dull TV drama episode has become the foundation for an interesting adventure.

Adventure Themes

One very important way to get adventure ideas is to look at your campaign's major theme. Even if you have plenty of adventures waiting to be played, it is a good idea to hark back to the major theme for an adventure fairly regularly. This serves to give your players a sense of growth and accomplishment as they see their world changing as a result of their actions.

In one way, this is similar to the concept of creating every adventure with an anthropomorphic foe. A foe can add a sense of purpose even to struggles against the elements. So, too, can a theme add a sense of purpose to otherwise unconnected adventures.

One way of using a theme to generate adventure ideas is simply to have the characters' primary opponent show up where the group is located. For example, the group might have just finished saving an asteroid miner from dying of asphyxiation because a pirate robbed him of all his supplies, including his oxygen. On the next adventure, the referee could have the characters still in the asteroid belt where they found the miner when suddenly the Kafers attack the system. The characters might find themselves adapting mining equipment into weapons to use. The combination of the campaign's major theme (the Kafer War) with the unusual location of the previous adventure (the asteroid mining camp) has created an exciting situation the referee might not have thought about if he were simply making up an unrelated Kafer adventure.

This chapter explains the importance of organizations in **2300 AD** and describes a number of the better known examples.

THE ROLE OF ORGANIZATIONS

Obviously, most of the character's life is spent working at his career. What he does and who he works for are of paramount importance. The line of work he chooses is determined by the player during character generation and as the consequence of other decisions during play. But who he works for can be influenced greatly by the referee in terms of what openings are available in which organizations. The organization makes a fantastic tool for the referee to use in administering adventures. Considering the importance of organizations, it is well that we take some time to look at the ways in which they are useful in a role-playing campaign.

The Organization as Group Identifier

One thing that any group of player characters needs is a sense of belonging to something. In **2300 AD**, characters can come from a number of different worlds; they may very well have national roots that conflict with those of other characters, and they will very likely have different careers. The fact that the players are in the same role-playing group is often not enough to give them a strong sense of unity. But if they all work for the same organization, such as being crewmembers of the same vessel, they are much more likely to work together as a team and have a team's sense of camaraderie.

The Organization as Arm Twister

Belonging to an organization means that a character is subject to the directives of that organization. Therefore, the referee can easily use the organization as a means to introduce adventures. Characters still have the option to try to affect that choice, or even to leave the organization, but the fact that they chose to join the organization in the first place will usually make players feel less like they are being coerced into doing an adventure against their wills. After all, they knew the job was dangerous when they took it.

The Organization as Group Organizer

Another thing that becomes necessary in some campaigns, especially ones in which there are a lot of players, is that someone be designated spokesman for the group when dealing with the referee. It becomes too big a task for the referee to try to keep the adventure rolling while responding to a swarm of questions from every direction. He needs to speak to the players as a group. If the player characters all belong to the same organization, the organization will most likely have set up a hierarchy within the group. This is especially true of military or paramilitary organizations, in which there is a chain of command. The character who ranks the most is the one who operates as group spokesman.

As a word of advice, if your group is not large enough to cause this problem, or if a group spokesman arises in the course of the interplay of player personalities, you need not insist on having the organization assign someone else as spokesman. Simply have the organization recognize the person as group leader, or allow the players to defer to whom they wish. In **2300 AD**, there are no hard and fast rules for rank; instead, the referee can judge who is most suitable as leader, using renown points to help in the decision.

The Organization as Supplier

When the referee chooses an adventure to run, the organization that the players belong to can serve as an excellent means for the referee to supply them with equipment they will need. In some adventures, of course, it may be best to have the player characters get by with less equipment than they might want. In others it may be interesting to have them track down the materials they want to use in accomplishing their mission. But in general, getting equipment is a
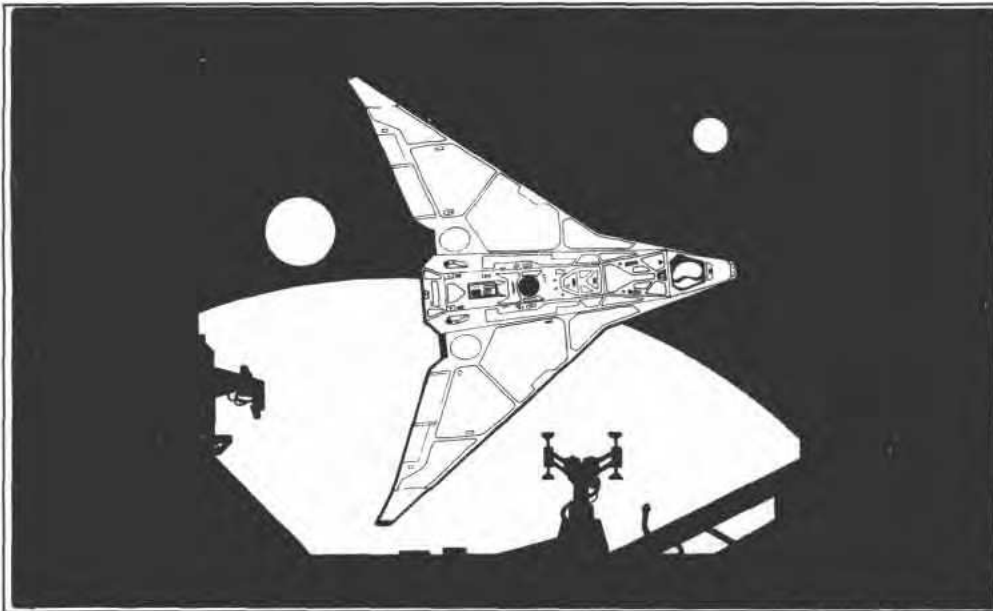
pretty mundane occupation, and if it is simply provided by the organization, or purchased from the organization, this preliminary is taken care of quickly and smoothly.

The Organization as Savior

Once in a while it happens. No matter how carefully the players plan, no matter how bravely their characters act, once in a while they can get into a situation from which it seems there is no escape. It may be a firefight in which their die rolls are going badly, but their opponents are shooting like marksmen. It may be that one poor choice caused them to become confronted by an enemy they were not prepared for. Regardless of the cause, it seems they are doomed.

The referee has two choices at this point. He can let the player characters all die, or he can bring in reinforcements. Usually, if he lets the player characters die, the players become discouraged (although there may well be times that they deserve it). But bringing help for the characters into the scenario can be dangerous too. If the player characters are constantly faced with more than they can handle, and then "the Cavalry comes over the hill" every time, it will seem to them that none of their actions make any difference. It is as if the referee is playing the game by himself, and the players are just spectators. Another danger in bringing in help is that players may come to depend upon it and have their characters perform outrageous acts, confident that they will never have to pay the consequences.

The organization that the player characters belong to can become a very handy tool for the referee at this point. It serves as a believable source of aid, preventing their salvation from seeming the act of a *deus ex machina*. It also serves as a point of accountability, upbraiding the characters for silly mistakes and punishing them for irresponsible actions without the sting there would be in letting them die.

Choosing an Organization

The choice of the organization the player characters are employed by should be made jointly by the players and the referee. The theme of the campaign to be played will affect what organizations would be best, as will the nationalities of the player characters. In the pages that follow, many different types of organizations are described. (Insignias for these organizations are located in the sidebars of this chapter.) The players and referee can choose from this list or use the organizations here as examples in creating their own organizations.

On a related note, even characters who are technically freelancers will have to hire out to someone, so, while their status may be different from that of other characters, they will still be working for an organization.

MILITARY AND POLICE ORGANIZATIONS

This group includes national military and police, as well as colonial militias and private mercenaries.

National Military Forces

National military forces are usually much larger than the other groups mentioned. As a consequence, they tend to be better supplied, but they also have a more rigid command structure, and individual soldiers often have little idea as to the reasons behind the orders they receive. Instead, they are expected to simply carry out the objective they have been given.

National military forces can be divided into two major groups: planetary forces and space forces. Planetary forces can be further divided into three basic types, defined by the medium in which they work: ground military, sea military, and interface (aerospace) military. Space forces are typically divided into two groups: interplanetary and interstellar. In general, it is best if player groups fall into the interstellar military (including marines) or ground military (but are rotated from world to world), as these two types serve best in the science-fiction setting of **2300 AD**. Short descriptions of two sample military units in **2300 AD** follow.

American Marine Corps, 1st Brigade: American Marines serve at many locations throughout all of human space. The American government, recognizing that a policy of nonintervention in most conflicts, while serving well as a domestic policy, prevented the nation from having experienced, battle-hardened troops, established a program by which it loaned units to France on the pattern of the French Foreign Legion. American Marines served in this capacity more than any other type of unit, and they have established a reputation of excellence that has given rise to other nations requesting the loan of American troops as well. As a consequence, American forces, particularly American Marines, serve as ship's troops throughout space.

American Marines in the 24th century are organized into brigade-sized units, each with a distinctive unit crest. The crest for 1st Brigade is shown in the sidebar.

French Foreign Legion, 13th Demi-Brigade: The Legion Etrangere, 13e Demi-Brigade (DBLE), or French Foreign Legion, 13th Demi-Brigade, was created in 1940 with the intent of providing a mountain unit for use in Norway. What the unit received was volunteers so anxious for action that they were willing to claim that they could ski when in actuality many could not. This aggressiveness served them well through many tough situations and established a good reputation for the unit. At present, one battalion is serving semipermanently on Aurore; the other two are moved where needed on the French Arm. The unit crest is shown in the sidebar.

Colonial Militias

Colonial militias tend to be less well-supplied than national military units, and what they do receive is usually older and maybe even out of date. But as their operations are smaller and their command structures usually less rigid, the individual soldier often has both a much better grasp of the factors determining his objectives and more freedom to participate in determining how those objectives should be reached. It should be understood, however, that there is a great range in how militia units are run. Some bear great similarity to a national military force in both size and structure; others are little more than a collection of volunteers carrying their own rifles and ammunition. Two examples of colonial militias are described below.

Hermes White Wing Militia: Hermes White Wing Militia is a very small group of only 2000 people, divided nearly evenly among the three major cities of the colony on Hermes (American Arm). Members of the militia are part-time volunteers outfitted with very little except personal equipment. In the past, the fact that their equipment is limited has caused no problems, as the militia has never been called upon for duty. With the Kafer attacks on the French Arm and the rise of terrorism on some Chinese Arm worlds, however, the colony has appealed to America (of which the colony is a dependency) for heavier weapons.

Hermes White Wing Militia takes its name from a local carnivore, a small, furry, white flier that resembles a pterodactyl. The unit crest is shown in the sidebar.

Ukrainian Novoa Ochrana: The Ukrainian colony of Novoa Kiyev (on Aurore) originally was protected by a militia unit called the Civic Guard. With the Kafer attacks on Aurore, the Civic Guard was virtually wiped out to a man. In its place, a resistance organization arose which called itself *Novoa Ochrana*, or *New Guard*. It contains approximately 15,000 members.

The *Novoa Ochrana* has no official unit crest; instead, members wear a green bandana.

Mercenary Units

Like colonial militias, private mercenary forces range from the very large to the very small. Some, like the Tanstaafl Free Legion on Aurore, contain thousands of soldiers and remain in the service of one particular colony or business group. Others may consist of nothing more than a half-dozen troops that travel from world to world hiring out where there is temporary trouble. Two examples of mercenary units are described below. Ideally, player groups who want to be a mercenary unit should create their own history, organization, and insignia.

Black Scorpion Company: The Black Scorpion Company is one of the stranger mercenary units in existence in the 24th century. Its history is as follows. In the summer of 2278, Johnny Burlund, an older (18-year-old) member of a London gang took a long, hard look at where his life was headed. He decided that he did not like what he saw, but his opportunities for escape were very limited. One that appealed to him was the SAS (Special Air Service, a British special forces unit). After all, he figured, he knew how to fight, and he had faced death many times in gang wars. Maybe in the SAS he could learn a more marketable skill.

After his initial stint, Burlund decided that he had found in the military the career he wanted, but that the money was too limited. He applied himself and worked his way into the officers' corp, where he learned much of military history and theory, and then he came up with what he believed would be a perfect money-making scheme—he would start his own army. Burlund returned to London to recruit as many of his previous fellow gang members as possible, and he hammered them into a mercenary unit that he named the Black Scorpion Company.

Burlund has since retired, not wealthy, but well-to-do. The Black Scorpion Company still recruits its members from Earth's big-city gangs, and it prides itself on providing them with a useful occupation. The opportunity is also provided to members to receive training in skills other than fighting, but few take it. Instead, most of the Company's members glory in their reputation as the meanest, baddest bunch of psychos anywhere.

The Black Scorpion Company does have a unit crest (it is pictured in the sidebar), but most members just wear a large scorpion tattoo on their left arms. Their "uniform" is a mixture of military surplus, leather, chains, and metal studs.

Gattinhos da Seva: The militia on Paulo is divided up into a number of local groups, each having a very strong sense of individual identity. In 2297, one of these groups attempted to seize control of its local government and was only defeated by the combined efforts of three other units.

Five members of one of these units decided that they liked the taste of combat. They banded together to seek their fortune among the stars as a mercenary unit, taking the name of a local carnivore that hunted in packs, and whose cunning was becoming legend among Paulo's colonists. They became the Gattinhos da Seva. Their unit crest is shown in the sidebar.

The Gattinhos da Seva gained international fame when they stormed a Manchurian space plane held by terrorists and freed the hostages held on it. Since then, they have spent more time on talk shows than in fighting.

Police Forces and Paramilitary Groups

Every nation and nearly every colony keeps a civilian police force for the purpose of keeping the public peace. Occasionally, a colony may have one force to serve as both police and militia. But usually there is a distinct division—the militia serve to protect from outside threats, the police from those within. Police positions may range from the local patrolman, to special units such as narcotics agents, to circuit sheriffs who patrol the more scattered settlements of the youngest colonies. As an example of one possible police unit that might be good for player characters, the Texas Rangers badge is reproduced in the sidebar.

Two other quasimilitary groups can be considered as potential employers for player characters. One is intelligence agencies, and the other is ship crews.

Nations, colonies, and large businesses alike maintain covert intelligence-gathering organizations. These groups can make good employers for player characters, but missions will tend to be investigation-oriented, so make sure that your players will be satisfied with such adventures.

Ship crews can be military members, foundation employees, or crewmembers on a private merchant vessel. Often they will wear some sort of insignia identifying their vessel (see sidebar).

Black Scorpion Mercenaries

Gattinhos da Seva Mercenaries

Texas Ranger

USCSS Kimmel Crew

13

FOUNDATIONS

Governments provide a variety of services for their citizens; how much they provide in the way of services depends on the prosperity of a nation's economy and the extent of the government's power. Throughout the 19th and 20th centuries, governments increased their services, gradually making government a major employer, a major supporter of research, and a major regulator of industry and commerce.

World War III changed all that. Governments collapsed; anarchy reigned in large areas of Europe, Asia, and America. Populations brought up to depend on their governments for pensions, employment, quality control, laws, regulations, public services, utilities, and hundreds of other vital services were put on their own. Those who could handle personal independence survived; those who couldn't died.

But some services can't be provided individually. Research support, higher education, and standards for product quality are all best provided under a centralized system. When government couldn't provide a valuable service, or stopped providing it, foundations were established to take over.

The Major Foundations

Foundations and their activities cover the entire spectrum of human activity. What each individual foundation has roots and interests in varies greatly, however, so that there is no typical explanation of them. In fact, it can be said that there are as many different types of foundations as there are foundations. What follows is an alphabetical descriptive listing of several of the more influential foundations—those the player characters are most likely to be employed by. There are a multitude of others not included in this listing.

Academia dei Lincei

Originally an Italian foundation concerned with the reconstruction on the peninsula, the Academia has had a troubled history. Once a relatively stable government was restored to Italy, the Academia began a controversial campaign, forming their own political party, in fact. Their platform was based heavily on the return to ancient morals and values, and a revitalization of a Christian Roman Empire.

However, political opposition to this proposal brought the Academia to its knees in the 2180s, and nearly wiped it out of existence. Now, under a completely apolitical board of trustees, the Academia has turned to the quest for antiquity, its artifacts, its ideals, and its knowledge, making it an almost totally Earth-centered foundation.

Missions for the Academia dei Lincei will include investigative attempts to locate works of antiquity, very often in private collections. As many people view antiquities as a form of investment, and as private possession of national treasures is often illegal, recovering these antiquities can be a dangerous occupation. The Academia dei Lincei often has the need for expert investigators who can handle such dangerous situations. Occasionally these jobs will take investigators to one or another of the older colonies.

Alberta Farmers' Cooperative

Alberta's great expanses withstood the collapse of government relatively easily (roads already existed; crime was not a major problem). Farmers, however, needed markets for their produce, and established the Alberta Farmers' Cooperative to aggressively find them. The AFC reached into Eastern Canada and south into Montana and Idaho, not only selling grain, but also providing transportation and even quality guarantees. Profits were shared with the producers, but enough profit was retained to endow the AFC with capital to support long-range programs. As the political situation stabilized and government re-emerged, the AFC relinquished much of its authority, but retained a long-range mission to support the agriculture of Alberta through research and marketing. Today the AFC has a major role in the exploitation of newfound worlds along the Canadian branch of the Manchurian Arm.

Missions for the Alberta Farmers' Cooperative will include not only the sipping of grain and machinery to various colonies, but the exploration and testing of previously unexplored parts of planets in the Canadian branch of the Manchurian Arm and the transporting of seed and other agricultural products from Alberta to those planets.

Elite Texas Rifles

British Fighter Corps

Bayern Crew
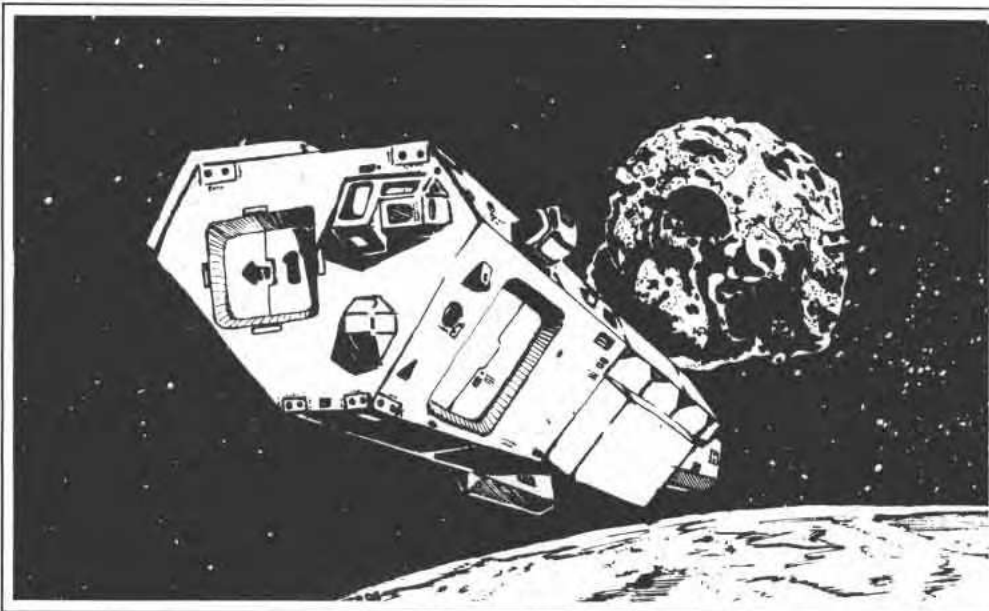
Astronomischen Rechen-Institut

Pure research establishments are organized to pursue goals that governments cannot or will not pursue. Often the results of pure research are decades away as governments have more pressing problems, and businesses are not able to invest the capital necessary to produce results. The Bavarian Astronomischen Rechen-Institut was originally part of the University of Heidelburg; endowed by Azania with tantalum and funding to support a squadron of interstellar scouts, the Institut is a foundation pursuing pure research into the nature of stars and their planetary systems.

The Rechen-Institut sponsors exploratory missions to strange star systems and phenomena within reasonable distances. Most of these are directed at the immediate Frontier systems. However, most interesting astronomical items are far beyond human space. At present there are several expeditions operating beyond 50 light-years from Sol. Many of these expeditions are not expected to return with results for more than a decade.

Missions for the Astronomischen Rechen-Institut will involve almost pure exploration. This might be anything from a voyage to an interesting stellar body to the search for, and exploration of, colonizable planets. First priority in these missions is the acquisition of new knowledge.

Astronomischen Rechen-Institut

Foundation for Practical Knowledge

Although formed in the shadow of its older brother, the Royal Society (described below), the FPK is a much more academic approach to scientific endeavors. Created in the minds of university intellectuals in the British Alpha Centauri colonies, the FPK organized a successful peaceful secession from Great Britain in 2277, making the Commonwealth Nation of Wellon. While many operations on the Frontier are funded by the FPK, it is usually the Royal Society or an independent contractor who provides the men and equipment for the expedition.

Missions for the Foundation for Practical Knowledge will tend to focus on pure research: anything from ground-based laboratory studies on genetics to the maintenance of a data collection facility in an asteroid belt. Adventures could include a research virus gone out of control, sabotage of a facility that is likely to yield a major discovery (possibly of military importance), or espionage.

L'Institut des Etudes Xenologiques

The Institut des Etudes Xenologiques (IEX), an academic institution funded by the French government, is the foremost organization on Earth dedicated to studying the diversity of alien life forms. Frequently requested by the governments of the French Empire to conduct biological surveys of potential colony worlds, the IEX has, at any one time, many study expeditions out

L'Institut des Etudes Xenologiques
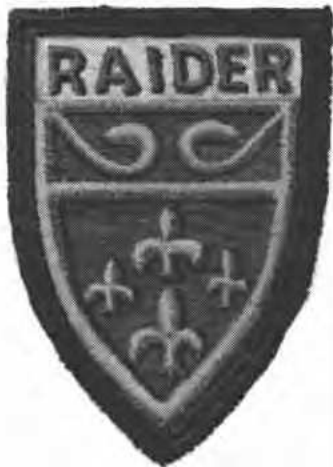
French Foreign Legion, 4th Recon Raider BN

Ukranian Streldhoup Polk 4

North American Research League

among the worlds in and just outside of the French Arm of explored space. Most of the data gathered by these expeditions must be brought back to IEX facilities on Earth where it is catalogued, stored, and analyzed extensively. Because the IEX maintains the largest most complete collection of xenological data in the world, the main IEX facilities (located on a large campus in the French countryside) attract many of the world's leading xenobiologists and sapientologists.

Missions for the IEX will usually involve the study or sampling of a little understood extraterrestrial organism or ecosystem. A variety of well-trained personnel is needed for such a mission, whether for studying a potentially deadly microorganism or capturing an irascible herbivore.

Instituto Nacional de Astronomia Practica

Argentine and Mexican militarism of the 21st century (crowned by the Antarctic Incident with Great Britain in 2188) has had an impact on those nations ever since. The Instituto Nacional de Astronomia Practica (INAP) was established by the governments of those nations in the 22nd century as their only viable response to a losing race to the stars. Of course, the Instituto had heavy militaristic overtones at its conception, and that has changed little since that time.

Instituto activities center mainly on the exploration of the Montana (Omicron2 Eridani)-Procyon branch of the Chinese Arm. With the help of other Central and South American powers (chiefly the Incas, though they had a falling out with the Instituto in 2277 over economic issues), the Instituto has begun a couple of budding colonies, mostly with the use of surplus colony ships purchased from already established European powers.

Missions for INAP will usually concern either further exploration or the solving of some problem for one of the organization's colonies—often a dispute between colonists. Characters working for INAP will find that chain of command is very important: with all but the most critical of problems, low-ranking persons will be expected to collect information, make recommendations, and implement the solutions decided by high-ranking officials.

The Life Foundation

Devoted solely to colonization, the Life Foundation has its beginnings in the initial colonization efforts on Alpha Centauri. Grants are provided to willing and talented individuals who wish to colonize other worlds, but who might otherwise not have been able to do so due to national or economic considerations. In its beginning years, Life Foundation was at the services of nations seeking particular individuals and skills which might have been in short supply. From that base, Life has become its own entity, promoting colonization in all of human space.

The Life Foundation's greatest achievement has been the colonization effort on DM−3 1123 on the route from Montana (Omicron2 Eridani) to Procyon (far along the Chinese Arm)—an effort accomplished using solely the Foundation's assets.

Missions for the Life Foundation will focus on new colonization efforts. This does not always mean new worlds, however. Often, it is as difficult a job to begin a colony on a new continent as on a new planet. Ecosystems from continent to continent can vary wildly, as is seen on Earth.

North American Research League

The United States has always been known as a very liberal, humanitarian country, even as far back as the 20th century. Organizations of that era concerned with ecological and moral issues abounded, and most were in league with international efforts seeking similar ends. Confrontations between these groups and government forces provided plenty of headlines and produced at least some success. The International Whaling Ban signed by every nation on Earth on October 3, 1993, was the largest achievement of these groups, and was the force which united nearly all of them into one coherent force—the North American Research League (NARL).

The name "North American" was derived from the chief source of charitable support for the organization at its conception. Today the League enjoys interstellar support of its activities to keep planetary ecologies safe from overexploitation, and the negotiation of national disputes in an attempt to avoid armed clashes. Though employing sometimes unorthodox tactics, the League and its far-flung membership can be found pursuing peaceful solutions to critical situations in all corners of human space. Their most interesting operation to date was their successful mobilization of world opinion to free the Xiang slaves from the Sung on DM+4 123.

Missions for NARL are usually begun by the local member who discovered the problem. Quite often, however, a more experienced touch is needed than can be provided by that local member.

For this reason, the organization keeps a file of expert agents for hire who can be trusted to travel to the location and solve the problem in a manner approved of by NARL headquarters. These agents often face personal danger, but they reap the rewards of travel to exotic places, as well as having large expense accounts.

Rebco SAR

In the year 2244, two financial institutions on Earth, the Rawal Pindi Trading Company of Pakistan and the National Express Bank of America, merged their holdings in an attempt to ride out a rough period in their histories. They became Rebco.

The majority of Rebco's business involves financial services on Earth, but in 2257, the corporation created a splinter group dedicated to providing short-term security forces to organizations on colony worlds. This ranged from uniformed guards for corporations, to mercenary troops for small colonial governments, to rescue operations. Rebco located their new organization's offices in Wellon, on Tirane, and they called it "Rebco Search and Rescue," or, more succinctly, "Rebco SAR." Since then, Rebco SAR has expanded from providing security forces to matching persons seeking employment with employers looking for experienced personnel.

Missions for Rebco SAR can include anything which might be dreamed up. If there is money to be made, Rebco SAR will most likely be willing to get involved, although its coordinators pride themselves upon their honest reputation and will avoid overtly criminal activities.

The Royal Society

Britain's climb back from the destruction of nuclear war was a long and troubled one—the English did not get back on their feet until long after other Europeans had done so. However, with the help of the European Space Agency (of which Great Britain was a charter member), and finally great wealth from holdings on Alpha Centauri, a period of renaissance came home to England, and has lasted for almost 100 years.

A spirit reminiscent of the 19th century has emerged in England—a large upper-middle and upper class has gained back much of the pride Britains had lacked in the 20th and 21st centuries, as wealth poured in from new Commonwealth territories on distant worlds. England ruled the waves once again—gravity waves, to be sure, but waves nonetheless.

Chief catalyst in English interstellar activities, the Royal Society has the Royal Family's blessing, the parliamentary government's tolerance, and endowments and popular support from all England to promote all sorts of colonial and exploratory expeditions on the Frontier.

Missions for The Royal Society include new colonization efforts such as those performed by the Life Foundation, as well as research ventures. Often, a work may be suggested by another foundation and funded by the Royal Society. A large aspect of any such pursuit will be the furtherance of Britain's aims to expand its colonial holdings.

Zapamoga

In the devastated areas of Europe, refugees placed great burdens on the isolated city-states, often asking for or needing more that could be provided. In Poland, several city-states established their own refugee relief organization which determined what was available and the priorities for providing it. Zapamoga originally provided food and temporary shelter; later it also provided direction and tools to help refugees settle vacant land. Zapamoga's mission gradually changed as the organization directed Europeans to settlements in Africa, Asia, and South America, and later directed Earthers to colonies on distant worlds.

Missions for Zapamoga will usually involve the transportation of people or goods to a colonial site. This might involve a brand new colony or a small one that has already been started. Occasionally Zapamoga will hire professionals to help a particular colony over a sudden problem.

Other Foundations

For each of these foundations, there are any number of smaller, less well-known organizations performing similar functions. The referee is encouraged to use any of the foundations named above as a pattern for creating other organizations. In this way, players will find opportunities for employment among a multitude of organizations rather than a select few, reflecting well the immensity of the human effort to colonize space. As well, this will provide the referee with the opportunity to introduce the players into situations that they might not have sought out themselves.

Tanstaafl Rural Police

Tanstaafl Free Legion

Experience and Renown

One job the referee will have at the conclusion of each adventure is the awarding of experience points and renown points to his players. Players like to see their characters developing not just as a personality, but also in terms of increased skill and fame. This gives them something that they can point to as an indicator of the progress their characters are making in the universe they dwell in.

Giving out experience and renown points need not be an onerous task for the referee. Guidelines are given below for how to appropriately award each of them. The use of experience points is, of course, covered in the *Adventurer's Guide*, but a few things remain to be explained. The use of renown points is not covered in the *Adventurer's Guide*, but is instead explained in the last half of this chapter.

EXPERIENCE POINTS

Two things remain to be explained about the use of experience points in **2300 AD**: the awarding of them to characters, and the cost of those characters using them in a training program to gain new skills.

Awarding Experience Points

Perhaps the easiest way to award experience points is to use the dividing points of an adventure as a guide. Using the system of dividing an adventure into episodes and scenes, experience points can be decided upon very easily. Remember that episodes are concerned with the players overcoming a major point in the story (we used the example of an expedition working its way across a mountain range on the way to its goal as an episode in one story). Scenes are concerned with minor points (our example of crossing a particularly tough rock face illustrates this). A second consideration is the quality of role playing involved in an adventure and the amount of fun people are having.

For each episode that a group successfully completes, give each member one experience point. Player characters who were particularly useful in an episode may be given another point if the referee desires. Occasionally, the referee might want to give an experience point for a particularly dramatic scene as well. If a player role plays particularly well at one point, give his character another point of experience, especially for those things that really helped the fun of the game for all involved. Finally, give everyone an experience point at the successful completion of the adventure.

On an average, then, most characters will receive about five experience points per adventure—more if they performed exceptionally well. Usually these points should be given at the end of an adventure, as the characters will typically not have time to spend them during the adventure's action, but will instead spend them during the time between adventures. (Note that a player is allowed to save points between adventures—nothing forces him to spend them before he wishes.) Sometimes, however, the referee may want to allow the players to spend the points at some point during a long adventure, to reflect the things that they are learning as they go along. In such cases, the referee should be very insistent that the points be used for skills that this adventure is developing. A player who does not wish his character to develop that skill can keep his experience points until after the adventure when they can be spent normally.

Increasing Coolness Under Fire

It is recommended that characters not be allowed to spend experience points to increase their coolness under fire unless they have recently been under fire. Anytime that they are in a mission involving fire combat, however, they should be allowed to do so.

Training Programs

Sometimes a player may want to take his character out of play for a while to enroll him in a program for training in a new skill, or to rapidly promote himself in a skill he already knows. The
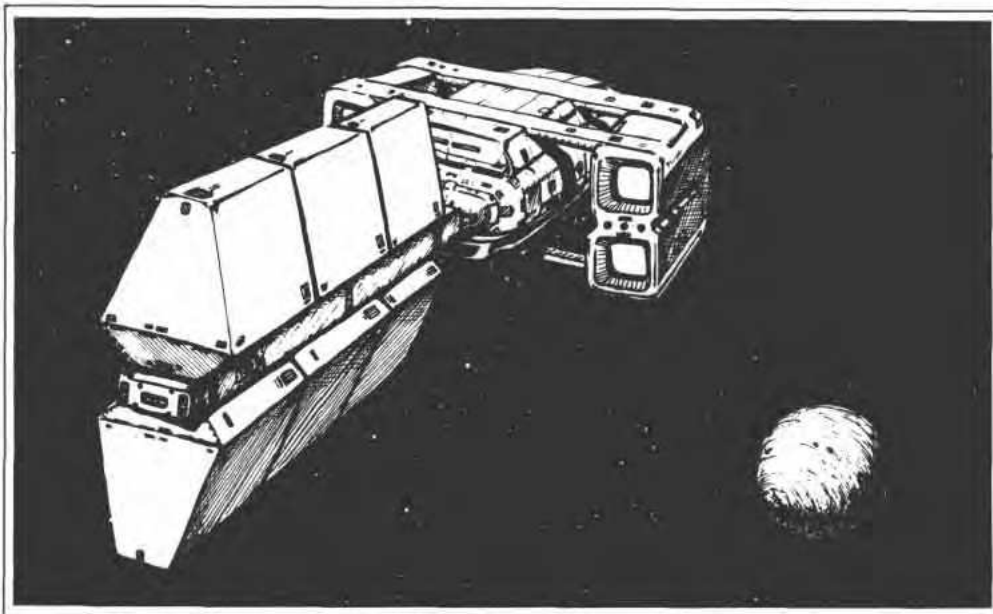
experience point cost for this is given in the *Adventurer's Guide*, but there are other costs to be incurred as well.

First, it costs between Lv70 and Lv150 per month that a character spends in a training program, just for the tuition. He must also pay for rent, food, and entertainment during this time. Tuition costs will vary, depending upon the type of skill being learned—it costs more to study organic chemistry at a university than to take a course in guitar at a local music shop. Location of the school might affect the price a bit as well, although usually not by much, but geographical location *will* determine what training is available. It will be difficult to find some courses being taught on young colony worlds, especially outside of the most major cities. It is up to the referee to decide whether a particular course is available at the location where a player character is looking for it.

Rent, food, and entertainment costs should be worked out between the player and the referee, with the referee taking into account the prevailing costs of the area and the player describing what quality his character will accept.

If the player wishes to get by on the minimum rent, the referee might wish to have him make a task roll to stay in the course, as rowdy neighbors and neighborhood toughs will make it difficult to study and practice. (They might even rob the character, or some such thing, giving rise to an adventure!)

If the player wishes to get by on minimum or poor food, the referee might make him make a task roll to remain healthy, failure meaning that he had to drop out of the course due to some illness brought on by a reduced resistance caused by poor nourishment. Finally, if the player wishes to get by without entertainment, the referee might have him make a determination check to handle the stress of constant study with no diversion.

For each three-month period that the player spends in a training program, he can increase the skill that is being trained by one level, assuming that he has the necessary number of experience points to spend.

Training by Another Character

Whether a character experienced in a skill can train another character who does not have the skill is totally up to the referee's approval. Usually such training should not be difficult to arrange, but the two characters must have have proper time and equipment. The character receiving training can be raised to skill level zero in this manner, but no further. To advance beyond level zero in the skill, the character is required to earn sufficient experience points and spend them in the normal manner.

EXPLORER MISSIONS

Lvl.	Description
0	Map Geographical Feature
1	Expedition without Dedicated Vessel
2	Expedition with Dedicated Vessel

MILITARY MISSIONS

Lvl.	Mission
0	Guard Duty
1	Combat Mission
2	Commando Mission

LAW ENFORCEMENT MISSIONS

Lvl.	Mission
0	Town Deputy
1	Circuit Sheriff, Detective
2	Investigative Task Force

MERCHANT MISSIONS

Lvl.	Mission
0	Colonial Grain Delivery
1	Representative to New Market Area
2	Representative to Alien Race

RENOWN POINTS

Renown points are another means by which a player can gauge his character's success in his occupation. The referee should give out one renown point to each character at the end of any adventure in which it is judged that the character would have gained fame. This judgment will be based partly upon the performance of the character, partly on the importance of the mission, and partly on the character's career field. Therefore, it is easier for a character to gain renown on an important mission in his own field than on an unimportant one in another field. If the mission is great enough, and the character's success is grand, the referee may even want to award two points, but this should be very rare.

The Uses of Renown Points: Renown points can be used in four ways. (1) If the referee is using a preprepared adventure, the renown points can be used to influence how much the character will be paid for his services on a mission and how much equipment he might be supplied with to accomplish it. (2) If the referee is designing his own adventures, renown points will help him to determine what sorts of missions to offer the players. (3) If a player suggests a mission his character would like to perform, renown points will serve to decide how likely he is to get it. (4) Finally, during any adventure, a character may wish to use his renown for some purpose, such as convincing a local official to aid him in his mission. (Alternatively, a character may wish *not* to be noticed, but his renown might give him away.)

Note: If a group of characters is attempting to get a mission together, they can choose which of their members represents them. If he is successful, it means that the whole group is hired.

Renown points work in the same way as characteristics. They are divided by four and used as die roll modifiers for tasks related to fame. Usually such tasks will involve convincing someone of something.

● *Case 1:* In case number one above, the die modifier would be used to increase the character's task roll to haggle a higher wage out of a prospective employer (how much higher he is trying to haggle it will determine the basic difficulty of the task, as set by the referee). Also, the die modifier would reflect how much more the character is offered in the first place. For example, a die modifier of 1 means the character is offered 10 percent more than usual; a modifier of 2 means 20 percent more, and so on.

● *Case 2:* In case number two, the referee uses the modifier from the renown points to determine what sorts of missions to design for his players. Examples of mission types for various career types are listed in the sidebar. For example, a mercenary with a final (there are some modifiers to basic renown, based on career and location, as explained below) renown die modifier of 0 would tend to be offered routine guard missions.

● *Case 3:* In case number three, if a player wants his character to be hired for a commando mission (level two on the chart), and he only has a renown die modifier of 1, he is at a disadvantage. The basic task roll for a player to make when he is seeking a mission is as follows:

Task: To receive a mission: Routine. Eloquence. Variable.
Referee: In this case, the renown die modifier serves to adjust the difficulty level of the task. For each level the renown modifier is above the mission level, drop the task difficulty level by one; for each level the modifier is below the mission level, raise the task difficulty one level. The variable time indication reflects the fact that in some cases the character will be able to get an immediate answer, while in others, he will have to wait for some period of time.

● *Case 4:* In case number four, when the referee and the player are role playing the interaction of the player character and an NPC, the player should indicate whether or not he wishes to use his renown, and the referee should decide whether the NPC recognizes the character (sometimes when the character would rather not be recognized). After role playing is over, if the referee decides that a task roll is in order, he may have the player use the renown die modifier as an addition to or subtraction from the roll. (Usually it will be an addition to the roll, but sometimes the player may be where he is not wanted, in which case his fame will hurt his chances of success.)

Losing Renown: If, in the referee's judgment, a player character has gone for some time without gaining renown (such as being in a long-term training program), the referee may have the player subtract renown points from his character to reflect his losing the public eye.

Gaining Negative Renown: If, in the referee's judgment, the player character has acted in an

Factor	Modifier
Wlds Worked On	−0
Other World	−1
Home Arm	−0
Other Arm	−1
Earth	−4
Same Career	−0
Other Career	−2

Note: "Worlds Worked On" means any world the character has performed a mission on. "Other World" means the character has not worked there. "Home Arm" means the region holding the character's homeworld; Core counts as a region for these purposes. "Other Arm" indicates a different region of space, including the Core, for those not born there. "Earth" applies its modifier to everyone, even its natives. "Same Career" means the character's career. "Other Career" means a career other than that of the character.

infamous way (cowardly leaving his companions to die some place, for example), that character may be assigned negative renown points. These are kept track of separately from regular renown, and they apply as an additional, direct negative die modifier (they are not divided by four) whenever fame would have some effect on play. Negative renown points can be lost over time, at the referee's discretion.

The Reach of Renown: Listed in the sidebar are modifiers to the renown die modifier, based upon the character's location in human space and the situation's relation to his career field. Basically, the farther a character is from the worlds he is known on, and the further his present endeavor is from his actual career field, the less well-known he will be. These modifiers are cumulative adjustments to the character's renown die modifier. (Note, however, that the renown die modifier should never be decreased below zero as a result of these modifiers.)

In determining the effect of career fields, the referee will need to decide what careers would be natural for a particular mission for a particular organization. For example, a mission for Zapamoga to deliver foodstuffs to a colonial disaster area would likely include merchant characters, space crew characters, and maybe even military characters, if there was to be some danger on the way. A journalist character would not be natural, and so would gain no renown, unless he convinced a journalistic corporation to publish his accounts (which would itself require a roll versus his renown, as in case number four, above).

Previous Employment: Characters should keep track of the various individuals, foundations, government agencies, corporations, and other organizations that they work for during the game. Each job successfully completed for a certain employer counts the same as a renown point in all future negotiations with that employer. This is in addition to all regular renown points. In some cases a previous employer will have useful contacts with a potential future employer. For example, repeated successful missions for the King Bureau of Mines might be turned to good use when applying for employment with the King Bureau of Hazardous Waste Disposal. The referee should make the player plan how this can be arranged, but it will usually take the form of the players convincing their former employers to produce a letter of recommendation to their potential future employers. This should only be possible if some relationship already exists between the two employers. Such a letter may enable the players to use up to (but never more than) half of their previous employment experience points as renown points with their potential employer.

Once all renown effects are calculated—basic renown, negative renown, character's location in space, and mission's relation to the character's career—the final result is used in the four cases given above.

Aliens

Aliens play a very special role in **2300 AD**. Much of the substance of science-fiction adventures concerns the use of futuristic technology and is set against the exotic backdrop of an alien world or a future Earth. Humans in the 24th century have been brought closer together as a consequence of better communication methods and faster transportation, as well as by the need to maintain a common culture that spans star systems, but human cultures have not been brought so close as to lose the various identifying marks of their individual nationalities. In fact, the number of human "nationalities" has grown larger with the colonization of new worlds. This ease of travel and disparity of culture makes for a perfect environment for science-fiction role-playing adventures.

But the differences among human cultures are as nothing compared to the alienness of races that have sprung from worlds other than Earth, born under the suns of stars other than, and often essentially different from, Sol. A world's ecology may be alien to humans and may cause them some difficulty in learning to deal with it, but that strangeness does not begin to compare to the difficulties to be encountered when dealing with an alien intelligence.

The Discovery of Aliens

In their exploration of the stars, humans have met six sapient alien races. Members of these races are not merely *biologically* different from humans; their very mental processes and their cultures are radically different as well. Humans have not had much time to get to know any of these alien races, nor to develop many general techniques for dealing with new contacts. The earliest alien contact occurred just over 50 years ago, when the Sung were discovered on the Chinese Arm (and misunderstandings founded in the lack of comprehension of the alien nature and customs of this first contacted race consequently led to the Slaver War). Since that time, five other races have been discovered—from the ultraprimitive Klaxun to the friendly, bioengineering Pentapods, to the violent Kafers. Sapientologists and xenobiologists are just now beginning to make headway on alien relations theory, and much work remains to be done in this important field which by its nature is forced to pioneer new approaches with each new race encountered.

To the bulk of humans living in the 24th century, the Sung, Pentapods, Klaxun, Ebers, and even the Kafers are mysterious and unfathomable. They should be so to the player characters as well.

The Secrets of Their Motivations

Much care has gone into designing each of the races that follow, both in their physical design and in their mental and cultural design. In this chapter, the secrets of each of **2300 AD**'s aliens are laid bare for the referee in order that he may truly understand each race and role play its members to maximum effect for his and his players' enjoyment. It is recommended that the referee keep these alien secrets to himself, revealing them slowly over a period of time (the course of a campaign, for instance) as his players explore relations with a new race. To preserve the mystery of these aliens, players *should not* read this chapter.

The Chance of Encounter

It is unlikely that player characters in **2300 AD** will encounter a member of an alien race by chance on an average city street. Relations between humans and alien races is still a rather specialized affair. Therefore, the times when player characters *do* meet aliens will be either a new contact by complete accident (such as the discovery of the Klaxun by a shipwrecked starship crew), which would be a very rare occurrence, or it will be the result of a mission of some sort (such as mercenary teams sent to battle the Kafers, or human workers hired by the Pentapods, for example).

The individual descriptions of each race will explain more fully how player characters may encounter its members.

SOPHONT SIZE COMPARISON CHART

3M

2M

1M

PENTAPOD

HUMAN

EBER

KLAXUN

KAFER

SUNG
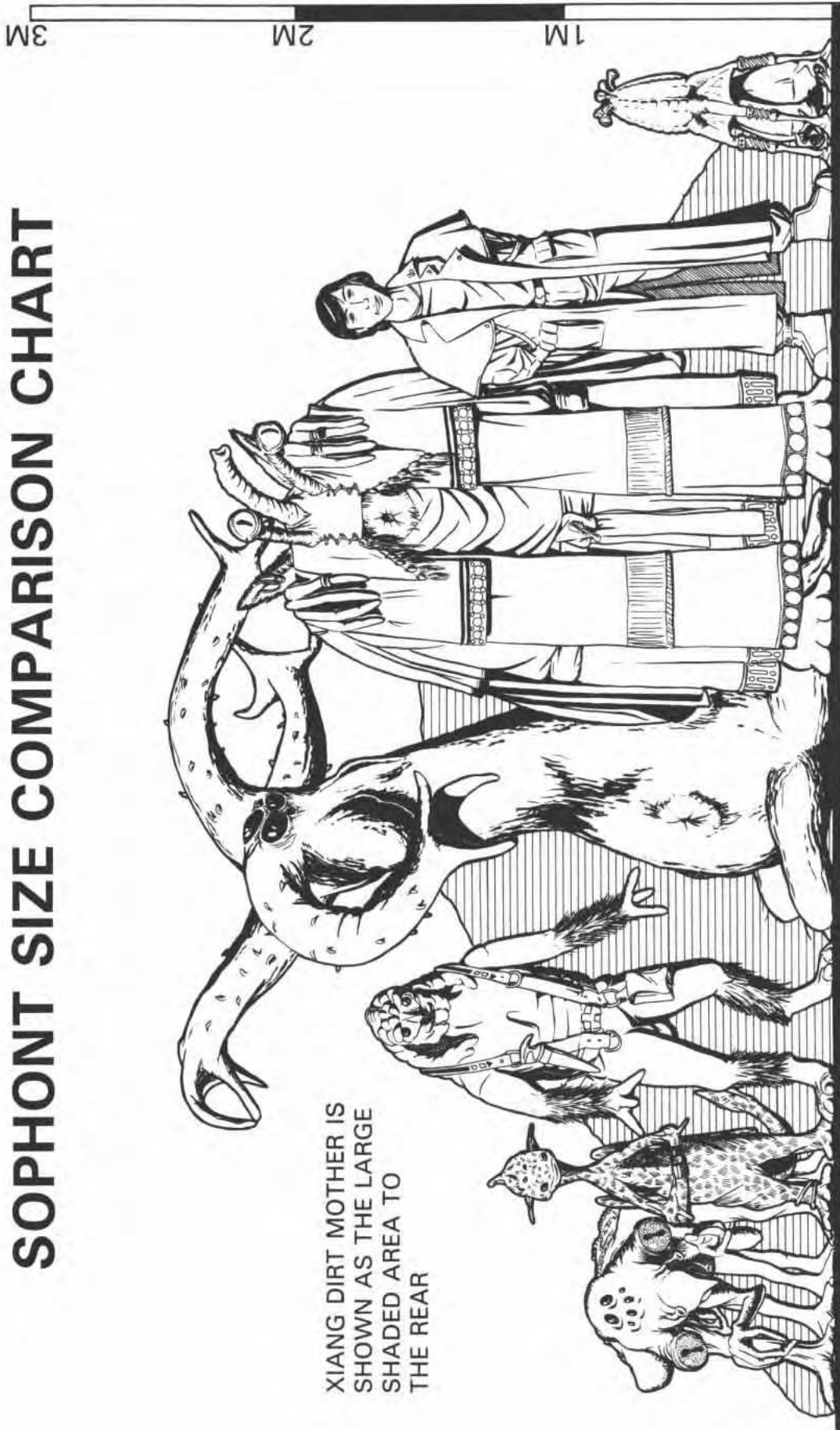
XIANG

XIANG DIRT MOTHER IS
SHOWN AS THE LARGE
SHADED AREA TO
THE REAR

(ALL SOPHONTS SHOWN IN THEIR ADULT GROWTH PHASE.)

THE KAFERS

Implacable, violent, and frightening, the Kafers play a very important part in **2300 AD**.

Homeworld

The Kafers originate from the second of five planets orbiting the star Gamma Serpenti.

Physical Description

Kafers are bipedal, humanoid creatures approximately two meters tall. They have a vaguely insectoid appearance, due mostly to the large carapace on their backs, the bristly, hair-like projections on their forearms and lower legs, and their vertical mouths, which consist of a complicated arrangement of mouthparts between two large, powerful mandibles.

A Kafer's carapace covers not only the creature's back, but projects upward to protect the rear of its head as well. The thickness and stiffness of the carapace makes the Kafer's torso less flexible than a human's and gives it a permanent hunched appearance.

Kafer limbs are very similar in shape and function to human's. But each Kafer extremity terminates in three digits; those on their hands are set as mutually opposable thumbs. While Kafer limbs are very powerful, Kafer hands have a much weaker grip than do human hands.

Kafer faces are very frightening to most humans. Besides the vertical, insectoid mouth, Kafer faces are very bony and nearly inflexible, giving them a static, emotionless expression. Their two eyes are set much like a human's, but rest deep beneath prominent brow ridges. The Kafers developed on a world circling a much brighter star than Sol, and as a consequence, they see farther into the violet end of the electromagnetic spectrum and less into the red end than do human eyes. In dim light, Kafers are nearly blind to anything more than a few meters away. Kafer heads are hairless (as is the rest of their bodies, with the exception of the bristles on their arms and legs), and are surmounted by irregularly shaped patches that are somewhat reflective, growing moreso in bright light, apparently a mechanism to protect from excess heat.

Coloration among Kafers ranges from reddish brown to an almost charcoal grey. Their skin is very tough, although still pliable.

Due to the fact that a Kafer's internal organs decompose shortly after death, making an autopsy difficult, the above information is all that humans know about Kafer physiology.

Society

Kafer society is based almost entirely upon two interlinking, driving forces. One is the need to ensure the survival of the species; the other is the love of violence.

Survival of the Species: Kafers are a very rapid breeding, hermaphroditic species. Each Kafer is instinctively driven to breed regularly throughout its adult life. Usually, both partners are fertilized during a tryst. Parturition takes about six Terran months, at which time, a pregnant Kafer will deliver two new Kafer young, each about one-sixth the size of an adult.

The newborns are able to scramble about on all fours within a few hours of their birth, and can walk upright within about four months. During the first three years of their lives, Kafer young feed on partially digested foods that are regurgitated by their "mother," who also cares for their safety and teaches them the basics of Kafer culture. At the end of this period, they will have attained about three-fifths the size of an adult and can expect no more help from "mother." At this age, Kafers are recruited into training camps where they will learn their adult occupations.

A Love for Violence: Most Kafers have an intelligence level equivalent to a human IQ of about 40. But intelligence is variable in each Kafer, depending upon its environment. Danger causes a physiological response in them similar to the action of adrenaline in humans, except that instead of increasing strength, the Kafer response stimulates intelligence and speed. Kafers who are spectators to another's danger experience this response as well. Most of the time, the increase is of relatively short duration—once the danger is over, a Kafer grows dull and sluggish once again. But its intelligence never quite falls back to what it was before. In other words, with repeated stimulation, a Kafer's normal intelligence will slowly but steadily rise.

In the early days of their history, Kafers experienced one pattern of events repeatedly. First, a group of Kafers would begin to develop a localized, permanent, city civilization. One benefit of such a civilization is that life is safer for its members, but for Kafers, this means that there is less stimulus to intelligence. Over and over again, city civilizations would fall before the onrush
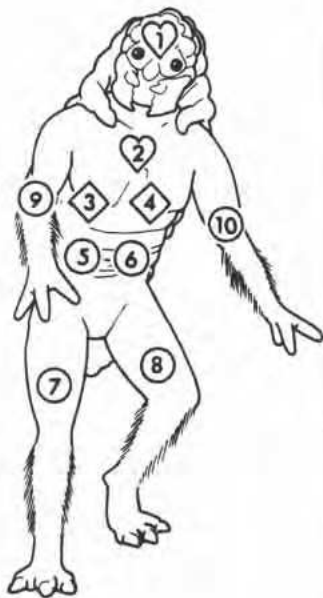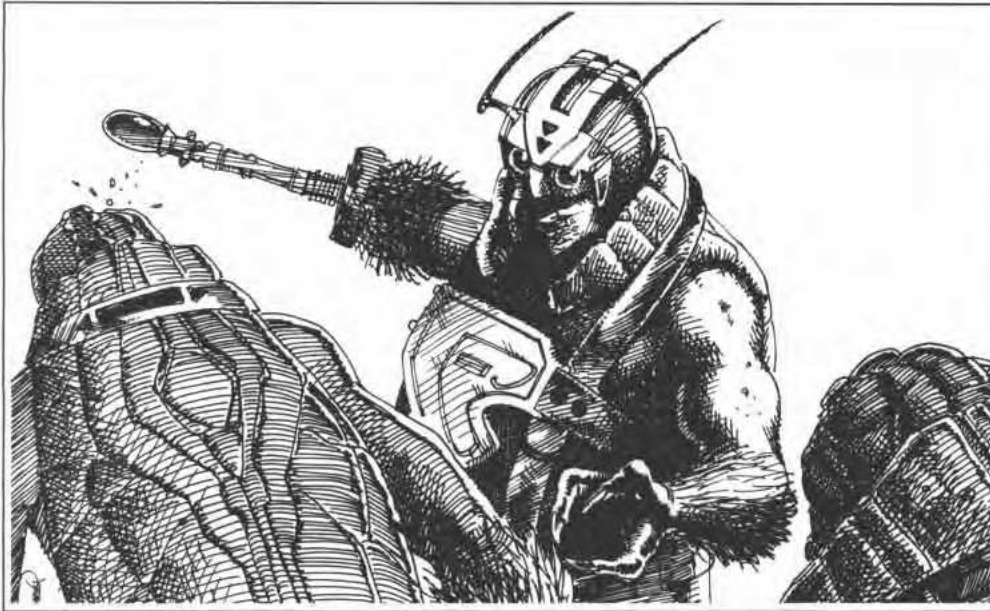
of nomad barbarians who were smarter, and trickier, because their lives were more dangerous. Eventually, a city civilization was developed in which routine violence was incorporated into the culture. With the pairing of this stimulus to intelligence and the technological developments that only a stable culture could bring, the nomad bands had met their match—but the "smart barbarian" remains an archetypal figure in Kafer horror stories.

All of this has made Kafers addicted to violence. Violence makes a Kafer more self-aware, makes it feel more alive. It also makes it intelligent enough to realize that a stable society is to be desired—this is what keeps Kafers from killing each other off indiscriminately.

But Kafers do love to kill, and the smartest seem to love it the most. In a Kafer city, therefore, the leaders often divert themselves by hunting the sick and unproductive through the city streets and slaughtering them. It is a terrible thing to be among the weak or wounded in Kafer society.

First Encounter

Humans first learned of the Kafers after a French-funded research station was built in orbit around the star Arcturus, at the far end of the French Arm of exploration. The station had been in operation for about seven years when, in 2295, vessels entered the system from outside human space. Radio messages were exchanged between human and alien, but with no comprehension on either side. After a few hours, the aliens left. Two years later they were back. Without provocation, they attacked the station, then swept on to Eta Bootis, where they overran the human fleets stationed there, then attacked the human colony on Aurore, landing several hundred troops on the planet. Humankind had experienced its first taste of Kafer ferocity.

Kafer Adventures

If the player characters encounter Kafers, it will be in battle somewhere on the French Arm. The farther from Earth and the closer to Arcturus, the more likely the encounter.

When running **2300 AD** adventures that include Kafers, the referee should keep in mind that much of what he knows about them is still a mystery to humans. They do not know where the Kafer homeworld is, nor do they understand the tie between violence and intelligence in Kafers.

Kafers view humans as "smart barbarians," meaning that they recognize humans as more intelligent and that they believe humans must be more vicious as well. Kafers will never make peaceful gestures, unless an unusually intelligent officer is leading them, and then it will be a trick to lower their opponents' guard.

Remember that Kafers are addicted to violence. Even if they do come to realize that humans want to make peace, they will continue to fight for the sheer pleasure of killing.

THE PENTAPODS

Although truly more alien than any of the other races discovered to this point (with the possible exception of the Klaxun), the Pentapods may turn out to be humankind's best friends. These amphibian bioengineers demonstrate a fascination with humans and are constantly seeking ways to be of service, especially in trading bioengineered products for human technology.

Homeworld

The Pentapods hail from the first of two worlds in orbit around DM + 43 1953, a small red star.

Physical Description

Pentapods are five-footed amphibians standing about one meter tall. The Pentapod head is a bullet-shaped bony case housing the brain and the main sensory organs. Five eyes on stalks provide full circle vision and can be retracted into depressions in the skull. Five sensitive strips between the eyes respond to temperature and infrared light. The very tip of the head is pierced by a breathing hole leading through the skull to the body and lungs.

Attached to the skull with shoulder-like joints are the five legs; each is internally supported by three rigid bones and terminates in a fleshy pad (the pod or foot). Just above the pod are four fleshy tentacles or fingers which fill grasping or manipulative functions. Between each of the five legs is a web of leathery skin. In the Pentapods' ancestors, this web connected all the legs down to the feet and was used when swimming. In contemporary Pentapods, the skin has receded to the first joint from the shoulder, allowing the limbs greater freedom of movement.

Directly below the skull is the central body containing the major organs. A single mouth at the base of the skull leads to the digestive system. The breathing tube through the skull leads to the lungs; a Pentapod exhales through five vents at the bottom of the body. The aquatic ancestors of the Pentapods vented water through gills for breathing and propulsion; modern Pentapods can hold their breath and bypass their lungs, to use water for propulsion while swimming.

The Pentapod body ends in a fleshy base; Pentapods rest their weight on this pad when still or standing. Pentapods walk somewhat like crabs, bringing each of the five pods forward in turn. When running, they draw up the trailing (fifth) leg, bunch their other legs together in pairs, and swing the body forward, alternating between the pairs of pods and the body itself.

Society

Humans perceive Pentapods to be creatures who have so blurred the division between maker and machine that they have lost the distinction. It is obvious that while many Pentapods fit the physical description above, others have been genetically tailored to fit a particular occupation. These tailored Pentapods often have extremities shaped as tools for their work, or they might be small to fit into tight spots in machinery they tend, or large to carry heavy loads. Even the Pentapods assigned to human relations show evidence of design, having skin colors and textures pleasing to humans. Each Pentapod is also mentally tailored to its occupation, demonstrating little interest in anything else but that job.

Humans realize that Pentapods view themselves as machines, each individual filling its niche in the overall Pentapod society. To humans then, Pentapods seem to be members of a race that, in the pursuit of biotechnology, sadly lost its identity as a collection of individuals. The truth is actually far stranger than that.

The Pentapods that humans know actually spring from a race of a few behemoth creatures who dwell deep in the seas of the watery Pentapod homeworld. These are the Pentapod "gods," vast, self-aware thinkers, nearly immortal, who each remain in a fixed location while exploring their environment, and interacting with one another, by means of "bullets" of genetic material that they extrude at will. The "bullets" are living beings in their own right, capable of everything usually associated with a living species except reproduction.

Over the course of ages, some of these "bullets" discovered dry land. The "god" who created them designed others to explore the land. Eventually others were made to explore the air. Finally, with the aid of mechanical technology developed on land, some were designed to explore space.

What humans know as Pentapods are, therefore, genetic "bullets" sent by a Pentapod "god" to explore space. Eventually, they will need to report their findings back to their creator. But in the meantime, they have discovered a new race among the stars—the human race—and under
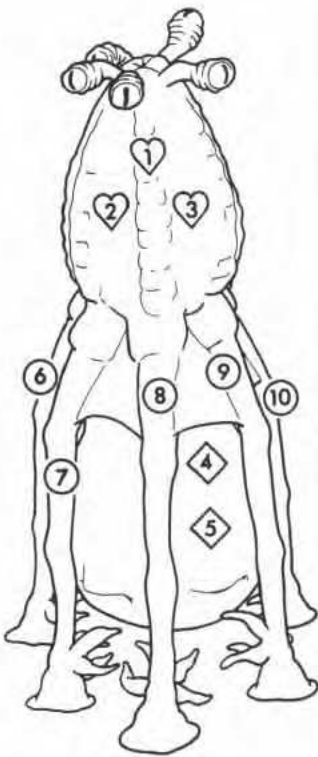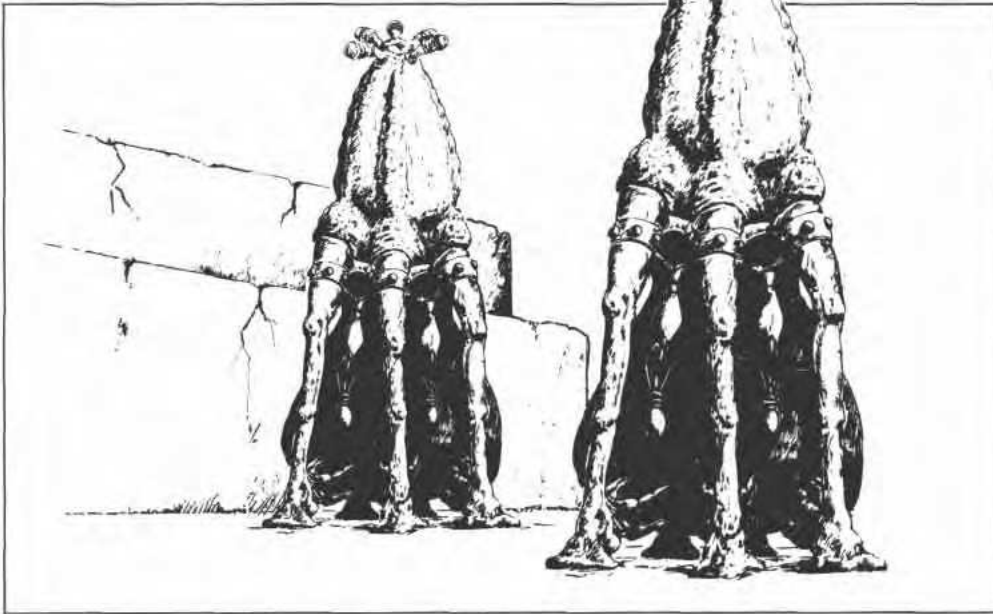
the stimulus of this highly individualistic life form, some Pentapods are beginning to develop an individualism of their own.

First Encounter

In 2251, the Astronomischen Rechen-Institut sent a pair of survey vessels to DM + 27 28217, a red dwarf just out from DM + 36 2219 on the French Arm. Upon approaching the second of the system's three planets, the Rechen-Institut vessels encountered a strangely organic-looking object in orbit there, an object the size of a small moon.

The Rechen-Institut survey team included a xenobiologist, and after a careful sensor scan, the xenobiologist and an assistant were sent in a small ship's boat to view the object up close. Upon approaching the object, the xenobiologist theorized that it was a vessel, and when an opening appeared in its side, flew the ship's boat in.

The object did indeed prove to be a vessel, the starship of a previously unknown race, the Pentapods. Peaceful contact had been established, and by 2261, the Pentapods had gone so far as to establish an enclave on Beta Canum Venaticorum-4, an important colony world further in on the French Arm.

The Pentapods demonstrated an anxiousness for trade, and humans were very willing to comply. The Pentapods provided bioengineered items such as living contact lenses and compasses, and the humans repaid them with land, raw materials, and the services of a more mechanical technology. Soon, a fast friendship based upon mutually beneficial trade had developed. That friendship continues to this day.

Pentapod Adventures

Humans are just as much a mystery to Pentapods, as Pentapods are to humans. Pentapods are fascinated by the individuality evidenced by each human. To them, this individuality puts humans on a par with the Pentapod "gods," but humans are small and short-lived, and they behave like "bullets" in that they join together into organizations in which directives from above are carried out by those below. To Pentapods, then, humans fill an undefinable niche somewhere between "god" and "bullet."

Regardless of the ostensible purpose of any particular adventure, whenever Pentapods and humans interact with each other, each race will be attempting to better understand the other. The referee should let the players slowly discover the mystery of the Pentapods' culture, letting comments and questions that a Pentapod makes during the course of an adventure serve as clues about its mysterious nature.

THE KLAXUN

The Klaxun are the most recently discovered alien race, from a world on the very fringes of the French Arm.

Homeworld

The Klaxun's emerging civilization was discovered quite by accident on a world surrounding the unlikely orange star DM+17 2611. For a time, only a marooned expedition there had contact with them, but since rescue, the Klaxun have become the latest craze among Earth's xenobiologists.

Physical Description

The Klaxun are bizarre creatures, from a human standpoint, since they do not readily fit into any one of the broad categories we have come to recognize. They definitely display characteristics of both animals and producers, forcing biologists to rethink their terminology. For now, the Klaxun are referred to as free-moving producers.

The Klaxun stand between 1.3 and 2.6 meters in height (when fully extended), and mass approximately 50-100 kilograms. They are usually green or grey in coloration, and this may change with the proximity to moisture and how much sunlight they are receiving at the moment. Of course, each Klaxun is unique, even to the extent that there is no set number of limbs designated to each individual.

From the ground up, the Klaxun have several root/legs, which are used for locomotion and for drawing nutrients from the soil when necessary. The root/legs have feelers attached to them, which are the Klaxun's primary sensory apparatus. The root/legs extend from the base of the brain/body case, the very core of the individual. The case is very rugged, protecting the brain and vital organs of the individual. At the top of the brain/body case is the mouth, the opening of the digestive system which operates in concert with the photosynthesis centered elsewhere. From the top of the creature extends several branch/arms, each with weak tentacles. The exact number of branch/arms varies from individual to individual. At the center of the branch/arm cluster is the eye-cleft.

Their diet is a combination of foraged food and photosynthesized starches. Primitive Klaxun forage for native food in the equatorial countryside, digesting through the mouth much as Terran animals do. However, this is supplemented by the ability to gather light and convert it into energy. Leafy structures form along the branch/arms of all Klaxun, and during the summer can account for upwards of 30 percent of the individual's personal energy.

Klaxun reproduce through seeding, a process practiced by all adults. Most seeds do not survive the harsh conditions of the mother planet; there is a 90 percent loss to the elements.

Where an individual is seeded dictates the creatures sightedness. Crystal structures in the soil are collected by the growing creature and centered in the eye-cleft to enhance light gathering. For the Klaxun, sightedness has been a fairly recent evolutionary event, and their vision, at best, is far inferior to that of a human being.

The Klaxun do not sleep, according to the human definition. They do hibernate through the very long, cold winters of their native world, emerging for a brief period each year to live and move freely through the summer season. A Klaxun will live through about 50 local years (25 standard). From our point of view, they are terribly slow creatures, due to slower synaptic processing in their brain.

Klaxun communicate through physical contact, using the branch/arms and tentacles to relay their information. This Klaxun "dance" is very difficult for humans to imitate, but successful communication has been made by humans using their hands and fingers as barely adequate substitutes.

Society

The Klaxun are in the very early stages of their civilization. To put this in terms of human history, the Klaxun are now at about the level of very early Mesopotamian civilizations, only beginning to develop systems of government, cooperation, and hierarchy.

The Klaxun have built a large city complex on the southern shore of the equatorial sea. The city is a collection of maze-like open-roofed rooms and corridors with few trappings, but is
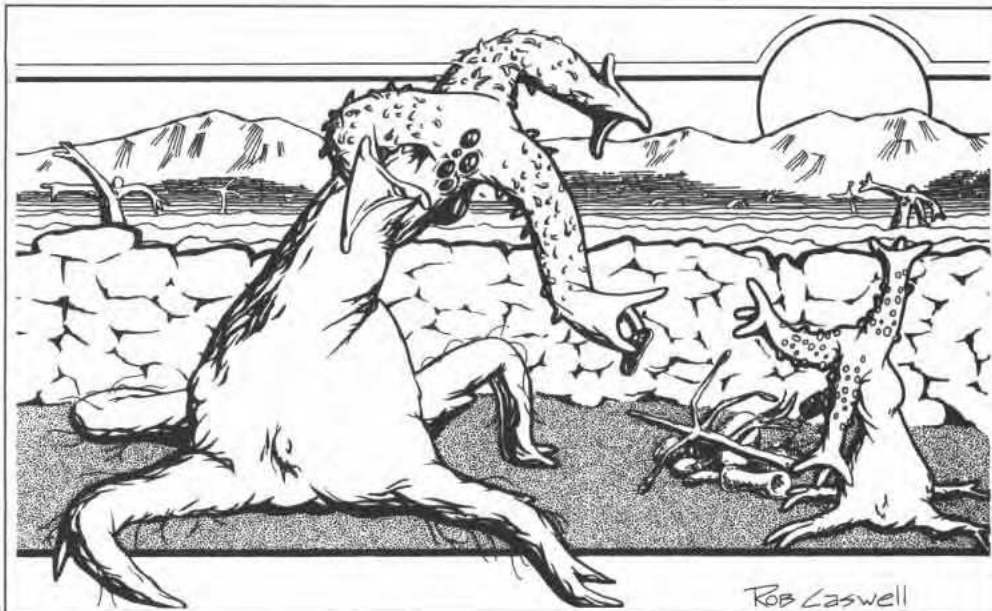
Rob Caswell

organized to house various higher level artisans, such as canal diggers, toolmakers, shipbuilders, tree fellers, and artists. The majority of the Klaxun are still occupied with the gathering of food, but organized gathering has allowed a percentage of the population, albeit a small percentage, to engage in these more "civilized" pursuits.

The Klaxun have developed a hierarchy based upon the sightedness of the individual, which is quite variable. Sighted Klaxun are better able to perform certain tasks and have many clear advantages over their blind counterparts. They have, therefore, taken their natural place as leaders of the communities. However, the current civilization is experiencing its first true civil unrest with respect to this hierarchy. The less fortunate blind Klaxun are organizing for social change, and the society is in danger of collapsing.

First Encounter

The Klaxun were accidentally encountered by the ill-fated expedition of the *LaFarge*, commanded by Marie C. Dubois, a ship and crew under the direction of Trilon corporation. Sent into the area under company orders, the *LaFarge* encountered hostile Kafers in the DM + 17 2611 system. After a brief firefight, the *LaFarge* was damaged and forced down onto the second planet in the system. Their ship destroyed, the expedition set out for the more temperate equatorial regions to await possible rescue, their only chance of survival.

But the time of their crash landing and trek across the frozen tundra coincided with the Klaxun hibernation. When they arrived at the equatorial sea, they found themselves almost overnight in the middle of a bizarre civilization of aliens whose biological clocks had awakened them. Actually, without the help of the Klaxun, the stranded humans would have never survived the next two winters on DM + 17 2611 II. After those two winters, a rescue ship finally did arrive in system, and the Klaxun were officially introduced to humanity as a new alien intelligence.

Klaxun Adventures

Now that the Klaxun have been contacted, there is great interest in learning about them. Almost all foundations are conducting expeditions and documentaries across their world. However, independent expeditions to the Klaxun world are discouraged by the foundations, and this can be backed up by force. The Klaxun are felt to be at too primitive a level to be open to free contact.

Being on the Kafer frontier, however, opens the world to possible invasion. The Life Foundation is actively seeking mercenaries who are willing to serve on DM + 17 2611 II, living in prepared communities. Their mission is to provide a force to discourage the Kafers from slaughtering the Klaxun should an invasion be mounted.

THE EBERS

Ancestors of the Ebers developed faster-than-light drives at about the same time that humanity's ancestors were beginning the widespread use of bronze. But interstellar war ravaged their culture, driving them back to a second stone age. They have just recently reinvented the steam engine.

Homeworld

Once possessing three colonies, the Ebers now dwell only on 82 Eridani's fourth planet.

Physical Description

Ebers are tall, heavy, bipedal creatures with thick, short legs, extremely long, thin arms, and no recognizable heads. An individual Eber stands about two meters tall at the shoulder. The body and legs are covered with a thick, shaggy fur, usually of a rust-brown color. The short legs and thick, heavy body give Ebers a waddling walk.

The major Eber sensory organs are located in a cluster atop the body between the shoulders. A pair of 15cm-tall, flexible ears resembling those of a Terran horse are spaced widely apart and slightly back from center. A pair of 10cm-tall eyestalks are located just forward of center and closer together. Between these two pairs of organs stands a flexible probiscus similar to a miniature trunk. Forward and slightly lower on the body is the oral sphincter, backed by a four-way arrangement of grinding jaws and a long, narrow tongue.

Eber arms are deceptively thin, partially because they are nearly hairless, but they are capable of lifting the entire body's weight, if necessary. (This is likely the way in which their first prehistoric ancestors escaped predators, by lifting themselves into the Eber analogue of a tree.) They are nearly twice as long as the body is tall, but the way in which they are folded when at rest makes this less noticeable. In the folded position, an Eber's arm bends down and backward from the shoulder, resting against the creature's back. The elbow reaches nearly to the legs, then the forearm runs back up to the shoulder, where the hands rest, bent forward at the wrist. Eber hands have five long digits, one being an opposable thumb.

Eber shoulder joints are arranged in such a way that the arms can be lifted upward and forward, where, with the elbows straightened, the hands can reach nearly six meters into the air. It is in this way that the earliest Ebers gathered the majority of their food from tall plants, since Ebers are leaf and fruit eaters. With the shoulders lifted, the elbows can bend forward, bringing the hands down to the mouth for feeding, or the eyes for close handiwork. Alternatively, with the arms resting down the back, the shoulders can roll forward and to the side, putting the elbows into such a position that the hands can be brought in front of the creature.

Ebers are very long-lived creatures by human standards. Average natural life span is 350 Terran years, and some individuals are reported to be nearly 500 years old.

Society

Ebers have a long history of intense territorialism. In ages past, they had actually developed an interstellar drive and had colonized three planets, but wars over territorial rights drove them back to a second stone age. In the centuries since that time, they have redeveloped their technology and culture to a level approximately equivalent to 15th-century Europe.

The Eber way of life is conducted in a slow, sedate, ceremonial way. The creatures have a marked fondness for bulky, ornate clothing involving multiple layers of drapery and robes, as well as heavy, intricate jewelry. Business typically involves a plethora of formalities: gifts and speeches are exchanged, meals are given, visiting is done, a multitude of reports are filed, and various other types of red tape, moreso than with the worst of human bureaucracies.

First Encounter

Humans first learned of the Ebers in 2249, when an Arabian team discovered the ruins of an ancient colony on Daikoku, a planet in the Beta Hydri system. Three years later, a Texan expedition to Rho Eridani found similar ruins on Heidelsheimat. Archaeologists estimated both sets of ruins at nearly 4000 years old.

Finally, in 2256, an exploratory mission of the United Arab Republic discovered the Ebers living at 82 Eridani. Initially, they just flew over a few Eber cities at high altitude, gauging the

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race's technology. After they returned to Earth with recordings, a first contact team was sent out.

Initial relations were awkward until the humans realized the importance of Eber ceremony. At first, it appeared to the human team that the Ebers were being overly cautious and unfriendly. To the Ebers, humans seemed hasty and overbearing. Eventually, each race began to understand. Relations are good now because humans have learned to adapt (and not the reverse). Humans who deal with Ebers must do so in Eber dress, using Eber customs, at an Eber's pace.

There are currently two human enclaves on the Eber world—one Texan and the other belonging to the United Arab Republic. The UAR enclave is located in an area ceded to them by a major Eber nation. The Texan enclave lies in the middle of a desert not wanted by the official Eber hierarchy, but still claimed by nomadic tribes. Some of these tribesmen are very militant and periodically reiterate their claims to the territory by staging raids on Texan irrigation farms (these raids also keep them better fed than more dangerous raids into Eber-held farmlands). Others have settled close to the humans, however, accepting them as an extension of the tribe.

Eber Adventures

There are few secrets for the referee to keep concerning Eber behavior. Most of what they do can be explained quite simply as the result of a long lifespan and a natural caution after having nearly obliterated themselves in an interstellar war.

One secret that the Ebers do keep, however, is the location of the third missing colony. Humans have discovered in Eber writings that such a colony existed, but the Ebers refuse to ever speak of it. The reason for this is a deep racial shame, as 82 Eridani, which humans believe to be the Eber homeworld, is actually the third colony. The real Eber homeworld (at Zeta 2 Reticuli, where it can only be reached by ships bearing multiple, disposable stutterwarp drives) was devastated by biological weapons in their ancient war.

The two younger colonies were apparently destroyed by more conventional weapons, while the oldest colony, at 82 Eridani, was able to preserve a remnant of its citizens and begin the climb to civilization once again. Those Ebers strive to hide the fact that this is not their original homeworld; if possible, they would even deny it to themselves.

Players might encounter an Eber on a human world or vessel, of course, but most encounters should be kept to the 82 Eridani system. It is possible that one of the players might even have been raised at one of the human enclaves there.

Ebers should always be played as ceremonious and secretive. This can range from silent friendliness as at the Texan enclave to the reclusiveness of societies trying to avoid the taint of the younger, human race.

THE XIANG

Of the known sapient races, the Xiang are the most technologically backward. But this masks the fact that a very high intelligence lurks within the Xiangs' spidery form.

Homeworld

The Xiang homeworld is a moon orbiting DM+4 123's fifth planet (a gas giant).

Physical Description

In structure, the Xiang are similar to Terran arthropods, particularly the crustaceans, although they are more like arachnids in appearance. But their world's lighter gravity has allowed them to attain a much larger size than their Terran counterparts. The Xiang body is covered by a tough carapace and consists mainly of a horizontal main portion that contains the internal organs and is supported by eight of the Xiang's 10 segmented legs. At the rear, a small, segmented tail curls under; at the front, a head holds the mouth and primary sensory apparatus. The average Xiang stands about one meter tall and is one meter in length.

The Xiang head is dominated by two large, bulging eyes, one to either side of the head. Between them runs a line of four vestigial eyespots, surmounted by another, slightly larger pair. Just below the row of eyespots is the creature's mouth, externally a strong beak for cutting, surrounded by four tiny arms, each with a pair of digits for holding food.

Xiang speech is produced in two ways. The primary means is by vocalization, but a pair of Xiang can also somehow transmit information privately by mouth-arm contact. Xiang hearing organs are four tympanic membranes located on the underside of the body, one pair just below the first, manipulative set of legs, and the second pair midway down the body.

The Xiangs' 10 legs are divided into two parallel rows of five, one on each side of the body. All 10 legs have three joints each and four clawed digits. Between these digits is a leathery "palm," with which the Xiang can sense vibrations in the earth. The first pair of legs are more properly termed "arms," as they are used only for manipulation, while the next four pairs are used for locomotion. The digits on the arms are more flexible than the others, with smaller claws and an opposable "thumb." As well, the palms are more sensitive.

The segmented tail on the Xiang serves for reproduction and for nurturing of its symbiotic partner, the "dirt-mother." The dirt-mother is an immobile, disc-shaped plant about one and a half meters in diameter which serves as a nest-home through most of a Xiang's life. A tough, bark-like outer surface covers most of the dirt-mother, protecting it and the young Xiang it harbors from predators. Although the plant performs a type of photosynthesis, its thick covering prevents it from producing enough energy to sustain its vast bulk. It is, therefore, dependent upon nutritive secretions from its Xiang partner, who tends it as a gardener as well.

Each Xiang goes through four basic stages of life in this order: (1) egg; (2) young; (3) adult female; and (4) adult male. During the first stage, the dirt-mother serves as a protective, insulating receptacle for the egg. Typically, a dirt-mother holds three to six eggs, the clutch of the adult female that tends it. When the eggs hatch, the young Xiang work their way to the outer surface of the dirt-mother, but along the way, they swallow enough of the plant's fluids to develop a chemical dependency which lasts until the adult male stage of life.

While the Xiang are young, the dirt-mother provides a home for them, without which they would otherwise fall prey to larger animals. During this life-stage, the adult female is also present to care for and educate the young Xiang. During this time, the increased nutritive secretions produced by the combination of the adult female and the young Xiang's efforts stimulates the dirt-mother to bud—a long, slow process. By the end of this time, the adult female has metamorphosed into an adult male, the buds have consumed most of the dirt-mother, leaving only a hollow shell, and the young Xiang have reached adult female-stage, ready to take a bud, find a planting spot, and lay a clutch of their own eggs.

The adult male usually only fertilizes one clutch of eggs before becoming sterile, but it may fertilize as many as three or four. Free from the chemical dependency upon the dirt-mother, and no longer necessary for the care of the young, the Xiang finds itself free to wander and explore.

Society

The symbiosis between Xiang and dirt-mother has led the Xiang to have consuming concern

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for the balance of nature. Being the largest predators on their Eden-like planet, the Xiang have no need to construct homes or weapons. Their stimulus to intelligence has been the need to find sufficient food while remaining in a fixed geographical location. The Xiang are not terribly fast creatures; instead, they have used their intelligence to become consummate trappers.

The Xiang also evidence a great love for artistic expression. This and their trap-building skills combine in the creation of beautiful sculptures with which they decorate their surroundings. Xiang also show a love for storytelling and music, the latter produced both by their bodies and by a few simple instruments they construct.

First Encounter

There were a few Xiang in evidence on the Sung homeworld when humans first visited there. But the Sung did not mention their intelligence, and without the evidence of technology or the knowledge of their ability to speak, humans assumed that they were beasts of burden. When a human research team finally reached the Xiang homeworld, however, Xiang art convinced them that the race possessed at least nominal intelligence. A few experimental contacts soon proved that the Xiang were as intelligent as human beings, but with no desire for advanced technology.

The fact that the Sung had great strip mines on this beautiful moon, where they worked the nature-loving Xiang, soon led to an outcry of "slavery" among humans. The Sung justified themselves by the system of Sos-Soon-Atkacharr, saying that it was only natural that the technologically primitive should serve the advanced. In return, they offered the Xiang the fullness of Sung knowledge. They did not see it as their fault that the Xiang did not desire that knowledge.

Humans disagreed with this view and the Slaver War was born, ending in the breaking of Sung power over the Xiang and the establishment of human power over the Sung.

Xiang Adventures

Humans are not sure as of yet just how to deal with the Xiang. Although Xiang do not use advanced technology themselves, they do seem to understand what human and Sung sciences they are taught. Their alienness makes communication of more abstract thought very difficult, but their art and music hints at a sophistication in that area as well.

The referee should play Xiang NPCs as great enigmas. The players might encounter them on human vessels (very rarely), on the Sung homeworld (a bit more likely), or the players might travel to the Xiang homeworld for research. Xiang they encounter will show great curiosity, but translation of speech between the races will tend to be garbled.

XIANG NPC STATS

Typical statistics for Xiang NPCs are:

Size: 8
Strength: 9
Dexterity: 15 (12)
Endurance: 11
Determination: 14
Intelligence: 12
Eloquence: —
Education: —

It has been said that the Xiang are technologically primitive. This primitivity is because they have no desire for advanced technology; stone age tools serve them well for their simple wants. The Xiang are both intelligent and curious, however, and older, sterile males often travel off-planet with other races in order to learn more about the universe beyond their homeworld.

There is no way to rate Xiang individuals in human terms for eloquence or education, however. While it is obvious that certain Xiang are held as great singers and storytellers among their own kind, broad communication between Xiang and humans is still dependent upon advanced computer translation programs, and these programs often fall far short of conveying an accurate message.

THE SUNG

The Sung were the first sapient alien race to be discovered by humans, and in many ways they bear the most similarities to humans in culture and thought processes.

Homeworld

The Sung hail from Stark, the third world in orbit around DM+4 123. It is a world slightly smaller than Earth, and with a somewhat lighter gravity.

Physical Description

The Sung are, to this point, the only sapient race yet discovered by humankind that is capable of natural flight. When standing as straight as possible, the typical Sung has a height of approximately 120 centimeters, but as Sung posture is slightly stooped, they appear to be even shorter. Sung wings, located midway between a pair of forelimbs and a pair of back limbs, have a span of about five meters taper outward to the tips. Sung forelimbs are small and delicate, while the back limbs are strongly muscled and sturdy. All four limbs terminate in "hands" of sorts, each with two fingers and two opposable thumbs (arranged thumb-finger-finger-thumb). The forelimb hands are very dextrous, but are smaller and weaker than the backlimb hands. The backlimb hands are large and strong, enabling the Sung to carry bulky items while in flight.

The Sung head and tail are designed to aid in flying. The well-muscled tail has a fan-like stabilizer at the tip which can be retracted when the Sung is on the ground. A rigid crest, located on the top of the Sung skull, functions as a small "rudder." The Sung head has four eyes, one pair above the other, with the lower pair being the larger and more widely spaced. Sung ears, placed on each side of the head, are hemispherical and can flatten against the skull for flight.

Sung bodies are hairless, and their skin is soft and supple. They are omnivores, and they reproduce by means of eggs. A Sung female lays a single, large egg; each parent then periodically covers it with a viscous fluid their bodies produce. This fluid slowly hardens to form a new outer shell, while the inner shell dissolves away, nourishing and warming the developing embryo. In this way, Sung eggs grow in diameter as the embryo grows. Eventually, when the parents' secretions cease, the egg dissolves through, birthing a new Sung.

Society

The hierarchal system of *Sos-Soon-Atkacharr* plays a crucial role in the structure of Sung society, which is organized into a system of nation-states. A state with technological or cultural dominance fills a leadership role in which it demands obedience from lesser states in its sphere of influence. The superior state, however, has an obligation to raise its subordinates to its level through educational and financial assistance. The pattern of ascendance to superiority proves to be cyclic in nature, with the superior status leap-frogging from one state to another as advances are made.

Technologically, the Sung are comparable to humans. In some areas, such as medicine, they are more advanced; in others, such as star travel, they are at a lower level. At first contact, Sung had developed interplanetary ships equipped with both solar sails and ion drives.

Sung language has presented some problems to human researchers, since Sung speech often extends into the ultrasonic ranges. As a result, the Sung usually resort to speaking human languages (especially Mandarin Chinese and French Canadian).

First Encounter

Discovered by a Manchurian exploratory mission, the Sung were first encountered in 2248, in their home system. First contact occurred when the Manchurian expedition, investigating mysterious signals from system's third planet, detected a Sung interplanetary craft. Assuming that the source of the signals, as well as the ship, was some unexpected human expedition, the Manchurians attempted communication. The signals that returned were obviously nonhuman, and the Manchurians panicked and fled from the system. They returned directly to Earth, with the news that there were technologically advanced aliens at the fringes of the Chinese Arm.

Another Manchurian expedition was quickly sent back out. This time, it consisted of a party of warships (in case the aliens proved hostile) carrying teams of exobioligical, linguistic, and diplomatic experts. Remaining in the outer regions of the system (so as not to appear a threat to the Sung homeworld), the expedition was successful in initiating peaceful communications
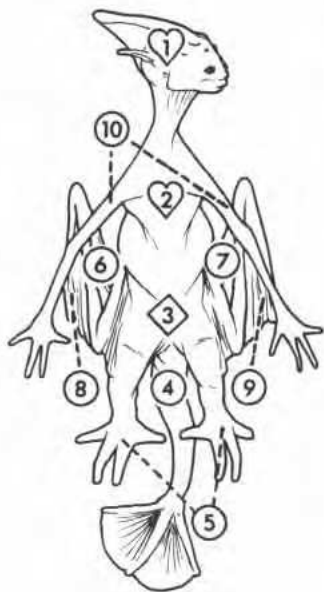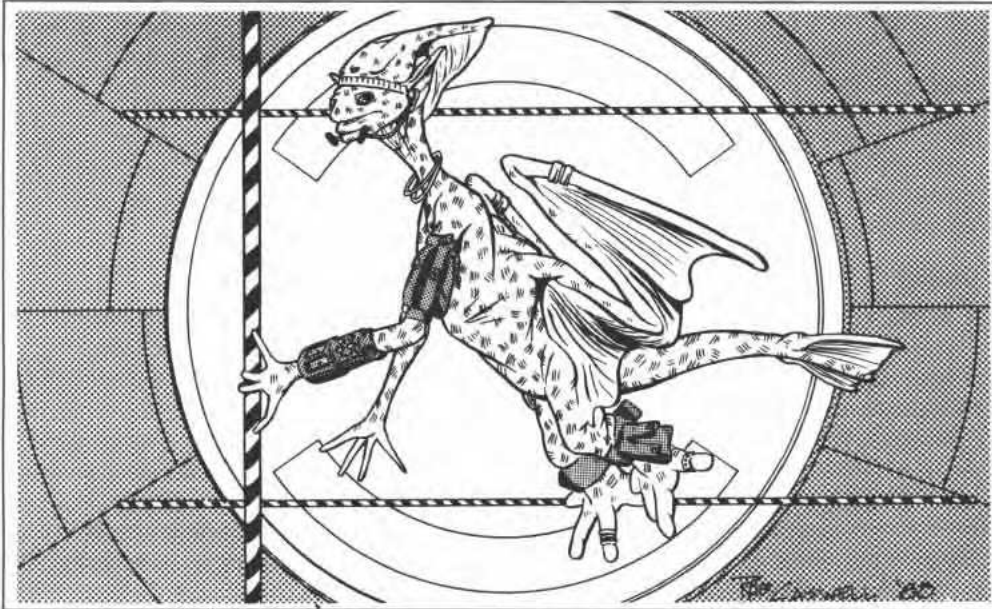
with the Sung. Progress continued until a Canadian group discovered the Xiang, another sapient race native to the system, who appeared to be slaves of the Sung. When news of this reached Earth, an outcry was raised leading to the Slaver War.

It was the system of Sos-Soon-Atkacharr that the Sung used to justify their treatment of the Xiang. In Sung eyes, the Xiang were primitives, and they were expected to obey their Sung masters, in return for which they were given access to Sung knowledge. It did not matter to the Sung that the Xiang did not desire that knowledge, in fact, that was so much the better, as it meant that Sung business would continue into the distant future on Xiang labor.

But Sung interplanetary vessels were no match for human stutterwarp warships. With very little loss of Sung lives, human dominance was accepted under the system of Sos-Soon-Atkacharr.

Since the end of the Slaver War, relations between Sung and humans have steadily improved into a system of fairly free cooperation. The only frictions still to be felt concern the reluctance on the part of humans to share stutterwarp technology and other advanced information. To the Sung, this reluctance constitutes a violation of the system of Sos-Soon-Atkacharr, which states that the dominant state must share freely with its subordinates. And even though the Sung realize that humans are alien, deeply ingrained cultural systems die very hard.

Sung Adventures

Using the Sung in adventures can be an easier task than incorporating some of the other alien races, although it will still present some challenges. Individual Sung can be encountered in their home system, of course, but there are also a number of them throughout human space on human ships and worlds, where they work usually menial jobs while attempting to learn as much as possible from what they consider to be a superior culture.

Due to the nature of Sos-Soon-Atkacharr, Sung interacting with humans are generally obedient and submissive, unless they feel that their ideas and understanding are superior. In exchange for their servitude, however, the Sung expect to be taught everything that humans know.

This can lead to great annoyance on the part of characters involved as the Sung will dog their heels wherever they go, constantly asking all sorts of questions and demanding detailed answers ("What does this button do? Why do humans do that? Where does this corridor go? Why do humans have hair on their heads?"). If the Sung is not answered, he is likely to grow irritated and begin to look for a good opportunity to make trouble for the characters before abandoning them.

The referee should play this for all it is worth, keeping in mind that humans do not really understand Sos-Soon-Atkacharr, and player characters may have never even heard of it.

Event Resolution

TASKS AND ROLL PLAYING

The most important thing for a referee to remember concerning this topic is to let the task system explained here serve only when an event cannot be resolved purely by role playing. Do not let task rolls become so common, or so predictable in form, that the action of the adventure becomes nothing but a dice-rolling exercise. (This rule includes the use of the combat system described in the Combat *chapter as well.)*

For example, suppose that a player tells you that his character is going to take a particular NPC out to lunch and pump him for information. You, as referee, should quickly review the NPC's persona, including his motivations, in order to get yourself in character when playing him. Then act out the meal with the player, listening to his conversation and responding in kind. If, in your judgment, the NPC would let the desired information out, either consciously or unconsciously, then do so in your acting. The event has then been resolved by role playing, rather than by rolling dice (sometimes called "roll" playing).

During the course of an adventure, player characters will often be called upon to accomplish various tasks necessary for them to achieve success in their mission. This chapter explains how to resolve such events.

WHAT A TASK IS

A task is any important activity which characters can perform; any activity can be a task. Characters face tasks as natural consequences of their adventures and ambitions; they may face a single task, or a series of tasks. Proper selection of tasks and successful completion of those tasks is what leads to success in adventures.

Because these game rules define and describe tasks (as well as allowing the referee to also define and describe tasks), **2300 AD** players are given understandable and consistent descriptions of what must be done to accomplish missions. Referees can use tasks to handle recurring situations on a consistent basis, confident that they are being fair in their dealings with their players. Players can, on the basis of task statements, predict which of their numbers will be most likely to succeed in specific tasks.

Overview: The task concept in **2300 AD** defines specific undertakings by noting what must be done, how difficult it is to do, and what skills and characteristics will influence the success of the task. Specific rules handle tasks which may be uncertain, hasty, hazardous, or unskilled. Attempting the task also determines how long it took. Finally, rules cover the negative consequences of failure in a task attempt.

TASK COMPONENTS

Tasks are written in a specific format to allow all necessary information to be included. Each task consists of a statement of the task, its type, its degree of difficulty, the assets (characteristics and skills) which may modify the outcome, and the time factor involved. A task may also be identified by type (in parentheses with the task statement) if it is not a standard task. Some tasks, as well, are followed by a note to the referee, explaining results of the task, and other related information, more fully.

Task Statement: A short, but complete, description of the task conveys to the players and the referee the actions being undertaken. The task statement should have enough information to make it distinct, but not be wordy enough to make it unclear.

The basic concept of the task statement is to describe a single action which can reasonably be considered by itself. Repair of damaged items may, for example, be broken down into a diagnosis task and a repair task.

Examples of task statements are:

To sneak past a compound guard.

To repair a broken radio.

To solve a complex mathematical equation.

Type: If a task is not a standard task, it should be identified by type: *uncertain, unskilled, hasty,* or *hazardous.* Each such type affects how the task functions.

Uncertain or unskilled tasks should always be identified. Hasty and hazardous tasks are often variants of standard tasks and will often be identified only when they are attempted.

Difficulty: Difficulty indicates the probability of success in a specific task. There are five levels of difficulty: *simple, routine, difficult, formidable,* and *impossible.*

Difficulty indicates the basic 1D10 throw needed for success in completing a task. Routine tasks require 6+ (on 1D10) to complete; the other levels of difficulty are at multiples of 4 higher or lower than the 6+ required for routine tasks.

Assets: The probability of completing a task is affected by assets (a collective term which refers to skills and characteristics or attributes). Assets which are listed for the task are called crucial assets.

Assets are used as a positive DM for success (better DMs enhance the character's chance of success with the task) and as a negative DM for time (better DMs accomplish the task in less time).

Crucial skills use their level as a positive DM on the throw for success. The manner in which skills are stated determines how they are used. When joined by "or" only the highest skill present may be used. When joined by "and," the sum of all available skills may be used. When "average of" is stated, the average of the stated skills may be used (counting nonpresent skills as zero and reducing the average accordingly—nonpresent skills also affect the difficulty level of the task, as will be explained later).

Crucial characteristics are divided by 4 (fractions are dropped, producing a range from 0 to 5) and are a positive DM on the throw for success.

Labeled characteristics (characteristics which have labels or names rather than numeric values) may be referred to; if they are, appropriate numeric values will be stated.

Assets shown with a minus sign are detriments; they are negative DMs on the die roll and work against success in accomplishing the task.

Time: The time period shown is *one-tenth* of the average time required for completion of the task. It is not the actual duration of the task.

The time roll for a task is 3D6; an average throw of 3D6 is 10, which produces an average accomplishment time equal to the usual time taken for that task.

The same asset modifier that was added to the die roll for success is subtracted from the die roll for time. Assets help reduce the time required to accomplish a task. Assets may not reduce the time roll below 3.

A task may state that it is *instant*, in which case it takes no time to accomplish.

A task may state *absolute* in addition to a period of time; in such a case, the task requires the stated amount of time and is not modified by assets.

For example, a task may state a time period of one hour. It can be accomplished in an average of 10 hours, although it could take as long as 18 hours or as little as three hours.

Referee: Sometimes a task will be followed by a note to the referee. This note is written as a separate paragraph, prefaced by the word "referee" in italics. Such notes are typically used to explain special conditions or results that are peculiar to that task that are not indicated in the normal task format.

Similarly, suppose that a player tells you that his character is going to carefully sneak up on a sleeping guard and shoot him with a tranquilizer dart, and he explains in detail exactly how he will go about it. Depending upon the circumstances, you might decide that such a task is an automatic success (especially if it helps the flow of the adventure).

As referee, it is always your perogative to decide what requires a task roll and what does not. But even if you decide that a task roll is necessary, let the player characters' actions influence your decision as to how difficult the task will be. In the second instance above, for example, you might well decide that you want to have a roll made to see if the attack is successful, but you might add that because of the player's inventiveness, such a roll will be a level easier than usual.

PROCEDURES

When confronted with a task, the characters are aware of the situation and indicate to the referee their intentions. With these intentions in mind, the referee selects an already established task, or generates a new one specifically for the situation. The procedure for resolving the task is then used.

Attempting a Task: The player determines assets that apply to the task and creates a DM for the task.

If related skills are to be used or can be used in place of the crucial skills, the referee should tell the player. In most cases, it will be up to the referee to decide whether a related skill can be used in place of a listed skill.

If the task is to be hasty, the player indicates that to the referee. If the task is hazardous, or uncertain, or both, the referee indicates that fact to the player.

The player then throws 1D10 to determine success. The throw required is determined by the difficulty level of the task. A natural roll of 1 (regardless of DMs) is a fumble, and the task is an automatic failure.

The noted DMs are added to the throw, and its result is compared to the required throw for the difficulty level.

If the modified throw equals or exceeds the required throw, then the task is successful. The character continues with his actions.

If the modified throw is less than the required throw, then the task is a failure. The character must consult the Failure Type table.

In all cases, the player determines the time elapsed for the task attempt. The time elapsed is the time required to complete the task attempt, regardless of success or failure. The player throws 3D6 and applies the same DMs that were used for success, but now subtracts them from the 3D6 throw. DMs may never reduce the result below 3. The result of the dice roll is multiplied by the time listed in the task statement and produces the total elapsed time for the task attempt.

If the task is labeled as "instant," the attempt takes no time. If an absolute time is stated for the task, then the task takes that amount of time and no time throw is made.

Failure: If a task attempt is unsuccessful, then the player must consult the Failure Type table. For most tasks, the throw for failure type is 2D6, but if the task is hazardous, the throw is 3D6.

The Failure Type table produces four types of results: retry, check determination, mishap (2D6), and serious mishap (3D6).

Retry allows the player to retry the task again without penalty, if the player desires to do so.

Check Determination requires that the player stay determined if he is to retry the task without penalty. To stay determined is itself a task.

Mishap (2D6) requires the player to consult the Mishap table using 2D6. After reacting to, absorbing, or correcting the effects of the mishap, the player may check determination and retry the task if successful.

Serious Mishap (3D6) requires the player to consult the Mishap table using 3D6. After reacting to, absorbing, or correcting the effects of the mishap, the player may check determination and retry the task if successful.

Mishaps: Negative results from a failure are indicated on the Mishap table. Mishaps range from superficial through minor and major to total or destroyed.

The referee must determine the implementation of specific mishaps in relation to a task attempt. Damage produced should relate to equipment, devices, vehicles, or participants in the task.

Superficial mishaps produce superficial damage to equipment and/or a potential light wound. Superficial damage affects appearance but not function or operation. A device may take any number of superficial damages without impairing its operation.

Minor mishaps produce minor damage to equipment and/or a potential light wound.

Major mishaps produce major damage to equipment and/or a potential serious wound.

Total mishaps produce total damage (destruction) to equipment and/or a potential kill.

Unrepaired damage levels above superficial are added together. Two minor damages create major damage; major damage and minor damage on a device creates total damage and destroys it. The referee may, however, rule some larger devices (vehicles, for example) to be composed of component devices and keep a record of damage levels on each of the component devices separately.

Diagnosis: When a mishap produces damage to a device, it must be repaired before it can be used again. Before it can be repaired, however, the nature of the damage must be properly diagnosed.

Diagnosis is an uncertain task whose level of difficulty corresponds to the level of damage to the device. Diagnosing superficial damage is a simple task; diagnosing minor damage is a routine task; diagnosing major damage is a difficult task; diagnosing total damage is a formidable task.

The time interval required for a diagnosis task, and the assets applying to the task, must be established by the referee.

Damage and Repair: Diagnosed damage may be repaired using the Damage and Repair table. Each level of damage has an associated difficulty level to be used for the task roll to repair.

The Damage and Repair table assumes repairs are undertaken in a repair shop (commercial, military, municipal, or private). If repairs are to be made in the field, increase difficulty by one. If repairs are to be performed without spare parts, increase difficulty by one. If repairs are to be performed without the use of tools, increase difficulty by one. All difficulty increases are cumulative.

If a diagnosis has not been made, it is still possible to replace the entire assembly (at a 1D10 times the stated repair cost).

Repairs performed in the field, or without spare parts, can be made without cost. The referee may record this fact and impose a greater likelihood of breakdown of such repaired items. Any task using a device or vehicle that has had major damage repaired in the field is automatically a hazardous task; this hazardous designation lasts until the original major damage is repaired in the shop.

Repeatability: Unless specifically stated in a note to the referee, any task (except combat tasks) is assumed to be repeatable. Some tasks may be defined as nonrepeatable (or only repeatable a specific number of times).

Retrying Tasks: Failed tasks may be retried by a character if allowed by the Failure Type table (and the referee's discretion).

Determination: When a task attempt has been unsuccessful, and the Failure Type table produces a result of "check determination," the character must successfully complete the task of checking determination before a repeat attempt may be made on the unsuccessful task. To check determination, the character must roll for the task in the sidebar.

Total Failure: A formidable task increased in difficulty becomes impossible; further failure is permanent and no more retries can be made on this specific task.

Tasks cannot be so flexible as to cover all situations. Consequently, special cases may be necessary to deal with unusual problems. If a special case is called for, then a paragraph (one or more sentences) should follow the task headed by the word "Referee." The referee paragraph lists any special conditions that apply to the task attempt. For example:

Referee: Nonrepeatable; only one attempt is allowed.

Referee: Any mishap causes a security alarm to sound.

Referee: If any character with Education 8 or less attempts this task, it becomes Difficult.

SPECIAL TYPES OF TASKS

There are four special types of tasks, each a variation on the standard task.

Hasty Tasks: If desired, a player may specify that his or her character is making a hasty attempt at a task. The difficulty level of the task is increased by one, and DM's are doubled before subtracting them from the time throw (a hasty attempt may take less time, but at a cost in difficulty).

Hazardous Tasks: The referee may declare a task is hazardous, and it has a higher chance of mishap if unsuccessful. Failure at a hazardous task requires a throw of 3D6 (instead of 2D6) on the Failure Type table.

Unskilled Tasks: If the skill listed in the task is not essential (it is helpful, rather than vital) to the completion of the task (either temporarily, or in general), declare the task to be unskilled. Do not increase the difficulty of the task if the crucial skill is not present.

Most tasks are skilled; the unskilled task is the exception.

Uncertain Tasks: When a task is concerned with information or opinion gathering, immediate feedback about how successful the effort has been may not be possible, and it is considered uncertain. Those performing the task have some idea of their success, but there is no way for them to be certain of it.

When an uncertain task is attempted, both the player and the referee roll for success, but the referee rolls secretly and averages his roll with the player's. (Note that in this case, a natural roll of 1 means automatic failure only on the player's roll, not the referee's.) Bonuses for skills or attributes are added to the resulting number, and the total is used to determine success or failure of the task. Since the referee keeps the final number secret from the player, the player will not know immediately whether the attempt was successful or not, unless his roll was either so far below the difficulty level that nothing the referee could roll would raise the average high enough to succeed, or if the player's roll was so far above the difficulty level that nothing the referee could roll would lower the average enough to fail. In most cases, however, the player will be unsure as to the success of the attempt, and consequently of the veracity of the information gathered.

The referee, of course, will know. If the task attempt was successful, the player should be given completely accurate information; if unsuccessful, he should be given false information (just how false the information is should be decided by the referee, but it is suggested that the margin of failure can serve as a guide).

CRUCIAL ASSETS

Assets specified for a task are considered crucial. They are important to the accomplishment of the task.

Characteristics or attributes listed for a task contribute to its accomplishment, and because all characters have characteristics, the individual performing the task will have some value (even zero) that applies to it.

Skills, however, may not be present in the character attempting a task. If a character does not have the crucial skill, then attempting the task is more difficult; increase the difficulty of the task by two levels (perhaps even to impossible).

If the character has a related skill (in the referee's judgement), then the task may be attempted at one higher level of difficulty rather than two. Occasionally, the referee may decide that a character may be allowed to use a Intelligence, Education, or an average of the two as a related skill. This represents all of the character's intellect, knowledge, and experience being brought to bear. It is the referee's decision as to when this may be allowed, but the difficulty level of the task should still be raised a level, as the necessary skill is missing.

Unskilled tasks indicate assets which are helpful rather than vital; for unskilled tasks, these assets are not essential and the lack of them does not hurt a task attempt.

SOME IDEAS FOR USE OF TASKS

Used properly, tasks can help the flow of an adventure along.

The Effects of Randomness: The random aspect of task accomplishment is there for a reason; it adds an element of uncertainty to any task and prevents absolute prediction of the outcome, but does allow reasonable prediction of time and success. Players can analyze any task

situation, decide ahead of time how much chance they have of success (just as they would in the real world), and perhaps seek out simpler alternatives if they decide that the problem they face is too great.

For example, faced with a vehicle that has sustained major damage, a character with mechanical skills might still attempt to repair it, while an outdoorsman would consider the time required and the chances of success and decide to continue his journey on foot.

Research: The process of researching information is easily handled by the task system. Research in the laboratory or in the field can be conducted through a series of separate but interrelated tasks.

Once a topic for research has been established, the referee can establish a sequence of related and dependent tasks which will lead to the desired result. At the same time, a related series of tasks can be established which are dead ends, false starts, unnecessarily long sequences, and expensive delays. With this small library of tasks, the research project can begin.

Research begins with a literature search. The task allows the character to consult available data in a reference library, in the computer, or even through discussion with colleagues. Such a task is uncertain, and its ideal result is a research plan which involves a series of tasks leading to the desired goal, result, or outcome. Total success in the literature search produces a totally workable and efficient research plan; less than total success results in the creation of a less usable and/or unwieldy plan.

The tasks of any research plan are themselves uncertain. Progress toward the desired result may be slow and full of delays, but ultimately, every course of action will show itself as valid or invalid.

But achieving the goal of the research once is not enough. The uncertainty of the truth of any task outcome means that results can be trusted only when they are repeatable with accuracy. A researcher must repeat his experiments until he is certain he is getting accurate, repeatable results.

Some tasks in research may be hazardous; the researcher risks injury or equipment damage during his endeavors.

Diagnosis: The uncertain task type can be used to diagnose the extent of damage to mechanisms. It can also be used in the diagnosis of disease or trauma effects, equipment malfunctions, or computer programming bugs.

Logical Prediction and Thought Processes: Even thinking can be a task within this system. Instead of forcing a player to solve a puzzle himself, the task system makes it possible for a player to approach a scientific, mathematical, social, or technical problem as a task. Faced with a fragment of text in a foreign language, a character could perform the task "to translate using a foreign language dictionary," modified by intelligence and foreign language skill (related foreign languages could serve as lower level modifiers). Confronted with a group of related clues, a player could perform the uncertain task "to analyze available data." Role playing by the player will always help the referee create and administer tasks, but the task system itself allows a player of above average intelligence to play a character at the genius level.

Cooperation and Teamwork: When more than one character are attempting to accomplish a task together, their cooperation can be taken into account when determining success.

Teamwork indicates that the participants are working together as a team, in close proximity to each other, and with each depending on the others as they work. The crew of a sailing vessel is a team; several medics working on a patient are a team; the pit crew servicing a racing car is a team. When a team attempts a task, the referee must specify the number of individuals required, and determine the difficulty of the task based on the number participating. An average of the characters' skill levels with the crucial skill is used as a die modifier.

Cooperation indicates that the participants each have their own tasks to complete, but that the overall cooperative task depends on these subordinate tasks being completed. Each individual cooperating is assigned a personal task; these personal tasks are classified as supportive or vital. Successfully completed supportive tasks contribute DMs to the completion of vital tasks; vital tasks must be completed or the overall task will fail.

Whenever a cooperation or a teamwork task fails, the results of failure are rolled for each character individually. Any of the characters who are instructed to "check determination," and then fail that determination check, will not be willing to participate in any new attempts at the cooperation task.

COMPETITION TASKS

Now and then a player may find his character attempting a task at which he is directly opposed by another character. Examples would include such things as tug-of-war, arm wrestling, a chess match, or convincing a third party to vote for a particular course of action.

These types of tasks are termed competition tasks and require a special use of the task resolution system. A competition task uses the following form:

Task: To win at a competitive activity: Routine. Appropriate attribute and/or skill modifiers minus opponent's appropriate attribute and/or skill modifiers. Interval of time.

Competition tasks are almost always routine (the referee may decide to make them more or less difficult depending upon the circumstances). Both competing individuals (or teams) roll for the task, adding their attribute and skill modifiers to the die roll and subtracting their opponents' modifiers. If both sides succeed at the task, the competition has not been resolved, and the task must be rolled for again. If both sides fail, the same is true. If, however, one side succeeds and the other one fails, the succeeding side has won the competitive event.

GENERATING TASK DESCRIPTIONS

Tasks are described in various **2300 AD** situations, but the referee will still be called upon to generate task descriptions as adventures progress. Generating task descriptions can be relatively easy if the referee understands the task to be described.

Checklist

1. Referee defines task in general terms.
2. Determines crucial assets.
 A. Characteristics.
 B. Skills.
3. Determines type of task.
 A. Standard.
 B. Uncertain.
 C. Unskilled.
 D. Hazardous.
4. Determine average time to complete task, then divide by 10 to determine time period statement. Decide if absolute or instant time is applicable.
5. Determine difficulty level of task.
6. Record task description.

EXAMPLES AND FORMATS

The following are examples of how to express tasks.

Standard: A standard task uses the basic task format without exception.

Task: To force open a door: Routine. Strength. 6 seconds.

Unskilled: An unskilled task is affected by assets which are helpful but not vital.

Task: To find information from a computer data bank (Unskilled): Difficult. Computer. 10 minutes.

Hasty: A hasty task increases difficulty level by one, but doubles the DMs for time.

Task: To find information from a computer data bank (Hasty): Formidable. Computer. 10 minutes.

Hazardous: A hazardous task, if failed, requires use of 3D6 on the Failure Type table.

Task: To disarm an unexploded warhead (Hazardous): Routine. Demolitions. 20 minutes.

Uncertain: An uncertain task provides information which the participants cannot tell for certain is accurate. Internal cues during the procedure, however, help participants to evaluate the quality of the information.

Task: To debug a computer program (Uncertain): Routine. Computer. 15 minutes.

Teamwork: A teamwork task uses more than one character working together to complete the same task, with each depending on the others for a contribution to completion. Each player must succeed at his die roll for the task to succeed as a whole. Otherwise, the task fails with an appropriate loss of time.

Task: To push a vehicle out of a ditch (Teamwork): Formidable. Strength. 1 minute.
Referee: Minimum two individuals plus a driver. Difficulty decreases by 1 for each additional individual.

Task Resolution

TASK FORMAT

Task: To accomplish a task: Routine. Skills and characteristics. Time.

Task Signal.

Task Statement.

Difficulty level.

Add to die roll.

Die modifiers.

Subtract from die roll.

Time interval.

TASK DIFFICULTY (1D10)

Difficulty	Roll Needed
Simple	2+
Routine	6+
Difficult	10+
Formidable	14+
Impossible	18+

FAILURE (2D6 OR 3D6)

Throw	Failure Type
2-6	Retry
7-10	Check Determination
11-14	Mishap (2D6)
15+	Serious Mishap (3D6)

MISHAPS

Throw	Consequences
2-6	Superficial Damage
7-10	Minor Mishap
11-14	Major Mishap
15+	Total Mishap

DAMAGE AND REPAIR

Damage Level	Operable?	Repair Task (Shop)	Repair Cost
Superficial	Yes	Simple	1D10× 1%
Minor	No	Routine	1D10× 5%
Major	No	Difficult	1D10×10%
Destroyed	No	Formidable	1D10×20%

TASK TYPES

Standard: Any task which states the standard task components: statement, difficulty, assets, and time.

Hasty: Any task declared hasty by the player or referee; difficulty is increased by one level, and time required is reduced by double the asset modifiers.

Hazardous: Any task declared hazardous by the referee or the rules; hazardous tasks use 3D6 on the Failure table.

Unskilled: Any task *not requiring* a specific skill for accomplishment. If a skill is stated and the character has it, it may be used, but there is no penalty for lack of the skill.

Uncertain: A task whose results are uncertain to the characters.

DETERMINATION

Characters must check determination in order to retry some tasks.

Task: To stay determined after failure of a task: Difficult. Determination. Instant.
Referee: If this task is successful, the character may retry immediately without penalty. If unsuccessful, the character may retry immediately at one increase in difficulty, or retry with no penalty after waiting 10 times the actual duration of the failed task.

SPECIAL CASES

A task may have special instructions which further detail how the task is to be performed. A note to the referee below the task may state repeatability, consequences, substitute skills or attributes, or other information.

CHECKLIST

1. Referee defines task in general terms.
2. Referee determines crucial assets.
   A. Characteristics.
   B. Skills.
3. Referee determines type of task.
   A. Standard.
   B. Uncertain.
   C. Unskilled.
   D. Hazardous.
4. Referee determines average time to complete task, and establishes time period.
5. Referee decides task difficulty level.
6. Referee records task description.
7. Player may declare a "hasty" attempt.

CHARACTERISTICS

Crucial characteristics are *divided by 4* (fractions are dropped, producing a range from 0 to 5) and are a positive DM called an asset modifier.

TIME

Time shown is *one-tenth* the average time required to complete the task.

Standard. The throw for time is 3D6, with asset modifiers subtracted; minimum result is 3.

Instant. If a task is labeled "instant," it takes no time. Split second decisions and many reactions are instant.

Absolute. If a task is labeled absolute, it takes the time specified. Many combat actions are absolute and use one action within the combat structure.

FUMBLE

A natural roll of 1 when resolving a task automatically produces a fumble and the task fails, regardless of the asset modifiers on the task. The referee may decide that such a fumble is a minor inconvenience or a major roadblock.

UNCERTAIN TASKS

When an uncertain task is attempted, both the referee and the player roll for success (the referee rolls secretly).

If the average of the rolls is equal to or greater than the difficulty level, the attempt succeeds.

If the average of the rolls is less than the task difficulty, the task fails.

Only if the player rolls a natural 1 does the task fumble.

The referee should give the player information based on the average of the rolls but should not directly tell the player if the task was a success or a failure.

Non-Player Characters

NPC BODY TYPE

1D6	Type
1	Ectomorph
2	Endomorph
3	Mesomorph
4	Normal
5	Normal
6	Normal

NPC AGE

1D6	Age Group
1	Child or Teenager
2	Young Adult
3	Adult
4	Adult
5	Middle Aged
6	Elderly

A major part of the satisfaction to be experienced in refereeing is in playing the parts of all the non-player characters (NPCs) that the player characters meet during their adventures. Each player concentrates on acting the part of his own particular character. The referee, on the other hand, acts the part of every other person in an adventure. Sometimes he will play an individual, other times a crowd. Likewise, an NPC might be an innocent child, or he might be an aged villain. An NPC might even be a sapient alien or an animal. In every case, it will fall to the referee to act the part of the NPC and to make him, her, or it believable.

ALIEN NPCS

There are a number of sapient alien races in the **2300 AD** universe. Each has a distinct physiology and psychology. When playing a member of one of these races, the referee should refer to the appropriate section of the *Aliens* chapter of this book.

ANIMAL NPCS

Animals can also play an important part in **2300 AD** adventures. Often, the part they play will be as the object of an expedition or as a danger incurred during an adventure episode. The *Animal Encounters* chapter of this book explains how to design animals in the **2300 AD** universe.

HUMAN NPCS

Most encounters the player characters will have in their adventures will be with other humans. Consequently, humans make up the bulk of the NPCs the referee will be required to play.

Players have detailed characteristics worked out for their characters. They also have designed careers for them and character personalities to go with the statistics. During the course of play, all of these things are in the players' minds, determining how their characters act.

It is too much to expect the referee to design every NPC in such detail, and if he did, it would be nearly impossible to keep track of them all during play. It is also unnecessary. Only the main NPCs in an adventure need be designed in anything near the detail given to a player character.

But less important NPCs should *seem* just as real to the players (otherwise, not only will the adventure be less exciting, but the players will be able to determine just who is important by how real he seems). To make an NPC seem living and believable, the referee needs to know the NPC's appearance, abilities (career and skill level), and motivations. These may be decided upon well in advance of play, or they may be made up on the spur of the moment, if necessary.

NPC Appearance

An NPC's appearance will often be dictated by his career, his skill level, and even his motivations. That is to say, a football player will tend to look big, strong, and probably fairly young; a very experienced government clerk will likely be smaller and older since his job is less physical and he has probably spent years gaining his experience. Likewise, an NPC with a motivation of pompous arrogance will look different from one who is amiable and cooperative, simply because of their facial expressions and mannerisms. Just these few details begin to bring an NPC to life in the players' eyes. This is not to say that a government clerk *cannot* be muscular, but if he is, it will tell the referee that he probably works out a lot, another detail which adds an aura of reality to the NPC. If the referee desires, the tables in the sidebars on these two pages (all except the NPC Experience/Skill Level table at the top of the sidebar on the next page) can also be used to generate details about an NPC's appearance.

NPC Career

When designing an NPC, one of the first things a referee will want to decide upon is the NPC's career. Usually this will be determined by the role played by the NPC. If the NPC is the head of the local police force, for instance, he will either be an Administrator or a Law Enforcement expert. If the NPC is a pilot on a starship, he will be in a Space Crew Career.

If the NPC is a cook in a restaurant, it is obvious that his career is Cook, but this is not listed in the *Adventurer's Guide*. Neither is barber, retail clerk, fast food worker, or the like, yet player characters will encounter these types of NPCs in the worlds of **2300 AD**. For the referee's purposes, such NPCs may be placed in the Core World career category if from Earth, Tirane, or a *very* large city on a colonized world, or the Colonist career, if from a less populated area.

Some NPCs may have two careers listed, reflecting a broad range of skills.

NPC Skills

Once an NPC's career has been chosen, his skillfulness at that career must be decided. Player characters list each skill individually and keep track of advancement in that skill separately from all others. Very important NPCs can be designed in the same way. Less important NPCs, however, can be designed using a sort of shorthand. With this system, once the NPC's career has been chosen, the referee merely decides whether the NPC is rated as Green, Experienced, Veteran, or Elite. This ranking tells the referee what skill level the NPC has in Primary and Secondary skills related to his profession. The NPC Experience/Skill Levels table at the top of this page's sidebar shows what these skill levels are. (NPC experience rating also reveals certain things about how the NPC will react in combat—for an explanation, see the *Combat* chapter.)

NPC skill levels are not a definition of what an NPC knows, but an indication. The referee may well decide that although Sea Vehicle is a primary skill for a Colonist, a particular colonist has no knowledge of it at all. On the other hand, while a Veteran Administrator has a skill level of 2 listed for Psychology, the referee may decide that he actually has a level of 5.

NPC Attributes

As has been stated, some NPCs the referee will want to create with a good degree of the complexity used for a player character. For this reason, the *Aliens* chapter, for example, lists average attributes for each alien race. Most of the time, however, all the referee needs to know is what kind of a modifier an NPC gets on a task roll that lists an attribute as necessary.

For this purpose, typical NPCs can be divided into two groups—the physically oriented group, and the mentally oriented group. Usually this will be indicated by the NPC's career, skills, or appearance. Then the referee just needs to remember the numbers 2 and 3. If a NPC is mentally oriented, he will have a task modifier of 2 for tasks listing physical attributes as necessary and a modifier of 3 for mental tasks. If the NPC is physically oriented, he will have the reverse—a 3 for physical tasks, and a 2 for mental ones. NPC attribute numbers, together with career listings and skill levels, give the referee a thumbnail sketch of what abilities an NPC is likely to have.

NPC Motivations

Another thing that can be of aid to a referee in playing the part of an NPC is a definition of that NPC's motivations. In many cases the motivations of NPCs are either obvious or unimportant. For example, general background characters, such as merchants or enemy soldiers, do not require a precise definition of motivation. Motivation becomes necessary, however, with influential or potentially important NPCs.

To determine NPC motivation, draw two cards from a standard deck of playing cards. The highest value card is the NPC's prime motivation, the other is his secondary motivation. The particular motive is determined by the suit of the card. Card values may be *low* (2, 3, or 4), *middle* (5, 6, or 7), or *high* (8, 9, or 10). Aces and face cards have their own special meaning.

Clubs

The club suit indicates that violence plays a part in the NPC's makeup.

Low means the NPC is not frightened or intimidated by violence or its threat.

Middle means he is aggressive and accepts violence as a means of solving problems.

High means he loves a good fight. But it does not, however, indicate cruelty or brutality.

Jack: He is subject to sudden, violent, and uncontrollable rages.

Queen: He is stubborn, nearly impossible to persuade once he has made up his mind.

King: He is a sadistic brute who enjoys inflicting pain on others.

Ace: The NPC is a natural military leader with an instinctive grasp of tactics and a good eye for terrain. The referee should have him anticipate many situations and make allowances for them.

Diamonds

The diamonds suit indicates that the NPC has a concern for wealth.

Low means he is cost-conscious and interested in making money.

Middle means that making money is always his first consideration, and he will always haggle over prices and wages.

High means he is easy to bribe and might betray his friends if the price is right.

Jack: He is a total coward and will run from danger at every opportunity.

Queen: The NPC is driven by lust for the opposite sex, either for a particular person or just in general.

King: He is obsessed with money, believes everything has a price, and will do anything if the price is right.

Ace: He is generous to a fault and gladly gives whatever he has to those in need.

Most disputes with NPCs are resolved by means other than force. When players attempt to persuade an NPC to a particular view, it is a task, using the player character's eloquence and taking one minute. The actual conversation is role-played between the player and referee, and the referee will determine the difficulty level of the task based on the quality of the arguments used by the player. If, for example, the NPC is a coward, threats of violence will make persuasion fairly easy. If he is unafraid of violence and also has a strong sense of justice, such attempts at intimidation will make the task nearly impossible.

Hearts

The hearts suit indicates that the fellowship is very important to the NPC.

Low means he is amiable and cooperative.

Middle means he has a strong sense of loyalty to his group.

High means he has a strong commitment to fairness and reacts with anger to injustice and brutality.

Jack: The NPC is very wise, shows good judgement, and offers sound advice.

Queen: The NPC loves a person (friend, spouse, parent, or child) so completely that he would willingly sacrifice himself.

King: He is scrupulously honest and his word of honor is his absolute bond. He has contempt for liars and anyone who breaks his word.

Ace: He sees justice as the greatest virtue and the only important consideration in deciding on a course of action. He hates cheaters, liars, and crooks, and will always assist any attempt to right an injustice.

Spades

The spades suit indicates that the NPC has a desire for personal power.

Low level indicates a braggart who wishes to impress everyone with his importance.

Middle level indicates a willingness to take responsibility and a desire for a position of importance.

High level means he is ambitious and manipulates the people around him for his own end.

Jack: He is pompous and arrogant and clearly considers himself superior to others.

Queen: He will let nothing stand in the way of achieving any goal. He can appear to be considerate, generous, loyal, or anything else which serves his purpose, but beneath the exterior, he ruthlessly uses others for his own gain.

King: He is a liar, and probably a traitor as well.

Ace: He is a charismatic natural leader who draws others to him and inspires extreme loyalty.

Jokers

Jokers indicate that the NPC's sanity is in question.

Minor (Replacement) Joker: The NPC is a harmless and entertaining eccentric.

Major Joker: The NPC may actually appear to be completely normal or very eccentric, but he is genuinely and hopelessly insane. The direction of his insanity is indicated by his other motivation card.

Combat

The universe of **2300 AD** can sometimes be a dangerous place. Often, players will find themselves unable to talk their way out of a difficult situation; a resort to violence may be the only resolution to a problem or the only means of survival.

COMBAT OVERVIEW

The general heading of personal combat includes attacks against living beings and vehicles using weapons such as guns, knives, bare fists, explosives, even rocks. But regardless of the type of attack or the type of target, the results can always be determined by answering two questions:

1. Did you hit the target?
2. If so, how much damage did you do?

To resolve a combat attack, players and referee roll dice to determine the answers to these two questions. The specific rules vary, and there are many complications which handle circumstances, special weapons, and other details, but the two main questions always form the basis of any attack.

TURN SEQUENCE

Combat is fought in turns which represent 30 seconds of real time. In each turn, a character can perform any two of the following actions:

Remain stationary.
Move.
Attack.
Prepare a weapon.
Reload a weapon.
Change weapons.
Duck.
Special action.

Initiative

Coolness under fire is a splendid asset for any individual to have; it allows rational evaluation of a situation followed with capable action toward victory or survival. Characters with coolness under fire have *initiative*; initiative determines when, during a combat turn, the individual can conduct an action.

Characters have an initiative level equal to their coolness under fire; encumbered characters subtract 2 from initiative; body armor may also reduce initiative (as indicated in the body armor lists). However, initiative is never reduced below 1.

All actions are carried out during a turn at *initiative points*. Each initiative point corresponds to an initiative level of a character. During the turn, the referee calls out initiative points in descending order (beginning with the highest level—10—and counting down). A character may conduct one action when an initiative point corresponds to his initiative level, and may conduct a second action when the initiative point equals half (round fractions down) his initiative level. Characters with initiative level 1 may only perform one action per turn. For example, the referee begins specifying initiative points at 10 and counts down through 9, 8, 7, 6, etc. A character with initiative level 5 could perform one action when the count reached 5, and another when the count reached 2.

All characters performing an action at the same initiative point do so simultaneously, and actions take place during movement. That is, any character who fires can fire at anyone, including a character who is moving. Fire at a moving character may take place at any point during that movement.

If several characters attack at the same initiative point, they attack in order of the bulk of their weapons (weapon bulk is listed in the weapon descriptions; unarmed blows are treated as bulk 0).

Characters with bulk 0 weapons attack first, followed by characters with bulk 1 weapons, followed by characters with bulk 2 weapons, and so on. If characters have the same bulk weapons, they attack simultaneously.

Characters knocked down or killed by an attack at any time in a turn, stop conducting actions (except for a simultaneous action at the current initiative point) and lose eligibility for actions in the rest of the turn.

If all 10 initiative levels were represented by characters on one or both sides in a battle, there would be a maximum of 10 initiative points. In practice, there will be fewer initiative points in a turn since not all initiative levels will be present.

Opportunity Actions

Whenever a character's initiative point occurs, he may (instead of performing an action) "pass." Passing is an option to perform an action at a later initiative point in the current turn or the next turn. If he has not used the option by the time his next initiative point is reached, the option is lost (he spent his time waiting for something to happen, and it apparently didn't). A character may never have more than one pass available, but the option may be carried past the end of a turn and into the next.

For example, a character with initiative level 6 might reach initiative point 3 and pass. As initiative points 2 and 1 occur, he makes no action, and the turn ends. In the following turn, he could elect to use the option to perform an action at initiative point 10, 9, 8, or 7. If the option is not used by the time initiative point 6 is reached, it is lost, although he could then perform the normally possible action for initiative point 6.

Movement

When characters elect to move as an action, they may select a mode of movement and then move up to the distance allowed for that mode.

Four different movement modes are possible as an action: *crawling, walking, trotting,* and *running.*

The movement mode not only affects speed, it also affects the chance of being hit by enemy fire. Crawling makes use of all available cover; walking makes use of local partial cover; trotting and running do not use cover.

Attacks

There are two general types of attacks—*melee attacks* and *fire attacks.* A brief description of each is given below.

Melee attacks involve attempts to hit an enemy within touching range. Melee (which means a hand-to-hand fight) attacks may be armed blows (with a melee weapon such as a club or a knife), or unarmed blows (which includes such things as fist strikes, slaps, punches, kicks, or tackles).

Fire attacks involve attempts to hit a target with a projectile. The projectile may be a thrown rock, an arrow from a bow, a bullet fired from a gun, a beam from a laser, a missile or a rocket, or any other form of projected attack. Fire attacks may be *aimed fire* or *area fire.* Aimed fire involves aiming a single fire attack against a single target (much as a hunter or a sniper would). Area fire involves projecting a large volume of fire into an area with one or more targets (machine guns produce area fire).

Ducking

Ducking may be done in response to a fire attack. It uses up one of a character's two actions for a turn and places that character behind any available cover. Ducking takes place at the same initiative point as the fire attack, even if the ducking character does not normally act at that initiative point. In such cases, the ducking character simply loses the opportunity to act in his next initiative point.

Special Actions

Special actions include any actions a character may wish to perform that do not fall under one of the other headings. In most cases, it will be up to the referee to decide whether such an action is possible in the given situation.

Task: To fire a sidearm without Sidearm skill (Unskilled, Hazardous): Difficult. Intelligence, Education, and Combat Rifleman. Absolute (1 action).
Referee: *See note below.*

Task: To fire an infantry weapon without Combat Rifleman skill (Unskilled, Hazardous): Formidable. Intelligence, Education, and Sidearm. Absolute (1 action).
Referee: *See note below.*

Task: To fire a heavy weapon without Heavy Weapons skill (Unskilled, Hazardous): Impossible. Intelligence and Education. Absolute (1 action).
Referee: *See note below.*

Note: Success at one of these tasks means that beginning with his or her next action, the character can fire that weapon at a difficulty level one stage higher than normal. Failure at one of these tasks means that the weapon is damaged, if a mishap results. A fumble at one of these tasks means that the character has accidentally shot himself—roll for damage as an attack.

Task: To hit a target with aimed fire at close range. Routine. Applicable weapon skill. Absolute (1 action).
Referee: Difficulty increases one level with each increase in range, but decreases one level if target is stationary in the open. Failure at this task does not require the character to roll on the Failure Type table, and a roll of 1 is not a fumble, but simply an automatic miss.

FIRE COMBAT

Fire combat uses weapons which shoot a projectile, a bullet, or some object at a target. Basically, fire combat is used against targets which are some distance from the shooter.

Weapons are identified in the weapons chart as fire weapons if they can conduct aimed or area fire.

The weapons listing in the *Adventurer's Guide* gives available information about specific weapons. When characters select their weapons, this data should be transcribed to the weapons data sheet for use by the referee and the players. The weapons data sheet makes pertinent information available in one place for easy reference during play.

Human Limits

One character can only fire one weapon at a time. Even a vehicle gunner who has several weapons available can only fire one weapon at a time.

A character without the required skill for a fire weapon has little chance of using that weapon successfully. In order to figure out how to use such a weapon, the character must first make a roll for one of the first three tasks in the sidebar.

Rate of Fire

Weapon rate of fire is the number of aimed shots or area fire bursts that a weapon can fire in a combat round.

Range

Weapon range is the effective range of the weapon. There may be a different effective range for aimed fire and area fire. Close range is half the effective range; long range is twice the effective range; extreme range is four times the effective range.

Hit Procedure

The hit procedure is used to determine if a shot has hit the target. The procedure is different for aimed and area fire.

Aimed Fire

To perform aimed fire, a character must roll for the last task in the sidebar.

Flechette grenades may not fire aimed fire. Direct fire weapons' DPV is halved at extreme range; shotguns cannot fire at extreme range.

Area Fire

Area fire is directed at a single area 10 meters in diameter, and it attacks separately each figure in the target area and each target on a line between the weapon and the target area. Figures in the line of fire beyond the target area are attacked by half the weapon's area fire value if in the same range band as the target area. Figures beyond the range band are not affected.

Area fire depends on weapon characteristics rather than firer's skill. The weapon listing shows rounds per burst and area fire value of the burst at effective range. Area fire value is doubled at close range and halved at long and extreme range. Shotguns and flechette grenades do not halve their area fire value at long range; and they may not fire at extreme range. Flechette grenades do not double their area fire value at close range.

The chance of hitting a figure with area fire is determined from the area fire value and the rate of fire (number of bursts fired). Multiply the area fire value times the number of bursts fired to produce a to-hit number—round all fractions down (some weapons may become totally ineffective at extreme range even at maximum rate of fire). Roll 1D10 for each figure in the target area, beginning with those closest to the firer. If the die roll is equal to or less than the to-hit number, the figure is hit. If the roll is half or less of the to-hit number, the figure is hit twice; one-third or less means three hits; one-fourth or less means four hits; and so on. The weapon's rate of fire times the number of rounds per burst equals the number of rounds spent in an area fire attack. This is also the maximum possible number of hits that can be scored in the attack.

Characters subjected to area fire may elect to duck for cover. Player characters always have the option of ducking. NPCs may be forced to duck. Throw 1D10 and add the area fire value; if the

result is greater than the NPC's coolness, the NPC ducks.

Moving Area Fire: A player may move and conduct moving area fire. The actual action is either walking area fire or trotting area fire (it is not possible to perform area fire while crawling or running). Weapons with ROF 1 may not be used, and moving area fire cannot be performed at extreme range.

Walking area fire is resolved normally.

Trotting area fire treats each range band as one farther than it is. For example, trotting area fire at an area which is at close range treats it as if at effective range.

Cover

Characters who duck or who are protected by cover benefit from cover effects.

A character who is under full cover cannot be seen and cannot be hit. However, someone under full cover from an attacker may not choose that attacker as a target. It is possible for a character to be under full cover from one attacker, partial cover from another, and without cover from a third.

The target diagram shows what portions of a human target are under partial cover. The wound potential die roll determines whether the shot hit cover rather than target. Determine the cover armor value and subtract it from the weapon DPV. If any DPV remains, it then hits the character.

Damage

Fire attacks produce normal damage. Extreme range halves the DPV of a weapon; close range doubles it. If the DPV of a weapon is greater than 1, round fractions up to the next whole number. If the DPV of a weapon is 1 or less, round fractions to the nearest tenth.

A shotgun halves its DPV at long range (round fractions up). If a hit occurs, throw to determine the number of slugs that hit (the die rolled is shown in parentheses after the DPV of the shotgun). At close and effective range, the number rolled is the number of slugs hitting; at long range, half the number rolled (round fractions up) is the number of slugs hitting. Each slug does damage equal to the DPV of the shotgun.

Deviation

If a weapon which fires an exploding round (from a thrown hand grenade to artillery) misses its target, it deviates. Throw 1D10 for the distance of the deviation.

Multiply the deviation distance by the range for the type of weapon used to determine the actual deviation distance.

Use the scatter diagram to determine the direction of deviation. Using direction and distance, determine the location where the rounds impact.

Indirect Fire

Indirect fire is fire at a target that the firing weapon crew cannot see; they follow directions given by a forward observer who can see the target. Only indirect fire weapons can use indirect fire. Indirect fire weapons are rifle grenades, grenade launchers, howitzers, mortars, rockets, and missiles.

Calling Fire: To perform indirect fire, the weapon crew must be in contact (by radio or telephone) with a character (called the forward observer) who can see the target. The target is a stationary position; it can be a building or a geographic feature or even an open patch of ground. It can't be a moving vehicle (although it can be a place where the forward observer thinks the vehicle will be when the fire hits). Indirect fire attacks are conducted one turn after the forward observer requests them.

Resolving Fire: To resolve indirect fire, roll the task in the sidebar. If the shot misses, it deviates.

Effects: If a shot hits its intended target, it attacks that target with its normal DP value. If it is an exploding round, it instead does contact, concussion, and fragmentation damage as an explosion. (Explosions are explained later in this chapter.)

Self-Observed Fire: The firing character may act as his own observer if he can see the target. Observing for oneself is done if the target is out of the weapon's direct fire range or if the weapon has no direct fire capability. For self-observed fire, only the firing player's weapon skill is used.

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THROWN WEAPONS

Any hard object may be thrown at a target. Hitting a target is resolved as aimed fire using the character's thrown weapon ability. Effective range for thrown weapons is equal to the character's throw range if the object weighs one kilogram or less; if the object weighs more than one kilogram, effective range for that object is the character's throw range divided by the object's weight in kilograms.

If a thrown object hits the target, it will cause blunt trauma damage; use a damage point value equal to the character's strength divided by 20, rounding fractions down to the nearest tenth.

A throwing knife inflicts normal damage with a DPV of 0.3, regardless of the range and strength of the thrower.

Hand Grenades: Hand grenades are thrown weapons thrown at specific targets. If the throw misses, it deviates (in accordance with the deviation rule). Total deviation, however, may never exceed the range of the throw (a grenade thrown at a target 20 meters away cannot deviate more than 20 meters).

All grenades explode when they hit (if at least five meters from the thrower—because of safety devices). Depending on the grenade type, they do contact, concussion and/or fragmentation damage, as noted in the grenade descriptions.

The actual chance to hit with a grenade is affected by the size of the target and other circumstances. The referee may analyze the situation and reduce the difficulty of a throw (perhaps against a bunker or tank), or increase it (perhaps against a small window or firing slit).

MELEE COMBAT

Characters who are within two meters of each other can make melee attacks. There are four possible melee attacks: strikes, grapples, escapes, and diving blows. Strikes and diving blows try to do damage to the target, while grapples try to seize and hold the target, and escapes try to counter such a hold. All melee attacks are unarmed, except for strikes, which may be either armed or unarmed.

Procedure: During the combat turn, a character may select a melee action at an initiative point. Performance of a melee action may allow the target to attempt a response (which does not count as an action).

Melee actions are resolved by task rolls. With this use of the task system, a natural roll of 1 means an automatic miss, not a fumble, and a failed roll does not require the character to roll on the Failure Type table.

Strikes: A strike tries to inflict damage by hitting an opponent. The attack may be armed or
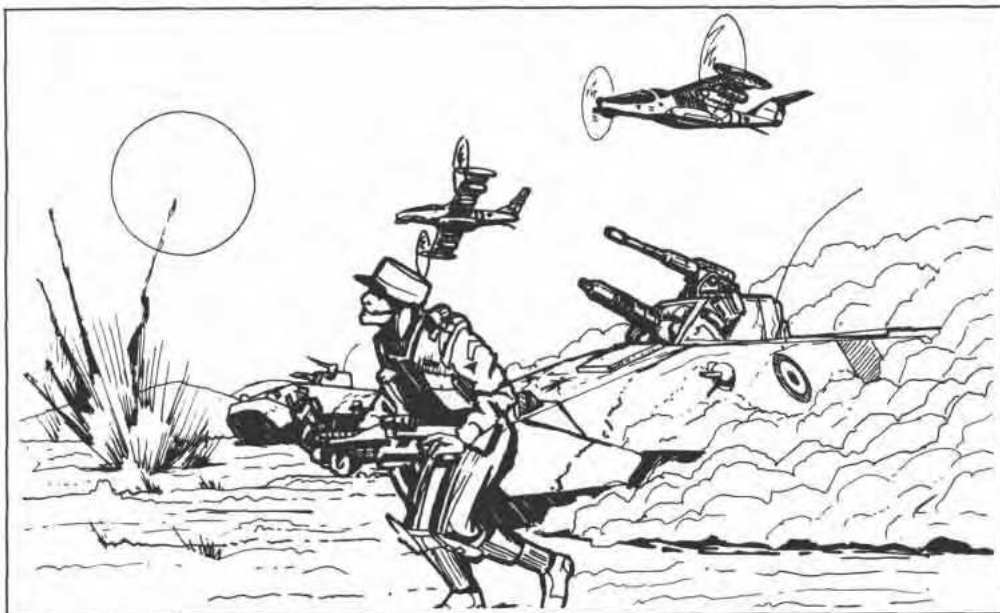
unarmed. Armed attacks use melee weapons and may be at long melee range or short melee range (depending upon the weapon's range listing—unarmed attacks take place at short melee range). To strike an opponent, a character must roll for the first task in the preceding sidebar.

A character who is the target of a strike attack may immediately attempt to block, even if that character normally cannot act during the initiative point. Blocking is a free action—it does not count as one of a character's two actions in a combat turn, but it does prohibit the blocking character from making a fire attack as his next action. To successfully block a strike, a character must roll for the second task in the sidebar.

A successful unarmed strike has a DPV equal to the attacker's (strength + melee)/30 (round fractions down to the next tenth). A successful armed strike uses the DP value of the weapon. Armor is subtracted from the DP value of an attack; however, armor is never breached by a strike attack.

Unarmed strikes inflict stun damage; characters with Melee-4 or higher may choose to inflict blunt trauma instead. Armed strikes using weapons labelled "blunt" cause blunt trauma.

Diving Blows: Diving blows attempt to knock down an opponent and inflict stun damage. A diving blow is automatic unless the target avoids it (avoiding is possible; blocking is not). If the target is not surprised, he may attempt to avoid it by rolling for the first task in the sidebar.

If a diving blow is avoided, the attacker is knocked down.

If the diving blow is not avoided, compare the attacker's size times 2 + 1D6 to the defender's strength plus size. The lower value receives the damage (if equal, both receive the damage). Damage received is equal to 1 stun hit (DP value = 0.5). Armor has no effect on diving blows.

Grapples: A grapple is an attempt to place an opponent under control. To successfully grapple, a character must roll for the second task in the sidebar. Blocking a grapple is not possible; armor and range have no effect.

The target of a grapple receives one hit of stun damage; DPV equals attacker's (strength + melee)/30. Treat any stun points received as control points instead. Control points are a temporary indicator of who is winning in a grappling melee. When control points equal or exceed the target's strength, the target ceases struggling and may not move; the controlling character may not move without releasing control.

Until a target is controlled, he may attempt to escape or grapple. If both characters grapple, the first to achieve sufficient control points then controls the opponent.

Escape: An escape is an attempt to move out of the control of an opponent. In order to escape a grapple, a character must roll for the third task in the sidebar.

A successful escape removes all control points that the opponent has on the character.

Task: To drive evasively: Routine. Driver. Absolute (1 action).

Task: To avoid a crash: Difficult. Appropriate vehicle skill. Instant.

Task: To emplace an explosive charge (Uncertain): Easy. Demolitions. 1 minute.

Referee: Treat total failure as immediate detonation of the charge. Treat any result in which one roll succeeds but the other fails (even though the average indicates success) as failure of the charge when triggered.

WIDE AREA SATURATION PROJECTILES

Wasp rounds scatter a large number of grenades or bomblets over a wide area. While the listed burst radius is very large, there is a high concentration of fragments in this area and very little fragmentation beyond it. Only characters within the burst radius of a wasp round are subject to fragmentation hits. All characters within the burst radius receive a contact hit on a throw of 1 (1D10); vehicles receive a contact hit on a throw of 3 or less (1D10).

VEHICLE COMBAT

Vehicles add another important element to combat. Rules for using vehicles are outlined below.

Vehicle Movement: Vehicles move at the initiative point of their drivers and fire weapons at the initiative point of their gunners. Vehicles manned by NPCs use standard NPC initiative levels. Riding animals move at the initiative point of their riders. Vehicles may move their listed combat movement rates each action. If the driver wishes, he may move at double speed by successfully rolling for the first task in the sidebar.

A driver may also use evasive driving tactics by rolling for the second task in the sidebar. Success in driving evasively allows the vehicle to use its full evasion rating against an incoming missile. Nonevading vehicles use one-tenth their evasion rating.

Vehicle Hit Location: A vehicle may be hit on one of several faces (front, overhead, flank, rear, or bottom), or in the suspension (a hovercraft's suspension is its plenum chamber). A face hit is determined by the direction from which fire was received. Overhead missiles always strike the overhead. If front, rear, bottom, or flank was hit, a result of 3 or less (on 1D10) creates a suspension hit; a result of 4 or more creates a hull hit.

Damage: If the vehicle hull was hit, compare the DPV of the weapon to the armor value of the face of the vehicle hit. If the DPV is equal to or less than the armor value, the hit does not penetrate and does no damage. If the DPV is greater than the armor value, throw 1D10 and add 1 for each 5 DPV in excess of the vehicle armor and consult the vehicle damage chart.

If the fire attack hits the suspension instead of the hull, compare the DPV of the fire attack to the armor value of the suspension. If the DPV is equal to or less than the suspension armor value, the hit does not penetrate and does no damage. If the DPV is greater than the armor value of the suspension, it damages the suspension. Divide the DPV of the weapon by the armor value and round all fractions down (if the armor value is less than 1—divide the DPV by 1). The result is the number of damage points inflicted on the suspension. All vehicles are reduced to half speed after five damage points to the suspension, and are immobilized after 10 damage points.

Vehicle Damage Effects: Damage on the Vehicle Damage table ranges from no effect to catastrophe. Each effect is explained below.

No Effect: The vehicle is unaffected.

Crew Hit: One crewmember is hit. If a player character, roll for the wound potential using the DPV that penetrated the vehicle. The crewmember receives normal damage.

2 Crew Hits: Two crewmembers are hit. (Resolve each as with Crew Hit, above).

Armament: One weapon, determined by the referee (at random if necessary) is destroyed. One of the weapon's crewmembers receives a hit as well (resolve it as a Crew Hit).

Mobility: The vehicle is stopped and suffers one crew hit. If airborne, the vehicle crashes. If moving at double speed, the driver must successfully roll the task in the sidebar to avoid a crash.

Catastrophe: The vehicle is destroyed and the crew is killed.

MISSILES

Missiles are used to attack vehicle-sized targets. All missiles available are homing missiles; once fired, the missile will seek its target until it hits, or misses and explodes. Missiles are listed in the equipment list. They have the following characteristics:

Launcher Weight: The mass (in kilograms) of the launcher.

Missile Weight: The mass (in kilograms) of the missile.

Range: The maximum distance (in meters) the missile can travel to a target. If the missile misses, or it does not hit, it crashes.

Guidance: The type of guidance system used for the missile.

Fully automatic guidance allows a missile to be fired into the general vicinity of enemy vehicles and it will seek out and attack a target. Firing such a missile constitutes one action.

Automatic after lock-on guidance requires that a gunner observe and indicate a specific target vehicle. Observe includes visual acquisition in the missile launcher sights, or acquisition by vehicle sensors. The missile then seeks out that specific target vehicle. Locating a target and firing such a missile requires one action, but the gunner must continue to observe the target until the missile hits, during which time the gunner cannot perform another action.

Homing Value: The chance that the missile will hit its intended target. Subtract target vehicle

evasion rating (if any) from missile homing value and throw (on 1D10) that number or less to hit; otherwise, the missile missed and crashed. Regardless of the homing value of the missile, it always misses on a throw of 10.

Attack Angle: The angle or approach that a missile makes against its target. Overhead missiles always attack by flying overhead and diving on the target. Direct missiles attack directly along their line of flight. Selectable missiles may be set to overhead or direct by the gunner before launch.

Damage: The explosive points the missile warhead produces. All missiles cause damage as tamped explosions.

EXPLOSIVES

Explosives have many more uses than just in combat (indeed, most of their uses are not combat related). But as combat is an important application of explosives, the rules for explosives are detailed here, in the *Combat* chapter.

Explosive Effects

Regardless of the type of explosive, all tend to produce three types of effects: explosive contact damage, concussion, and fragmentation.

Explosive Contact Damage: Explosive contact damage is caused whenever an object (be it a brick wall or a human body) is in direct contact with an explosive when it goes off. Contact damage is resolved as a normal damage attack using the EP value for the explosive.

Concussion: All explosions have a concussion value which affects every character within five meters and may affect characters further away as well. For each additional five meters from the explosion, halve the concussion value (round fractions down). For example, an explosion with a concussion value of 8 at five meters produces a concussion value of 4 at 10 meters, 2 at 15 meters, and 1 at 20 meters.

The chance of being hit by concussion equals the concussion value of the explosive at the appropriate range. Throw that number or less on 1D10. If hit, the explosion produces blunt trauma damage with a DP value equal to the range's concussion value. The basic concussion value for an explosive equals twice its EP value.

Fragmentation: Most explosions produce fragmentation. Fragmentation is produced when the explosive is in contact with a hard material that will produce fragments (a rock cliff face, a wooden wall, an explosive shell's steel casing, and the like).

All explosions that produce fragments have a burst radius. An explosion with an EP value of 1 has a burst radius of five meters. Doubling EP value adds five meters to the burst radius (EP 2 equals 10 meters; EP 4 equals 15 meters, etc.). Every character within the burst radius has a 60 percent chance of being hit by 1D6 fragments with a DPV of 0.4. Characters within twice the burst radius have a 20 percent chance of being hit by 1D6 fragments with a DPV of 0.2.

Setting Charges

An explosive charge is one or more blocks of explosive (or a container of bulk explosive) connected together and with a total mass of 10 kilograms or less. To successfully emplace an explosive charge, a character must roll for the fourth task in the sidebar on the previous page.

Tamping Explosives

Tamping a set charge with additional heavy material (such as sandbags or large rocks) contains the force of the explosion and directs it toward the intended surface (some explosive shells are designed to do this as well). A tamped charge has half the normal concussion value (1 per EP instead of 2), always produces fragmentation at the explosion's normal burst radius, and does four times normal contact damage (DP value=4×EP value).

Breaching Barriers

Demolition charges can be used to breach walls, armor plates, starship hulls, embankments, or other barriers. Explosive shells can produce the same effects. To determine the size of breach a charge will make, find its maximum penetration, in centimeters, in the material. Divide the contact damage DP value of the charge by the armor multiplier of the barrier material. The result is the maximum penetration, in centimeters, of the charge in the material. The diameter of the breach is the maximum penetration of the demolition charge minus the thickness of the barrier.

WOUND DAMAGE

Wound damage comes in three types: *normal*, *blunt trauma*, and *stun*. Normal damage is significant surface and internal tissue damage (as in burns or gunshot wounds). Blunt trauma is impact damage or crushing (as in blows from a club, concussion, or perhaps crushing from a tire rollover). Stun is damage to the central nervous system (as in electric shock, or incapacitating gas). All three types of damage are resolved similarly, but they have slightly differing effects.

The Extent of Damage

After a character has been hit (by a fire attack or a melee attack), to find the extent of damage, first find the potential effect and then resolve the actual effect. To find the potential effect, throw 1D10 on the target hits diagram to find the type of wound (kill, serious, or light wound) and the hit location. The Wounding table has bars that correspond to each of these wound types. To find the actual effect, find the damage type (normal, blunt, or stun) within the appropriate bar and compare it to the DP value of the attack. Exact explanations of the effects of each type of wound are given below:

Potential Kill: A potential kill affects a character as follows:

Normal Damage: If weapon DPV is 1 or greater, the target is killed. If weapon DPV is less than 1, roll 1D10. If the 1D10 roll is less than or equal to the DPV times 10, the target is killed. Otherwise, the target suffers one shock point and is knocked down.

Blunt Trauma: Effects are identical to normal damage.

Stun: Stun inflicts four stun points (or the DP value of the stun weapon, whichever is larger), and the target is knocked down.

Potential Serious Wound: A potential serious wound affects a character as follows:

Normal Damage: If the weapon DPV is 1 or greater, the target suffers one shock point per damage point of the weapon and is knocked down. If weapon DPV is less than 1, roll 1D10. If that result is less than or equal to the DPV times 10, the target suffers a shock point and is knocked down. Otherwise, the target suffers a light wound and is knocked down.

Blunt Trauma: Blunt trauma creates exactly the same effects as normal damage in this case, with the exception that every odd shock point (1, 3, 5, etc.) becomes a stun point instead.

Stun: If the weapon DPV is 1 or greater, the target suffers one stun point per damage point of the weapon and is knocked down. If the weapon DPV is less than 1, roll 1D10. If that result is less than or equal to the weapon DPV times 10, the target suffers one stun point and is knocked down. Otherwise the target just suffers the one stun point.

Potential Light Wound: Potential light wounds do damage as follows:

Normal Damage: If the weapon DPV is 1 or greater, the target is knocked down and suffers a light wound. If weapon DPV is less than 1, roll 1D10. If that result is less than or equal to the DPV times 10, the target is knocked down and suffers a light wound. Otherwise, there is no effect.

Blunt Trauma: If the weapon's DPV is 1 or greater, or if a 1D10 roll is less than or equal to the DPV times 10, the target is knocked down. Otherwise, there is no effect.

Stun: If the weapon's DPV is 1 or greater, or if its DPV times 10 is greater than or equal to a 1D10 roll, the target suffers one point of stun. Otherwise, there is no effect.

The Effects of Damage

Wounding results have the following effects:

Kill: The character is dead. Head hit kills are absolute; other hit kills may be eligible for resuscitation.

Shock Point: The character is dazed. Initiative is reduced by −3, but never below 1 until the character is unconscious. NPCs are made unconscious after receiving 1 shock point. A player character is unconscious when his total of shock and stun points equals his consciousness level. A character is dead when his shock points equal his life level.

Stun Point: The character is dazed. Initiative is reduced by −3, but never below 1 until the character is unconscious. NPCs are made unconscious after receiving 3 stun points. A player character is unconscious when his total of shock and stun points equals his consciousness level.

Light Wounds: The character is immobilized for the rest of the combat turn. Initiative level is reduced by 1 per light wound. NPCs may be incapacitated by light wounds. Green NPCs are

incapacitated by 1 light wound; Experienced NPCs are incapacitated by 2; Veterans by 3; and Elites by 4.

Knocked Down: The character is knocked or blown down by the force of the attack or blow and is dazed. Knocked down applies even to individuals who are already down.

Dazed: The character cannot move or act. He is assumed prone, motionless, and is under any available cover. Dazed remains in effect for a number of turns equal to the total of shock and stun points the character has received (and this effect is cumulative). If the character has no shock or stun points, dazed applies only until the end of the combat turn. All eligibility for further actions in the combat turn is lost, regardless of initiative level. Any passed or option actions are lost.

ARMOR EFFECTS

Characters may wear personal armor, or they may be sheltered by vehicle armor or some other cover that protects them somewhat from wounding.

Different portions of the body may be protected differently, such as a character wearing an armored vest but no leg protection, or a character standing behind a waist-high concrete wall. When hit location is determined, only the armor for that particular location is used in determining armor's protection.

General Rule: For most types of damage, the armor value is subtracted from the DP Value of the weapon, and the remainder is used to determine the effects of the wound.

Personal Armor: There are three types of personal armor: nonrigid, rigid, and inertial. Nonrigid armor is made up of flexible material which is extremely tough and resists puncture by a bullet or energy beam. Since it is flexible, it does not inhibit movement made by the wearer to the extent that rigid armor does. Rigid armor is made up of solid pieces of armor, such as a breastplate, and is more restrictive of movement. Inertial armor is flexible like nonrigid armor but becomes very rigid when struck by a fast-moving projectile (such as a bullet or piece of shrapnel).

The difference among nonrigid, rigid, and inertial armor is only important when resolving blunt trauma or stun injuries. This is also the only case in which the effects of armor are figured differently from the general rule above.

Nonpenetrating Kinetic Energy Rounds: A kinetic energy round that has a DPV less than that of the armor will not penetrate but instead will cause either blunt trauma or stun damage. If the round hits rigid or inertial armor, it inflicts stun damage; if the round hits nonrigid armor, it inflicts blunt trauma damage. In all cases, half of the armor value is subtracted from the round's DP value, and the potential seriousness of the wound is reduced one bar on the Wounding table.

WOUNDS AND RECOVERY

A wounded character may be treated and the severity or consequences of a wound reduced.

Resuscitation: Head wound kills cannot be reversed. Torso wound kills or death through shock points may be resuscitated.

Resuscitation must take place within 60 minutes of death or irreversible brain damage makes it impossible. To resuscitate a wounded individual, a character must roll for the task in the sidebar.

Stabilizing Serious Wounds: Shock points (representing serious wounds) require immediate medical care, or a deterioration in condition adds more shock points and brings on death. To stabilize wounds, a character must roll for the second task in the sidebar.

There are five critical times for wound stabilization; at each point, if the wound is not yet stabilized, there is a chance the condition will deteriorate. Critical points are listed in the sidebar.

At each point, throw 1D10. If the result is less than or equal to the number of shock points suffered so far, the character receives one additional shock point. Otherwise no further effects are suffered at that point. It is not impossible for a wounded individual to stabilize himself (by effort or naturally). If he has not died from shock points within 12 hours of the wound, he has stabilized naturally. Of course, deterioration of a serious wound at the crisis points can also produce enough shock points to bring on death.

Regaining Consciousness: If a character became unconscious, throw 1D10 every hour. If the result is less than the number of hours unconscious, the character regains consciousness.

Healing: A character naturally recovers from one light wound and one shock point per week. Additional healing is possible as a result of medical care, expressed by the third task in the sidebar.

Combat Resolution

ARMOR VALUES

Cover	Armor Value
Wood	.025
Loose Dirt	.03
Packed Dirt, Stone	.15
Brick, Cement	.25
Reinforced Concrete	.5
Construction Steel	.8
Hardened Steel	1.0
Aligned Crystal Steel	1.5
Construction Composites	2.0
Composite Matrix Armor	3.0

NON-PLAYER CHARACTERS

Experience	Cool	Incapaci-tation	Prim. Skills	Rel. Skills
Green	4	1	0	—
Exper.	6	2	1	0
Veteran	8	3	2	1
Elite	10	4	3	2

Cool: Coolness is the NPC's initiative level and chance to duck in area fire.

Incapacitation: Incapacitation shows the number of light wounds required to incapacitate an NPC.

WOUNDING

Potential Wound	Damage Type	DPV = 1 +	1D10 ≤ DPV × 10	1D10 > DPV × 10
Kill	Normal	Kill	Kill	Shock, KD
	Blunt	Kill	Kill	Shock, KD
	Stun	4 Stun (or DPV×times Stun, if more), KD		
Serious	Normal	DPV×Shock*, KD	Shock, KD	Light Wound, KD
	Blunt	DPV×Shock*, KD	Shock, KD	Light Wound, KD
	Stun	DPV×Stun, KD	Stun, KD	Stun
		*Note: Every odd (1,3,5...) Shock is a Stun instead		
Light Wound	Normal	Light Wound, KD	Light Wound, KD	No Effect
	Blunt	KD	KD	No Effect
	Stun	Stun	Stun	No Effect

Normal damage is significant surface and internal tissue damage (as in burns or gunshot wounds). *Blunt trauma* is impact damage or crushing (as in blows from a club, concussion, or perhaps crushing from a tire rollover). *Stun* is damage to the central nervous system (as in electric shock or incapacitating gas).

Wound Effects

Kill: The character is dead. Head hit kills are absolute; other hit kills may be eligible for resuscitation.

Shock Point: The character is dazed. Initiative is reduced by −3, but never below 1 until the character is unconscious. NPCs are made unconscious after receiving one shock point. A character is unconscious when his total of shock and stun points equals his consciousness level. A character is dead when his shock points equal his life level.

Stun Point: The character is dazed. Initiative is reduced by −3, but never below 1 until the character is unconscious. NPCs become unconscious after receiving three stun points. A character is unconscious when his total of shock and stun points equals his consciousness level.

Light Wound: The character is immobilized for the rest of the combat turn. Initiative level is reduced by 1.

Knocked Down: The character is knocked down by the attack and is dazed.

Dazed: The character cannot move or act, and is assumed prone, motionless, and under any available cover. Dazed remains in effect for a number of turns equal to the total of shock and stun points the character has received (and this effect is cumulative). If no shock or stun points, dazed applies only until the end of the combat turn. All eligibility for further actions in the combat turn is lost, regardless of initiative level. Any passed or option actions are lost.

BASIC QUESTIONS

1. Did you hit the target?
2. If so, how much damage did you do?

ATTACKS

Fire attacks involve attempts to hit a target with a projectile.

Aimed fire involves aiming a single fire attack against a single target (much as a hunter or a sniper would).

Area fire involves projecting a large volume of fire into an area with one or more targets (machine guns and bombs produce area fire).

Melee attacks involve attempts to hit an enemy within touching range with armed or unarmed blows.

ALLOWED ACTIONS

Remain stationary.
Conduct aimed fire at one target.
Conduct area fire at one area.
Move.
Conduct walking area fire.
Conduct trotting area fire.
Reload a weapon.
Change weapons.
Duck.
Special action.

Responses do not count as actions:
Block a strike.
Avoid a diving blow.

MOVEMENT

Type	Meters per Turn
Crawling (uses all available cover)	5
Walking (uses available partial cover)	20
Trotting (no cover)	40
Running (no cover)	80

ARMOR EFFECTS

Armor effects are subtracted from the Damage Point Value (DPV) of the weapon, and the remainder is used to determine the effects of the wound.

RANGES

Effective range is stated for each weapon.

Close range is half effective range.

Long range is 2× effective range.

Extreme range is 4× effective range.

Combat Resolution

COMBAT TASKS

Task: To hit a target with aimed fire at close range: Routine. Marksmanship. Absolute (1 action).

Referee: Difficulty increases one level with each increase in range (difficult at effective range, formidable at long range, and impossible at extreme range). Shotguns may not fire at extreme range. Flechette grenades may not fire aimed fire.

Task: To hit a target with indirect fire: Difficult. Lower of Forward Observer or Marksmanship. Absolute (1 action).

Task: To hit a target using laser designation: Easy. Lower of Forward Observer or Marksmanship. Absolute (1 action).

Referee: Forward observer must actually be firing his spotting laser at, and hitting, the target when the projectile hits.

Task: To strike: Routine. Melee and melee modifiers. Absolute (1 action).

Referee: Using short range weapon against opponent with long range weapon makes the attack difficult. Surprise attacks (unexpected attacks from behind) are automatically successful.

Task: To block a strike: Difficult. Melee and melee modifiers. Instant.

Referee: A successful block blocks a would-be successful strike, and the strike misses. Trying a block prohibits fire attacks (but not melee attacks) at the next initiative point.

Task: To avoid a diving blow: Routine. Agility. Instant.

Referee: A diving blow is automatic unless the target avoids it.

Task: To grapple: Routine. Melee. Absolute (1 action).

Task: To escape: Routine. Melee. Absolute (1 action).

Task: To drive at double speed: Routine. Driver. Absolute (1 action).

Task: To drive evasively: Routine. Driver. Absolute (1 action).

Task: To emplace an explosive charge (uncertain): Easy. Demolitions. 1 minute.

Referee: If both rolls fail, the charge detonates immediately. If the average is failure, the charge fails to detonate when triggered.

VEHICLE DAMAGE

1D10	Result
1	No Effect
2	No Effect
3	Crew
4	2 Crew
5	Armament
6	Mobility
7	Armament
8	Mobility
9	Catastrophic
10	Mobility
11	Catastrophic
12	Armament
13	Catastrophic
14	Mobility
15+	Catastrophic

Effects: Crew Hit=One crewmember receives 1 hit by DPV of weapon. 2 Crew=Two crewmembers hit. Armament=One weapon destroyed. Mobility=Vehicle stopped and one crew hit. Catastrophe=Vehicle destroyed and crew killed.

DEVIATION

If a weapon which fires an exploding round (from a thrown hand grenade to artillery) misses its target, it deviates. Throw 1D10 for the distance of the deviation.

Multiply the deviation distance by the distance for the type of weapon used to determine the actual deviation distance.

Scatter Diagram

7	8,9	4
6	★	3
5	0,1	2

Use the scatter diagram to determine the direction of deviation. Using direction and distance, determine the location where the rounds impact after deviation.

Weapon Type	Deviation Multiplier
Direct Fire	1 m
Indirect Fire Grenades	5 m
Indirect Fire Mortars	10 m
Indirect Fire Missiles	10 m
Indirect Fire Rockets	20 m

If an indirect fire weapon is shooting at more than half its indirect fire range, double the multiplier.

♡ Kill

◇ Serious Wound

○ Light Wound

Partial Cover

OPTIONAL WOUND RULES

Roll once on the target hits diagram for location, then roll a second time for wound severity, applying the following modifiers:

Head (1): −4
Chest (2): −2
Abdomen (3-4): −1
Upper Leg (5-6): +0
Lower Leg (7-10): +1

TARGET HITS:
Throw 1D10 for potential wound and hit location.

Combat Examples

In this example scenario, police forces have located a smugglers' hideout. The house lies at the edge of a grove of trees near a meadow landing field for light aircraft. Police vehicles are approaching cautiously when three figures suddenly dart out the building's front door and head for a waiting plane. Two police hovercraft rush in to apprehend them. The first contains two player characters: Angela and Boris. In the second are two NPCs: Clifford and Donna. The three smugglers (all NPCs) are Edwin, Frank, and Georgette.

Rather than list all character statistics and equipment here, information will be revealed as it becomes necessary.

Combat Begins

The referee announces that the turn sequence begins with the two groups 1000 meters apart. At initiative point 10, no one acts, since no one has an initiative rating that high. No one acts at point 9, either, for the same reason. (From this point on, only those initiative points in which someone acts will be mentioned.)

At point 8, Georgette (a Veteran NPC, hence an initiative level of 8) takes a special action—she lifts a Guiscard Blindicide-3 antivehicle missile weapon to her shoulder and prepares to fire.

At point 6, Edwin and Frank (both Experienced NPCs) run 40 meters toward the plane (which is 100 meters away), half of the 80 meters that can be run in a combat turn, and Angela (with a Coolness of 6), who has been watching the smugglers through binoculars, warns her companions by radio that they are about to be fired upon.

At point 5, Boris (with a Coolness of 5), who is driving the first Songbird, passes until Donna, the other hovercraft's driver, can act.

At point 4, Donna (a Green NPC) attempts evasive driving tactics, a routine level task. The referee adds her primary skill level of 1 to a roll of 6, and she succeeds. Her vehicle advances 500 meters, its combat speed, and Boris (with Hover Vehicle-2) also rolls successfully for evasive movement. The two drivers also let their vehicles drift apart a total of 20 meters. Georgette takes her second action for the turn (this initiative point is equal to half her initiative level, rounded down) and fires her missile at Donna's hovercraft.

The missile's homing value of 12 minus the Songbird's evasion value of 9 means that Georgette needs a 3 or less to hit. The referee rolls a 2—success. This missile has an overhead attack angle, so it is automatically a hull hit. Unfortunately the Songbird has no overhead armor. This missile's full 20 explosion points get into the interior. Dividing the 20 points by 5 yields a +4 modifier to the roll on the vehicle damage chart; a 7 is rolled; plus 4 yields an 11 for a *Catastrophic* hit—the vehicle is destroyed and the crew is killed.

The concussion value is 40; halving it for every five meters of distance means that the characters in the other hovercraft suffer a concussion value of 2. The players for Angela and Boris both roll above a 2 on 1D10, so their characters are unaffected. They are also within the explosion's burst radius (25 meters in this case), so they have a 60 percent chance of being hit by fragments. A 9 means Angela is safe, but a 6 is rolled for Boris. Rolling 1D6 for the number of fragments yields a 2, and hit location rolls of 5 and 7 mean that he is hit in the upper and lower right leg. Since he is sitting in a hovercraft, the referee rules that he has the benefit of partial cover, and the armor value of the vehicle is higher than the DPV of the fragments (0.4), so Boris is unhurt.

At point 3, Edwin, Frank, and Angela take their second actions. The two smugglers run the second half of their 80 meters per combat turn. Angela readies her DunArmCo close assault gun.

At point 2, Boris drives his hovercraft another 500 meters, closing with Edwin and Frank, and tries to run them over. The referee rules that they must make a task roll as if to avoid a diving blow in melee combat, and he assigns them an agility modifier of +2. He succeeds with Frank, but fails for Edwin and decides to rule that Edwin automatically receives the stun hit mentioned under that task, except that since the hovercraft is bigger than a human attacker and moving much faster, the DPV of the attack is 10 times higher (the referee made this up, using the rules as a guideline). A 7 is rolled for hit location, a light wound, and Edwin receives one point of stun, lowering his initiative by three.

The first combat turn is now over.

Combat turn two begins. At initiative point 8, Georgette changes weapons—she now sports a Jaschonek Fabrikant A-9 Sturmgewehr plasma gun.

At point 6, Angela fires on Frank with her close assault gun, and Frank, who has been carrying an SK-19 at the ready while running, panics and fires a grenade at the hovercraft. Both weapons have a bulk of 2, so the fire is conducted simultaneously. Angela fires two aimed shots—her Combat Rifleman-3 means she needs a 4 to hit (Frank is just a few meters away, well within this weapon's 50-meter short range). She misses with the first shot but hits with the second. She rolls a 7 on 1D10 for the number of slugs that hit, and rolls hit locations of three times in the head, once in the chest, once in the groin, once in the upper left leg, and once in the lower left leg. The DPV for each slug is 0.3, doubled to 0.6 for close range. A roll of 4 for the first slug to the head is less than the DPV of the weapon times 10, so Frank is dead.

But his shot went off at the same time as hers. The referee assigns him a skill level of 1 with the weapon and rolls an 8, for

success. He rolls a 3 for hit location on the vehicle, a suspension hit (plenum on the hovercraft). His grenade does damage as a tamped explosion with 4 EP, making its DPV 16. This obviously exceeds the plenum's armor value of 0.3. Dividing 16 by 1(since fractional values become 1 for suspension hits), the referee finds that the plenum takes 16 points of damage, six points more than the 10 needed to destroy a vehicle's movement capability.

Concussion and fragmentation have yet to be rolled for. The referee points out that as fragments could not penetrate the hovercraft's armor, Angela and Boris are safe from them, but they do have to worry about the concussion. Concussion for a tamped explosion is equal to the EP—in this case 4. Angela, Boris, and Edwin are all within five meters of the blast, so they all must roll for this. Georgette is more than 15 meters away, so concussion for her is below 1—she need not roll. Angela rolls well above the concussion value, as does Edwin, so neither suffers damage. Boris, however, rolls a 3 and is subject to blunt trauma with a DPV equal to the concussion value of 4. A roll of 3 for wound severity yields a potential serious wound—he is knocked down and suffers the 4 points as 2 points of shock and 2 points of stun (because every odd numbered shock point is a stun instead). As a result of being dazed, Boris will be out of the action for the next four combat turns (the combined total of his shock and stun points). When he recovers from being dazed, he will still be suffering a −3 to his initiative for each shock and stun point, a total of −12, but initiative is never dropped below 1.

When the referee rolls fragmentation for Edwin, he finds that he is hit by four, one of which hits him in the chest and kills him (for the procedure, see the missile explosion, above). Note that since it is a torso hit, he may be eligible for resuscitation, if the referee so rules after the combat is over.

At point 5, Boris would normally act, but he is dazed for four turns.

At point 4, Georgette runs 40 meters toward the plane (and the hovercraft between her and the plane).

At point 3, Angela's player asks the referee if she can perform moving area fire, jumping out of the far side of the hovercraft as she fires toward Georgette. The referee agrees to allow this. She fires the remaining eight shells in her magazine—maximum would have been 10, (ROF×Area Fire Burst), if her magazine were full—and rolls once to hit for each figure in her 10-meter diameter target area, as well as for any figures between her and that target area. As she only has one target, Georgette, she only rolls once. Her target is at close range (effective area fire range is 80 meters for Angela's weapon, and Georgette is only 40 meters away). To hit, she needs a 4 or less—ROF×AFV, and AFV is double at close range—and she rolls a 6, missing.

Since Georgette is an NPC, she might duck as a result of the area fire. A Veteran NPC's chance to do so is an 8 or more. The referee rolls 1D10, adding the AFV of the weapon. His total of 7 means Georgette does not duck.

Instead, Georgette stops running and fires back when her next initiative point comes around—initiative point 8 of turn 3. Her A-9's ROF is 3—the referee assigns her a skill level of 3 in using it, so she gets three shots off with a 4 or better to hit at close range. Angela's player decides to have Angela duck behind the hovercraft for full cover, causing her to forfeit her next initiative point. When the referee rolls for Georgette's fire, he finds that she hits twice, but as Angela is out of sight behind the hovercraft, Georgette hits that vehicle. Plasma gun hits produce damage as tamped explosions. The hits therefore have a DPV of 4, and, as the referee decides that the armor on the hovercraft is one centimeter thick, they create holes three centimeters in diameter.

Angela would normally act again at point 6, but her ducking at point 8 negates this. At point 4, Georgette performs her second action for the turn, which is to run another 40 meters toward the plane, bringing her even with the hovercraft.

At point 3, Angela's player asks the referee if Georgette is within melee combat range (two meters). The referee decides that she is. Angela takes her second action and jumps from behind the hovercraft, initiating a diving blow at Georgette. Georgette fails to avoid, and the referee decides that both characters are now tangled together on the ground. To determine who takes damage from the attack, a 1D6 roll is added to each character's size times 2. The referee decides that Georgette is the same size as Angela, and a 3 is rolled for both characters, so they both take damage from the attack—one stun hit with a DPV of 0.5. A 4 is rolled for Georgette, a potential serious wound, but a 6 is rolled for its affect, yielding one stun point: Her initiative is reduced by three (leaving 5) for the rest of combat. A 7 is rolled for Angela, a potential light wound, and a 9 is rolled for its affect, giving her one stun point as well and reducing her initiative to 3. Also, as a result of receiving a stun point, both characters are dazed for one combat turn (the number of stun points they each have). Turn 4 passes, therefore, without either character acting.

Turn 5 begins, and when initiative point 5 comes around, Georgette strikes at Angela. The referee uses Georgette's primary skill level of 3 and rolls a successful strike. Angela rolls to block, with a Melee skill of 4, and succeeds.

At initiative point 3, Angela performs a grappling attack in an attempt to pin Georgette. She rolls successfully and causes a stun hit with a DPV equal to her strength of 12 plus her Melee skill of 4, the total divided by 30 and rounded down to the nearest tenth. This results in a DPV of 0.5 for Angela's attack. A 1 is rolled for wound severity, yielding 4 points of stun to Georgette, but as this is a grappling attack, these points are considered to be points of control instead. When the total control points equal Georgette's strength (which the referee decides is 11), she will be pinned. At initiative point 2 (half of Georgette's new initiative level of 5, rounded down), Georgette attempts to escape Angela's grapple. The referee rolls and determines that she is successful. All control points are negated. The next combat turn begins. At initiative point 6, Angela makes a successful strike attack, and Georgette fails to block. To determine the DPV, the player adds Angela's strength of 11 to her Melee skill of 3 and divides the total by 30, rounding to the nearest tenth, for 0.4. Rolling for potential wound yields a 1, for 4 points of stun, a knockdown, and a dazed result. The dazed result will keep Georgette from acting for the next five combat turns, the total of her stun points. During that time, backup police forces can arrive and take her into custody.

The end of the starship listings gives several examples of laser and particle weapons. Any of these can be placed on a ship and are readily available at any space facility on the frontier.

The maximum number of point laser weapons which can be placed on a ship is one per megawatt of power plant output. Attaching one to a hull is the sum of three tasks.

Task: *To install a point laser: Routine. Ship Drive Engineering. 1 hour.*

Task: *To install a point laser: Routine. Electronics. 1 hour.*

Task: *To install a point laser: Routine. Mechanical. 2 hours.*

Once all three tasks have been completed, the weapon is ready for use.

Any number of missiles can be carried by a ship up to the cargo capacity. However, they can only be launched at the rate of one per remote station on the ship per space combat turn.

Starships travel between the stars using the stutterwarp—the stardrive that makes faster-than-light travel possible. Stutterwarp is an implementation on the macro scale of the tunneling phenomenon common to electrons. The proper introduction of energy in a field around a starship allows it to move instantaneously from one location to another without passing through the intervening space.

The distances that the stutterwarp can travel in one jump, however, are very small. One cycle of the drive moves a ship less than a few hundred meters. By cycling the drive very rapidly, however, the ship can travel vast distances in very short times, even faster than light.

The structure of the stutterwarp drive imposes some limitations on distances travelled. As a stutterwarp drive tunnels, an energy charge builds up on its components. This charge is related to the total distance tunneled, rather than to the time the drive is in operation. When this charge reaches a critical threshold level, a rapid deterioration of drive components begins, stalling the drive and releasing lethal radiation. The energy charge is removed by discharging it in a gravity well. If the discharge is not made by the time the ship has travelled its range value in light-years, the ship will be completely irradiated and the crew killed. The discharge must take place in a significant gravity well of at least 0.1 G, and it requires about 40 hours to complete.

Actual speed of a stutterwarp ship depends upon the output of the power plant, the amount of mass that is being moved, and the amount of gravity through which it is being moved. In deep space, where gravity is less than 0.0001 G, the warp efficiency is equal to light-years per day. A warp efficiency-1 ship, for example, would require one week to travel between stars seven light-years apart. In the inner system of a star where the gravity becomes greater than 0.0001 G, the efficiency of the stutterwarp drops off enormously (by a factor of approximately 10,000). Ships with stutterwarp in the inner system are still moving at enormous speeds, but no longer at multi-light speeds. Stutterwarp-powered ships travelling between worlds in the inner system can expect travel times ranging from hours to at most a couple of days. Finally, when gravitation reaches about 0.1 G, the efficiency of the stutterwarp drops off once again. At 0.1 G, the stutterwarp has just enough efficiency to maintain orbit; above 0.1 G, it cannot overcome the gravitational attraction and some other means of propulsion must be used. The major effect of this fact is that a stutterwarp drive cannot lift a vessel off of a world's surface or even out of its atmosphere. Some other type of engine is required, or the vessel may carry a landing craft.

It is fairly easy for a referee to determine at what distance from a planet or star these cutoff points are. Simply divide the body's surface gravity by 0.1 G or 0.0001 G (depending upon which distance you wish to know), take the square root of that value, and multiply it by the radius of the body. The result will be the distance from the body's core at which the cutoff points are located. For Sol, stutterwarps will not operate above light speed much beyond the asteroid belt, and they cannot overcome Sol's attraction at all if they are within 11.6 million kilometers of Sol's core (or about 10.9 million kilometers from Sol's surface). For Earth, the cutoff points are at approximately 638,000 kilometers and 20,000 kilometers.

Note that in order to discharge into 0.1 G, a vessel must be orbiting a body while discharging. Although 0.1 G is also the limit at which stutterwarp drives drop below the efficiency of conventional drives, stutterwarp drives are sufficient to make any velocity changes necessary to maneuver a ship that is in orbit, as long as the vessel does not drop below the 0.1 G distance. Stutterwarp vessels can also leave orbit without using conventional drives.

Also, a stutterwarp vessel can use a planet to change its vector. To do so, the craft begins a shallow drop toward the planet. The velocity it picks up in this drop is sufficient to slingshot it past the planet and beyond the 0.1G limit, where its stutterwarp can be used to maneuver it away.

TINKERING WITH YOUR SHIP

It is possible to fine-tune many aspects of ship performance, provided that the skilled individuals are available. Turning your ship into a hot rod might make all the difference in a tight situation.

Increasing Power Output: This translates into increased power for the stutterwarp drives,
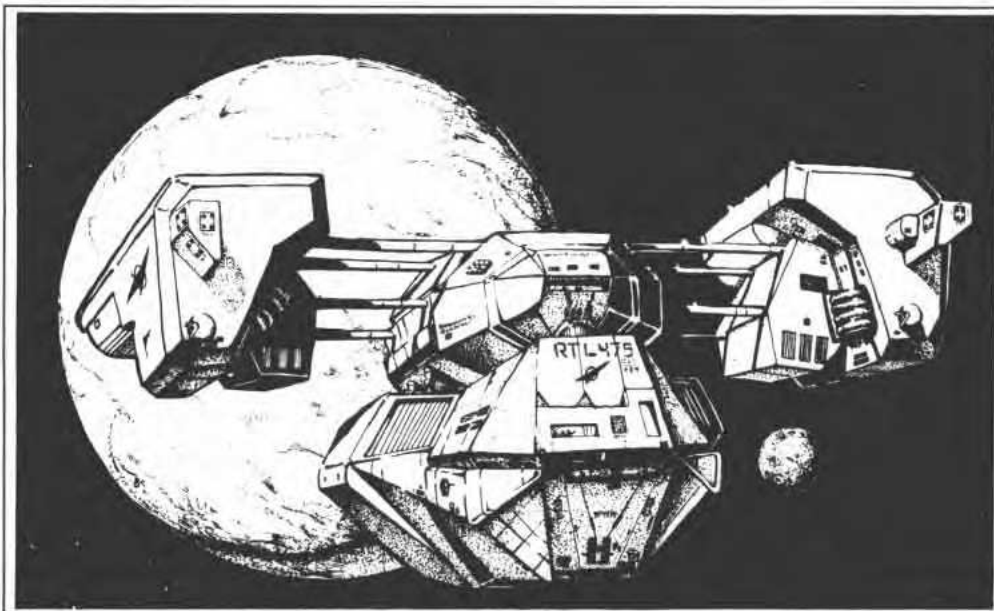
which means greater warp efficiency.

Task: To increase power output: Difficult. Ship Drive Engineering. 4 hours.
Referee: Success increases stutterwarp efficiency 1D6 percent. This task must be reperformed each time the ship makes a discharge, or once per month minimum.

Delaying Discharge: Certain steps can be taken to delay the requirement for the energy discharge.

Task: To delay discharge: Difficult. Ship Drive Engineering. 1 hour.
Referee: The task must be attempted before a journey is started. Success will delay discharge by one day.

Heightening Sensors: Each type of sensor (military, navigational, and investigative) can be enhanced.

Task: To enhance sensor values. Formidable. Electronics. 1 hour.
Referee: The effects of enhancement are lost after one month, and the task must be repeated.

Enhanced military sensors add 3 to both the passive and active sensor number. Enhanced navigational and investigative sensors act as if they are one degree better than they are (minimal act like standard; advanced remain advanced).

Overpowering Lasers: Lasers and particle weapons can be overpowered to allow greater delivery of energy.

Task: To enhance weapons station: Difficult. Electronics. 2 hours.
Referee: The effects of enhancement are lost after one month, and the task must be repeated.

Each enhanced laser delivers double hits (twice as much damage per roll on the Hit Location table). However, each time it is fired, an enhanced laser will burn out on a roll of 10 on 1D10. On a subsequent roll of 10 on 1D10 the laser explodes, killing any crewmember manning it, and doing one point of battle damage to the ship (see the *Space Combat* chapter for explanation of these effects). Burnt-out lasers cannot be repaired; they must be replaced. Detonation lasers cannot be enhanced.

REMODELING YOUR SHIP

Moving walls and rearranging the interior of a ship is relatively easy. Provided all installations remain within the confines of the hull, virtually anything can be done to the interior.

Minor changes such as new partitions, new rooms, rearrangement of cargo space, and so forth, are very easy to accomplish. Materials are easily available, as are necessary tools and instructions. The total cost runs about Lv50 per cubic meter involved.

Major changes like changing the computer system or drives, putting in a new power plant, relocating the bridge, etc., are considerably more difficult. These require putting in at a space facility and generally cost some percentage of the purchase price of the ship.

Details of major changes must be determined by the referee.

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CREWING YOUR STARSHIP

Starships are largely automated pieces of equipment, but they nevertheless require a certain number of humans to serve in duty roles that automation cannot fill.

__Work Stations:__ A work station is a physical location that provides materials and equipment needed to perform a particular job. Usually this implies a computer terminal, acceleration couch, and tools, but some stations are less well-defined (the drive sector for engineers and corridors for security crew, for example).

__Work Station Types:__ Work stations may be either constant-duty or individual positions. Constant-duty work stations require two persons to fill the position, each working a 12-hour shift. Individual work stations require only one individual, who performs his duties at that work station only when necessary. Bridge and Engineering work stations are constant-duty. All other work stations are individual unless specifically noted.

__Crew Positions:__ Each starship description specifies the number of work stations aboard, their types and locations, and the skills required to man them (a minimum skill level of 1 is required).

A ship can operate with one person per constant-duty station only and with individual work stations unfilled, but nearly all ship-operations tasks are raised one level in difficulty, and some tasks become hazardous (referee's option). Having more crew than stations does not benefit task rolls.

(Continued.)

SENSORS

There are three basic types of sensors that can be installed on a ship. These are military, navigational, and investigative.

Military Sensors

Military sensors are described in detail in the *Space Combat* chapter.

Navigational Sensors

The following types of navigational sensors may be included in a ship's sensor package.

Deep-System Scan: A deep-system scan uses various telescopic devices to evaluate the stellar and planetary population of a stellar system. It reveals the location, size, and type of all stellar bodies; location and physical characteristics of all planetary bodies; and the existence of rings or belts in the system (and will also detect energy emissions from any vessel's actively running power plant at distances up to one au.) The deep-system scan can be used from any point within a stellar system. Many ships forego the use of such a scan if entering a familiar system.

Gravitational Scan: A gravitational scan reveals the size (only) of all planetary and stellar bodies within a star system (and will detect within 150 au any actively operating stutterwarp drive by its effect on the gravitational field.) It can be used from anywhere within the system.

Navigational Radar: Navigational radar is the cheapest type of sensor to use when maneuvering among many close-set bodies. This radar will sense all objects within one au of the vessel, but usually will not identify them. The radar emissions also make the vessel using nav radar very visible to other vessels. Some very good operators can identify distinctive object by nav radar, but this is very difficult. It will, of course, be obvious on nav radar if an object is moving.

Investigative Sensors

Many starships, particularly survey vessels, carry sensors specially suited to investigating unexplored environments. These fall into two broad categories—cartographic and life—each of which has several models to choose from.

Cartographic Sensors: Mapping a planet's surface can be accomplished from orbit. To do so requires 20 hours for the entire planetary body, or less if only portions are to be mapped. Exactly what information is gathered by the cartographic sensor depends on its level of complexity.

Minimal Cartographic Sensors: A complete sweep of the planet will map all land and liquid masses and major geographic features. In terms of mapping, this scan will only reveal the presence of mountainous terrain, large rivers, and coastlines.

Standard Cartographic Sensors: A complete sweep will map an entire planet, revealing all terrain types. It will also pick up large urban areas, extensive agriculture or mining sites, and global weather patterns.

Advanced Cartographic Sensors: Advanced cartographic sensors work just like standard sensors, but they also pick up individual creatures, buildings, etc., and can register the planet's mineral wealth.

Life Sensors: Life sensors detect the characteristics of living animals. Fine-tuning the equipment allows greater accuracy and distinction. Note that life sensors measure the raw size of a creature, not its intelligence. A dinosaur registers larger than a rabbit; a herd of cows registers larger than a dinosaur.

Minimal Life Sensors: These can detect the presence of life within one kilometer of the device. Position can be determined to within 10 meters, but no other information is revealed.

Standard Life Sensors: Range is increased to 10 kilometers, and not only the presence but also the size is revealed. Location can be pinpointed to within one meter.

Advanced Life Sensors: Advanced life sensors can scan for a specific type of creature within a radius of 100 kilometers. A scan for humans, for instance, will pinpoint anything humanoid. However, this is not an exact science, and mistakes can occur, especially at long range.

STARSHIP POWER

Starships need fuel to generate electricity in their power plants and to provide reaction mass for their thrusters. The type of fuel varies with the type of power plant used.

Power plants are rated in megawatts per week. Fuel tankage for ships is generally allocated

in terms of what will supply the power plant for a week.

Direct Energy Conversion: Two types of power plants utilize the technique called direct energy conversion: Fuel Cells and MHD Turbines. Both combine hydrogen and oxygen and in the process produce electricity; the difference is only in their efficiency and their handling of the waste gases. Fuel for both types consists of liquid oxygen and liquid hydrogen stored in separate compartmentalized tanks.

Fuel Cells require 100 tons (165 cubic meters) per megawatt per week. Many fuel cells recycle their waste gasses.

MHD Turbines are more efficient and require 75 tons (125 cubic meters) per megawatt per week. Nearly all MHD turbines vent their waste gasses as exhaust.

Fission Power Plants: Fission power plants use decaying radioactive elements to produce heat which then drives electrical generating equipment. The fuel is carried within the reactor vessel and provides continuous energy for two years.

Refueling a fission power plant is a major operation requiring the attention of skilled operators and heavy tool sets. It is usually performed at a world with an industrial base (and a fission fuel processing plant); it is, however, possible to refuel anywhere if the fuel package is available.

A fission fuel package masses 750 kilograms (two cubic meters) and will last for two years. Fission fuel packages are dated for freshness and must be installed within two years of manufacture or else they provide unreliable service. Used fission fuel packages may be returned to a recycler for reprocessing, but they are so dangerous that most are dropped into a star if a reprocessor is not immediately available to handle them.

Fusion: Fusion power plants are constructed with their supply of fuel already in them; they never need refueling. By the time the fuel supply is exhausted, the plant has worn out and must itself be replaced.

Refueling: Fuel Cell and MHD Turbines need hydrogen and oxygen for fuel. These gases are obtained by breaking down water.

Terminals: Any colony world and many other star systems have orbital terminals which provide liquid oxygen and liquid hydrogen as fuel for ships. The terminal has performed the work of locating water or ice, transporting it to orbit, and then cracking it using solar power. In exchange, the terminal fuel station charges Lv100 per ton.

Self-Fueling: Many ships carry the necessary equipment to process water or ice into fuel. In some systems, self-fueling is necessary because there is no terminal present. In other systems, self-fueling saves money, but at a cost of time and effort.

Self-fueling requires that the ship visit a location where ice or water is available, obtain it, and transport it to the ship. Ice or water equal to twice the cubic meters required is necessary (to allow for wastage). The ship's solar arrays are then used to melt the ice and crack the water into fuel. One solar array will process 23 tons (40 cubic meters) in a week. Ships often carry more than one solar array.

Closed-Cycle Fuel Cells: Fuel cells can be operated on a closed cycle; their exhaust gas (water vapor) can be condensed and saved in the fuel tanks. Upon arrival in a system, the ship's solar array can be opened up and the electricity used to crack the water back into fuel.

A closed cycle system eliminates the need to find a local source of water or ice, but still requires one week to process 23 tons (40 cubic meters).

Solar Arrays: MHD Turbines and Fuel Cells are often shut down to conserve fuel when a ship is in orbit and does not have to maneuver. Auxiliary power is provided by solar arrays that provide electrical energy directly from sunlight.

Solar arrays are produced in a standard size and configuration; they are easily procured and replaced when damaged. One standard solar array expands to produce a flat screen 10 meters by 10 meters and massing about 100 kilograms.

The standard array produces two megawatts. One solar panel can substitute for two megawatts of power plant.

STUTTERWARP EFFICIENCY

Stutterwarp efficiency is equal to the cube root of (the megawattage of the ship power plant divided by the mass of ship in tons) multiplied by a constant. In nearly every instance, this constant is 14.25, but it can vary somewhat, depending upon the technology used to build the stutterdrive.

STUTTERWARP DRIVES: A FURTHER LOOK

(From Dr. D. Bartholomew Wenthworth's opening lecture to his Introductory Physics students, Chandler University, Hermes, The American Arm.)

It is undeniable that the development of stutterwarp technology has had one of the greatest effects upon humanity in the history of the race. Suddenly, a culture that had been effectively bound to one star system found itself able to travel easily among the stars. This is not to say that there are now no limitations to where humans can travel, however. The limited availability of tantalum, the material necessary for the working of stutterwarp drives, and the limited distance that a stutterwarp engine can travel before requiring discharge both serve to keep routes of travel within certain boundaries. Perhaps in the future humans will be able to simply point a ship in any direction and quickly travel any distance to reach their destination. But for now, we must work within the boundaries set upon us by our present understanding of physics....

THE BASICS

Stutterwarp drives operate on the same principle as the tunneling phenomenon in certain atomic particles. In essence, they allow a mass to be moved from one location in space to another location in space without travelling through the intervening area. The move is instantaneous. This jump is known as the Jerome Effect, after Dr. Emile Francois Jerome who first demonstrated it with a hydrogen atom.

The distance that an object can be moved is relatively short in comparison to stellar distances— each jump is only several hundred meters—but the cycling time is very rapid, on the order of hundreds of thousands of times per second. Because of the nature of the jump, the cycling time is fixed, but the amount of charge built up can vary, allowing distances jumped to be adjusted according to the travel speed desired. Greater masses require larger charges to jump the same distance as smaller masses, and more powerful engines are able to build these charges more rapidly. Therefore, a smaller stutterwarp ship will travel faster than a large ship with the same engine (its lower mass means that each individual jump is longer), and ships with more powerful engines travel faster than ships of the same size with weaker engines (the higher charge means longer individual jumps).

This may seem like common sense, but common sense is a dangerous thing to trust to when discussing the stutterwarp phenomenon. As an example, objects travelling by stutterwarp seem to have a velocity, but it is purely illusory. There is no feeling of thrust, as there is with the use of drives such as rockets. If the stutterwarp drive is stopped, the vessel it propels also stops— immediately, completely, without any sense of deceleration. In fact, since stutterwarp movement is only pseudovelocity, any velocity the vessel has when the stutterwarp is engaged (such as orbital velocity) is retained throughout the stutterwarp travel even if the two directions are opposite to one another. Typically, therefore, a vessel will make its final approach to its point of destination in such a way as to match the velocity it retains (the orbital velocity from its point of origin) to the orbit it now requires.

STUTTERWARP DISCHARGE

As a stutterwarp cycles, it builds up a charge residue on tantalum coils within the drive unit. This residue is not dangerous in itself, but once it passes a threshold limit, the tantalum coils begin to rapidly disintegrate, giving off a deadly radiation that cannot be shielded by any presently developed means. In the course of this disintegration, the drive unit is ruined, and any life forms within several hundred meters are killed by the radiation given off. To get rid of this charge residue, the drive must be maneuvered into a gravity field of at least 0.1 G, where it can be discharged.

The stutterwarp's charge residue is directly related to the distance travelled. Some very experienced engineers can calibrate the drives in such a way that the residue is spread very evenly over all components, allowing discharge to be delayed for up to 24 hours and the total distance travelled to be increased, but this is very difficult. For all practical purposes, 7.7 light-years is the limit. This applies even to drives that are online but not propelling the ship. In some of the earliest experiments with stutterwarp, drones were sent out with double drives. Both drives were running, but only one at a time was actively propelling the drone. The intent was to operate the first drive to the 7.7 light-year limit, dump it, and use the second drive to bring the drone back.

The drones never returned. It was soon determined that the second, passive drive had also picked up a residue from the cycling of the first drive. Later, manned vessels proved this theory to be true. The only way an inactive stutterwarp drive could be transported without building a charge residue on its coils was if it were offline during the other drive's operation.

The difficulty with this is that many delicate elements of a stutterwarp drive are held in magnetic suspension during operation. It takes many hours and quite a lot of skill to bring an inactive drive online and calibrate it without damaging or destroying it. (It is even more difficult to take an active drive unit offline without destroying it.) It is, of course, impossible with unmanned probes. Also, the technique has been relatively unimportant until lately because it presumed that any previously running drive would be jettisoned to prevent it from irradiating the ship. But, dumping stutterwarp drives is a very expensive way to travel. Recently, however, another use has been found for the practice of carrying an inactive drive. It will be explained in the next section.

BREAKING THE 7.7 LIGHT-YEAR LIMIT

Compared to the other two arms of human exploration, the American Arm is a dead end. No one knows for sure just how far the branches of the French and Chinese Arms stretch; it is possible that they reach on to the farthest edges of the galaxy. The American Arm, however, runs to Zeta Herculis on one branch, Ellis on another, and DM – 46 11370 on a third, but no farther. Much effort has been put into breaching these dead ends, and two techniques for doing so have been developed recently.

Tugships

The Trilon Corporation recently acquired plans for a stutterwarp tug vessel. This ship is designed to project its stutterwarp field around a ship it tows, allowing the second ship's engines to remain offline. The tug travels out to 3.85 light-years, half the 7.7 light-year distance, then releases the towed ship and returns to its starting point to discharge. The towed ship then brings its own engines online and travels up to another 7.7 light-years, a total of 11.55 light-years distance in all. This technology could expand the number of stars that can be reached to nearly three times the current number.

The problems with tugships are that they are very slow—their drives must move a lot of mass when towing another ship—and there must be a tugship facility at both ends of a route in order to bring the towed ship's engines back offline and provide a tug to haul it one-third of the way back in the other direction. (Remember, the towed ship could not travel 7.7 light-years to meet a tug and then be hauled back, as its engines would continue to build a charge residue while it was being towed.)

Brown Dwarfs

Another recent development on the American Arm has been the use of a system to discover the location of solitary brown dwarfs that could serve as discharge points between star systems that are more than 7.7 light-years apart. Near the middle of the 23rd century, facilities began to be built along the American Arm to gather astronomical readings from various different locations. By coordinating information gathered at observatories all along the Arm, astronomical bodies could be located that were previously undiscoverable. Recently, these observatories have been turned to the task of locating brown dwarfs. As these brown dwarfs give off very little radiation, they are very difficult for astronomers to locate. By using this system, however, a few brown dwarfs have been identified, and it is expected that more will be found in the future. The difficulties of coordinating such widely scattered observatories is staggering, however, so the program is of limited utility.

CONCLUSION

...The technology of stutterwarp construction and operation may not seem very important to the average citizen in the 24th century. But, as can be determined from the above information, it dictates the development of human space exploration, which in turn has a profound effect on our culture and our economy. The realities of stutterwarp technology therefore touch all of our lives. Let us appreciate the labor that has gone into developing it into the tool it is today, and let us support the experts who work to improve it and so open other worlds to the expansion of our race.

Task: To bring an inactive stutterwarp drive online (Hazardous): Difficult. Ship Drive Engineering. 30 minutes.

Referee: On a failed roll, a Major Mishap will result in a 1 EP explosion; a Total Mishap will result in a 3 EP explosion.

Task: To take an active stutterwarp drive offline (Hazardous): Formidable. Ship Drive Engineering. 1 hour.

Referee: On a failed roll, a Major Mishap will result in a 2 EP explosion; a Total Mishap will result in a 5 EP explosion. Also, a drive being taken offline must first be fully discharged. Failure to do so results in the charge residue collecting on a few small drive parts, breaking them down, and flooding the ship's engineering section with lethal radiation (automatic death). If the drive has been discharged before it is taken offline, this danger will not occur.

Space Combat

Adventures often call for some sort of space combat. As a supplement to role playing, this chapter gives simple tactical rules along with ample opportunities for the use of player characters' skills. A separate product, *Star Cruiser*, approaches these same space battles in a boardgame format. It also contains ship construction rules and further ship listings.

SCALE

Space combat uses standard scales of time and distance to regularize play.

Time: Each turn represents one minute.

Distance: Each hex on the playing surface is 600,000 kilometers in diameter. At this scale, the diameter of the Solar system (30 au) is 7500 hexes.

Units: Each marker or ship model represents one space vehicle, whether it is a missile, drone, or space craft. (All are referred to as vehicles in these rules.) For purposes of space combat, planets may occupy any hex on the map, but they do not interfere with play in any way.

PREPARATION FOR PLAY

Before play can begin, a few things need to be prepared.

Playing Surface: Space combat requires a playing surface with a hex grid. The grid size needed will depend upon the type of units being used.

Units: Any type of markers can be used to represent the forces on the board. Actual models of space craft and missiles are the most aesthetically pleasing, but are not strictly necessary.

Ship Data Sheets: Each ship likely to be engaged in fighting must have a ship status sheet. A blank data sheet, from which photocopies can be made, is provided with these rules.

Most of the information necessary to fill out a status sheet for each ship is given in the *Ship Listings* chapter. Some other information not listed in that chapter, but necessary for play, will have to be taken from character sheets or assigned by the referee. For example, the skill level of the sensor operator is helpful to know, as is the notation of each appropriately skilled individual assigned to damage control. Also, if backup systems for sensors, computers, remote stations, or targeting computers are available, they should be noted under hit capacity. Finally, the skill levels of any gunners or remote pilots should be noted.

Once everything is prepared, play may begin. Initial contact range is approximately 30 hexes, but this depends on the situation and is up to the referee.

Black Globes: Until detected as described in Detection, below, all vessels are represented by black globes. A black globe is a marker which has nothing but a facing. The actual vessel marker or model is not placed on the playing surface until the vessel is successfully detected.

TURN SEQUENCE

One game turn includes two competitor turns, one for each side involved in the conflict. (In a few, very rare cases, there may be three or more sides in a battle, with three or more competitor turns to a game turn.) Each competitor turn includes the following phases: Movement and Fire, Sensor Commit, Detection, Detonation Commit, and Damage Control. For ease of reference, these are also listed in the sidebar.

The referee designates one side as Side A, the other as Side B. Side A performs its competitor turn before Side B. Combat progresses using this sequence until the battle is over.

Only the designated player moves during his movement phase, but any weapon on either side can fire. (Each weapon can only fire once in each *game turn*, however.) In all other phases, both competitors perform the indicated activity simultaneously.

MOVEMENT

Each ship has a listed movement rating. This rating is the number of movement points the ship may use in a movement phase. Note that only stutterwarp-driven ships have a movement rating greater than zero. Ships without a stutterwarp, regardless of their other drive systems, have
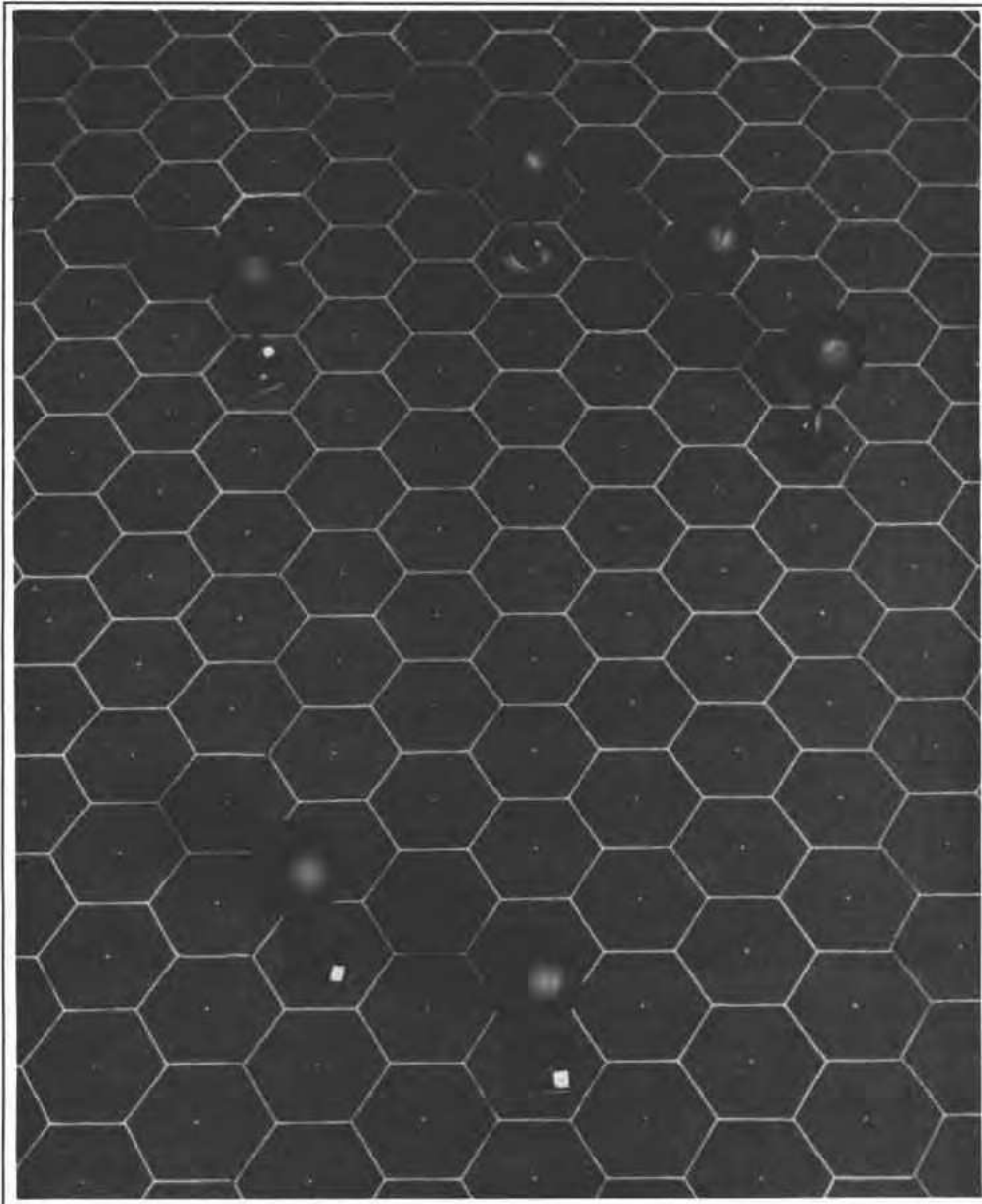
a movement rating of zero for purposes of combat.

Facing: Each ship model on the map must face one of the six possible hexsides. Facing dictates the direction of movement and can only be changed by expending movement points.

Expending Movement Points: One movement point allows a vessel to move one hex in the direction it is facing. One movement point will turn the vessel one hexside; the vessel remains in its original hex when changing facing. Each vessel may expend up to its total number of movement points each turn in any combination of hex movement and facing changes.

All Stop: Ships that expend none of their movement points, including ships that have none to begin with, have two options. First, they may change their facing any number of times in their hex. Second, they may declare that they are dropping their power plant output to "All Stop." This brings their passive signature ratings down to 1 for the next two detection phases (see Detection, below). A ship at "All Stop" has no power for screens or weapons.

Hex Limitations: Any number of ships may move through or occupy a single hex during a turn; 600,000 kilometers is a lot of room.

Referee: Apply DM – 1 for each detection beyond the first that the ship is attempting to maintain in a given detection phase. (For example, if it tries to maintain three detections, the modifier is – 2 on each attempt.)

DETECTION

Each vessel has two signatures and two possible means of detecting those signatures in other vessels. Signatures may be active or passive. The passive signature of a ship represents its neutrino emissions and infrared signature created by its power plant; both can, to some extent, be masked by the hull of the ship. This passive signature can be detected by the passive sensor arrays of other ships.

Active signature indicates how much a ship reflects the radar emissions of another vessel's active sensors. Particularly advanced materials and ship designs have greater stealth characteristics which reduce a ship's active signature.

Signatures: The ship listings give numbers for each ship's passive signature, its masked passive signature, and its active signature. The masked passive signature follows the passive signature in parentheses. When determining the passive signature of a ship, use the masked value until such time as there has been battle damage to cause a breach or serious breach in the hull (see Damage, below). The minimum signature in each area is 1; the maximum signature is 10.

Sensors: Each ship's description lists number ratings for that ship's passive and active sensors. The numbers express the ship's automatic detection range in hexes; automatic detection range is the range at which the sensors can automatically detect a target with a signature of 1 or greater. Each hex beyond automatic detection range raises the minimum signature detected by 1. Note that active sensors can only detect active signatures, and passive sensors can only detect passive signatures.

Example: A ship with a passive sensor rating of 5 would be able to detect any ship up to five hexes distant. At six hexes, it could only detect a ship with a passive signature of 2 or greater. At seven hexes, it could only detect ships with passive signatures of 3 or greater. Since the maximum possible passive signature is 10, the maximum passive detection range for this ship is 14.

Committing Active Sensors: During the commit sensors phase, both competitors decide whether or not they will use their active sensors. Each then places either blank or "commit sensors" chits on the board next to his vessels. Markers are revealed simultaneously for all vessels.

Once active sensors are committed, they remain in operation for the next two detection phases: the one immediately following the commit phase, and the detection phase following that.

Committing active sensors also makes a ship very visible to others. Since the radar is a burst of energy, any ship using its active sensors is automatically detected by the opposing side. This automatic spotting takes place for as long as the ship's active sensors are on, with a minimum of two detection phases. After those two detection phases have passed, the detection must be maintained by the opposing side (as described in maintaining detections below), or it is lost and the black globe returns to the map.

Initial Detection: In order to detect a black globe, a ship must attempt initial detection. To do so, the detecting player counts the range to the black globe he wishes to detect and determines the minimum signature which he can detect at that range. The detecting player then asks the target player "Is the passive/active signature of this black globe X or greater?" The target player then answers either yes or no—"yes" results in the black globe being replaced with a marker or model; "no" indicates that the initial detection attempt has failed, and the black globe remains on the map.

Maintaining Detection: Once initial detection has been successful, maintaining that detection is somewhat easier. As long as the detecting ship's sensors are operable and the target ship remains within range, the target ship remains spotted. If the target ship moves out of range, maintaining detection is a task for the sensor operator, as listed in the sidebar.

Any number of initial detections may be attempted per detection phase. Any number of detections may also be maintained, given the provisions of the negative modifiers mentioned above.

Effects of Detection: Until detected, a ship cannot be fired at; in other words, a black globe cannot be targeted. Once detected by either active or passive sensors, the vessel is an eligible target for weapons fire.

Also, if the vessel detected is of a fairly familiar variety (a referee decision) the exact nature of the vessel becomes apparent to the detecting side. (The computer calls up the appropriate information, including displacement, drives, crew complement, etc.) If the item detected is foreign to the detectors, then only the general nature of the vessel is revealed—this includes displacement

in cubic meters and its exact signatures (active and passive). Other information cannot be determined until the vessel is examined after the battle (if possible).

FIRING

Weapons may be fired at any time during a turn's movement and fire phase. Firing is in the form of laser or particle weapons, all herein after referred to as lasers.

Weapon Descriptions: Each type of laser has several descriptive elements which affect how its hits are determined and/or how its damage is inflicted.

Particularly high-tech, well-manufactured lasers often have built-in targeting mechanisms that supplement those of the vessel they are attached to. Any laser with a +1 or +2 targeting designation uses this as a die modifier to the task to hit.

Double mount lasers provide a wider area of fire, giving them a greater chance to hit a stutter-warping target. Double mount lasers therefore get a +1 modifier to hit, but they roll only once on the Hit Location table.

High energy weapons may have the designation A×B—A being the number of a roll is made on the Hit Location table, and B being the number of hits that are achieved per location. For example, a 10×2 laser rolls 10 hits on the Hit Location table, and each hit does two points of damage. Note, however, that the 10×2 laser above only needs one hit determination roll (either all its beams hit or they all miss). A weapon designated as being ×2 does double the damage when it hits.

Dividing Fire: A multiple shot laser (that is, one with more than one roll on the Hit Location table) may divide those hits among more than one vessel prior to firing. The competitor firing the missile indicates how many shots will be devoted to each target. The shots devoted to each target vehicle are then rolled for together, as in the high energy weapon rule above.

If, for example, a 10×2 laser were to fire at three vessels, it might dedicate three shots to one vessel, one to another, and six to the third. But only three rolls to hit would be made, one for each target. If the first roll were successful, all three shots devoted to that ship would hit; a successful roll on the second target would yield one hit; and a successful roll on the third target would yield six hits.

Detonation Lasers: During the commit detonation phase, any detonation type lasers must either commit or remain intact. This is done in the same manner as active sensor commitment, described in Detection, above. Once committed, the detonation laser must fire immediately. Once fired, it is destroyed and removed from play.

Hit Determination: Hit determination is a task for the gunner of a ship. This task is listed in the sidebar.

Hit Determination for Remote Piloted Lasers: Roll 7+ on 1D10, modified by distance, as explained directly above.

SCREENS

If there are screens on the ship, they will be rated with a value of 1 to 10 in the ship's description. This value is the screen value at the beginning of each competitor turn in which the screens are operating—their effective value will decrease as they absorb hits.

Once a hit has been achieved on a ship with screens, the hit must be confirmed against the screens. For each hit, roll 1D10. If the number rolled is less than or equal to the screen value, the screens absorb the energy. If the roll is greater than the screen value, the hit is achieved on the ship itself.

Each hit on the screens reduces their effectiveness by the damage rating of the weapon hitting them. For instance, once screens rated at 3 have taken a hit from a 1-point laser, they only rate 2 against subsequent hits that turn. The most damage that this ship can hope to absorb into its screens is 3 per combat turn. At the beginning of the owning competitor's next damage control phase, the screens reset to their original value.

If the power plant is inoperative due to battle damage, the screens will also be out. They will be operative again during the competitor's first damage control phase in which successful power plant repairs are made.

The use of screens increases the passive signature of the screened ship by the number value of the screens, to a maximum of 10. Screens may be tuned to any value less than or equal to their given value during the owning competitor's damage control phase.

Task: To hit a target: Routine. Gunner. Instant.

Referee: Also apply these die modifiers: If the ship's targeting computer has a modifier, apply it. If the weapon itself has a targeting modifier, apply it as well. Last, if the range is one hex, there is an automatic −2. Lasers may not fire at more than one hex range.

Hit Determination for Remote Piloted Lasers: *Roll 7+ on 1D10, modified by distance, as explained directly above.*

SPECIAL HIT LOCATION

Roll Result
1-2 Sensors
3-4 Computer
5-6 Continuing Damage
7-8 Remote Station
9-10 Weapons Mount

CREWMEMBER DAMAGE

Roll Result
1-2 Dead
3-4 1D10+6 Shock
5-6 1D6+6 Shock

Task: To repair hull damage: Difficult. Ship Drive Engineering. Instant.

Referee: A quarter of the character's Electronic and Mechanical skills (rounded down) may be added to the roll as well.

Task: To repair power plant damage: Routine. Ship Drive Engineering. Instant.

Referee: See the note for the task to repair hull damage, above.

Task: To repair computer, targeting, continuing, remote, or sensor damage: Difficult. Electronics. Instant.

Referee: A quarter of the character's Ship Drive Engineering and Mechanical skills (rounded down) may be added to the roll as well.

DAMAGE

For each hit achieved on a vessel, a roll is made on the Hit Location table in the sidebar, and the appropriate damage is marked on the target vessel's status sheet.

Hit Locations

The hit locations indicated on the Hit Location tables are explained in the material that follows below:

Hull: The hull hit capacity of each vessel is given in its description. It is a three number sequence. The first is the total number of hit points that the hull can absorb before the ship is completely destroyed. The second is 20 percent of that number, and the third is 50 percent of the same number.

Once hits totaling 20 percent of the hull hit capacity have been taken, the hull is breached. Until repaired below this 20 percent level, the masked passive signature of the vessel is increased by 1. If there is no masked signature for the vessel, this has no effect.

Once hits totaling 50 percent have been taken, the hull is seriously breached. The masked passive signature is ignored in favor of the normal passive signature until sufficient repairs have been made to reduce the hit total below 50 percent.

Power Plant: The power plant hit capacity is given as two numbers. The first is the total hits that can be absorbed before the power plant is completely destroyed. The second is 20 percent of this number. Once hits totaling 20 percent of the power plant hit capacity have been taken, the power plant is inoperative. The ship may not move, fire weapons, or power shields until it is repaired.

Crew: One crewmember, determined at random, is incapacitated. If this is a remote pilot or gunner, those devices cannot function until another crewmember fills the vacant position. Once all pilots and navigators on board have been incapacitated, the ship may not move any longer.

During the heat of battle, it does not matter if the crewmember's incapacitation is the result of death, or of unconsciousness. After combat is over, however, it will become important, especially if the crewmember was a player character. To determine how serious the damage is that caused the incapacitation, roll 1D6: On a 1 or 2, the crewmember took nearly the entire energy of the hit and is dead; on a 3 or 4, the crewmember took 1D10+6 shock points; on a 5 or 6, the crewmember took 1D6+6 shock points. If the number of shock points is greater than the crewmember's life level, he is dead; otherwise he is certain to be unconscious.

Sensors: A sensor hit indicates that one of the ship's sensors systems (roll randomly) has been rendered inoperable. No detection may be undertaken with that system until it is repaired. Once a ship's sensors have all been destroyed, that ship may not acquire any new targets for weapons fire (it can, however, continue to fire at current targets, as long as they remain within one-hex range).

Computer: The ship's computers have been damaged. The ship may do *nothing* until they are repaired.

Remote Station: One remote station is destroyed, determined at random by an appropriate die roll. The remote object that it was controlling may do nothing until the station is repaired or another remote station takes over control. Each remote station can only control one remote object at a time.

Weapons Mount: One of the ship's weapons mounts has been damaged (roll randomly to determine which one). One point of damage renders a weapon inoperable until repaired; two points destroys it utterly.

Continuing Damage: This indicates that some sort of continuing damage is underway (electrical damage, fires in pressurized areas, etc.). The number or continuing damage results is marked on the ship status sheet. For each continuing damage marked, roll once on the Hit Location table during that ship's damage control phase, and apply one damage point to resultant area. Note that continuing damage can give rise to further continuing damage results.

REPAIRING DAMAGE

Hits can be repaired during a competitor's damage control phase. Each available engineer can put his talents to use on one specific task per segment, attempting to repair one point of
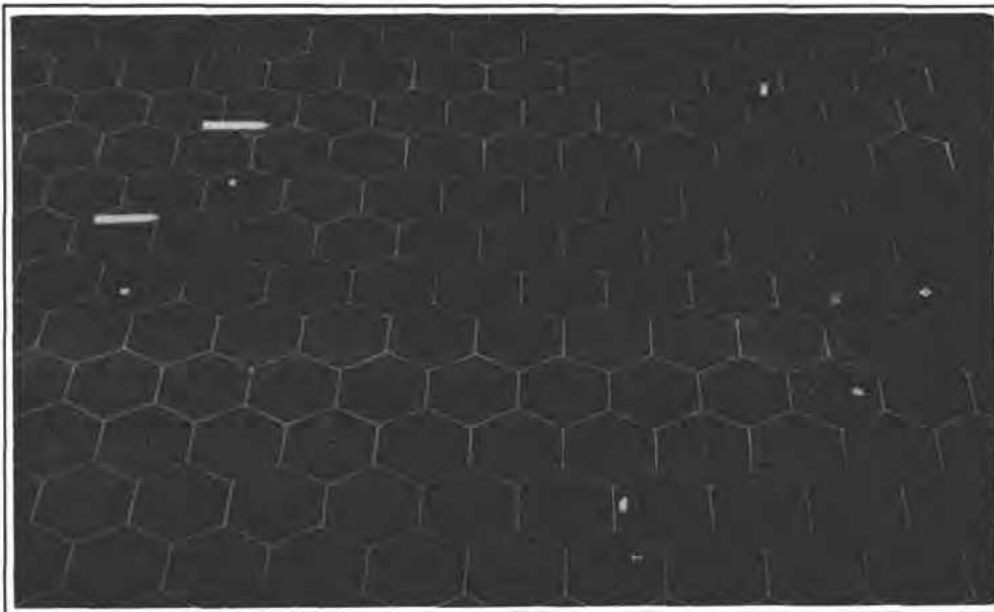
damage that has been done to the ship up to that time. The tasks for repairing damage are listed in the sidebar on the opposite page.

The effects of repairs take place immediately.

REMOTE OBJECTS

Remote objects are unmanned vessels that are controlled from a mother ship. Missiles and sensor drones are typical remote objects. Note that fighters and other manned items are not remote objects, though both can be launched from the mother ship at the very beginning of the mother ship's movement and fire phase.

Controlling the remote object is the job of the remote operator on the mother ship. While controlled, the remote object can perform any action that any other ship can do (provided it has the necessary equipment); it can attempt to detect other ships, commit sensors or detonation lasers, fire its weapons, and move.

Remote Detonation Missiles: Remote detonation missiles are common in space combat. They deliver a high burst of energy at the target without endangering the mother vessel.

First Fire: During every detonation phase, once a competitor has placed a chit next to his detonation missile, but before that chit is revealed, every ship within range of that missile has a chance to fire at it before it goes off. This is a task for each gunner making the attempt (see sidebar). If successful, the gunner has reacted before the missile has detonated, and he may then perform the usual task to see if he hits. If sufficient hull hits are achieved to destroy the missile, then the missile detonates but does no harm. If not, each hit achieved on the missile is counted as a negative modifier to its hit determination roll(s) when it detonates.

HINTS ON TACTICS

Remote objects are very important. Use them as much as possible to detect and fire upon enemy vessels. Ships are too costly to be risked on the front lines, so let your fighters and missiles do that fighting for you whenever possible. Fly around with your remote objects deployed if possible. This puts plenty of black globes on the map at the start of the battle, confusing your opponent as much as possible.

Also, only use your active sensors when you are either (a) reasonably certain of achieving a valuable detection, or (b) ready to detonate or about to be destroyed. Otherwise you become visible to everyone in the battle, and that could be the last thing you do.

Don't use your screens until later in the battle. Otherwise you will be very easy to detect. It's better to remain a black globe in the enemy's eyes for as long as possible.

MODELING SUGGESTIONS

2300 AD space combat is designed for use with miniatures, though any system of markers and a hex grid will suffice. However, miniatures will lend a bit of added realism and color to your game and should not be ruled out.

The models and globes shown in the accompanying photographs were all constructed in about an hour only with materials easily obtained for less than $10. The black globes are ping-pong balls mounted on golf tees and wooden bases, held together with wood modeling glue, and spray-painted flat black. The ships are pieces of white golf tee mounted the same way. Missiles and sensor drones are also pieces of golf tee, cut to smaller sizes and mounted differently for distinction.

The hex grid is also easy to come by. Several companies create iron-on hex grids to be put on sheets. They range in size from one to several inches per hex (we recommend two inch hexes). At this size, a reasonable battle can be played out on a typical tabletop. Grids can be obtained from Rafm Company, Incorporated, 19 Concession Street, Cambridge, Ontario, Canada, N1R 2G6.

Ship Listings

Ship listings give all the information needed to operate a shp and to use if in space combat. An explanation of the format is given in the sidebars.
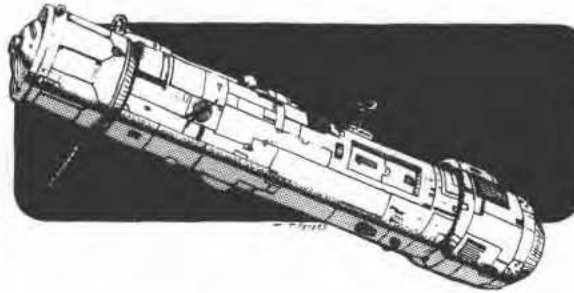
ANJOU-CLASS CARGO VESSEL

The *Anjou* class was the mainstay of the Sol-Serurier run during the 2270s and '80s. Designed originally by L'Tage, Ltd. of Paris, the *Anjou* class is the result of two predecessors, the *ExC-1* and *ExC-2*. The original contract called for a design which would be capable of hauling an internal 25,000 cubic meters of material at nominal speeds between the worlds of the Serurier cluster. The *Anjou* class did just that, and the original order of 34 vessels has grown over time into a family of nearly 600 ships.

The contract for the power plant went to Hyde Dynamics of the United States, as a part of the Shared Technology package of the Jones-Bouvier summit of 2267. The American firm provided a powerful, compact, three-megawatt plant turbine, easily maintained from only a few access points (vital to the design of the engineering section of the rest of the ship). The stutterwarp unit itself was an off-the-shelf French design typical of all French craft of that era.

The hull is a basic cylinder 100 meters long and approximately 20 meters in diameter. Virtually all of the interior space is formed into cargo holds, though a large portion of the ship is set aside as a spin habitat for the possible 24 personnel on board. The ship does not benefit from streamlining and is not manufactured with any ship's vehicle or bays for such, but many models still in use have a shuttle or cutter dock attached.

There were no weapons installed on the *Anjou* class when they were being produced (the last came off the line approximately 20 years ago). However, the government of New Melbourne is known to employ several as revenue cutters, and they have been mounted with shields, several lasers, and an escape pod.

As a cargo ship in the present world of trade and commerce, the *Anjou* class is definitely outclassed by newer, more sophisticated models. However, due to the large numbers produced and the ready serviceability of the design, *Anjou*-class ships are often purchased and refitted for a variety of purposes. They are a cheap, abundant resource to draw upon when constructing new starships is either physically or economically impossible.

Streamlining: None.

Sensor Package: Navigational radar, deep system scan.

Work Stations:

Off-Bridge: 2 engineering.

Bridge: 1 command, 1 navigation, 1 communication, 2 engineering, 1 computer.

Additional Crew Recommendations: None.

General Information: *Warp Efficiency:* 2.386 (unloaded) *Plant:* 3MW MHD Turbine *Fuel:* 300 tons *Range:* 7.7 *Mass:* 639 tons (unloaded) *Cargo Capacity:* 25,066 m³ *Comfort:* +1 *Emergency Power:* Battery, 150 hours *Total Life Support:* 25 *Solar Array:* None

Ship Status Sheet Information: *Movement:* 5 hexes (unloaded) *Screens:* None *Passive Signature:* 5 *Active Signature:* 7 *Passive Sensors:* 0 *Active Sensors:* 5 *Hull Hit Capacity:* 30/6/15 *Power Plant Hit Capacity:* 10/2 *Crew Complement:* 10 *Weapons:* None *Targeting Computer:* None *Remote Stations:* None

DESARGE 8680

Introduced in 2275, the *Desarge* class has almost taken over the luxury passenger market along the Sol-Alpha Centauri-Beta Canum route. The original specifications for the *8680* were drawn up by the founder of General Service Transport, author-architect Julius Bourge. GST originally purchased six of the vessels (since expanded to 23) which run regular passenger service to all colony worlds along the Frontier. These are the famed Tall Ship Fleet; GST's flagships are an institution in their own right.

The Tall Ships are designed around a small but powerful fusion reactor designed by TerraFuse, now a subsidiary of Hyde Dynamics. Considering the ambitious design and luxurious accommodations, a fusion plant was seen as the only option. Anything less would have required an enormous fuel load, which might interrupt regular service without warning.

The actual staterooms of the Tall Ship class are designed to handle the entire crew and passengers (534 total). The ship's crew, including stewards, runs at about 100, and many of the other suites are taken up by entertainers or company officials, so the ship can hope to take on approximately 400 passengers per flight. Each stateroom or suite provides a generous amount of room, classic furnishings (some Tall Ships boast that no two staterooms are furnished alike), and superb cuisine, which alone would draw the upper crust of passenger service.

However, the Tall Ships are more than simple comfort and luxury. Each Tall Ship has a casino deck, designed and furnished in a unique style. One resembles an American casino of the 20th century, one like an ancient Egyptian palace, and one like Tangiers in the 1920s. A variety of live entertainment can be found here or in one of the two night clubs featured on each vessel.

There are two gymnasiums for the passengers' enjoyment. Social events are presented: costume parties, official dinners in honor of distinguished passengers, and dances, plus an in-the-round holographic theatre. Tall Ship passages are sought-after by those who want more than just to travel the distance. There are faster ships, but none more entertaining than the Tall Ships.

In the 2280s and '90s, the Tall Ships gained another reputation as being a neutral meeting ground for diplomats and intelligence agents of all nations. This lent itself well to the overall feel of each vessel, as rumored intrigue added to the mystique of each ship. These ships are, in fact, the chosen method of travel for both the corporate and government elite. Many rich patrons spend months, if not years, living on the Tall Ships, moving from one vessel to another on an extended vacation of debauchery and conspicuous consumption.

Desarge is rumored to be constructing what it is calling the Tall Ship II class. The prototype is under construction in orbit around Titan in the Sol system under extremely tight security. However, industry gossip reveals that this ship is at least three times the size of the *Desarge 8680* class, and that the prototype is within months of completion.

Streamlining: None.

Sensor Package: Navigational radar, gravitational scan.

Work Stations:
  Off-Bridge: 26 engineering, 18 steward, 11 medical.
  Bridge: 1 command, 2 navigational, 2 communications, 4 computer, 4 engineering.

Additional Crew Recommendations: None.

General Information: *Warp Efficiency:* 2.412 (unloaded) *Plant:* 180MW Fusion *Fuel:* NA *Range:* 7.7 *Mass:* 37,103 tons (unloaded) *Cargo Capacity:* 20,000 m³ *Comfort:* +3 *Emergency Power:* Battery, 150 hours *Total Life Support:* 750 *Solar Array:* None

Ship Status Sheet Information: *Movement:* 5 hexes (unloaded) *Screens:* None *Passive Signature:* 9 *Active Signature:* 7 *Passive Sensors:* 0 *Active Sensors:* 5 *Hull Hit Capacity:* 400/80/200 *Power Plant Hit Capacity:* 120/24 *Crew Complement:* 94 *Weapons:* None *Targeting Computer:* None *Remote Stations:* None
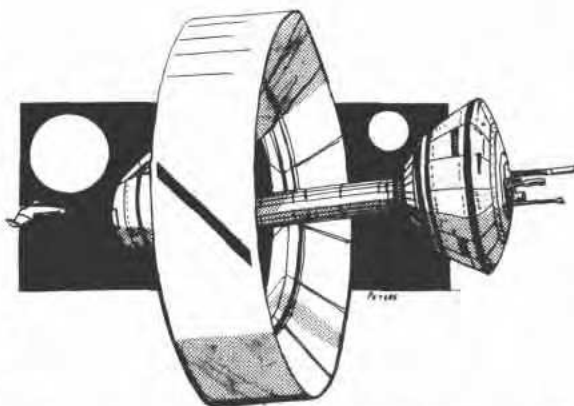
General Information:
Warp Efficiency: *In light-years per day.* Plant: *Megawatts output and type of power plant.* Fuel: *Mass of fuel. Type of fuel follows from plant type.* Range: *In light-years before discharge of stutter drive must take place.* Mass: *Total mass of ship in tons.* Cargo Capacity: *Given in cubic meters. Cargo mass must be considered in warp efficiency.* Comfort: *A modifier to such tasks as hiring new personnel, taking on passengers, etc.* Emergency Power: *If there is an emergency power system, its type and duration in hours is given here.* Total Life Support: *The total number of humans which can be accommodated by the atmospheric and food generating life support. Passengers beyond this sum can only be taken on in emergencies.* Solar Array: *The total area in square meters of any solar array are given, plus the time required to breakdown the total fuel supply in days.*

Ship Status Sheet Information: Movement: *In hexes, unloaded.* Screens: *The value of screens.* Passive Signature, Active Signature, Passive Sensors, *and* Active Sensors: *All single numbers, the meaning of which is given in* Space Combat. Hull Hit Capacity *and* Power Plant Hit Capacity: *Sequences of numbers explained under* Space Combat. Crew Complement: *The total number of crew operating the ship, not necessarily the number of people on board.* Weapons: *Weapons carried will be named and described here.* Remote Stations: *The number of remote stations on board will be given here.*

ACONIT CLASS

As a result of their good reputation, and France's willingness to sell them to other nations, Aconit-class frigates are very common throughout human space in the 24th century. There are currently nearly 50 of them in existence, with several others still under construction.

ISV-5

A fairly advanced vessel, the ISV-5 has only been in production for 10 years. There are nearly a 100 in use in all corners of human space, including a shipment of 10 copies delivered to the American Space Force at Ellis.
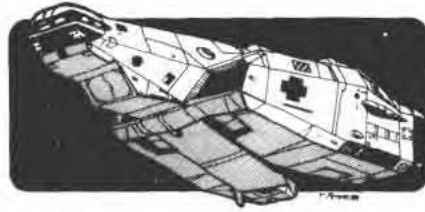
ACONIT-CLASS FRIGATE

Late in 2279, the French released their first Orage-class frigate, a return to the concept of a well protected, laser-armed ship, without missiles. The Orage proved so worthless in actual combat, however, that they abandoned it, selling off the already built models.

A new vessel was desperately needed to fill the gap that this left in the French forces. Fortunately for the French, a design crew had been working on the Aconit-class frigate since just after the first Orage had been laid down, and they were able to complete the first model of the ship just two years after the first Orage was completed. The Aconit was nearly identical in size to the ill-fated Orage, but it had the benefits of missile carrying capability and faster movement, at the price of less armor.

The Aconit class performed very well in combat, and other nations approached the French about purchasing Aconits. Shortly, Bavaria had purchased a few, as had Soviet Asia and Russia.

The first actual combat use of the Aconit class was in 2283, when a Manchurian raiding force of two missile frigates attacked a Bavarian convoy being escorted by the Kassel. Despite the fact that the Kassel was destroyed, it inflicted such heavy damage on the Manchurian ships that they were forced to return to their base, and the other Bavarian vessels escaped.

The Russians first used their Aconits in the Battle of Barnard's Star (2284). Three Russian Aconit-class frigates chased down two larger Manchurian destroyers, attacking them. The battle was left undecided (both sides received massive damage), but the reputation of the Aconit grew.

Other battles Aconits took part in were the First Battle of Joi (2286), the Kimajano Raid (2292), the Third Battle of Alpha Centauri (2293), and the First and Second Battles of Tithonus (2298).

Streamlining: As shuttle.

Sensor Package: Deep system scan, navigational radar, active and passive military sensors.

Work Stations:

Off-bridge: 2 sensor, 2 gunnery, 2 remote, 6 engineering, 1 troop, 1 medical.

Bridge: 1 command, 1 navigation, 1 communications, 1 computer, 1 engineering.

Additional Crew Recommendations: 10 ship's troops.

General Information: *Warp Efficiency:* 1.49 (unloaded) *Plant:* 7MW MHD Turbine *Fuel:* 1400 tons *Range:* 7.7 *Mass:* 2588 tons *Cargo Capacity:* None *Comfort:* 0 *Emergency Power:* Battery, 150 hours *Total Life Support:* 34

Ship Status Sheet Information: *Movement:* 3 hexes *Screens:* None *Passive Signature:* 4 *Active Signature:* 4 *Passive Sensors:* 5 *Active Sensors:* 7 *Hull Hit Capacity:* 34/9/17 *Power Plant Hit Capacity:* 20/4 *Crew Complement:* 29 *Weapons:* 2 double mount Hyde Dynamic Model EA122 lasers, ×1; 2 French Ritage missiles *Targeting Computer:* +1 *Remote Stations:* 2

TRILON AND ASSOCIATES INITIAL SURVEY VESSEL, ISV-5

Trilon Industries has always been in the forefront of both ship design and corporate exploration around the Sol-Beta Canum Venaticorum trade route. After their initial survey and colonization of Xi Ursae Majoris (2250), and their ability to make the planet nearly Trilon exclusive, efforts have been redoubled to be the first on the scene of all potentially habitable worlds within their sphere of influence.

The Trilon ISV-5 is an extension of Trilon's policies: Obtain fast, quick survey information to make contact with a potentially profitable system as soon as possible. The ISV-5 is a fast vessel with an extended-range stutterwarp drive. The prototype of its stutterwarp drive was installed in the ISV-4. Unfortunately, the prototype developed operational problems, and several missions were lost due to faulty design. The new version is easier to service and fewer breakdowns.

Trilon got the best of MHD power plants for the ISV-5. Their top-of-the-line small turbine was installed, giving fantastic performance for the plant's size. Also, fuel processing equipment has been installed in the ship for frontier refueling. Complete breakdown from raw to molecular to
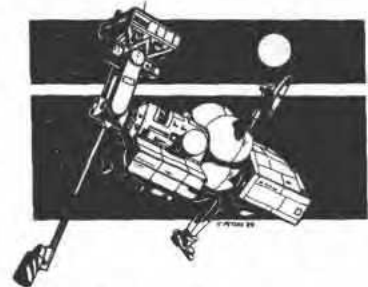
crystalline hydrogen takes roughly seven hours for the entire 1500-ton fuel supply needed.

Ship sensors include advanced navigational and system survey equipment. Since the ship is only to map out the system, noting interesting points for later inspection, further sensor equipment was deemed unnecessary. There is no means for getting the crewmembers on- or off-planet.

Streamlining: None.

Sensor Package: Deep system scan, navigational radar, minimal cartographic sensors.

Work Stations:

Off-Bridge: 2 engineering.

Bridge: 1 command, 1 navigation, 1 engineering, and 1 computer.

Additional Crew Recommendations: None.

Note: The command figure on company vessels is generally an employee with a high security clearance for corporate intelligence. The reduced bridge crew also requires that some crewmembers double as a communications operator.

General Information: *Warp Efficiency:* 2.773 (unloaded) *Plant:* 5MW MHD Turbine *Fuel:* 500 tons *Range:* 7.7 *Mass:* 679 tons (unloaded) *Cargo Capacity:* 52.5 m³ *Comfort:* 0 *Emergency Power:* Battery, 100 hours *Total Life Support:* 16 *Solar Array:* 500 m² 3.5 days

Ship Status Sheet Information: *Movement:* 6 hexes (unloaded) *Screens:* None *Passive Signature:* 6 *Active Signature:* 7 *Passive Sensors:* 5 *Active Sensors:* 10 *Hull Hit Capacity:* 4/1/2 *Power Plant Hit Capacity:* 10/2 *Crew Complement:* 8 *Weapons:* None *Targeting Computer:* None *Remote Stations:* None
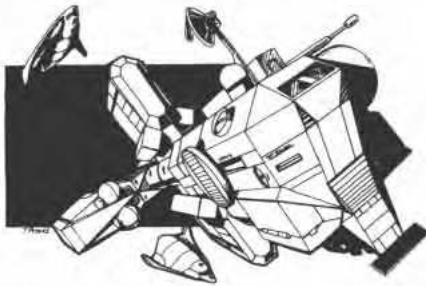
TRILON ASSOC C-SYSTEM SPECIAL SERVICES VESSEL, *SSV-21*

Trilon also has need for more sophisticated vessels for such things as contacting new life forms and doing extended surveys of living worlds. Their chief vehicles for these missions is the *SSV-21*, a highly-rated craft for its class sought after by anyone wishing to do fringe exploratory work on a larger scale.

The *SSV-21* relies on a closed system fuel cell power plant. Fuel cells are usually used for smaller military vessels for their lower radiated signature, but they also have the adaptive advantage of being easily able to retain their fuel supply after use. By simply deploying its solar array, the *SSV-21* can again break down the water exhaust of their oxygen and hydrogen fuel, without relying on bases or searches. Beyond the frontier, this is very important; it is a rare system that does not have a large quantity of water or ice, but finding it can take weeks off the travel time of a deep exploratory craft. Using a closed system alleviates this need altogether.

The *SSV-21* is designed to take along up to 20 trained individuals for deep investigative surveys. They have been provided with quarters, a conference area, and a laboratory featuring such things as work stations for their needs, and two quite good linguistics computers to help crack any new languages that come up.

Streamlining: None. Interface vehicles attached.

Sensor Package: Navigational radar, deep system scan, advanced cartographic sensors.

Work Stations:

Off-bridge: 3 engineering, 1 medical.

Bridge: 1 command, 1 navigational, 1 communications, 1 computer, 1 engineering, 1 sensor.

Additional Crew Recommendations: Up to 20 specialists in contact, investigation and computer work. Two space plane pilots may also be taken on.

General Information: *Warp Efficiency:* 2.076 (unloaded) *Plant:* 4MW Fuel Cell *Fuel:* 400 tons, enclosed system *Range:* 7.7 *Mass:* 1295 tons (unloaded) *Cargo Capacity:* 2360 m³ *Comfort:* 0 *Emergency Power:* Battery, 250 hours *Total Life Support:* 56 *Solar Array:* 800 m², 1.75 days

Ship Status Sheet Information: *Movement:* 4 hexes (unloaded) *Screens:* None *Passive Signature:* 3 *Active Signature:* 9 *Passive Sensors:* 0 *Active Sensors:* None *Hull Hit Capacity:* 10/2/5 *Power Plant Hit Capacity:* 16/4 *Crew Complement:* 24 *Weapons:* None *Targeting Computer:* None *Remote Stations:* None

SSV-21

Besides the features already mentioned, the SSV-21 also features two space planes which can perform interface operations (the ship itself is not streamlined, and relies on these two craft for all interface requirements). These space planes each mass 120 tons and displace 200 cubic meters. They can carry 15 people and up to 11 tons of cargo, provided it fits into 22 cubic meters. They are VTOL craft for rough terrain landing, and are of rather rugged design to withstand the rigors of several months of continuous use out of reach of repair facilities.

KENNEDY-*CLASS CRUISER*

The Kennedy-class cruiser is intended primarily for use as a fast missile carrier. As such, its usefulness is primarily in space. The vessel design does not allow planetary landings, but most Kennedy-class vessels have some cargo space modified to carry a landing vehicle (or occasionally a fighter craft).

MISSILES AND DRONES

Missiles and drones are, of course, miniature stutterwarp ships in their own right. As such, they are extremely expensive pieces of equipment.

The two tend to be used in conjunction with one another in combat. A vessel will send out drones to detect the enemy at a distance so that it can send its missiles to attack without having to approach the enemy itself.

This means that drones are often targeted during combat. Sometimes this is because they are mistaken for missiles, but more often, the enemy simply wants to deprive the missile ship of the information the drones transmit, forcing the missile ship to close the distance itself.

When considering the fact that every time a detonation missile explodes or a regular missile or a drone is destroyed by fire, another small stutterwarp engine is lost, it becomes obvious that such battles are very expensive, even if the main military vessels themselves are never hit.
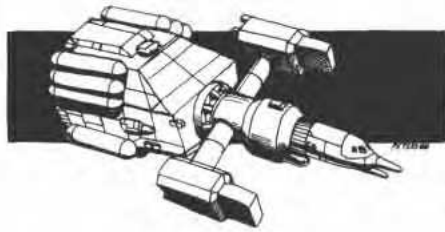
KENNEDY-CLASS CRUISER

American Space Forces, on the cutting edge of large warship design, have developed the *Kennedy*-class cruiser to be the finest military craft in space.

Fusion powered, the *Kennedy*-class cruiser has terrific performance at warp efficiency 4.81. The warp unit itself is a completely new design built by American Space Force engineers within the last five years. Most of the mass of the ship is centered in the fusion plant in order to take advantage of every bit of energy for greater speed. The American *Kennedy*-class cruiser is perhaps the fastest ship in service today, but its overwhelming cost to firepower ratio makes its use prohibitive.

There are five remote stations to control up to 20 deployed missiles. The most common missile for the *Kennedy*-class cruiser is the Hyde Dynamic One-Mission Definite-Kill missile. There are also two remote sensor drones, also of Hyde manufacture, issued as standard equipment.

Armament is variable. Most *Kennedy*-class cruisers mount high output lasers in single mounts. However, as with all military craft, these weapons are often changed in favor of others according to the preference of the captain or gunner. There are a total of 10 weapons mounts and gunner work stations on the *Kennedy*-class cruiser.

Stealth characteristics for the *Kennedy*-class cruiser are quite good, according to industry observers. Apparently the Americans are converting to a body style pioneered by the French in the 2280s for their newer craft.

There are between 10 and 20 *Kennedy*-class cruisers in service now (American Space Force security and disinformation is quite good—the actual number of craft in service is difficult to pinpoint). However, considering its performance and effectiveness, this design should continue for some time in order to fill what was a considerable hole in the American table of organization.

Streamlining: None.

Sensor Package: Deep system scan, navigational radar, active and passive military sensors.

Work Stations:

Off-Bridge: 2 sensor, 10 gunnery, 5 remote, 11 engineering, 1 troop, 3 medical.

Bridge: 1 command, 2 navigation, 2 communications, 3 computer, 3 engineering.

Additional Crew Recommendations: 10 security personnel.

General Information: *Warp Efficiency*: 4.81 (unloaded) *Plant*: 150MW Fusion *Fuel*: NA *Range*: 7.7 *Mass*: 7213 tons *Cargo Capacity*: 3695 m³ *Comfort*: 0 *Emergency Power*: Battery, 90 hours *Total Life Support*: 100.

Ship Status Sheet Information: *Movement*: 9 hexes (unloaded) *Screens*: None *Passive Signature*: 4 *Active Signature*: 6 *Passive Sensors*: 10 *Active Sensors*: 15 *Hull Hit Capacity*: 59/15/30 *Power Plant Hit Capacity*: 100/20 *Crew Complement*: 72 *Weapons*: 10 Hyde Dynamic Model EA122 lasers, ×1; 20 Hyde Dynamic One-Mission Definite-Kill missiles *Targeting Computer*: +2 *Remote Stations*: 5.

HYDE DYNAMIC ONE-MISSION DEFINITE-KILL MISSILE

Displacing only two and a half tons, the latest Hyde Dynamics missile is one of the smallest high energy missiles on the market today. A very small power plant and stutterwarp unit drives the entire unit at warp efficiency 1.908 for an entire day of defensive preparedness operations. Fueled by simple crystalline hydrogen, the missile can draw upon the fuel reserves of the mothership indefinitely.

The main weapon is a one-shot, nuclear detonation laser mounted in the nose. The laser has one burst, about equal to 20 bursts at close range from a typical near-defense laser system. This much punch is certain to do massive damage to any but the most heavily armored ships.

An advanced sensor package makes the Hyde Dynamic missile an asset as a remote sensor drone, as well. The package also includes an active sensor device which can be used by the missile prior to detonation in order to retrieve all the information possible from its vantage point.

Streamlining: None.

Sensor Package: Navigational sensors.
Work Stations: None.
General Information: *Warp Efficiency:* 3.304 *Plant:* .07MW Fuel Cell *Fuel:* 1 ton *Range:* 7.7 *Mass:* 5.620 tons *Displacement:* 6.77 m³ *Cargo Capacity:* None *Emergency Power:* None *Solar Array:* None

Ship Status Sheet Information: *Movement:* 7 hexes *Screens:* None *Passive Signature:* 1 *Active Signature:* 1 *Active Sensors:* 5 *Passive Sensors:* 8 *Hull Hit Capacity:* 4/1/2 *Power Plant Hit Capacity:* 1/1/1 *Weapons:* 1 Detonation Laser, 10×2

FRENCH RITAGE MISSILE

The French Ritage missile was the standard design of all French military craft up until the introduction of its successor, the Ritage 2, three years ago. Now, in large quantities, Ritage missiles are being sold off to local governments and other powers wishing to purchase cheap arms from the French Union.

The Ritage is not a detonation missile. Instead, the Ritage mounts a single particle weapon for close-in fighting. French doctrine has been against the use of high-cost detonation missiles since the 2270s, but is now returning to that school of thought.

The Ritage is a short performance missile, having only enough fuel on board to keep the fuel cell plant operating for twelve hours. However, due to their small size and ease of construction, each missile is quite cheap, and several could be deployed at any time to form a protective screen of sensors and weapons around a valuable ship in a potentially hostile situation.

The price given for the Ritage missile is that reported by the French military upon original purchase. However, modern prices for Ritages run approximately 25-50 percent of this price as more and more examples are dumped onto the market.

Streamlining: None.
Sensor Package: Military sensors only.
General Information: *Warp Efficiency:* 2.861 *Plant:* .03MW Fuel Cell *Fuel:* 0.214 tons *Range:* 7 *Mass:* 3.106 tons. *Displacement:* 3.82 m³

Ship Status Sheet Information: *Movement:* 6 hexes *Screens:* None *Passive Signature:* 1 *Active Signature:* 1 *Passive Sensors:* 5 *Active Sensors:* None *Hull Hit Capacity:* 1/1/1 *Power Plant Hit Capacity:* 1/1/1 *Crew:* 0 *Weapons:* 1 French Mid-output Particle Beam Weapon, ×1, *Remote Stations:* None

AQUITAINE CORPORATION REMOTE SENSOR DRONE

The remote sensor station has become a particularly useful piece of equipment for hostile space missions against the Kafers. The Aquitaine Corporation remote sensor drone is typical of such drones built by all serious spacefaring nations in human space.

There is no power plant to speak of; the device itself runs off batteries. Once deployed in an advanced position, the drone is left off until such time as it is needed. Due to its small size and lack of power plant, the remote sensor drone is particularly hard to spot, even if no special stealth procedures have been taken.

Without a stutterwarp to drive it, in the context of any space battle, the device is completely immobile. Placing remote sensor drones in advance of combat can assist in detecting enemy vessels. However, this advanced placement is not always possible. One tactic used by pilots against Kafer adversaries is to deploy a sensor drone and keep it between them and any "black globes" they may be aware of. While hiding this way, the ship's missiles and other remote objects can do the dirty, dangerous work and leave the mother vessel in relative safety.

Streamlining: None.
Sensor Package: Military sensors only.
General Information: *Fuel:* Batteries, good for 40 hours of continuous operation *Mass:* 0.67 tons *Displacement:* 0.44 m³

Ship Status Sheet Information: *Movement:* 0 hexes *Screens:* None *Passive Signature:* 1 *Active Signature:* 1 *Passive Sensors:* 10 *Active Sensors:* 15 *Hull Hit Capacity:* 1/1/1 *Power Plant Hit Capacity:* 1/1/1 *Crew:* 0 *Weapons:* None *Remote Stations:* None
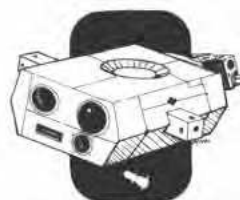
ADDITIONAL WEAPONS

Hyde Industries Laser, Model EA 122

Hyde Industries has always been at the forefront of space weapons technology, and the model EA 122 is their most popular design.

Damage: ×1 Targeting: +1 Price: Lv105,000.

Hyde Industries High Output Laser, Model EAA1000

The EAA1000 is the high output favorite of most national space fleets. This model is often adaptable for use in detonation laser devices.

Damage: ×2 Targeting: +1 Price: Lv174,000.

Allen Model BMZ 150MW Particle Beam Weapon System

An American produced weapon, the Allen was one of the first particle weapons with sufficient targeting to be a viable space combat asset.

Damage: ×3 Targeting: −2 Price: Lv212,000

Guiscard LL-98

The LL-98 is the standard armament of the French naval and merchant vessels.

Damage: ×1 Targeting: +0 Price: Lv97,000.

DunArmCo Amplified Particle System, ALS-22

Australian DunArmCo is attempting to break into the space weapons field with the introduction of the ALS-22 in 2296.

Damage: ×2 Targeting: −3 Price: Lv146,000.

In the final analysis, the X-2296 is a good fighter. However, in light of overall speculation and the eventual drop in price of the space-craft after introduction, it is certain the Hyde has taken it on the chin with this design, and several positions in their fighter design team will be subject to change in the near future.
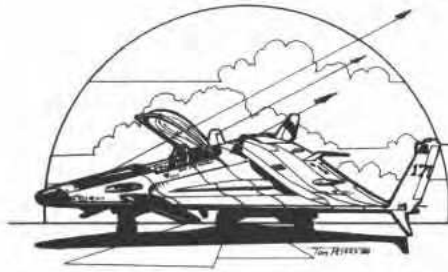
HYDE DYNAMICS
MODEL X-2296 FIGHTER

Hyde Dynamics completely rethought and redesigned its fighter development program in the early 2290s. Emphasis was on the removal of old ideas in the quest for and implementation of the latest technology and innovation. (However, this seems to have been a marketing ploy aimed at securing the lucrative Beta Hydri defense contracts so hotly contested at that time. Such new ideas have not leaked into other areas of Hyde design such as their missile, sensor, and hull construction divisions.)

The first, and so far only, result of this restructuring has been the *X-2296* fighter. It is indeed a unique design, though critics claim that many of the changes were made for changes sake, and not for the overall improvement of performance. However, in its own right, the *X-2296* fighter holds its own against any comparably priced fighter craft in human space.

Specifically, the Hyde *X-2296* is a one-man fighter craft with extensive targeting and computer enhancement. The cockpit has been designed with a great deal of voice and/or eyesight directed mechanisms, all keyed to the pilot/helmet/computer link-up.

Hull, power plant, and stutterwarp design were completely reworked, though the end result was less than spectacular. The final warp efficiency of the craft is 1.489—impressive, but hardly worth the years and millions poured into the project. Synthetic hull design copies French boron composites of the 2280s, and does a good job protecting and masking the ship.

Streamlining: As space plane.
Sensor Package: Navigational radar, minimal life sensors.
Work Stations:
   Bridge: 1 command.
Additional Crew Recommendations: Impossible.
General Information: *Warp Efficiency:* 2.824 *Plant:* .1MW Fuel Cell *Fuel:* 2.85 tons *Range:* 7.7 *Mass:* 12.85 tons *Cargo Capacity:* None *Comfort:* 0 *Emergency Power:* Battery, 20 hours *Total Life Support:* 1 *Solar Array:* 100 m², 0.7 days

Ship Status Sheet Information: *Movement:* 6 hexes *Screens:* None *Passive Signature:* 1 (1) *Active Signature:* 4 *Passive Sensors:* 10 *Active Sensors:* 15 *Hull Hit Capacity:* 4/1/2 *Power Plant Hit Capacity:* 1/1 *Crew Complement:* 1 *Weapons:* One High Output Hyde Laser, ×2, *Targeting* +1 *Targeting Computer:* +1 *Remote Stations:* None

INTERFACE VEHICLES

Interface refers to that space which needs to be overcome between the surface of a world and the orbits around it. Since this usually requires moving within a significant gravity well and through an atmosphere of some sort, a special type of vehicle is required.

Streamlining: Most interstellar craft are not streamlined, and are therefore not interface capable. These ships rely on interface craft to deliver or load their cargo or passengers, and are indeed completely dependent on interface craft for all physical contact with the surface of a world with atmosphere. If properly powered, however, using reaction thrusters, a nonstreamlined ship can land on the surfaces of worlds where there is no atmosphere present.

Streamlined ships are designed with an airfoil to give the ship lift when within an atmosphere. Streamlined spacecraft take off and land in the same manner as space planes or shuttles (as is given in the ship's description). When attempting to land or take off from a planetary surface, consult the appropriate section below for travel times and procedures.

Beanstalks: A beanstalk is an extremely advanced technological device which, as its name implies, is a linear stretch of material reaching from the surface of a world straight up to orbit. Elevators on or within the beanstalk allow the transport of cargo in either direction with the use of easily created electrical energy.

The chief drawback to a beanstalk is the required materials technology. A substance strong enough to support such a mammoth structure has only recently been developed. Also, the

Tethered Asteroid

Geostationary Terminal
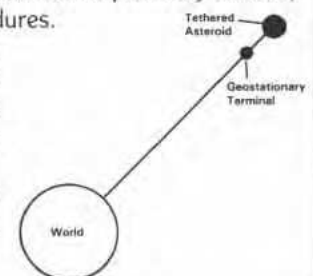
World

engineering problems of such a device have been extremely difficult to overcome. However, the end result is nearly effortless interface transportation for that world.

There are two beanstalks in existence in human space. The first was created by the French on Beta Canum Venaticorum, where, due to lower gravity and shorter days, the materials technology did not have to be so great. The second is a beanstalk on Earth, pioneered by the French, but financed by nearly every nation on the planet. The Earth beanstalk is, without a doubt, the greatest technological and engineering achievement of mankind to date.

Beanstalk travel times are approximately five days in either direction (orbit to surface or surface to orbit). Although beanstalks primarily haul cargo, the length of the trip, plus the spectacular view available, makes them popular spots for short vacations as well.
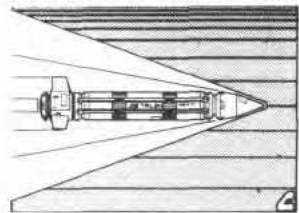
Catapults: On a lower technological level lies the catapult or linear accelerator. Such accelerators are popular for moving materials from a surface to orbit (only). Several catapults were erected on Earth before the discovery of the stutterwarp. They are still quite efficient for placing cargos in orbit around a planet.

A catapult is usually designed to throw a specifically designed package, usually streamlined, into orbit. Different loads can be placed into these packages, and the energy put into the acceleration is adjusted for the object's overall.

Catapults are used most heavily on agricultural and mineral-rich worlds. They are not open for human or live animal transport, and can only be used to get up. Once a package is taken to orbit and is unloaded, it is usually returned to the surface as a dead glider.

Catapult trip time is almost instantaneous; the entire journey takes only a few minutes.

Dead Gliders: A dead glider is any sort of unpowered reentry vehicle. Dead gliders are quite often disposable, or at least collapsible for ease of transport back to orbit by means of some other interface vehicle. Dead gliders can only be used to get from orbit to surface, and then only on a world with an atmosphere.

Dead gliders take advantage of the world's gravity to power it toward the surface. The streamlined airfoil design of the glider gives it and its payload lift against the atmosphere, allowing it to simply glide to the surface under no power of its own.

Dead glider flights require virtually no energy input. However, returning the glider to orbit for reuse requires some other interface vehicle, and the cost of such operations reflects this fact. Dead glider landings take approximately three hours from orbit to surface.
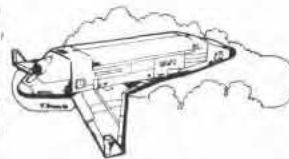
Space Planes: Space planes are aerodynamic aircraft capable of flight directly into orbit around a world. They generally operate on a jet/ramjet/scramjet combination engine, propelling the craft from a horizontal or vertical takeoff, through the atmosphere and beyond to orbit.

Space planes are the most luxurious form of interface transport in either direction, other than a beanstalk. They are usually employed in passenger service, but many larger models have been produced which carry cargo as well. Regular flights from the surface to orbital stations on nearly any human colony world are available, usually with many flights per day.
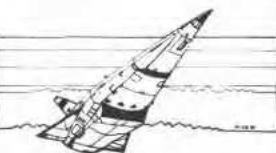
A space plane flight takes around two hours to orbit. A return trip takes the same amount of time.

Shuttles: Shuttles are still used on many worlds for their chief means of cargo interface transport. A shuttle relies on many supplemental drives and engines to power the horizontal launch of the main craft. Returning, the shuttle uses a dead glider method, landing at some predetermined port.

A shuttle has a greater cargo capacity than most space planes, and the flight to orbit is uncomfortable (high acceleration). Expended engines during a surface to orbit flight take time to refuel and reuse, making shuttle flights more expensive than an accelerator. However, many items cannot take the hyperacceleration of a slingshot ride without damage, and a shuttle provides an alternative.

Shuttle flights to orbit take about one hour. Return trips are similar to dead gliders, and take three hours to complete.

When running space combat with Kafers, apply a −3 modifier to all tasks they attempt, especially to-hit rolls, until they become more intelligent as a result of danger. To determine when this will happen, roll 1D10 each turn until the number rolled on the die is less than or equal to the turn number. For example, on turn 1, a roll of anything but a 1 indicates that they have not become more intelligent. On turn 2, a roll of 1 or 2 would mean that they had become more intelligent, but any other roll would not.

You will notice that it takes the Kafers longer to have an intelligence increase in space combat than in regular combat. This is because the perceived danger is less, since the enemy is not visible to the naked eye, and weapons are not trained on the individual but on the ship.

KAFER VESSELS

The following will give the referee necessary information for using Kafer vessels in space combat.
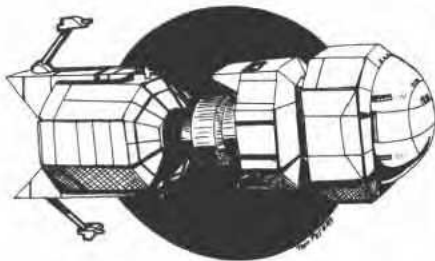
Kafer *Beta*-class Battlecruiser

One of the smaller vessels used by the Kafers in their attacks on French Arm colony worlds is the *Beta*-class Battlecruiser. Typical of Kafer designs, it is relatively slow compared to human vessels but is very heavily armored and sprouts weapons all along its length. Little else is known about the craft, since none have been captured in battle. *Beta*-class Battlecruisers carry Kafer fighter craft mounted internally in bays. *Streamlining:* None.

Sensor Package: Active and passive military sensors, otherwise unknown.

Work Stations: (Presumed)

Off-Bridge: 2 sensor, 10 gunnery, 2 remote, 14 engineering, others unknown.

Bridge: 1 command, 1 navigation, 1 communications, 3 computer, 4 engineering, others unknown.

Additional Crew Recommendations: Unknown.

General Information: *Warp Efficiency:* 2.8 *Plant:* Unknown *Fuel:* Unknown *Range:* Unknown *Mass:* 47,000 tons *Cargo Capacity:* Unknown *Comfort:* Unknown *Emergency Power:* Unknown *Total Life Support:* Unknown

Ship Status Sheet Information: *Movement:* 6 hexes *Screens:* 6 *Passive Signature:* 7 *Active Signature:* 12 *Passive Sensors:* 16 *Active Sensors:* 8 *Hull Hit Capacity:* 72/18/36 *Power Plant Hit Capacity:* 90/18 *Crew Complement:* 47 presumed, others unknown *Weapons:* 4×4 lasers, 6×1 +1 lasers, 10 Kafer X-ray missiles *Targeting Computer:* +2 *Remote Stations:* 2

Kafer *Golf*-class Fighter

The Kafer *Golf*-class Fighter is the larger but faster of the two types of Kafer fighters used against humans thus far. From reports gained from the study of the one sample that has been captured, it mounts a powerful laser, carries long-range sensors, and has very heavy armor. Incapable of planetary landings, it would be so even if it were more streamlined because its mass to fuel ratio is too low.

Study of the sample vessel also reveals that the Kafers use a very unusual basis for their computer systems, making them completely unadaptable to use with human systems.

Streamlining: None.

Sensor Package: Active and passive military sensors, navigation radar.

Work Stations:

2 Cockpits: 1 pilot, 1 gunner.

Additional Crew Recommendations: Not applicable.

General Information: *Warp Efficiency:* 3.28 *Plant:* Unknown megawattage MHD plant *Fuel:* 25 tons *Range:* Unknown *Mass:* 230 tons *Cargo Capacity:* None *Comfort:* Unlivable by human standards *Emergency Power:* Unknown *Total Life Support:* 3 Kafers

Ship Status Sheet Information: *Movement:* 7 hexes *Screens:* None *Passive Signature:* 3 *Active Signature:* 3 *Passive Sensors:* 10 *Active Sensors:* 10 *Hull Hit Capacity:* 5/2/3 *Power Plant Hit Capacity:* 16/4 *Crew Complement:* 3 *Weapons:* 1×2 laser *Targeting Computer:* +3 *Remote Stations:* None
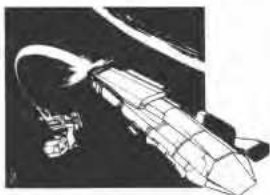
Kafer X-ray Missile

The little that is known about this Kafer missile is outlined here.

Ship Status Sheet Information: *Movement:* 11 hexes *Screens:* None *Passive Signature:* 0 *Active Signature:* 1 *Active Sensors:* None *Passive Sensors:* 2 *Hull Hit Capacity:* 1/1/1 *Power Plant Hit Capacity:* 2/1 *Weapons:* 1 14×2 detonation laser *Targeting Computer:* None

Starship Data

Ship Name	Class	Movement
Registry (or Armed Force)	Nationality	Year Built

Sensor Operator Skill Level	Passive Signature	Passive Sensors
	Active Signature	Active Sensors

Hull Hit Capacity		Sensors
Power Plant Hit Capacity		Computer
Crew		Remote Station
		Weapons Mount
Screens		Continuing Damage

Damage Control

List characters and skill levels of damage control personnel.

Weapons

List weapons with their gunner's skill, targeting bonus, damage.

List remote objects and Remote Pilot skill.

World Generation

SOCIAL DATA

Most worlds are in-hospitable to life, and they can be expected to have no more than a few small out-posts, scientific stations, or mines. Habitable worlds, however, will have more ex-tensive settlement and development.

Inhospitable Worlds: *Consult the Inhospitable World table to determine the installations to be expected on the world.*

Hospitable Worlds: *Hospitable worlds soon become colonies. Earth has produced 17 colony worlds in star systems beyond Sol.*

A colony world can be described in great detail by indicating its age, population, and settlement character.

Determine the Age of the Colony: *This data may be found by consulting published material, by using the Colony Age table, or by arbitrarily determining the value.*

Determine the Colony Population: *First decide if the colony was the object of heavy colonization, median colonization, or light col-onization. Using age as a guide, determine the current population level.*

(Continued.)

Adventures that take place in star systems require that the referee have a basic knowledge of what that star system contains. In preparation for an adventure that takes place in a star system for which no details have been provided, the referee must generate for himself the details of the star systems involved.

Overview: The star system generation procedure begins with the selection of the central star in a system and determines the characteristics of the star and its companions, if any. Orbital data for the star's worlds are generated. For each world, physical data is generated. If the world is a colony, social data for the world is also generated. Once the star system has been generated, the data is recorded.

STAR SELECTION

The referee begins star system generation by selecting a star from the Near Star Map and then consulting the *Near Star List* to determine what information concerning the star is already available.

The *Near Star List* provides spectral type, size, and magnitude. The list also indicates if the star has any companions which should be noted. Finally, it gives the location of the star in x, y, and z coordinates.

Companion Star Orbits: For each companion star, determine its orbit from the Companion Star Orbit table.

Companion stars can interfere with the orbits of planets. Stable planetary orbits must have a radius of less than one-third or more than three times the distance between the star and each of its companions.

ORBIT INFORMATION

Knowing the basic data for the stars in the system, it is possible to compute orbital data for worlds in the system.

The Presence of Planets: Stars of spectral type O, B, and A do not form planets; they are too young for the planets to have coalesced around the stars.

Such stars may have some small planetoids in random orbits. Throw 1D6 for the number of planetoids (called chunks) present. Throw 1D10 plus (1D10 x 0.1) for the orbital radius of each in au.

Orbital Zones: The life zone (the region with life-supporting temperatures) is found on the Orbital Zone table which shows the optimum life zone orbital distance as well as the inner and outer limits of the life zone.

World Orbits: Star systems are generated outward from the closest orbit to the star. The radius of each orbit and the world core in the orbit is determined. The values for successive orbital radii are dependent on previous orbits.

Consult the Allowed Orbits table and determine the maximum number of orbits allowed for the system. Throw once for each star in the system.

If the star system is a multiple (with companion stars), the allowed orbits are restricted by the presence of the other stars. The Companion Star Orbit Radii table details where those com-panion stars will orbit based on information in the near star list.

Consult the Initial Orbit table and determine the distance of the orbital radius for the first world orbit.

If the initial orbit is close enough to be inside the star, the orbit is labeled empty. No star on the near star map is large enough to encompass an orbit at 0.1 au; a stellar radius of 20 would be necessary.

If the initial orbit has a temperature of 2000 degrees K, any planet there would be vaporized and the orbit is empty. A star with luminosity 130 is necessary to vaporize a planet at 0.1 au; luminosity 520 is required to vaporize a planet at 0.2 au.

If the orbit is empty, record the radius of the orbit for reference.

Subsequent orbits are determined from the Subsequent Orbits table. The table produces a number which is multiplied times the radius of the previous orbit to produce a new orbital radius. Record each new orbital radius until all allowed orbits are found.

If, during the course of orbit determination, two consecutive empty orbits are produced, orbit determination is considered completed regardless of the number of allowed orbits previously determined.

WORLD DATA

World data must be generated for each world in an orbit around the star.

World Core Type: Determine the core type for the world. Worlds may have either rocky or icy cores.

World Size: Consult the World Size table to determine the throw required for world diameter and then make that throw and record the world diameter.

World Density: The density of the matter that forms a world is determined from the World Density table. Using the table, determine the world density.

World Mass: World mass can be read from the World Mass table using world size and density. Mass is given in earth masses.

Surface Gravity: The Gravity table shows the gravity in Gs for the world based on diameter and density. Gs can be converted to escape velocity by multiplying by 11.2 (the escape velocity at 1 G is 11.2 kilometers per second; the escape velocity at 2 Gs is 22.4 kilometers per second).

World Atmosphere: The Atmosphere Component table shows the minimum molecular weight of the atmospheric gases retained by a world of specific diameter and density.

Note the diameter and density of the world and find the minimum molecular weight of atmospheric gases retained. Using that number, find the label for the world's atmospheric type and the specific gas with that molecular weight (or higher). The atmosphere will contain the gases listed on the atmosphere gas list with molecular weights equal to or greater than the numbers from the table.

Molecular weight is an indication of the mass of specific atmospheric gases; the higher the mass, the more likely that a world's gravity will retain the gas in the atmosphere.

Atmospheres are classified by type depending on the minimum molecular weight of the gases retained. The Atmosphere Type table shows the specific label attached to atmospheres based on minimum molecular weight retained.

Note: If a world retains gasses of a molecular weight of four or less, it is a gas giant. If it retains a molecular weight of two or less, it is not only a gas giant—it may even be a brown dwarf. On the same page as the Minimum Molecular Weight table, there is a procedure to follow for discovering just how big such a world becomes.

Atmospheric Pressure: Atmospheric pressure is proportional to surface gravity. The Atmospheric Pressure table gives the average atmospheric pressure on a world surface. The Atmospheric Pressure (Condensed) table provides roughly the same information.

World Type: It is possible to designate world type based on atmosphere type, world core type, and orbital zone. Consult the World Type table and determine the world type.

If the world type is Garden, then further classification is necessary to determine where the world is in the time sequence of garden planets. Pregarden planets appear early in the life cycle of a star and its system, and soon transform themselves into another phase of the cycle, becoming either glacier planets or garden planets. Very old garden planets become postgarden planets. Throw 1D10 and apply the DM shown for stellar type. Record the result.

The world type determines many of the characteristics of the world. Consult the World Characteristics chart to determine what they are and record them.

Water Presence: Consult the Water Presence table to determine if there is water available on the world.

Average Temperature: Consult the Average Temperature table to determine the average temperature for the world. This value may vary across the world surface, but the average temperature provides an indication of temperature levels on the world.

Atmospheric Oxygen: Free oxygen is present only on glacier and garden worlds. Consult the Atmospheric Oxygen table to determine the percentage of oxygen in the atmosphere.

Multiply the oxygen percentage times the atmospheric pressure (previously determined) to find the oxygen pressure in the atmosphere.

Determine the Settlement Character of the Colony: Character is based primarily on age and indicates the degree of capital improvements that have been made in the colony. The referee will have to make a decision as to the settlement character in some cases.

Capital Improvements: Total the points provided by settlement character for the colony and add to that one point for each million (or fraction thereof) colonists.

The referee may then determine what capital improvements have been made to the colony by expending points to purchase items from the Interface Systems, Orbital Facilities, and Surface Facilities tables. Every colony must have an interface system and an orbital terminal. All points must be spent.

The items acquired should be described in the commentary about the colony.

SPECTRAL TYPE

Type	Color
O	Blue
B	Blue
A	Blue
F	White
G	Yellow
K	Orange
M	Red

STELLAR SIZE

Type	Label
Ia	Brightest Supergiants
Ib	Weaker Supergiants
II	Bright Giants
III	Normal Giants
IV	Subgiants
V	Main Sequence Stars
VI	Sub Dwarfs
VII	White Dwarfs

MAGNITUDE TO LUMINOSITY CONVERSION TABLE

Absolute Magnitude	Luminosity
15	.000083
14	.00021
13	.00052
12	.0013
11	.0033
10	.0083
9	.021
8	.052
7	.132
6	.33
5	.83
4	2.09
3	5.25
2	13
1	33
0	83
−1	209
−2	525
−3	1320

Luminosity for fractional magnitudes can be approximated by interpolation.

UNITS

Stellar radius, mass, and luminosity are all expressed in Sols, where 1 = Sol. Effective temperature is in °K.

RANDOM PLANETOIDS

Star types O, B, and A do not naturally have planets. They may have captured planetoids (chunks) in random orbits.

Throw 1D6 for the number of chunks. For each chunk, throw 1D10 + (1D10 × .1) for the orbital radius in au.

STELLAR RADIUS CHART

Spectral Class	Ia	Ib	II	III	IV	V	VI
B0	52	30	22	16	13	10	—
B5	75	35	20	10	5.3	4.4	—
A0	135	50	18	6.2	4.5	3.2	—
A5	149	55	14	4.6	2.7	1.8	—
F0	174	59	16	4.7	2.7	1.7	—
F5	204	60	18	5.2	2.6	1.4	1.14
G0	298	84	25	7.1	2.5	1.03	1.02
G5	454	128	37	11	2.8	.91	.55
K0	654	216	54	16	3.3	.90	.40
K5	1010	392	124	42	—	.56	.30
M0	1467	857	237	63	—	.54	.26
M5	3020	2073	712	228	—	.35	.10
M9	3499	2876	931	360	—	.20	.05

STELLAR MASS CHART

Spectral Class	Ia	Ib	II	III	IV	V	VI
B0	60	50	30	25	20	18	—
B5	30	25	20	15	10	6.5	—
A0	18	16	14	12	6	3.2	—
A5	15	13	11	9	4	2.1	—
F0	13	12	10	8	2.5	1.7	—
F5	12	10	8.1	5	2	1.3	.8
G0	12	10	8.1	2.5	1.75	1.04	.6
G5	13	12	10	3.2	2	.94	.52
K0	14	13	11	4	2.3	.82	.43
K5	18	16	14	5	—	.57	.33
M0	20	16	14	6.3	—	.48	.15
M5	25	20	16	7.4	—	.33	.10
M9	30	25	18	9.2	—	.21	.05

STELLAR LUMINOSITY CHART

Spectral Class	Ia	Ib	II	III	IV	V	VI
B0	560,000	270,000	170,000	107,000	81,000	56,000	—
B5	204,000	46,700	18,600	6700	2000	1400	—
A0	107,000	15,000	2200	280	156	90	—
A5	81,000	11,700	850	90	37	16	—
F0	61,000	7400	600	53	19	8.1	—
F5	51,000	5100	510	43	12	3.5	.97
G0	67,000	6100	560	50	6.5	1.21	.32
G5	89,000	8100	740	75	4.9	.67	.186
K0	97,000	11,700	890	95	4.67	.42	.117
K5	107,000	20,400	2450	320	—	.08	.025
M0	117,000	46,000	4600	470	—	.04	.011
M5	129,000	89,000	14,900	2280	—	.007	.002
M9	141,000	117,000	16,200	2690	—	.001	.00006

STELLAR EFFECTIVE TEMPERATURES CHART

Spectral Class	Ia	Ib	II	III	IV	V	VI
B0	22,000	24,000	25,000	26,000	27,000	28,000	—
B5	14,200	14,500	15,100	15,200	15,400	15,500	—
A0	9000	9100	9300	9500	9700	9900	—
A5	8000	8100	8200	8300	8400	8500	—
F0	6900	7000	7100	7200	7300	7400	—
F5	6100	6300	6400	6500	6600	6700	6800
G0	5400	5600	5700	5800	5900	6000	6100
G5	4700	4850	5000	5100	5200	5500	5600
K0	4000	4100	4300	4500	4700	4900	5000
K5	3300	3500	3650	3800	—	4100	4200
M0	2800	2900	3100	3400	—	3500	3600
M5	2000	2200	2400	2650	—	2800	2900
M9	1900	2000	2100	2200	—	2300	2400

Spectroscopic Binary: Orbit is 1D10 times au. Spectroscopic binaries are identified as "SB" in the *Near Star List*.

Unseen Companion: Orbit is 1D100 au. Unseen companions are identified as "UC" in the *Near Star List*.

Different Coordinates: Orbit is 63,000 au times the square root of:

$$(X_1 - X_2)^2 + (Y_1 - Y_2)^2 + (Z_1 - Z_2)^2$$

Use this method for companion stars (in the *Near Star List*) which have different XYZ coordinates. X_1 is the X coordinate of the first star; X_2 is the X coordinate of the second star. By finding the square root of the sum of the differences in X, Y, and Z coordinates, it is possible to determine the distance separating the stars; multiply by 63,000 to convert au to light-years.

Others: Orbit is 1D10 au.

Restrictions: Stable orbits must have a radius less than 1/3, or greater than 3 times the distance between companions.

UNTENABLE ORBITS

Planets are not tenable (they cannot exist) if their star produces a temperature of 2000°K or more at their orbit.

This table shows the minimum stellar luminosity which creates a temperature of 2000°K at the orbital distance shown.

Untenable Orbit	Luminosity
.1 au	130
.2 au	520
.3 au	1170
.4 au	2090
.5 au	3270

ALLOWED ORBITS

Star Type	Quantity
O	1D6 (chunks only)
B	1D6 (chunks only)
A	1D6 (chunks only)
F	1D10
G	3D6
K	2D6
M	1D6

When generating orbits, stop after rolling two consecutive empty orbits, regardless of the result on this table.

White dwarfs (size VII or 7) have no allowed orbits.

TIDAL LOCKING

Planets of stars with a mass of less than .7 are tidally locked to the star if in the life or inner zones.

Tidally locked worlds in the life zone may have small pockets of habitable terrain in the twilight zone between total day and total night.

INITIAL ORBIT

1D10	Orbit Radius
1	Empty Orbit
2	.1 au
3	.2 au
4	.3 au
5	.4 au
6	.5 au
7	.6 au
8	.7 au
9	.8 au
10	.9 au

If empty orbit, roll again for its radius.

If orbit radius places it inside the star or produces a temperature above 2000°K, then the orbit is empty.

SUBSEQUENT ORBITS

1D10	Multiplier
1	Empty Orbit
2	1.3
3	1.4
4	1.5
5	1.6
6	1.7
7	1.8
8	1.9
9	2.0
10	2.1

Multiply the previous orbit by the multiplier to determine subsequent orbit radius. If empty orbit, roll again for the radius of its orbit.

An empty orbit may, instead, be an asteroid belt. Roll 1D6: On a roll of 1, it is an asteroid belt. Whether an orbit is empty or contains asteroids, a second 1D10 roll must be made to determine its radius.

LIFE ZONES

Distance	Inner Limit	Optimum Distance	Outer Limit	Distance	Inner Limit	Optimum Distance	Outer Limit
.3	.45	.54	.66	4.1	1.66	2.02	2.44
.4	.52	.63	.76	4.2	1.68	2.04	2.47
.5	.58	.70	.85	4.3	1.70	2.07	2.50
.6	.63	.77	.93	4.4	1.72	2.09	2.52
.7	.68	.83	1.00	4.5	1.74	2.12	2.55
.8	.73	.89	1.07	4.6	1.76	2.14	2.58
.9	.78	.94	1.14	4.7	1.78	2.16	2.61
1.0	.82	.99	1.20	4.8	1.80	2.19	2.64
1.1	.86	1.04	1.26	4.9	1.82	2.21	2.66
1.2	.90	1.09	1.32	5.0	1.83	2.23	2.69
1.3	.93	1.14	1.37	5.1	1.85	2.25	2.72
1.4	.97	1.18	1.42	5.2	1.87	2.28	2.74
1.5	1.00	1.22	1.47	5.3	1.89	2.30	2.77
1.6	1.04	1.26	1.52	5.4	1.91	2.32	2.80
1.7	1.07	1.30	1.57	5.5	1.92	2.34	2.82
1.8	1.10	1.34	1.61	5.6	1.94	2.36	2.85
1.9	1.13	1.37	1.66	5.7	1.96	2.38	2.87
2.0	1.16	1.41	1.70	5.8	1.98	2.40	2.90
2.1	1.19	1.44	1.74	5.9	1.99	2.42	2.92
2.2	1.22	1.48	1.78	6.0	2.01	2.44	2.95
2.3	1.24	1.51	1.82	6.1	2.03	2.46	2.97
2.4	1.27	1.54	1.86	6.2	2.04	2.48	3.00
2.5	1.30	1.58	1.90	6.5	2.09	2.54	3.07
2.6	1.32	1.61	1.94	6.7	2.12	2.58	3.12
2.7	1.35	1.64	1.98	6.9	2.16	2.62	3.16
2.8	1.37	1.67	2.01	7.0	2.17	2.64	3.18
2.9	1.40	1.70	2.05	7.2	2.20	2.68	3.23
3.0	1.42	1.73	2.08	7.4	2.23	2.72	3.27
3.1	1.44	1.76	2.12	7.6	2.26	2.75	3.32
3.2	1.47	1.78	2.15	7.8	2.29	2.79	3.36
3.3	1.49	1.81	2.19	8.0	2.32	2.82	3.41
3.4	1.51	1.84	2.22	8.2	2.35	2.86	3.45
3.5	1.53	1.87	2.25	8.4	2.38	2.89	3.49
3.6	1.56	1.89	2.28	8.6	2.41	2.93	3.53
3.7	1.58	1.92	2.31	9.0	2.46	2.99	3.61
3.8	1.60	1.94	2.35	9.5	2.23	3.15	4.45
3.9	1.62	1.97	2.38	9.9	2.28	3.15	4.56
4.0	1.64	1.99	2.41				

Life Zone Formula: $D = KL^{.5}$

K is a constant which is different for each distance. At the inner limit, $K = 0.72$; at optimum distance, $K = 1.0$; at the outer limit, $K = 1.45$.

WORLD CORE

1D6	Inner Zone	Life Zone	Outer Zone
1	Rocky	Rocky	Rocky
2	Rocky	Rocky	Rocky
3	Rocky	Rocky	Icy
4	Rocky	Rocky	Icy
5	Rocky	Rocky	Icy
6	Rocky	Rocky	Icy

WORLD DIAMETER

1D6	Rocky Core	Icy Core
1	1D6 × 1000	1D6 × 1000
2	1D6 × 1000	2D6 × 1000
3	2D6 × 1000	3D6 × 1000
4	3D6 × 1000	4D6 × 1000
5	4D6 × 1000	6D6 × 1000
6	5D6 × 1000	8D6 × 1000

This table provides world diameter in kilometers. Circumference at the equator equals 3.14 times this amount.

WORLD DENSITY

1D10	Density of Rocky Core	1D6	Density of Icy Core
1	.4	1	.1
2	.5	2	.2
3	.6	3	.3
4	.7	4	.4
5	.8	5	.5
6	.9	6	.6
7	1.0		
8	1.1		
9	1.2		
10	1.3		

Density is in Earths (Earth = 1).

EQUIVALENT DENSITIES

Material	g/cc	Earths
Water	1.0	.18
Ice	.9	.16
Carbon	2.3	.41
Rock	3.5	.65
Iron	7.9	1.43
Gold	19.3	3.50

Body	g/cc	Earths
Sun	1.0	.18
Mercury (Rock Ball)	5.4	.98
Venus (Hot House)	5.2	.94
Earth (Garden)	5.5	1.00
Luna (Rock Ball)	3.3	.60
Mars (Desert)	3.9	.71
Jupiter (Gas Giant)	1.3	.23
Saturn (Gas Giant)	.7	.13
Uranus (Gas Giant)	1.6	.29
Neptune (Gas Giant)	1.7	.30
Pluto (Ice Ball)	1.0	.18

ATMOSPHERIC TYPES

Minimum Molecular Weight Retained	Atmosphere Type
>1-4	Massive
>5-19	Dense
>20-39	Standard
>40-79	Thin
>80-119	Very Thin
120+	Vacuum

ATMOSPHERIC PRESSURE (CONDENSED TABLE)

Surface Gravity (Gs)	Atmospheric Pressure (Atms)
.1	.1
.2	.2
.3	.3
.4	.4
.5	.5
.6	.6
.7	.7
.8	.8
.9	.9
1.0	1.0

Atmospheric pressure is roughly equivalent to Gs. Humans require a minimum pressure of .2 atm.

MOLECULAR WEIGHTS OF COMMON ATMOSPHERIC GASES

Constituent	Molecular Weight
Molecular Hydrogen (H_2)	2.0
Helium (He)	4.0
Methane (CH_4)	16.0
Ammonia (NH_3)	17.0
Water Vapor (H_2O)	18.0
Neon (Ne)	20.2
Molecular Nitrogen (N_2)	28.0
Carbon Monoxide (CO)	28.0
Nitric Oxide (NO)	30.0
Molecular Oxygen (O_2)	32.0
Hydrogen Sulfide (H_2S)	34.1
Argon (Ar)	39.9
Carbon Dioxide (CO_2)	44.0
Nitrous Oxide (N_2O)	44.0
Nitrogen Dioxide (NO_2)	46.0
Ozone (O_3)	48.0
Sulfur Dioxide (SO_2)	64.1
Sulfur Trioxide (SO_3)	80.1
Krypton (Kr)	83.8
Xenon (Xe)	131.3

ATMOSPHERIC COMPOSITION

A world atmosphere will have a gas shown on the molecular weights of common atmospheric gases table if the gas's molecular weight is equal to or greater than the value shown on the Atmospheric Type table for the world's atmosphere.

WORLDS

There are 11 broad types of worlds possible; they are:

Rock: A plain rock ball with no appreciable atmosphere. Most planets begin with a rocky core; if the total mass is below a certain limit, the planet cannot retain an atmosphere and becomes a plain rock ball. *Example:* Mercury.

Ice Ball: A plain ball of frozen gases. Ice balls occur only in the outer zone of a system. *Example:* Pluto.

Gas Giant: A massive planet with an atmosphere primarily of hydrogen and helium. Any world with a minimum molecular weight retained of 4 or less is a gas giant. *Example:* Jupiter.

Hot House: A planet with a large greenhouse-effect atmosphere. The initial planetary accumulation produces an atmosphere with a large amount of CO_2; the world retained too much heat and cannot generate life. *Example:* Venus.

Glacier: A planet with a heavy overburden of ice. If, for various reasons, the water content of a world becomes locked up in the icecaps, the world albedo increases, and heat from the star is reflected directly back into space; with less heat being retained, the icecaps expand. Ultimately, all water on the world is locked up in icecaps which cover much of the world's surface.

Pre-Garden: Given the right circumstances, a planet in the life zone will have the prerequisites for life. Given sufficient time, life will evolve on the world, shifting the atmosphere from methane and water vapor to nitrogen and oxygen. *Example:* Earth eons ago.

Garden: A world with a hospitable environment, an oxygen atmosphere, and locally evolved (often bountiful) life. *Example:* Earth.

Post-Garden: A world which has a history of life, but which has since developed a high greenhouse effect. Post-garden planets are similar to hot houses, but they have a different history. *Example:* Earth eons from now.

Desert: The world has an atmosphere, but has never developed liquid water. *Example:* Mars.

Failed Core: A world which accumulated an atmosphere during the formation of the star system, but which never accumulated enough mass to become a gas giant. *Example:* Triton.

Chunk: A small airless world less than 1000 kilometers in diameter. *Example:* Ceres.

MINIMUM MOLECULAR WEIGHT RETAINED

Diameter: 1000 km	.1	.2	.3	.4	.5	.6	.7	.8	.9	1.0	1.1	1.2	1.3	1.4
1	vac	vac	vac	vac	vac	vac	vac	vac	vac	vac	vac	vac	vac	vac
2	vac	vac	vac	vac	vac	vac	vac	vac	vac	vac	vac	vac	vac	vac
3	vac	vac	vac	vac	vac	vac	vac	vac	vac	vac	116	106	97	90
4	vac	vac	vac	vac	vac	118	101	89	79	71	64	59	54	50
5	vac	vac	vac	114	91	76	65	56	50	45	41	38	35	32
6	vac	vac	105	79	63	52	45	39	35	31	28	26	24	22
7	vac	116	77	58	46	38	33	29	25	23	21	19	17	16
8	vac	89	59	44	35	29	25	22	19	17	16	14	13	12
9	vac	70	46	35	28	23	20	17	15	14	12	11	10	10
10	114	56	38	28	22	18	16	14	12	11	10	9	8	8
11	94	47	31	23	18	15	13	11	10	9	8	7	7	6
12	79	39	26	19	15	13	11	9	8	7	7	6	6	5
13	67	33	22	16	13	11	9	8	7	6	6	5	5	4
14	58	29	19	14	11	9	8	7	6	5	5	4	4	3
15	50	25	16	12	10	8	7	6	5	4	4	3	3	2
16	44	22	14	11	8	7	6	5	4	3	3	2	2	1
17	39	19	13	9	7	6	5	4	3	2	2	1	1	0
18	35	17	11	8	6	5	4	3	2	1	1	0	0	0
19	31	15	10	7	5	4	3	2	1	0	0	0	0	0
20	28	14	9	6	4	3	2	1	0	0	0	0	0	0
21	25	12	8	5	3	2	1	0	0	0	0	0	0	0
22	23	11	7	4	2	1	0	0	0	0	0	0	0	0
23	21	10	6	3	1	0	0	0	0	0	0	0	0	0
24	19	9	5	2	0	0	0	0	0	0	0	0	0	0
25	18	8	4	1	0	0	0	0	0	0	0	0	0	0
26	16	7	3	0	0	0	0	0	0	0	0	0	0	0
27	15	6	2	0	0	0	0	0	0	0	0	0	0	0
28	14	5	1	0	0	0	0	0	0	0	0	0	0	0
29	13	4	0	0	0	0	0	0	0	0	0	0	0	0
30	12	3	0	0	0	0	0	0	0	0	0	0	0	0
31	11	2	0	0	0	0	0	0	0	0	0	0	0	0
32	10	1	0	0	0	0	0	0	0	0	0	0	0	0
33	9	0	0	0	0	0	0	0	0	0	0	0	0	0
34	8	0	0	0	0	0	0	0	0	0	0	0	0	0
35	7	0	0	0	0	0	0	0	0	0	0	0	0	0
36	6	0	0	0	0	0	0	0	0	0	0	0	0	0
37	5	0	0	0	0	0	0	0	0	0	0	0	0	0
38	4	0	0	0	0	0	0	0	0	0	0	0	0	0
39	3	0	0	0	0	0	0	0	0	0	0	0	0	0
40	2	0	0	0	0	0	0	0	0	0	0	0	0	0
41	1	0	0	0	0	0	0	0	0	0	0	0	0	0
42	0	0	0	0	0	0	0	0	0	0	0	0	0	0
43	0	0	0	0	0	0	0	0	0	0	0	0	0	0
44	0	0	0	0	0	0	0	0	0	0	0	0	0	0
45	0	0	0	0	0	0	0	0	0	0	0	0	0	0
46	0	0	0	0	0	0	0	0	0	0	0	0	0	0
47	0	0	0	0	0	0	0	0	0	0	0	0	0	0
48	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Density (Earths) across the top columns.

Gas Giant Generation

Any world that retains gas with molecular weight four or less has accumulated hydrogen and helium in its atmosphere. Over time, this accumulation of gas has created a gas giant.

Snowballing: When generating worlds, some will accumulate gas beyond the limits of the normal generation system. If molecular weight retained is two or less (and the world is not in the inner zone), throw 1D6−2 and double the world diameter that number of times. For example, when generating Jupiter, the original throw calls for a diameter of 35,000 kilometers and a density of 0.2. A 1D6−2 roll results in a 2, and the 35,000-kilometer diameter is doubled twice, for a final result of 140,000 kilometers.

WORLD MASS

Density (Earths)

Diameter: 1000 km	.1	.2	.3	.4	.5	.6	.7	.8	.9	1.0	1.1	1.2	1.3	1.4
1	.00004	.00009	.0001	.0001	.0002	.0002	.0003	.0003	.0004	.0004	.0005	.0005	.0006	.0006
2	.0003	.0007	.001	.001	.001	.002	.002	.003	.003	.003	.004	.004	.005	.005
3	.001	.002	.003	.005	.006	.007	.009	.010	.011	.013	.014	.015	.017	.018
4	.003	.006	.009	.012	.015	.018	.022	.025	.028	.031	.034	.037	.041	.044
5	.006	.012	.018	.024	.030	.036	.043	.049	.055	.061	.067	.073	.080	.086
6	.010	.021	.031	.042	.053	.063	.074	.085	.095	.106	.117	.127	.138	.149
7	.016	.033	.050	.067	.084	.101	.118	.135	.152	.169	.185	.202	.219	.236
8	.025	.050	.075	.100	.126	.151	.176	.201	.227	.252	.277	.302	.328	.353
9	.035	.071	.107	.143	.179	.215	.251	.287	.323	.359	.395	.431	.467	.502
10	.049	.098	.147	.197	.246	.295	.344	.394	.443	.492	.542	.591	.640	.689
11	.065	.131	.196	.262	.327	.393	.459	.524	.590	.655	.721	.787	.852	.918
12	.085	.170	.255	.340	.425	.510	.596	.681	.766	.851	.936	1.02	1.10	1.19
13	.108	.216	.324	.433	.541	.649	.757	.866	.974	1.08	1.19	1.29	1.40	1.51
14	.135	.270	.405	.540	.676	.811	.946	1.08	1.21	1.35	1.48	1.62	1.75	1.89
15	.166	.332	.498	.665	.831	.997	1.16	1.33	1.49	1.66	1.82	1.99	2.16	2.32
16	.201	.403	.605	.807	1.00	1.21	1.41	1.61	1.81	2.01	2.22	2.42	2.62	2.82
17	.242	.484	.726	.968	1.21	1.45	1.69	1.93	2.17	2.42	2.66	2.90	3.14	3.38
18	.287	.574	.862	1.14	1.43	1.72	2.01	2.29	2.58	2.87	3.16	3.44	3.73	4.02
19	.338	.676	1.01	1.35	1.69	2.02	2.36	2.70	3.04	3.38	3.71	4.05	4.39	4.73
20	.394	.788	1.18	1.57	1.97	2.36	2.75	3.15	3.54	3.94	4.33	4.73	5.12	5.51
21	.456	.912	1.36	1.82	2.28	2.73	3.19	3.65	4.10	4.56	5.02	5.47	5.93	6.38
22	.524	1.04	1.57	2.09	2.62	3.14	3.67	4.19	4.72	5.24	5.77	6.29	6.82	7.34
23	.599	1.19	1.79	2.39	2.99	3.59	4.19	4.79	5.39	5.99	6.59	7.19	7.79	8.39
24	.681	1.36	2.04	2.72	3.40	4.08	4.76	5.45	6.13	6.81	7.49	8.17	8.85	9.53
25	.770	1.54	2.31	3.08	3.85	4.62	5.39	6.16	6.93	7.70	8.47	9.24	10.01	10.78
26	.866	1.73	2.59	3.46	4.33	5.19	6.06	6.92	7.79	8.66	9.52	10.39	11.26	12.12
27	.970	1.94	2.91	3.88	4.85	5.82	6.79	7.76	8.73	9.70	10.67	11.64	12.61	13.58
28	1.08	2.16	3.24	4.32	5.40	6.49	7.57	8.65	9.73	10.81	11.90	12.98	14.06	15.14
29	1.20	2.40	3.60	4.80	6.00	7.21	8.41	9.61	10.81	12.01	13.22	14.42	15.62	16.82
30	1.33	2.66	3.99	5.32	6.65	7.98	9.31	10.64	11.97	13.30	14.63	15.96	17.29	18.62
31	1.46	2.93	4.40	5.87	7.34	8.80	10.27	11.74	13.21	14.68	16.15	17.61	19.08	20.55
32	1.61	3.22	4.84	6.45	8.07	9.68	11.30	12.91	14.53	16.14	17.76	19.37	20.99	22.60
33	1.77	3.54	5.31	7.08	8.85	10.62	12.39	14.16	15.93	17.71	19.48	21.25	23.02	24.79
34	1.93	3.87	5.81	7.74	9.68	11.62	13.55	15.49	17.43	19.37	21.30	23.24	25.18	27.11
35	2.11	4.22	6.33	8.45	10.56	12.67	14.79	16.90	19.01	21.13	23.24	25.35	27.46	29.58
36	2.29	4.59	6.89	9.19	11.49	13.79	16.09	18.39	20.69	22.99	25.29	27.59	29.89	32.19
37	2.49	4.99	7.48	9.98	12.48	14.97	17.47	19.97	22.46	24.96	27.45	29.95	32.45	34.94
38	2.70	5.40	8.11	10.81	13.52	16.22	18.92	21.63	24.33	27.04	29.74	32.45	35.15	37.85
39	2.92	5.84	8.77	11.69	14.61	17.54	20.46	23.38	26.31	29.23	32.15	35.08	38.00	40.92
40	3.15	6.30	9.46	12.61	15.77	18.92	22.07	25.23	28.38	31.54	34.69	37.84	41.00	44.15
41	3.39	6.79	10.18	13.58	16.98	20.37	23.77	27.17	30.56	33.96	37.36	40.75	44.15	47.55
42	3.65	7.30	10.95	14.60	18.25	21.90	25.55	29.21	32.86	36.51	40.16	43.81	47.46	51.11
43	3.91	7.83	11.75	15.67	19.59	23.51	27.42	31.34	35.26	39.18	43.10	47.02	50.93	54.85
44	4.19	8.39	12.59	16.79	20.99	25.18	29.38	33.58	37.78	41.98	46.17	50.37	54.57	58.77
45	4.49	8.98	13.47	17.96	22.45	26.94	31.43	35.92	40.41	44.90	49.40	53.89	58.38	62.87
46	4.79	9.59	14.39	19.18	23.98	28.78	33.57	38.37	43.17	47.97	52.76	57.56	62.36	67.15
47	5.12	10.23	15.35	20.46	25.58	30.70	35.81	40.93	46.05	51.16	56.28	61.40	66.51	71.63
48	5.45	10.90	16.35	21.80	27.25	32.70	38.15	43.60	49.05	54.50	59.95	65.40	70.85	76.30

Gas Giant Generation

Due to a low minimum molecular weight retained, some gas giants will have diameters larger than those included on this table. To determine the mass of such a world, use the following formula:

$$m = (4/3 \pi r^3 d)/V_E$$

Where: m = mass in Earths, π = 3.14159, r = (radius in kilometers) d = density in Earths, and V_E (Volume of Earth) = 1.062×10^{12}.

WORLD GRAVITY

Diameter: 1000 km	.1	.2	.3	.4	.5	.6	Density (Earths) .7	.8	.9	1.0	1.1	1.2	1.3	1.4
1	.006	.014	.022	.030	.038	.046	.054	.062	.070	.078	.086	.094	.102	.108
2	.015	.031	.047	.062	.078	.094	.110	.126	.141	.157	.173	.189	.205	.220
3	.023	.047	.071	.094	.118	.142	.165	.189	.213	.236	.260	.284	.307	.331
4	.031	.063	.094	.126	.157	.189	.221	.252	.284	.315	.347	.379	.410	.442
5	.039	.078	.118	.157	.197	.236	.276	.315	.355	.394	.434	.473	.513	.552
6	.047	.094	.142	.189	.236	.284	.331	.379	.426	.473	.521	.568	.616	.663
7	.055	.110	.165	.221	.276	.331	.387	.442	.497	.552	.608	.663	.718	.774
8	.063	.126	.189	.252	.315	.379	.442	.505	.568	.631	.695	.758	.821	.884
9	.071	.142	.213	.284	.355	.426	.497	.568	.639	.710	.781	.853	.924	.995
10	.078	.157	.236	.315	.394	.473	.552	.631	.710	.789	.868	.947	1.026	1.105
11	.086	.173	.260	.347	.434	.521	.608	.695	.781	.868	.955	1.042	1.129	1.216
12	.094	.189	.284	.379	.473	.568	.663	.758	.853	.947	1.042	1.136	1.232	1.326
13	.102	.205	.308	.410	.513	.616	.718	.821	.924	1.026	1.129	1.231	1.334	1.436
14	.110	.221	.331	.442	.552	.663	.774	.883	.995	1.105	1.215	1.326	1.437	1.547
15	.118	.236	.355	.473	.592	.710	.829	.947	1.065	1.184	1.302	1.421	1.540	1.658
16	.126	.252	.379	.505	.631	.758	.884	1.010	1.136	1.263	1.389	1.516	1.642	1.769
17	.134	.268	.402	.537	.671	.805	.939	1.074	1.208	1.342	1.476	1.611	1.745	1.879
18	.142	.284	.426	.568	.710	.852	.994	1.137	1.279	1.421	1.563	1.706	1.848	1.990
19	.150	.300	.450	.600	.750	.900	1.050	1.200	1.350	1.500	1.650	1.800	1.950	2.100
20	.157	.315	.473	.631	.789	.947	1.105	1.263	1.421	1.579	1.737	1.895	2.053	2.211
21	.165	.331	.497	.663	.829	.995	1.160	1.326	1.492	1.658	1.824	1.990	2.156	2.321
22	.173	.347	.521	.695	.868	1.042	1.216	1.390	1.563	1.737	1.911	2.085	2.258	2.432
23	.181	.363	.544	.726	.908	1.089	1.271	1.453	1.634	1.816	1.998	2.179	2.361	2.543
24	.189	.378	.568	.758	.947	1.137	1.327	1.516	1.705	1.895	2.085	2.274	2.464	2.654
25	.197	.394	.592	.789	.987	1.184	1.382	1.579	1.777	1.974	2.172	2.369	2.566	2.764
26	.205	.410	.615	.821	1.026	1.232	1.437	1.642	1.848	2.053	2.259	2.464	2.669	2.875
27	.213	.426	.639	.853	1.066	1.279	1.492	1.706	1.919	2.132	2.345	2.559	2.772	2.985
28	.220	.442	.663	.884	1.105	1.326	1.548	1.769	1.990	2.211	2.432	2.653	2.875	3.096
29	.228	.457	.687	.916	1.145	1.374	1.603	1.832	2.061	2.290	2.519	2.748	2.977	3.206
30	.236	.473	.710	.947	1.184	1.421	1.658	1.895	2.132	2.369	2.606	2.843	3.080	3.317
31	.244	.489	.734	.979	1.224	1.469	1.713	1.958	2.203	2.448	2.693	2.938	3.183	3.427
32	.252	.505	.758	1.010	1.263	1.516	1.769	2.022	2.274	2.527	2.780	3.033	3.285	3.538
33	.260	.521	.781	1.042	1.303	1.563	1.824	2.085	2.345	2.606	2.867	3.127	3.388	3.649
34	.268	.537	.805	1.074	1.342	1.611	1.879	2.148	2.417	2.685	2.954	3.222	3.491	3.759
35	.276	.552	.829	1.105	1.382	1.658	1.935	2.211	2.488	2.764	3.041	3.317	3.593	3.870
36	.284	.568	.853	1.137	1.421	1.706	1.990	2.274	2.559	2.843	3.127	3.412	3.696	3.980
37	.292	.584	.876	1.168	1.461	1.753	2.045	2.337	2.630	2.922	3.214	3.507	3.799	4.091
38	.300	.600	.900	1.200	1.500	1.800	2.100	2.401	2.701	3.001	3.301	3.601	3.901	4.202
39	.308	.616	.924	1.232	1.540	1.848	2.156	2.464	2.772	3.080	3.388	3.696	4.004	4.312
40	.315	.631	.947	1.263	1.579	1.895	2.211	2.527	2.843	3.159	3.475	3.791	4.107	4.423
41	.323	.647	.971	1.295	1.619	1.943	2.266	2.590	2.914	3.238	3.562	3.886	4.210	4.533
42	.331	.663	.995	1.326	1.658	1.990	2.322	2.653	2.985	3.317	3.649	3.980	4.312	4.644
43	.339	.679	1.018	1.358	1.698	2.037	2.377	2.717	3.056	3.396	3.736	4.075	4.415	4.755
44	.347	.695	1.042	1.390	1.737	2.085	2.432	2.780	3.127	3.475	3.823	4.170	4.518	4.865
45	.355	.710	1.066	1.421	1.777	2.132	2.488	2.843	3.199	3.554	3.909	4.265	4.620	4.976
46	.363	.726	1.090	1.453	1.816	2.180	2.543	2.906	3.270	3.633	3.996	4.360	4.723	5.086
47	.371	.742	1.113	1.484	1.856	2.227	2.598	2.969	3.341	3.712	4.083	4.454	4.826	5.197
48	.379	.758	1.137	1.516	1.895	2.274	2.654	3.033	3.412	3.791	4.170	4.549	4.928	5.308

Gas Giant Generation

Due to a low minimum molecular weight retained, some gas giants will have diameters larger than those included on this table. To determine the gravity of such a world, use the following formula:

$G = m/r^2$

Where: G = gravity in Earths, m = mass in Earths, and r = radius in Earths.

ATMOSPHERIC PRESSURE

Diameter: 1000 km	.1	.2	.3	.4	.5	.6	.7	.8	.9	1.0	1.1	1.2	1.3	1.4
1	vac	vac	vac	vac	vac	vac	vac	vac	vac	vac	vac	vac	vac	vac
2	vac	vac	vac	vac	vac	vac	vac	vac	vac	vac	vac	vac	vac	vac
3	vac	vac	vac	vac	vac	vac	vac	vac	vac	vac	.250	.273	.296	.319
4	vac	vac	vac	vac	vac	.183	.213	.244	.275	.305	.336	.366	.397	.427
5	vac	vac	vac	.152	.191	.229	.267	.305	.343	.382	.420	.458	.496	.535
6	vac	vac	.137	.183	.229	.275	.321	.366	.412	.458	.504	.550	.596	.642
7	vac	.106	.160	.213	.267	.320	.374	.427	.481	.534	.588	.641	.695	.748
8	vac	.122	.183	.244	.305	.366	.428	.489	.550	.611	.672	.733	.794	.856
9	vac	.137	.206	.275	.344	.412	.481	.550	.619	.688	.756	.825	.894	.963
10	.076	.152	.229	.305	.382	.458	.535	.611	.688	.764	.841	.917	.993	1.070
11	.084	.168	.252	.336	.420	.504	.588	.672	.756	.840	.925	1.009	1.093	1.177
12	.091	.183	.275	.367	.458	.550	.642	.734	.825	.917	1.009	1.101	1.192	1.284
13	.099	.198	.298	.397	.497	.596	.695	.795	.894	.994	1.093	1.192	1.292	1.391
14	.107	.214	.321	.428	.535	.642	.749	.856	.963	1.070	1.177	1.284	1.391	1.498
15	.114	.229	.344	.458	.573	.688	.802	.917	1.032	1.146	1.261	1.376	1.491	1.605
16	.122	.244	.367	.489	.611	.734	.856	.978	1.101	1.223	1.345	1.468	1.590	1.712
17	.129	.259	.389	.519	.649	.779	.909	1.039	1.169	1.299	1.429	1.559	1.689	1.819
18	.137	.275	.412	.550	.688	.825	.963	1.101	1.238	1.376	1.513	1.651	1.789	1.926
19	.145	.290	.435	.581	.726	.871	1.016	1.162	1.307	1.452	1.598	1.743	1.888	2.033
20	.152	.305	.458	.611	.764	.917	1.070	1.223	1.376	1.529	1.682	1.835	1.988	2.140
21	.160	.321	.481	.642	.802	.963	1.124	1.284	1.445	1.605	1.766	1.926	2.087	2.248
22	.168	.336	.504	.672	.841	1.009	1.177	1.345	1.513	1.682	1.850	2.018	2.186	2.355
23	.175	.351	.527	.703	.879	1.055	1.231	1.406	1.582	1.758	1.934	2.110	2.286	2.462
24	.183	.367	.550	.734	.917	1.101	1.284	1.468	1.651	1.835	2.018	2.202	2.385	2.569
25	.191	.382	.573	.764	.955	1.146	1.338	1.529	1.720	1.911	2.102	2.293	2.485	2.676
26	.198	.397	.596	.795	.994	1.192	1.391	1.590	1.789	1.988	2.186	2.385	2.584	2.783
27	.206	.412	.619	.825	1.032	1.238	1.445	1.651	1.858	2.064	2.270	2.477	2.683	2.890
28	.214	.428	.642	.856	1.070	1.284	1.498	1.712	1.926	2.140	2.355	2.569	2.783	2.997
29	.221	.443	.665	.886	1.108	1.330	1.552	1.773	1.995	2.217	2.439	2.660	2.882	3.104
30	.229	.458	.688	.917	1.146	1.376	1.605	1.835	2.064	2.293	2.523	2.752	2.982	3.211
31	.237	.474	.711	.948	1.185	1.422	1.659	1.896	2.133	2.370	2.607	2.844	3.081	3.318
32	.244	.489	.734	.978	1.223	1.468	1.712	1.957	2.202	2.446	2.691	2.936	3.180	3.425
33	.252	.504	.756	1.009	1.261	1.513	1.766	2.018	2.270	2.523	2.775	3.027	3.280	3.532
34	.259	.519	.779	1.039	1.299	1.559	1.819	2.079	2.339	2.599	2.859	3.119	3.379	3.639
35	.267	.535	.802	1.070	1.338	1.605	1.873	2.140	2.408	2.676	2.943	3.211	3.479	3.746
36	.275	.550	.825	1.101	1.376	1.651	1.926	2.202	2.477	2.752	3.027	3.303	3.578	3.853
37	.282	.565	.848	1.131	1.414	1.697	1.980	2.263	2.546	2.829	3.112	3.394	3.677	3.960
38	.290	.581	.871	1.162	1.452	1.743	2.033	2.324	2.615	2.905	3.196	3.486	3.777	4.067
39	.298	.596	.894	1.192	1.491	1.789	2.087	2.385	2.683	2.982	3.280	3.578	3.876	4.174
40	.305	.611	.917	1.223	1.529	1.835	2.140	2.446	2.752	3.058	3.364	3.670	3.976	4.281
41	.313	.627	.940	1.254	1.567	1.881	2.194	2.508	2.821	3.135	3.448	3.762	4.075	4.389
42	.321	.642	.963	1.284	1.605	1.926	2.248	2.569	2.890	3.211	3.532	3.853	4.174	4.496
43	.328	.657	.986	1.315	1.643	1.972	2.301	2.630	2.959	3.287	3.616	3.945	4.274	4.603
44	.336	.672	1.009	1.345	1.682	2.018	2.355	2.691	3.027	3.364	3.700	4.037	4.373	4.710
45	.344	.688	1.032	1.376	1.720	2.064	2.408	2.752	3.096	3.440	3.784	4.129	4.473	4.817
46	.351	.703	1.055	1.406	1.758	2.110	2.462	2.813	3.165	3.517	3.869	4.220	4.572	4.924
47	.359	.718	1.078	1.437	1.796	2.156	2.515	2.875	3.234	3.593	3.953	4.312	4.671	5.031
48	.367	.734	1.101	1.468	1.835	2.202	2.569	2.936	3.303	3.670	4.037	4.404	4.771	5.138

Gas Giant Generation

Due to a low minimum molecular weight retained, some gas giants will have diameters larger than those included on this table. To determine atmospheric pressure of such a world, simply use the planet's gravity as an equivalent value. Gravity can be calculated by using the formula below the World Gravity table.

WORLD TYPES

Atmosphere Type	Inner Zone Rocky	Life Zone Rocky	Outer Zone Rocky	Outer Zone Icy
Vacuum	Rock	Rock	Rock	Ice Ball
Very Thin	Rock	Rock	Rock	Ice Ball
Thin	Desert	Desert	Desert	Failed Core
Standard	Hot House	Desert	Failed Core	Failed Core
Dense	Hot House	Garden	Failed Core	Failed Core
Massive	Gas Giant	Gas Giant	Gas Giant	Gas Giant
Chunk	Chunk	Chunk	Chunk	—

Note: Consult the Garden Worlds table to determine the nature of the garden world.

WATER

World Type	Inner Zone	Life Zone	Outer Zone
Rock	Rare Ice	Rare Ice	Rare Ice
Ice Ball	—	—	Plentiful
Desert	No	Rare Ice	Rare Ice
Hot House	No	—	—
Failed Core	—	—	Ice Sheets
Gas Giant	Crystals	Crystals	Crystals
Glacier	—	Ice Sheets	—
Garden	—	Oceans	—
Pre-Garden	—	Oceans	—
Post-Garden	—	No	—
Chunk	Rare Ice	Rare Ice	Rare Ice

Surface Coverage: *No:* None. *Rare Ice:* Ice less than 1%. *Plentiful:* 1D6×10%. *Crystals:* 1% ice crystals floating in atmosphere. *Oceans:* (2D6−2)×10%. *Ice Sheets:* (2D6−2)×10%.

AVERAGE TEMPERATURES

World Type	Inner Zone	Life Zone	Outer Zone
Rock	Hot-VHot	Temperate	Cold-VCold
Ice Ball	—	—	Cold-VCold
Desert	Hot-VHot	Cold-Hot	Cold-VCold
Hot House	VHot	Hot-VHot	—
Failed Core	—	—	Cold-VCold
Gas Giant	—	—	—
Pre-Garden	—	Temperate	—
Glacier	—	Cold	—
Garden	—	Temperate	—
Post-Garden	—	Hot	—
Chunk	Hot-VHot	Cold-Hot	Cold-VCold

Ranges (in °C): *VHot (Very Hot):* 60° or more. *Hot:* 30° to 60°. *Temperate:* 0° to 30°. *Cold:* −30° to 0°. *VCold (Very Cold):* −30° or less.

GARDEN WORLDS

1D10	World Type
1	Pre-Garden
2	Glacier
3	Glacier
4	Glacier
5	Garden
6	Garden
7	Garden
8	Garden
9	Post-Garden
10	Post-Garden
11	Post-Garden

DMs: Star type F, −1; G, 0; K, +1; M, +3.

OXYGEN PRESSURE

Multiply % oxygen by atmospheric pressure to determine oxygen pressure.

Human Acceptable Oxygen Levels: 0.40 atm maximum; 0.05 atm minimum. Beyond these limits, humans require supplements or protective devices.

ATMOSPHERIC OXYGEN

% Water	% Oxygen
0	5
10	10
20	12
30	14
40	16
50	18
60	19
70	20
80	22
90	24
100	26

Life in oceans produces oxygen. Use this table to determine the oxygen level present in the atmosphere of garden and glacier worlds (other world types do not have free oxygen in their atmospheres).

Ice Coverage: Treat the surface coverage of ice as 1/3 its actual percentage when using this table. Round down to match a value on the table.

GRAVITY TO ESCAPE VELOCITY CONVERSION

Multiply gravity in Gs by 11.2 to determine escape velocity in kilometers per second.

SATELLITE ORBITS

1D10	Orbit Type	Close	Far	Extreme
1	Close	1	15	70
2	Close	2	20	80
3	Close	3	25	90
4	Far	4	30	100
5	Far	5	35	110
6	Far	6	40	120
7	Extreme	7	45	130
8	Extreme	8	50	140
9	Extreme	9	55	150
10	Extreme	10	60	160

Rings are always in close orbit. Satellites larger than 200 kilometers in diameter must have an orbital radius of 3 or greater; reroll if necessary.

SATELLITES

Use the following procedure for the generation of satellites of planets.

1. Satellite Presence: For each planet (except gas giants), the number of satellites is 1D6−3. For each gas giant, the number of satellites is 2D6. A result of 0 or less indicates no satellites.

2. Satellite Core: Throw on the World Core table to determine if the satellite core is icy or rocky.

3. Satellite Size: Throw 1D10−4 for satellite size. If the satellite diameter is greater than the parent world diameter, halve it (more than once, if necessary) until the satellite diameter is less than the world diameter. If satellite diameter is 0, it is a chunk (even if icy core) with diameter of 1D10×100 kilometers. If diameter is less than 0 (and satellite orbit is close), then it is a ring.

4. Satellite Orbits: Place satellites into orbits using the Satellite Orbits table (above). Throw 1D10 for the orbit type, and then throw on the correct orbit type column. Orbital radii are given in planetary diameters of the parent planet (thus, an orbital result of 30 for the satellite of a world of 12,000 kilometers diameter produces an orbital radius of 360,000 kilometers). More than one satellite may occupy the same orbital radius.

5. Satellite Density: Throw on the World Density table.

Additional Satellite Information. Using the above information, it is possible to determine more details about satellites using the world generation procedures. These details include: mass, surface gravity, escape velocity, atmosphere type, world type, water presence, average temperature, and oxygen levels.

STAR SYSTEM CHECKLIST

1. Select Star from Near Star Map.
A. Determine data from *Near Star List.*
(1) Spectral Type and Size.
(2) Magnitude.
(3) XYZ Coordinates.
B. Determine data from charts.
(1) Radius (Stellar Radius Chart).
(2) Mass (Stellar Mass Chart).
(3) Luminosity (Stellar Luminosity Chart).
   a. Alternative: Convert Magnitude to Luminosity.
(4) Effective Temperature (Stellar Effective Temperature Chart).
2. Orbital Information.
A. Locate Companion Star Orbits (Stellar Companion Radii table).
B. Orbit Restrictions.
(1) Companion Restrictions (Companion Restrictions Note).
(2) Untenable Orbits (Untenable Orbit table).
(3) Orbital Zones (Orbital Zone table).
C. Existing Orbits.
(1) Allowed Orbits (Allowed Orbits table).
(2) Innermost Orbit (Initial Orbit table).
(3) Subsequent Orbits (Subsequent Orbits table).
3. World Data.
A. Basic Data.
(1) World Core Type (World Core table).
(2) World Size (World Size table).
(3) World Density (World Density table).
B. Computed Data.
(1) Mass (World Mass table).
(2) Surface Gravity (World Gravity table).
(3) Escape Velocity (Gravity to Escape Velocity Conversion table).
C. Atmosphere Data.
(1) Minimum Retained Molecular Weight (Retained Molecular Weight table).
(2) Atmospheric Pressure (Atmospheric Pressure table and Atmospheric Pressure—Condensed table).
D. World Type Data.
(1) World Type (World Type table and Garden World table).
(2) Water Presence (Water table).
(3) Average Temperature (Average Temperature table).
(4) Atmospheric Oxygen Levels (Atmospheric Oxygen table).
E. Social Data.
(1) Colony Age (Colony Age table).
(2) Colony Population (Colony Population table).
(3) Settlement Character (Settlement Character table).
(4) Colony Facilities.
   a. Points Available.
   b. Interface Systems.
   c. Orbital Facilities.
   d. Surface Facilities.

COLONY POPULATION

Age (Years)	Colonization Effort (in thousands) Heavy	Light	Median
0	100	10	50
10	400	44	194
20	900	96	407
30	1700	172	723
40	2500	285	1119
50	3700	452	1882
60	5500	700	2905
70	8000	1066	4421
80	12,000	1600	6664
90	18,000	2411	9985
100	26,000	3500	14,900

Heavy Colonization: Assumes 100,000 colonists, 25,000 immigration for 30 years, and 4% growth rate.

Light Colonization: Assumes 10,000 initial, 2500 immigration constant to date, and 4% growth rate.

Median Colonization: Assumes 50,000 colonists, 10,000 immigration constant to date, and 4% growth rate for first 50 years, 2% thereafter.

COLONY AGE

1D6	Age Determiner
1	10+3D10
2	20+4D10
3	30+4D10
4	40+4D10
5	50+4D10
6	60+4D10

SETTLEMENT CHARACTER

Type	Typical Age	Points
Initial	1- 20	10
Frontier	20- 40	15
Developing	40- 60	20
Expanding	60-100	30
Mature	80-140	40
Declining	60+	30

Points available for improvements to a colony are derived from this table, plus 1 point per 1,000,000 population.

POSSIBLE LOCAL BASES

Military
Scientific
Foundation
Naval
Outpost

Representatives of all five types will be present; a base of each of these types is present on 8+ (1D10).

INTERFACE SYSTEMS

Description	Point Cost
Orbital Catapult	5
Scram Aircraft	3
Rocket Planes	2
Rockets	1

ORBITAL FACILITIES

Description	Point Cost
Solar Power Satellite	10
Orbital Factory	3
Defense Installation	1
Terminal (one required)	2

SURFACE FACILITIES

Description	Point Cost
Fusion Power Plant	4
Power Transmission Net (per hex)	1
Heavy Industry	5
Rail Net (per hex)	1
Air Film Net (per hex)	2
Maglev Net (per hex)	3
Hydrogen Road Net (per hex)	1
University	4
Mining (per hex)	1
Farming (per hex)	1

DETAILS

There can be more than one colony on a world (but only one per nationality). Each colony develops separately, but colonies may elect to share some facilities.

Typical colonies develop territory in contiguous hexes; all developed hexes must be connected by a transport net of some type.

INHOSPITABLE WORLD INSTALLATIONS

World	Very Hot	Hot	Temperate	Cold	Very Cold
Rock	Mine 3	Mine 2	Mine 4	Mine 3	Mine 2
Ice Ball	—	—	—	Mine 2	Mine 1
Desert	Mine 2	Mine 2	Mine 3	Mine 2	Mine 1
Hot House	Research 1	Research 2	—	—	—
Failed Core	—	—	—	Research 2	Research 1
Gas Giant	—	—	—	—	—
Pre-Garden	—	—	Mine 3	—	—
Garden	—	—	Research 4	—	—
Glacier	—	—	Mine 3	—	—
Post-Garden	—	Research 2	—	—	—
Chunk	Mine 2	Mine 2	Mine 2	Mine 2	Mine 2

Installations are either mines (commercial or for profit) or research bases (academic or not-for-profit).

Throw the number after the type or less on 1D10 to determine if the installation is present on the world.

Star Data

Primary Star Name		Spectral Type, Size	Companion Star Name		Spectral Type, Size
XYZ Coordinates		Magnitude	Companion Orbit Radius		Magnitude
Mass	Radius	Luminosity	Mass	Radius	Luminosity
Life Zone: Inner Limit/Optimal/Outer Limit			Life Zone: Inner Limit/Optimal/Outer Limit		

World Data

Orbit Radius	World Name					World Type
	World Core Type	Diameter (km)	Density (Earths)	Mass (Earths)		Gravity
Temperature	Atmosphere Type	MMW Retained	Atmos. Pressure	Oxygen Pressure		Water Percentage

Colony/Outpost Data

Population		Nationality	Settlement Character
Date Settled	Bases		
Commentary			

Colony/Outpost Data

Population		Nationality	Settlement Character
Date Settled	Bases		
Commentary			

World Mapping

OVERVIEW

Adventures on worlds very often involve travelling from one point to another. Travelling is an important part of an adventure, providing an opportunity for the adventurers to learn more about the world they are on, and about the goals that they seek.

Worlds are mapped using a geodesic hex map which is successively divided into triangles, regions, and terrain hexes.

The geodesic map is always divided into 20 triangles numbered 1 to 20. The length of each triangle side is measured in regions; the number of regions is determined by the diameter of the world.

Regions (also called big hexes) are always 1000 kilometers across. They provide a rough view of terrain on a world, indicating terrain type (flatland, upland, mountain, and ocean). Regions can be further divided into terrain hexes.

Terrain hexes are 100 kilometers across, and provide a more detailed view of the terrain present.

Mapping is an imaginative process. The referee, using known data about a world, must establish what types of terrain are present on a world and where that terrain is located. Mapping can be performed in any order, depending on the requirements of the situation or the adventure; the following is a suggested, logical order.

1. Complete the Geodesic Map: Using the blank geodesic map, draw in rough continental outlines and sea areas. Fill in mountains, hills, and rough terrain areas. Locate cities, settlements, and connecting transportation routes.

The completed geodesic map is a reference for players and the referee, allowing them to know information that is reasonably available through computer services or orbital surveillance.

2. Complete the Map Triangles: Using the Geodesic Map Triangle Size chart, determine the length of the side of a triangle. Count off that number of hexes along side A and side B, and then draw a line connecting those two hexes. Note the number of the geodesic map triangle and compare it to the completed geodesic map. Now it is possible to map the specific map triangle in detail at the 1000 kilometers per hex scale. At this scale, the only important terrain features are hills, mountains, oceans and seas, major rivers, settlements, and transportation routes. They should be noted to allow reasonable evaluation of the quality and restrictions terrain may provide.

3. Complete the Region Map for Those Triangle Hexes Which Have Further Interest: Important areas on the world surface can be mapped at the 100 kilometers per hex scale to show the location of specific terrain types, settlements, and resources. Adventurers travelling on the world surface will probably need to journey through well-mapped region hexes in order to determine time elapsed and events occurring along the way.

TERRAIN

There are many types of terrain which can be encountered on alien worlds. The following list is certainly not all-inclusive, but it serves two purposes: it shows typical terrain types that are often encountered; and it shows what information is important in creating other terrain types.

Contour Types

Contour terrain types deal with the terrain's relative elevation, from flat to mountain.

Flat terrain has little difference in elevation, allowing an individual to see to the horizon (assuming there are no vegetation or atmospheric obstructions).

Hilly terrain shows some minor changes in elevation, primarily created by small streams and drainage. Slopes in hilly terrain are generally smooth and easily traversed.

Broken terrain is badly eroded or heavily interrupted by ravines, cliffs, or geological outcrops that make straight line surface travel difficult.

Mountain terrain is the highest elevated territory, marked by sparse vegetation and rocky outcrops. It is nearly impassable for surface transportation.

Vegetation Types

Prairie is open grassland characterized by many area-type producers.

Savannah is open grassland with many area-type producers and a few point-type producers.

Woods are characterized by an even mix of area-type producers and point-type producers.

Forest is characterized by a predominance of point-type producers.

Swamp is low-lying wetland characterized by an even mix of area-type producers and point-type producers (marsh has a predominance of area-type producers).

Desert experiences little rainfall; it has little indigenous life.

Geological Types

Volcanos are eruption points where interior magma on geologically active worlds reaches through the crust and to the surface. Inactive volcanos are similar to mountains; active volcanos are

sources of molten rock and ash clouds.

Craters are impact scars from meteor strikes. Erosion removes craters from the surface over thousands of years, but craters remain undisturbed on vacuum worlds. Craters may be water-filled lakes. Many craters are sources of heavy metals.

Maritime Types

Ocean is a major body of water on a world surface. Oceans, because of their age and because they receive river drainage, have large quantities of dissolved minerals (salt); the fact that they are salt water distinguishes them from fresh water lakes.

Coast is the demarcation line between dry land and ocean.

Archipelago is a series or chain of islands in the ocean. Archipelagos are created by the tips of mountains on the sea floor reaching above the ocean surface, or by minor variations in land elevation poking above a shallow sea floor.

Continental Shelf is the edge of the continental plate which is submerged below the surface of the ocean. Continental shelves occur when the ocean level is high enough to encroach on the land; it is possible that some worlds will not have continental shelves.

River is a drainage path for water which naturally makes its way to lakes, seas, or oceans.

Lakes are accumulations of water in low areas of the land, usually fed by drainage from surrounding terrain and serving as the source of larger rivers draining to the sea.

Special Types

Icecap is an accumulation of frozen water at one or both of the poles of a planet. An icecap may be hundreds of meters thick and may be growing or receding, depending on the local climate.

Glacier is an accumulation of frozen water in a mountainous region under circumstances where the ice does not fully melt each year.

Improvements

City is a large settlement which acts as a center of government and industry. Cities are accumulations of population which then serve as the work force for heavy industry and government.

Town is a middle-sized settlement providing markets for major types of goods and supporting skilled trades, medicine, and repair services.

Village is a small, primarily residential settlement providing basic services to its immediate area.

Croplands are cultivated fields producing agricultural products. They are usually accessed by a roadgrid. Surface travel through croplands (not on the roadgrid) is considered inappropriate.

Transportation Routes

Railroad is a heavy freight transportation route designed to carry high tonnages, bulk cargos, and passengers great distances at relatively cheap prices. Railroads are easily constructed with cheap, low technology easily available to developing colonies. Advanced railroads may be monorails. Railroads stop for passengers and cargo at most settlements along their route.

Airfilm Line is a very smooth roadbed used exclusively for airfilm transports. Airfilm systems require higher technology than railroads, but they are more efficient and can carry greater tonnages. Airfilm transports stop for passengers and cargo at most settlements along their route.

Maglev Line is an advanced rail system which depends on magnetic levitation above a steel roadbed. Maglev lines are common surface transport systems in vacuum. Maglev lines stop for passengers and cargo at most settlements along their route.

Highway allows transportation between major points such as cities, bases, or markets. Highways are built in a variety of qualities which then affect the speed possible on them. Highways may be designed for wheeled or hover vehicles, or both; the design used affects the speed which vehicles may achieve on the highway. Highways can be expected to have fuel stations (alcohol, petroleum, or hydrogen, depending on the world) at intervals of 200 kilometers or less.

Roadgrid is a dense collection of roads of varying quality. A roadgrid allows access to nearly all points within an area, in farming areas to croplands, and in settled areas to homes and businesses. Roadgrids have fuel stations at intervals of 50 kilometers or less.

Airfield is a designated point for aircraft landing and takeoff. Such improved airfields are essential for sophisticated aircraft capable of reaching orbit (most other aircraft are VTOL or STOL and can use ordinary roads, open fields, or less elaborate facilities).

```
           (10)
         (6) (9)
       (3)(5)(8)
     (1)(2)(4)(7)
   (A)(P)(A)(P)(A)
  Barren  Sparse Abundant Teeming
```

All native life on a world can be described in terms of its place in the food chain. A somewhat simplified food chain is used in the game in order to make the generation of animal encounters easier for the referee.

THE FOOD CHAIN PYRAMID

The diagram in the sidebar presents the food chain in terms of a pyramid. The bottom tier consists of plant life (flora). The next tier is made up of herbivores and omnivores which subsist largely on plants. The three uppermost tiers are carnivores which subsist on the animals below them in the food chain.

The food chain pyramid is actually several pyramids of varying size. The smallest pyramid (to the left of the chart) is used for barren regions and consists of only two major types of plants and one animal. The next pyramid, representing sparse regions, adds one additional plant type and two animal types. The third pyramid, representing abundant life regions, adds another plant and three animals. The complete pyramid represents regions teeming with life and uses all five plants and all 10 animals.

TYPES OF PLANTS

There are only two broad categories of plants considered: point producers and area producers. Point producers concentrate considerable biological energy in a single robust organism. A good Terran example of a point producer is a tree. Area producers tend to be widespread, such as Terran grasses.

The type of producer has no material effect on the game, but will assist referees in determining the type and density of vegetation in a region and in describing it to players. When describing the vegetation in a region, keep in mind that the plants indicated on the food chain pyramid are not the only plants in the area; they are simply the most prevalent. As a rule of thumb, for every major plant type in an area there will be half a dozen less prevalent types and a dozen or more completely unnoticed ones.

ENCOUNTERING ANIMALS

When characters are travelling in the wild, the referee will roll 1D10 once every four hours of game time. The result of the roll indicates whether the party has some sort of an animal encounter and if so, what type. Each of the 10 animal niches is numbered. The number rolled by the referee indicates the type of beast encountered. If an animal is rolled that doesn't belong to that region's pyramid, there is no encounter.

Each type of beast also has a chance of encounter listed in its description. If a second 1D10 roll is less than the listed chance, the characters encounter the creature. If it is greater than the listed chance, they do not actually encounter the creature, but they do find signs of its passage—pawprints, droppings, or the like.

For example, players are travelling in an area of abundant life. If the referee rolls a 10, there is no encounter, as the number 10 niche is only part of the teeming life food chain pyramid. If, on the other hand, the referee rolled a 2 (which belongs to the abundant pyramid), the players would either encounter an animal or its spoor.

Once it is determined that there has been an animal encounter, the referee should read the brief description of the animal or animals occupying that niche and determine whether the animal attacks the party or flees from it. If an actual struggle takes place, the referee should determine the characteristics of the animal.

NICHE DESCRIPTIONS

The following descriptions are numbered to correspond to the niches on the animal encounter pyramid. In the statistics that follow each description, values for size, speed, armor, and DPU are modifiers to be used on the Animal Characteristics table in the sidebar.

1. Gatherer: Gatherers are omnivorous animals, which display a greater tendency toward herbivorous rather than carnivorous behavior. If provoked (occasionally by something as simple as a character invading their territory), they will attack on a 1D10 roll of 3 or less and flee on other results. The chance of encounter with a gatherer is 8 or less on 1D10. (Terran example: raccoon.)

Number Appearing: 1D6−2 *Initiative:* 3 *Hit:* Difficult *Size:* −2 *Speed:* +1 *Armor:* +1 *DPV:* −1

2. Intermittents: Intermittents are herbivores which do not devote their full time and energy to eating. They will attack anything they view as a threat on a 1D10 roll of 2 or less and flee on any other result. The chance of encounter with an intermittent is 9 or less on 1D10. (Terran example: elephant.)

Number Appearing: 1D6 *Initiative:* 2 *Hit:* Difficult *Size:* Normal *Speed:* +1 *Armor:* +1 *DPV:* Normal

3. Chasers: Chasers are packs of carnivores which kill their prey by attacking after a chase. They will attack potential prey, threats or competitors on a 1D10 roll of 6 or less and flee on any other result. For each chaser in the pack in excess of the characters in the party encountered, subtract 1 from the die roll to see if they attack. The chance of encounter with a chaser is 7 or less on 1D10. (Terran example: wolf.)

Number Appearing: 2D6 *Initiative:* 6 *Hit:* Routine *Size:* −1 *Speed:* −2 *Armor:* −2 *DPV:* Normal

4. Hunter: Hunters are omnivorous animals which display a greater tendency toward carnivorous rather than herbivorous behavior. They will attack anything they encounter on a 1D10 roll of 5 or less and flee on any other result. The chance of encounter with a hunter is 5 or less on 1D10. (Terran example: bear.)

Number Appearing: 1D6 *Initiative:* 4 *Hit:* Routine *Size:* +1 *Speed:* Normal *Armor:* +1 *DPV:* Normal

5. Pouncer: A pouncer is a solitary carnivore which attacks from hiding or by surprise or by stalking and springing. It will attack if it surprises the party but will flee otherwise. The chance of encounter with a pouncer is 4 or less on 1D10. (Terran example: mountain lion.)

Number Appearing: 1 *Initiative:* 5 *Hit:* Easy *Size:* Normal *Speed:* −1 *Armor:* −1 *DPV:* Normal

6. Large Chaser: A large chaser is a big, solitary carnivore which kills its prey by attacking after a chase. It will attack anything it encounters on a 1D10 roll of 6 or less and flee on any other result. The chance of encounter with a large chaser is 3 or less on 1D10. (Terran example: polar bear.)

Number Appearing: 1 *Initiative:* 7 *Hit:* Routine *Size:* +2 *Speed:* −2 *Armor:* −1 *DPV:* Normal

7. Grazers: Grazers are herbivores which devote most of their time to eating. Generally in herds, their primary defense is flight. If provoked or threatened, they will attack on a 1D10 roll of 1 but flee on any other result. The chance of encounter with a grazer is 9 or less on 1D10. (Terran example: antelope.)

Number Appearing: 1D6×1D10 *Initiative:* 2 *Hit:* Difficult *Size:* Normal *Speed:* −2 *Armor:* +1 *DPV:* −1

8. Killer: A killer is a carnivore which devotes much attention to killing, apparently for the act itself, in a kind of blood lust. Attacks by killers are fierce and violent. They will attack on a 1D10 roll of 8 or less and flee on any other result. The chance of encounter with a killer is 3 or less on 1D10. (Terran example: shark.)

Number Appearing: 1 *Initiative:* 10 *Hit:* Easy *Size:* +1 *Speed:* Normal *Armor:* +1 *DPV:* +1

9. Large Pouncer: A large pouncer is a very big solitary carnivore which kills its prey by stalking and springing, and which actively and aggressively defends its hunting territory. It will attack if it surprises the party. If it does not surprise the party it will attack on a 1D10 roll of 7 or less and flee on any other result. The chance of encounter with a large pouncer is 5 or less on 1D10. (Terran example: tiger.)

Number Appearing: 1 *Initiative:* 8 *Hit:* Easy *Size:* +2 *Speed:* −1 *Armor:* −1 *DPV:* Normal

10. Hijacker: A hijacker is a scavenging carnivore which relies on its superior strength to steal the kills of other carnivores. It will attack anything it encounters on a 1D10 roll of 9 or less and flee on any other result. The chance of encounter with a hijacker is 2 or less on 1D10. (Terran example: Tyrannosaurus Rex.)

Number Appearing: 1 *Initiative:* 9 *Hit:* Routine *Size:* +3 *Speed:* +2 *Armor:* +2 *DPV:* +2

ANIMAL CHARACTERISTICS

2D6	Size	Speed	Armor	Wound
1	−2	130	0	−6
2	5	120	0	−5
3	10	110	0	−4
4	20	100	0	−3
5	40	95	0	−2
6	60	90	0	−1
7	80	85	0	—
8	100	80	0	—
9	150	75	0.1	—
10	200	70	0.1	—
11	300	65	0.2	—
12	500	60	0.2	—
13	1500	55	0.3	+1
14	3000	50	0.3	+1
15	6000	40	0.4	+1
16	12000	30	0.4	+1
17	24000	20	0.4	+1

18 Roll again on this table and add to result from row 17.

2D6	Size	Consciousness/Life	DPV	Signature
1	−2	1/1	0.1	None
2	5	1/2	0.1	None
3	10	1/3	0.1	None
4	20	1/4	0.1	−6
5	40	1/5	0.1	−3
6	60	2/6	0.2	−1
7	80	3/8	0.2	0
8	100	4/10	0.3	0
9	150	5/12	0.4	0
10	200	6/14	0.5	0
11	300	8/16	0.8	0
12	500	10/18	1	+1
13	1500	12/21	2	+2
14	3000	14/24	4	+4
15	6000	16/27	6	+6
16	12000	19/30	8	+8
17	24000	21/33	12	+10

18 Roll again on this table and add to result from row 17.

The diagrams in the sidebars illustrate various different animal body forms and the hit locations for those forms. When running combat involving animals, use these diagrams in place of the Target Hits diagram in the Combat chapter.

The following procedure determines the statistics of an animal encountered. (Ten of the 11 statistics listed are numbered for reference during use of the Random Characteristics rules below.)

Number Appearing: Many animals travel in groups; others travel singly. Each niche description tells the number of that animal that will be encountered together.

Initiative (1): The animal's listed initiative rating is used as its initiative in combat.

Melee Hit Chance (2): The animal descriptions indicate whether an attack by the animal is an easy, routine, or difficult task.

Size (3): Roll 2D6. If the animal description lists a size modifier, add or subtract it from the die roll. If the animal is from a low-gravity world (0.8 Gs or less), subtract one from the die roll. If the animal is from a high gravity world (1.2 Gs or more), add one to the die roll. The table indicates the size of the animal in terms of its mass in kilograms. This affects most of the other characteristics of the animal. In addition, if the animal masses 1500 kilograms or more, it is treated as a large target; weapons with range finders may use them when firing at the animal, and the animal may be attacked by missiles.

Speed (4): To determine the running speed of the animal, look at the speed column corresponding to the animal's size. (not the original die roll). If the animal description lists a speed modifier, add or subtract it as if it were a die roll modifier. If the animal is from a low-G world, add one; if from a high-G world, subtract one. The result on the chart is the number of meters the animal can run each action.

Armor (5): To determine the armor rating of the animal, look at the die roll number corresponding to the animal's size (not necessarily the original die roll). If the animal description lists an armor modifier, add or subtract it as a die roll modifier, then read across the table to the armor column to discover the armor rating of the animal. Animal armor is considered rigid for potential kills and nonrigid for all other wounds.

Optional Armor Rule: Some animals have tougher hides than others, and some have special armor only in particular locations. Rather than simply assuming that the armor rolled covers the entire animal, roll 1D6—on a 1-5 the armor is normal; on a 6, the creature has double the rolled armor on its back, but its limbs and underside have no armor. (The referee will have to decide if these unprotected areas can be targeted.)

Wound Potential Modification (6): To determine the wound potential modification of the animal, consult the wound potential column of the Animal Characteristics table. The modification used is the one corresponding to the animal's size. The wound potential modification is an addition to or subtraction from the *target hits* die roll for all hits inflicted on the animal, making small animals fairly easy to kill with one hit and large animals somewhat more difficult. This is *not* a modifier for wounds inflicted *by* the animal.

Consciousness Level (7): The animal's consciousness level is listed on the table across from its size.

Life Level (8): The animal's life level is also listed across from its size on the table.

Damage Point Value (9): All animals attack as if conducting an armed melee strike and do normal damage. In addition, all animals 150 kilograms in weight or larger may conduct an additional blunt melee attack each action. In both cases, the DPV of the attack is determined from the Animal Characteristics table. Locate the spot on the DPV column of the chart that corresponds to the animal's size. Make any adjustments called for by the animal description, treating them as if they were die roll modifications.

Signature (10): The animal's signature is the die roll modifier used with sensors. To determine the animal's signature, consult the signature column of the table and note the correct value corresponding to the animal's size. Some animals have a signature of "none" indicating that they may not be detected by sensors due to their extremely small size.

QUICK GENERATION VS. DETAILED GENERATION

With this system, a referee can design the bare essentials of an animal life form very quickly (in the middle of a play session, for example). Or, if more time is allowed, more complete and varied life forms can be designed. To design an animal quickly, simply roll 2D6 for size and read across the table, modifying each value by the amount listed in the animal's niche. The advantage of this system is that it is quick; the disadvantage is that if used too often, animals become predictable. To avoid this problem, it is best to design many animals before play by using the following rules.

Random Characteristic: In order to increase the variance in animal attributes, the referee should roll 1D10 and randomly alter the characteristic corresponding to the number rolled. If, for example, a 6 was rolled, the referee would change the wound potential modification of the animal. To do so, roll 1D6. On an even roll modify the characteristic up; on an odd roll, down. Then roll 1D6 again and apply the roll as a modifier. For results, read off the Animal Characteristic table and apply the roll as a shift up or down on the table. For the initiative characteristic, apply the roll as a modification to the actual value. The animal's hit chance can also be modified; just roll the initial 1D6 to determine if it is to be adjusted up or down, then change it by one level in the indicated direction.

If desired, more than one characteristic may be modified and/or 1D10 may be used instead of 1D6 to determine the amount of the modification.

Air, Land, and Water Creatures: Most of the time, the type of animal will be indicated by the environment in which it lives. Some creatures, however, are equally at home in more than one type of environment. Some creatures can fly or glide; some walk on land; some swim; and many are capable of some combination of the three.

Aquatic Animals: Animals that spend all of their time in water will be double the listed size.

Flyers/Gliders: To determine if an animal *might* be a flyer or glider, roll 1D6 and compare it to the die roll listed next to the creature's size on the Animal Characteristics table. If the result is greater than or equal to the number on the table, the creature *might* be a flyer or glider. A second 1D6 roll of 6 confirms it; on any other result, the animal is not. The referee decides whether the flyer or glider is more appropriate. When in the air, flyers have twice the speed listed on the table; on the ground they have half the listed speed. Gliders have the normal listed ground speed, and half that speed in the air.

Amphibians/Semiaquatic: Amphibious animals are able to live on land or in water (some Terran frogs, for example). Semiaquatic animals live on the land but spend much of their time in the water (Terran ducks and otters, for example). Amphibians or semiaquatic animals will only be found near a land/water interface. Animals encountered in such an area will be amphibious or semiaquatic on a 1D6 roll of 5 or 6. It is possible that a semiaquatic creature might also be a flyer or a glider. The referee decides what is most appropriate.

Special Offenses and Defenses: One way to design individualized animals is to give them some sort of special offense or defense. In general, these will not change the animal's combat statistics, but will simply explain why and how those abilities work.

Teeth and Claws: These are typically a carnivore's means of doing damage. Claws are useful for tearing flesh or for digging prey out of hiding places. Sharp teeth can also be used to tear, but this usually brings the attacker's head near the victim, which can be dangerous.

Horns and Antlers: Usually, horns and antlers will only be found on herbivores. On carnivores, such bulky appurtenances would slow the animal down, but they work well as a defense, keeping an attacker's teeth and claws at a distance.

Spines: Spines are typically used by small animals to make it more difficult for larger animals to swallow them. They can therefore be found on small herbivores, carnivores, or omnivores.

Camouflage: In its usual form, camouflage helps a creature to hide, either so that its predators have a difficult time finding it or so that it can sneak up close to its prey. Another use of camouflage is when one creature appears to be a different type of creature, usually as a defense mechanism. (For example, among Terran butterflies, Viceroys look like Monarchs, which are noxious to birds.)

Poisons: Some herbivores produce poisons to discourage predators, and some carnivores use poisons to hunt with. Poisons can range from substances that do little real harm, but taste or smell badly, to lethal chemicals that kill within seconds. When creating an animal that uses poisons, the referee may wish to adjust the normal combat rules for animals and allow some poisons to continue to do damage after they are first delivered in an attack. For example, a snake bite might have only a DPV of 0.1, but the poison might cause a separate damage roll every turn for 1D10 turns thereafter. Slower poisons might cause the damage roll to be only every hour. Some poisons might only do stun damage. The possibilities for adaptation are numerous. Poisons might be delivered by teeth, claws, spines, spray, or spitting.

Electricity: A few Terran creatures use electricity in attacks or defenses. For example, the electric eel uses it both to stun prey and to discourage predatores. It is not difficult to imagine alien animals using this ability as well. If the referee designs such a creature, he might wish to allow it to do stun damage rather than normal damage.

Travel

TYPICAL TRAVEL TIMES (per 100km hex)

Terrain Type	Foot[7]	Horse[1,7]	Hover	Wheel	Tracked	Aircraft[10]	LTA[9]	Ship[9]	Hydrofoil[9]	Boat[9]
Flat	2d	1d	30m	1h	2h	10m	4h	—	—	—
Hilly	2d	1d	1h	2h	3h	—	—	—	—	—
Broken	3d	2d	3h	5h	6h	—	—	—	—	—
Mountain	5d	4d	no	no	no	—	—	—	—	—
Savannah	2d	1d	1h	5h	6h	—	—	—	—	—
Woods	2d	1d	8h	6h	8h	—	—	—	—	—
Forest	3d	2d	No	10h	12h	—	—	—	—	—
Swamp	2d	1d	3h	no	6h	—	—	—	—	—
Desert	2d	1d	30m	2h	2h	—	—	—	—	—
Volcano	+12h	+12h	+2h	+2h	+2h	—	—	—	—	—
Craters	4d	3d	1h	2h	4h	—	—	—	—	—
River[3]	+12h	+12h	1h[2]	+1d	+12h	—	—	—	80m[2]	10h[4]
Lake	no	no	30m	no	no	—	—	4h	1h	8h
Glacier	3d	2d	3h	no	8h	—	—	—	—	—
City, Town[5]	+12h	+12h	+12h	+12h	+12h	+6h	+6h	+6h	+6h	+6h
Cropland[6]	+12h	+12h	+12h	+12h	+12h	—	—	—	—	—
Road Grid	2d	−12h[8]	2h	2h	2h	—	—	—	—	—
Highway	2d	−12h[8]	12h	1h	2h	—	—	—	—	—
Calm Seas	—	—	—	—	—	—	—	4h	1h	8h
High Seas	—	—	—	—	—	—	—	5h	1h	—
Coastal Waters	—	—	—	—	—	—	—	6h	1h	8h

1. Horse or similar riding animal. 2. Time following river route. 3. Time to cross river (building rafts, etc.). 4. Time downstream; double time to go upstream. 5. Assumes passing through settlement, stopping for lunch, etc. 6. Assumes skirting crop fields. 7. Assumes 12 hours travel and 12 hours rest per day. 8. Decrease in usual time to traverse hex when using a highway. 9. Weather may increase time spent by up to one day. 10. Supersonic aircraft travel at twice this rate; hypersonic and scramjets at four times this rate. **Note:** Use the following special travel times per 100km hex: Railroad 1h, Airfilm 10m, Maglev 10m.

MAXIMUM SPEEDS

Vehicle Type	Max Speed kph	per hex
Foot, walking	5	40h
Horse	10	20h
Hovercraft	200	30m
Conventional Train	200	30m
Airfilm	600	10m
Maglev	600	10m
Wheeled Car	150	40m
Tracked Vehicle	80	75m
Subsonic Air	900	6m
Supersonic Air	1800	3m
Scramjet	4000	90s
Dirigible (LTA)	30	3h
Ship	30	3h
Hydrofoil	150	40m
Boat	15	6h

Note: Walking and riding specify double travel time, assuming half the time is spent in rest/meals/sleep. Others assume constant driving and shifts of drivers.

Airfilm is common on garden worlds; maglev is common on vacuum worlds.

TIMES

1d = 1 day; 1h = 1 hour;
1m = 1 minute; 1s = 1 second.

TRAVEL TIME—INTERFACE

Going Into Orbit

Craft	Preparation	Travel Time	Cleanup	Turn Around
Rocket	1d	1h	2h	6h
Rocket Plane	6h	1h	1h	immediate
Scramjet	3h	2h	1h	immediate
Catapult	1h	2h	none	as lifting body
Beanstalk	not applicable	5d	not applicable	immediate

Returning to Surface

Craft	Preparation	Travel Time	Cleanup	Turn Around
Scramjet	none	1h	2h	3h
Parachute	1h	2h	4h	no
Deadfall	1h	1h	none	no
Rocket	none	1h	12h	1d
Lifting Body	1h	1h	2h	no
Beanstalk	not applicable	5d	not applicable	immediate

Preparation includes fueling, preflight checks, and boarding.
Travel Time includes actual flight time and maneuvering to position in orbit.
Cleanup includes postflight checks and equipment shutdown.
Turn Around is the minimum time required for a vessel to leave its destination and begin its return to its starting point.

INTERSTELLAR TRAVEL TIME

Depending on mass and drive, between 0.15 and 9.5 ly per day.

Speed Limit: 7.7 ly travel between stars; a stop in a gravity well is required for drive safety and performance. The stop requires 40 hours.

INTERPLANETARY TRAVEL TIME

Within a gravity well (where G is greater than 0.0001) stutterwarp operates at about 0.01 percent efficiency. Multiply interstellar speed (in ly per day) by 0.645 for in-system speed in au per day.

NPC Data

Name	M/F	Body Type	Age	Career	Skills Prim.	Rel.	Phys.	Ment.	Motive	Notes

The Nations of Earth

Africa

Angola	Portuguese
Azania	English
Biafra	English
Ethiopia	Amharic
Kenya	English
Madagascar	French
Malawi	English
Mali	French
Mozambique	Portuguese
Nigeria	English
Somalia	Somali
Tanzania	English
Ubangi Shari	Ubangi Shari
Zambia	English
Zimbabwe	English

North America

America	English
Canada	English
Mexico	Spanish
Texas	English and Spanish

North Africa

Berbera	Arabic
Eritrea	French
Kanuri	Kanuri
Mauritania	French
Morocco	Arabic
Polisaria	Arabic
Tunisia	Arabic
UAR	Arabic

French Empire

Algeria	French
Burkina Faso	French
Cameroon	French
Chad	French
Djibouti	French
Gabon	French
Guinea Coast	French
Guyana	French
Katanga	French
Senegal	French
Zaire	French

South America

Argentina	Spanish
Bolivia	Spanish
Brazil	Portuguese
Chile	Spanish
Inca Republic	Spanish
Paraguay	Spanish
Uruguay	Spanish
Venezuela	Spanish

Middle East

Arabia	Arabic
Armenia	Armenia
Baluchistan	Farsi
Iran	Farsi
Iraq	Arabic
Kurdistan	Kurdish
Palestine	Hebrew, Arabic
Syria	Arabic
Turkey	Turkish

Europe

Albania	Albanian
Austrovenia	German
Britain	English
Bulgaria	Bulgarian
Catalonia	Catalan
Croatia	Serbo-Croatian
Czechoslovakia	Czech
Flanders	Flemish
France	French
Germany	German
Greece	Greek
Hungary	Hungarian
Ireland	English
Italy	Italian
Latvia	Latvian
Netherlands	Dutch
Poland	Polish
Portugal	Portuguese
Romania	Romanian
Russia	Russian
Scandinavian Union	Scandinavian
Serbia	Serbo-Croatian
Spain	Spanish
Switzerland	French
Ukraine	Russian

Antarctica

Unpopulated

Australia

Australia	English
Papua	English
Tasmania	English

Pacific

Japan	Japanese
Nauru	English
New Zealand	English
Philippines	English

India

Afghanistan	Farsi
Bengal	English
Bhutan	Dzongkha
Bihar	English
Bombay	English
India	English
Madras	English
Mysore	English
Nepal	Nepali
Pakistan	Urdu
Punjab	English
Rajastan	English
Sri Lanka	Tamil

Asia

Azerbaijan	Azerbaijani
Burma	Burmese
Canton	Cantonese
Cen Asian Rep	Russian
China	Mandarin
Far East Rep	Russian
Georgia	Russian
Indochina	French
Indonesia	Malay
Korea	Korean
Manchuria	Manchurian
Mongolia	Mongolian
Tibet	Mandarin

The Colonies of Earth

Nationality	Year	Star Name	Type	Gravity	Nationality	Year	Star Name	Type	Gravity
America	2160	Barnard's Star	Outpost	0.71	France	2220	Beta Comae	Colony	1.05
America	2172	Broward	Outpost	0.26	France	2231	Kimanjano	Colony	0.94
America	2194	King	Colony	3.08	France	2244	Vogelheim	Colony	1.16
America	2199	New Melbourne	Outpost	0.39	France	2246	Eta Bootes	Colony	0.73
America	2215	Mu Herculis	Colony	0.73	France	2274	DM+27 28217	Outpost	0.00
America	2224	Vega	Outpost	0.00	Germany	2224	DM+36 2393	Colony	0.60
America	2225	Red Speck	Outpost	0.23	Germany	2231	Hochbaden	Colony	0.29
America	2229	Ellis	Colony	0.92	Germany	2169	Neubayern	Colony	0.63
Arabia	2245	Beta Hydri	Colony	0.66	Germany	2207	Beta Canum	Colony	0.94
Argentina	2168	Alpha Centauri	Colony	1.01	Germany	2231	Vogelheim	Colony	1.16
Argentina	2175	DM-26 12026	Outpost	0.97	Germany	2241	61 Ursae Majoris	Colony	1.05
Argentina	2245	Omicron2 Eridani	Colony	0.98	Germany	2268	Augereau	Outpost	0.47
Australia	2196	King	Colony	3.08	Inca	2289	Rho Eridani	Colony	0.44
Australia	2196	New Melbourne	Outpost	0.39	Inca	2294	DM-3 1123	Colony	1.25
Australia	2201	Ross 863	Outpost	0.00	Independent	2257	Eta Bootes	Colony	0.73
Australia	2212	Botany Bay	Colony	0.91	ex-British	2167	Alpha Centauri	Colony	1.01
Australia	2217	Zeta Herculis	Colony	0.99	ex-German	2167	Alpha Centauri	Colony	1.01
Azania	2141	Nyotekundu	Outpost	1.02	ex-French	2248	61 Ursae Majoris	Colony	1.05
Azania	2167	Alpha Centauri	Colony	1.01	Japan	2172	Alpha Centauri	Colony	1.01
Azania	2205	Kimanjano	Colony	0.94	Japan	2211	Davout	Outpost	0.76
Azania	2280	61 Ursae Majoris	Colony	1.05	Japan	2213	Beta Hydri	Colony	0.66
Bavaria	2228	Rho Eridani	Colony	0.44	Japan	2257	61 Ursae Majoris	Colony	1.05
Brazil	2184	Alpha Centauri	Colony	1.01	Life Foundation	2258	DM-3 1123	Colony	1.25
Brazil	2258	DM-21 1377	Outpost	0.69	Manchuria	2153	Barnard's Star	Outpost	0.71
Brazil	2267	Ross 614	Outpost	0.48	Manchuria	2172	DM-26 12026	Outpost	0.97
Brazil	2284	Procyon	Colony	0.99	Manchuria	2201	Delta Pavonis	Colony	0.83
Britain	2178	Queen Alice's Star	Colony	1.05	Manchuria	2204	Xiuning	Outpost	0.70
Britain	2187	Clarkesstar	Outpost	0.00	Manchuria	2208	Epsilon Indi	Colony	1.12
Britain	2207	Beta Canum	Colony	0.94	Manchuria	2213	Hunjiang	Outpost	0.33
Britain	2217	Henry's Star	Colony	0.61	Manchuria	2214	Zeta Tucanae	Colony	1.02
Britain	2254	61 Ursae Majoris	Colony	1.05	Manchuria	2218	Serurier	Outpost	0.21
Canada	2255	DM+19 5116	Outpost	0.38	Manchuria	2219	Tau Ceti	Colony	0.93
Canada	2257	DM+3 123	Enclave	0.83	Manchuria	2235	Epsilon Eridani	Colony	1.57
Canada	2267	DM+15 4733	Outpost	0.13	Manchuria	2238	DM-15 6290	Outpost	0.86
Canada	2273	DM+20 5046	Colony	0.87	Manchuria	2238	Haifeng	Outpost	0.81
Canton	2259	Zeta Tucanae	Colony	1.02	Manchuria	2247	DM+1 4774	Outpost	0.37
Eber	0000	82 Eridani	Homeworld	1.46	Manchuria	2255	DM+4 123	Enclave	0.83
France	2145	Bessieres	Outpost	0.58	Mexico	2245	Omicron2 Eridani	Colony	0.98
France	2152	Augereau	Outpost	0.47	Mexico	2265	Tau Ceti	Colony	0.93
France	2159	Serurier	Outpost	0.21	Pentapod	2267	Beta Canum	Enclave	0.94
France	2167	Alpha Centauri	Colony	1.01	Sung	0000	DM+4 123	Homeworld	0.83
France	2175	DM-26 12026	Outpost	0.97	Texas	2258	DM-3 1123	Colony	1.25
France	2184	Davout	Outpost	0.76	Texas	2258	Rho Eridani	Colony	0.44
France	2184	Nyotekundu	Outpost	1.02	Texas	2269	82 Eridani	Enclave	1.46
France	2185	D'Artagnon	Outpost	0.65	Trilon Corp	2260	Xi Ursae Majoris	Colony	1.21
France	2196	Queen Alice's Star	Colony	1.05	UAR	2261	82 Eridani	Enclave	1.46
France	2205	Beta Canum	Colony	0.94	Ukraine	2244	Eta Bootes	Colony	0.73
France	2211	DM+36 2219	Outpost	0.02	Unmanned	2245	Van Maanen's Star	Outpost	0.08

Weapons Data

Weapon	Mass/Wt.	Bulk	ROF	Rate of Fire	RPB	Rounds per Burst	Mag	Magazine Capacity	Aimed	Area	AFV	Area Fire Value	DPV	Damage Point Value

The American Arm

The American Sub-Arm

The Australian Sub-Arm

Key

⌐ 1 ly
★ Sol
▬ Major Route
— Other Route
● 30 to 50 ly
● 10 to 30 ly
● 10 to −10 ly
● −10 to −30 ly
. −30 to −50 ly

Z-axis distance is the value above or below the map plane. Symbols represent perspective distance, not stellar size.

Eta Cassiopei   Wolf 47   Van Maanen's Star
DM +66 34
Groombridge
Beta Hydri   Ross 248

lalorts   DM +74 456   Nyotekundu
Berthier   DM +66 717   Bessieres
1519   AC +13 14332   L145-141
   C1   Wolf 424   AC +79 3888
DM −51 5974   Queen Alice's Star   L68-28
DM −68 1095   AC +66 3955
DM −51 6859
Comae Berenices
DM +46 1889
11 2576
L258-146
2393   DM −20 4125
DM −11 3759   DM −40 9712
12   Xi Bootis
38   DM −7 4003
otis   DM +39 2947
44 1 Bootis
2
708
Ross 508   L480-69
112   L1346-53
   Lambda Serpenti
DM −37 10500

Proxima Centauri
Sol ★
Alpha Centauri
AC +13 14332

DM +48 2108
DM +15 2620
DM −58 5564

L49-19   Lacaille 9352
   Kruger 60
Epsilon Indi   DM +56 2966
   DM +43 4305
   L24 52
61 Cygni
Xiuning
Sigma Draconis   DM −39 14192
Chi Draconis   Delta Pavonis
DM +76 785   Gamma Pavonis
Serurier   DM +61 2068
   AC +65 6955
D'Artagnon
Darout   DM −45 13677
AC +70 8247   DM −36 13940
L347.14   AC +17 534-105
Red Speck
DM −26 12026
DM +67 1014
70 Ophiuchi

Altair
   L115-21
   DM +66 1281
   DM +4 4048

DM +19 5116
DM +57 2735
Fomalhaut
DM −15 6290
L119-21
DM +15 4733   Ross 226
DM −32 17321   DM −23 17699
DM −21 6267
DM −58 8327
DM −54 9222   DM −60 7821
   DM −5 5715
   Wolf 1
   DM −51 13128
   DM +0
AC +16 73
DM +20 5046
L355-62
Wolf 922
DM +62 1916
Eta Cephei   DM −47 13928
DM −53 8617   DM −51 12998
DM −32 16135   DM −31 17
DM −27 14659   Wolf 10
   AC
AC +32 54804
   G2
AC +20 1463-148   Psi
DM −48 12818
DM +52 2294   Ross 165
DM −46 12902   AC −7 342-402
AC −7 342-402
AC +2 2155-242
L489-58
AC +8 142-393

Vega
Mu Herculis   DM +43 2796
DM −3 4233
DM −58 7076
New Melbourne
DM −48 11837
Mu Arae
AC +41 726-154
Ross 868
DM +5 3409
Ross 867

Broward   DM −46 11540
Zeta Draconis
DM +67 935
Ellis
L74-13   DM −44 11370
DM −37 10765
26 Draconis
AC +61 26806
DM −51 10924
King
Clarkesstar
Wolf 629
Botany Bay   Zeta Herculis
Ross 863
DM +25 3173
L339-19
L768-119
DM −57 6303
AC +54 1646-56
LP101-15
DM +45 2247
DM +45 2743
DM +51 2402
DM +38 3095
DM −43 12343
DM +45 2688
DM −1 3220
DM +41 2695
DM −4 4225

The Chinese Arm

The Latin Finger

The Canadian Finger

Key

- 1 ly
- ★ Sol
- Major Route
- — Other Route
- ● 30 to 50 ly
- ● 10 to 30 ly
- ● 10 to −10 ly
- ● −10 to −30 ly
- ● −30 to −50 ly

Z-axis distance is the value above or below the map plane. Symbols represent perspective distance, not stellar size.

DM −45 1184
DM −46 943
M −28 69
● Ross 55?
● AC +3 2259
● DM −47 50?
DM −23 693
● DM +2 348
Theta Persei
● DM −13 544
DM −44 775
Delta Trianguli
● DM −54 487
● DM −18 359
L1303-10
● DM +32 828
● DM −51 532
● DM −41 328
Nu Phoenicis
Alpha Hydri
● DM +19 279
L89-27
● DM +56 13511
● DM +62 274
L1724-32
● DM +63 137
AC +60 3496
● DM −28 302
DM +4 123
● DM +41
● DM −42 249
● DM +20 85
DM +40 4?
Beta Cassiopei
● DM +45 4408
DM +44 4548
L362-81
DM +1 4774
● DM +19 5116
● DM +57 27
Fomalhaut
Ross 22?
DM.
DM −54 9222
DM −60 7821
DM +20 5046
L355-62
● Wolf 922
AC +17 534-105
Altair
L115-21
● DM +62 1916
Eta Cephei
DM +66 1281
DM −47 13

● DM +52 857
Omicron2 Eridani
Zeta1 Reticuli
Zeta2 Reticuli
82 Eridani
Epsilon Eridani
● DM +47 612
L127-97
AC +58 13565
AC +25 7918
DM +6 398
DM +63 229
● DM +61 366
Haileng
● DM +63 238
Rho Eridani
Nu Cassiopei
● DM +61 195
Van Maanen's Star
● DM +66 34
Wolf 47
● DM +73 672
Hunjiang
Zeta Tucanae
DM −15 6290
L119-21
DM +15 4733
DM −32 1732?
DM −39 14192
Gamma Pavonis
DM −45 13677
DM −36 13940

● DM +53 935
LP658-2
● DM −62 780
DM −3 1123
AC +12 1800-213
VZ Canis Minoris
DM −21 1377
AC +33 25644
AC +38 23616
Ross 614
DM +5 1668
Procyon
Sirius
Kapetyn's Star
Alpha Mensae
AC +58 25001
AC +79 1584
Qingyuan
Eta Cassiopei
AC +71 532
AC +79 3888
Tau Ceti
DM −68 47
Groombridge 34
Ross 248
Lacaille 9352
Kruger 60
DM +43 4305
L789-6
Epsilon Indi
61 Cygni
Xifuning
DM +61 2068
AC +65 6955
AC +70 8247
L347-14

DM −44 3045
● Ross 619
LP425-140
L674-15
AC +36 616
DM +67 552
DM −59 2351
DM +71 482
DM +53 1320
AC +70 4337
AC +70 4336
Neubayern
AC +82 1111
Tau3 Eridani
Kapetyn's Star
DM +80 238
L97-12
Nyotekundu
Bessieres
L145-141
Proxima Centauri
Alpha Centauri
Sol ★
Beta Hydri
DM +68 946
Barnard's Star
DM +59 1915
Sigma Draconis
Delta Pavonis
Chi Draconis
DM +76 785
Securiet
D'Artagnon
Bayout
AC +70 8247

DM −51 5613
DM −32 5613
Augereau
DM +74 456
DM +66 717
Ross 128
Queen Alice's Star
AC +66 3955
Wolf 424
L68-28
DM +15 2620
DM −58 5564
DM −46 11540
Zeta Draconis
Broward
DM +67 935
L74-13
Ellis
Red Speck
DM −26 12026
DM −40 9712
DM −20 4125
Xi Bootis
DM −7 4003

675-81
DM −32 5613
C1
195
−51 6859
58-46
459
69
0 3532
48 2108
9
DM −51 5974
DM −20 4125

The French Arm

Key

⌐ 1 ly	
★ Sol	
▬ Major Route	
— Other Route	
●	30 to 50 ly
●	10 to 30 ly
●	10 to -10 ly
•	-10 to -30 ly
·	-30 to -50 ly

Z-axis distance is the value above or below the map plane. Symbols represent perspective distance, not stellar size.

Pentapod Space

Kafer Space

NEAR STAR MAP

V 371 Orionis

Ross 417
Ross 42 AC + 1 1951-103
L886-6 DM - 3 1110
L597-31 DM - 3 1061 AC - 19 1165-38
DM - 20 802
DM - 13 2267 DM - 3 2001 Lowne 1 DM - 63 110
DM - 25 3913 DM - 17 954 DM - 21 587 DM - 1 565
DM - 35 3233 Wolf 1539 G7-17
Wolf 1421 Castor DM - 18 1214 Lambda Aurigae DM - 7 699
DM - 11 878 1736-30 Wolf 219 DM - 5 642
DM - 12 1944 DM - 22 2345 DM - 34 4036 Psi5 Aurigae L737-9
DM - 8 2582 AC - 47 256-150 Chi1 Orionis AC - 33 10883 AC - 10 22-181
DM - 12 2449 L745-46 DM - 10 1032 Capella H A DM - 18 683 DM - 25 613 Epsilon Ceti
DM - 2 2901 L820-19 DM - 4 2490 DM - 4 2226 DM - 5 1844 DM - 49 2340 Capella A DM - 5 1123 DM - 41 1288 G5-43 Tau1 Eridani
DM - 28 1660 Pollus DM - 17 1320 DM - 52 911 DM - 21 652 DM - 20 643 Alpha Fornacis
DM - 31 6229 DM - 36 1638 Ross 41 DM - 49 1280 DM - 37 748 DM - 33 529
G107-69 DM - 36 2458 Zeta Doradus DM - 38 1058
AC - 13 1301-119 G107-70 DM - 46 3046 Gamma Leporis Pi3 Orionis Delta Eridani DM - 26 828
DM - 23 8646 DM - 36 1970 Ross 64 Ross 594 Kappa Reticuli
DM - 9 2 3000 DM - 6 2182 Iota Ursae Majoris DM - 60 1003 DM - 53 889 Ross 28 AC - 45 133-65
DM - 11 2741 L316-62 1182-44 DM - 21 1051 DM - 45 1184 DM - 46 943
DM - 43 1953 DM - 38 4789 L675-81 DM - 53 935 DM - 62 780 DM - 48 1011 Iota Horologii DM - 28 694
DM - 29 8019 Ross 92 G195-19 DM - 32 5613 Ross 619 DM - 52 857 Iota Persei Theta Persei DM - 2 348 L870-2
L1113-55 DM - 46 1551 DM - 12 2918 LP425-140 YZ Canis Minoris DM - 3 1123 DM - 21 1377 AC - 12 1800-213 DM - 13 544 DM - 44 775 Ross 555
L824-28 DM - 48 1829 DM - 45 5627 DM - 40 5404 L674-15 AC - 33 25644 AC - 25 7918 Delta Trianguli DM - 23 693 DM - 16 214
L678-39 AC - 38 23616 Omicron2 Eridani DM - 6 398 DM - 54 487 DM - 18 359 AC - 3 2259-31
DM - 3 2870 DM - 36 1979 Zeta1 Reticuli L1303-10 DM - 32 828 DM - 47 502
DM - 46 1635 DM - 42 5678 DM - 45 5378 Ross 614 Zeta2 Reticuli DM - 47 612 DM - 51 532 DM - 41 328
L968-22 DM - 67 552 DM - 5 1668 L127-97 DM - 2 129
G44-42 L1897-16 82 Eridani AC - 58 13565 L89-27 Alpha Hydri
DM - 18 3019 DM - 39 2376 Procyon AC - 58 13511 DM - 19 279 Nu Phoenicis DM - 41 219 DM - 23 332
DM - 22 2302 DM - 41 2147 DM - 1 2447 DM - 63 869 DM - 59 2351 Sirius Kapetyn's Star DM - 63 229 AC - 56 13511 DM - 11 325
DM - 31 2240 DM - 56 1458 DM - 56 1459 DM - 71 482 DM - 53 1320 Alpha Mensae Epsilon Eridani DM - 61 366 DM - 62 274 1724-32 DM - 39 154 DM - 25 225
Ross 627 DM - 23 9765 Wolf 358 AC - 70 4337 DM - 80 238 AC - 58 25001 Haifeng DM - 63 137 DM - 42 249 Wolf 1056
DM - 19 3242 Xi Ursae Majoris AC - 70 4336 197-12 AC - 60 3496 DM - 28 302 DM - 20 85
L396-7 AC - 23 468-46 Neubayern AC - 82 1111 Tau Ceti Rho Eridani Mu Cassiopei DM - 4 123
DM - 31 9113 DM - 32 8179 L192-72 Augereau AC - 79 1584 Qingyuan Wolf 47 Van Maanen's Star DM - 40 45 L1154-29
DM - 27 2055 DM - 43 7228 DM - 50 1832 DM - 60 3532 Bessieres Eta Cassiopei Zeta Tucanae DM - 44 4548 Beta Cassiopei DM - 28 4704
Denebola L1829-26 DM - 27 28217 61 Ursae Majoris DM - 74 456 Nyotekundu Groombridge 34 Hunjiang DM - 66 34 DM - 45 4408 R5 Pegasi
L901-10 Beta Virginis DM - 36 2219 DM - 39 7301 DM - 66 717 L145-141 Beta Hydri L362-81 DM - 22 6219
DM - 9 3413 Ross 119 DM - 26 8883 Berthier DM - 51 5974 Ross 128 Sol Ross 248 DM - 1 4774 Ross 249
Alpha Crucis Henry's Star DM - 55 1519 C1 Wolf 424 L68-28 Proxima Centauri L149-19 Lacaille 9352 DM - 73 1672 AC - 32 86422 Iota Piscium
DM - 45 2014 AC - 13 14332 Queen Alice's Star Alpha Centauri Kruger 60 DM - 43 4305 Wolf 1039
DM - 42 2296 Beta Canum Venaticorum DM - 68 1095 Kimanjano AC - 66 3955 Epsilon Indi DM - 56 2966 DM - 15 6290 DM - 57 2735 DM - 17 6768
Wolf 414 Ross 695 DM - 45 7872 L24 52 L1789-6 G29-38
DM - 9 2636 Gamma Virginis DM - 34 2323 Wolf 437 DM - 48 2108 DM - 68 946 DM - 59 1915 61 Cygni Xiuning Fomalhaut
AC - 10 95-26 Wolf 433 Vogelheim DM - 15 2620 Barnard's Star Sigma Draconis DM - 39 14192 AC - 15 4733 Ross 226 1915-50
DM - 16 2404 DM - 0 2989 Beta Comae Berenices DM - 46 1889 Delta Pavonis DM - 32 17321 DM - 23 17699 DM - 21 6267
Wolf 461 DM - 17 3813 DM - 11 2576 DM - 58 5564 Chi Draconis Gamma Pavonis DM - 26 16501
Wolf 457 DM - 13 2618 DM - 35 2436 Wolf 489 L258-146 DM - 76 785 DM - 61 2068 DM - 19 5036
Ross 974 DM - 37 8437 DM - 36 2393 Serurier AC - 65 6955 DM - 54 9222 DM - 58 8327
DM - 17 2611 DM - 20 4125 DM - 46 11540 D'Artagnon DM - 60 7821 DM - 20 5046 DM - 5 5715
DM - 10 2531 Hochbaden DM - 11 3759 DM - 40 9712 Zeta Draconis Davout AC - 70 8247 DM - 13 677 AC - 17 534-105 L355-62 Wolf 1561 DM - 30 19255
Ross 486 DM - 18 2776 DM - 50 2030 L74-113 Broward DM - 36 13940 Altair Wolf 922 DM - 5 1 13128 DM - 30 19175
DM - 47 2112 Xi Bootis Ellis Red Speck L347-14 L115-21 DM - 62 1916 DM - 47 13928 DM - 0 4810
DM - 21 3781 G200-38 DM - 7 4003 DM - 26 12026 DM - 66 1281 Eta Cephei DM - 51 12998 Iota Pegasi DM - 1 4323
DM - 1 2892 Theta Bootis Beta Trianguli Australis DM - 46 11370 DM - 67 1014 70 Ophiuchi DM - 4 4048 DM - 53 8617 DM - 31 17815 AC - 16 734-144 AC - 17 536-125
Arcturus 44 I Bootis DM - 37 10765 DM - 34 11626 Vega DM - 32 16135 Wolf 1084 AC - 39 60670 L1715-89
DM - 3 3508 Ross 848 Wolf 629 Clarkesstar DM - 27 14659 AC - 44 871-589 DM - 5 5674
Theta Centauri DM - 30 2512 Ross 52 L339-19 26 Draconis DM - 43 2796 AC - 32 54804 L1714-88
AC - 12 2306-155 DM - 16 2708 L768-119 AC - 61 26806 Mu Herculis AC - 20 76187 Wolf 918 DM - 27 4120
Ross 845 Wolf 534 DM - 19 2881 DM - 57 6303 DM - 51 10924 DM - 3 4233 DM - 58 7076 G24-16 AC - 39 57322
DM - 16 2658 L480-69 Zeta Herculis King DM - 20 1463-148 Psi Capricorni
DM - 24 2733 Ross 508 LP101-15 AC - 54 1646-56 Botany Bay New Melbourne DM - 48 12818 Ross 165 AC - 22 108-605
DM - 24 2733 B AC - 18 1890-112 L1346-53 Mu Arae DM - 48 11837 DM - 38 3095 DM - 52 2294 Wolf 906
DM - 24 2786 Ross 802 DM - 39 2947 AC - 41 726-154 DM - 45 2743 DM - 51 2402 L1856-54
DM - 23 11940 DM - 25 2874 Lambda Serpenti DM - 37 10500 Ross 863 DM - 25 3173 DM - 46 12902 AC - 7 342-402 DM - 28 16676 Ross 188
Ross 868 AC - 2 2155-242 DM - 23 15935 AC - 24 747-102
DM - 13 2901 Gamma Serpenti DM - 1 3220 Ross 867 DM - 5 3409 L997-21 DM - 31 3767 AC - 24 16193 DM - 14 5936
DM - 41 2695 DM - 43 12343 AC - 8 142-393 DM - 45 2688 L489-58 DM - 24 16193
DM - 4 4225 DM - 24 15668 DM - 19 5899
DM - 24 12677 DM - 39 10940 DM - 32 2896 DM - 5 3993 BPM 94172 DM - 25 3719 DM - 2 4076 Ross 193
L1989-20 DM - 3 3465 AC - 16 247-80 DM - 4 4157 AC - 11 1185-145
DM - 21 4352 Beta Aquilae
DM - 6 4663 DM - 15 3364 L1850-62 DM - 7 4052
DM - 18 4986 DM - 21 5081 DM - 1 3474 Delta Aquilae
DM - 18 3606
Wolf 1466 AC - 3 2528-176
L1064-75

2300AD

In This Game

The future is an exciting place, and this box provides you with what you need to begin role playing immediately. **2300 AD** contains several separate items which provide information and background about the universe of the future. Look them over and familiarize yourself with them.

Adventurer's Guide

The *Adventurer's Guide* is directed at the individual players of **2300 AD**, giving them information they will find useful while playing the game. It provides background on the future universe, describing what nations exist on Earth and what colonies they have out among the stars. It covers character generation and the varieties of equipment that can be purchased and used. The referee should also read the *Adventurer's Guide*.

Director's Guide

The *Director's Guide* is directed at the referee, providing basic game rules that govern **2300 AD**. These rules cover task resolution, starships, personal combat, and world generation, as well as other important topics.

Near Star Map

The Near Star Map shows the locations of stars within 50 light-years of Earth. Each is color-coded to show its spectra and identified by name. Smaller maps show the major exploration routes of Earth's future: the French, Chinese, and American Arms.

Play Aids

Behind this cover you will find three separate items that will be of great help to you in playing **2300 AD** adventures: a collection of tables and forms, a sample solitaire adventure, and a catalog of star data. Each of these items is described separately in the sections below.

Forms Book

The first 16 pages of play aids include a collection of tables and forms. Each form can be photocopied and then filled in with information drawn from the rules or generated during play. Be careful to only use photocopies of the forms, keeping the originals for photocopying.

Terror's Lair

To demonstrate how the **2300 AD** game system works, *Terror's Lair* is included in the game as a sample programmed adventure. This sample adventure can easily be expanded to become the first adventure a referee runs as well.

Near Star List

The more than 750 stars on the Near Star Map are cataloged in the *Near Star List*. Stars are listed in alphabetical order, and the listing includes spectral and size data, magnitude, and XYZ coordinates. Data in this *Near Star List* is the most accurate information available on stars within 50 light-years of Earth.

Dice

2300 AD requires dice as random number generators. Dice are important to the game because they make the outcome of events reasonable, yet individually unpredictable. This game includes two six-sided dice (D6) and one 10-sided die (D10).

Character Data

Name		Nationality	Homeworld	Gravity	Frontier/Core?
Gender & Looks	Birthdate & Age	Mass	Eyesight	Hearing	Body Type
Throw Range	Coolness Under Fire	Encumbrance	Native Language	Other Languages	

First Career	Second Career
Notes:	Notes:

Attributes

High-G	High-G					
Size	Normal Str	Normal Dex	End	Det	Int	Elo	Edu
	Low-G	Low-G		Con	Life	
	Zero-G	Zero-G				

Attribute Task Modifiers

Size	Str	Dex	End	Det	Int	Elo	Edu

Money & Equipment

Skills

Experience   Renown:

Weapons

Weapons	Mass/Wt.	Bulk	Ammunition				Range		AFV	DPV
			ROF (Rate of Fire)	RPB (Rounds per Burst)	Mag (Magazine Capacity)		Aimed	Area	AFV (Area Fire Value)	DPV (Damage Point Value)

HOMEWORLD

1D10	Gravity	Core/Frontier
1	Zero-G	Core
2	Zero-G	Core
3	Low-G	Core
4	Low-G	Frontier
5	Low-G	Frontier
6	Normal	Frontier
7	Normal	Frontier
8	Normal	Frontier
9	High-G	Frontier
10	High-G	Frontier

BODY TYPE

1D10	Zero	Low	Normal	High
1	Ecto	Ecto	Ecto	Endo
2	Ecto	Ecto	Ecto	Endo
3	Ecto	Ecto	Endo	Endo
4	Ecto	Normal	Endo	Normal
5	Ecto	Normal	Normal	Normal
6	Normal	Normal	Normal	Normal
7	Normal	Normal	Normal	Normal
8	Normal	Meso	Normal	Meso
9	Normal	Meso	Meso	Meso
10	Normal	Meso	Meso	Meso

PHYSICAL ATTRIBUTES

Body Type	Str	Dex	End
Mesomorph	+4	−2	+2
Ectomorph	−2	+3	0
Endomorph	+1	−1	+3
Normal	0	0	0

EDUCATION MODIFIERS

If Intelligence or Determination is...	Change Education by...
1 to 4	−4
5 or 6	−3
7 or 8	−2
9 or 10	0
11 or 12	+1
13 or 14	+2
15 to 20	+4

Note: Consult this table once for intelligence and once for determination.

SECONDARY ATTRIBUTES

1D10	Eyesight/Hearing	Appearance
1	Poor	Unattractive
2	Average	Plain
3	Average	Plain
4	Average	Good-Looking
5	Average	Good-Looking
6	Average	Good-Looking
7	Average	Good-Looking
8	Excellent	Attractive
9	Excellent	Attractive
10	Exceptional	Sensational

GRAVITY TABLE (STR/DEX)

Gravity of Homeworld			
Zero-G	Low-G	Normal	High-G
Zero-G +0/+0	+1/−1	+2/−2	+4/−4
Low-G −1/+1	+0/+0	+1/−1	+2/−2
Normal −2/+2	−1/+1	+0/+0	+1/−1
High-G −4/+4	−2/+2	−1/+1	+0/+0

Note: The first number in each column is the strength modifier, and the second is the dexterity modifier.

BACKGROUND SKILLS

Background skill points equal education divided by 2 (round fractions up).

Frontier Skills: Combat Rifleman, Sidearm, Melee, Ground Vehicle, Hover Vehicle, Sea Vehicle, First Aid, Survival, Electronic, Mechanical, Riding, Prospecting, Swim, P-Suit.

Core Skills: Computer, Ground Vehicle, Hover Vehicle, Sea Vehicle, Bureaucracy, Information Gathering.

SPECIAL ATTRIBUTES

Special attributes are figured as follows:

Mass: Mass (in kilograms) begins with a base of 50 plus (3 times size). If mesomorph, add +35; if endomorph, add +20; if ectomorph, add −20.

Consciousness and Life Level: Consciousness level equals mass divided by 20; life level equals mass divided by 10. Round results down.

Encumbrance: Twice the sum of size plus strength is the limit of carrying capacity in kilograms.

Throw Range: Strength times 8 gives throw range (for a one-kg object) in meters.

Coolness Under Fire: Throw 1D6 and add +1 for each turning point in a Military, Law Enforcement, Field Agent, or Extralegal career.

Nationality: Taken from any available on homeworld.

Homeworld: Choose one to match gravity type and Frontier or Core designation.

Eyesight, Hearing, and Appearance: Roll on Secondary Attributes table.

Age: Add 18 years to the number of years in careers. +1 if the character changed careers.

Money: Character has Lv1000 times the number of years spent in service.

CAREER SKILL POINTS

A character receives one skill point for each year spent prior to a turning point.

If intelligence plus determination is less than 10, subtract two career skill points (but the number available is never less than 1).

If intelligence plus determination is more than 30, add two career skill points.

CHARACTER GENERATION CHECKLIST

1. Select homeworld.
   A. Determine if Core or Frontier.
   B. Find homeworld gravity.
2. Select body type.
3. Generate attributes.
   A. Physical attributes.
      (1) Size. 4D6−4.
      (2) Strength. Size+Physical Attributes table.
      (3) Dexterity. 4D6−4+Physical Attributes table.
      (4) Endurance. 4D6−4+Physical Attributes table.
   B. Psychological attributes.
      (1) Determination. 4D6−4.
      (2) Intelligence. 4D6−4.
      (3) Eloquence. 4D6−4.
      (4) Education. 4D6−4+Education Modifiers table.
   C. Rerolling. Any one physical and one psychological attribute may be rerolled and the old or the new die roll may be selected.
   D. Determine strength and dexterity values in alternate gravities.
4. Background skills.
   A. Background skill points equal education divided by 2.
   B. Select background skills.
5. Career skills.
   A. Select career.
   B. Receive initial training.
   C. Throw years to turning point (1D10).
      (1) Career skill points equal years.
      (2) Apply career skill point modifiers.
      (3) Select skills.
      (4) Resolve turning point.
      (5) If success, go to next turning point.
      (6) If failure, go to character finalization.
6. Character finalization.
   A. Mass.
   B. Consciousness and life level.
   C. Encumbrance.
   D. Throw range (in meters).
   E. Coolness under fire.
   F. Homeworld, nationality, and languages known.
   G. Eyesight, hearing, and appearance.
   H. Age.
   I. Money.

LANGUAGES

Native language is determined by nationality. Government and Civilian careers also provide French. Mercantile, Space Military, Exploratory, and Ship Crew receive English. Academics receive one additional language of choice. Linguistics provides one language per level of skill.

The Nations of Earth

Africa		French Empire		Europe		Pacific	
Angola	Portuguese	Algeria	French	Albania	Albanian	Japan	Japanese
Azania	English	Burkina Faso	French	Austrovenia	German	Nauru	English
Biafra	English	Cameroon	French	Britain	English	New Zealand	English
Ethiopia	Amharic	Chad	French	Bulgaria	Bulgarian	Philippines	English
Kenya	English	Djibouti	French	Catalonia	Catalan		
Madagascar	French	Gabon	French	Croatia	Serbo-Croatian	**India**	
Malawi	English	Guinea Coast	French	Czechoslovakia	Czech	Afghanistan	Farsi
Mali	French	Guyana	French	Flanders	Flemish	Bengal	English
Mozambique	Portuguese	Katanga	French	France	French	Bhutan	Dzongkha
Nigeria	English	Senegal	French	Germany	German	Bihar	English
Somalia	Somali	Zaire	French	Greece	Greek	Bombay	English
Tanzania	English			Hungary	Hungarian	India	English
Ubangi Shari	Ubangi Shari			Ireland	English	Madras	English
Zambia	English			Italy	Italian	Mysore	English
Zimbabwe	English	**South America**		Latvia	Latvian	Nepal	Nepali
		Argentina	Spanish	Netherlands	Dutch	Pakistan	Urdu
		Bolivia	Spanish	Poland	Polish	Punjab	English
		Brazil	Portuguese	Portugal	Portuguese	Rajastan	English
North America		Chile	Spanish	Romania	Romanian	Sri Lanka	Tamil
America	English	Inca Republic	Spanish	Russia	Russian		
Canada	English	Paraguay	Spanish	Scandinavian Union	Scandinavian	**Asia**	
Mexico	Spanish	Uruguay	Spanish	Serbia	Serbo-Croatian	Azerbaijan	Azerbaijani
Texas	English and	Venezuela	Spanish	Spain	Spanish	Burma	Burmese
	Spanish			Switzerland	French	Canton	Cantonese
				Ukraine	Russian	Cen Asian Rep	Russian
		Middle East				China	Mandarin
North Africa		Arabia	Arabic			Far East Rep	Russian
Berbera	Arabic	Armenia	Armenia	**Antarctica**		Georgia	Russian
Eritrea	French	Baluchistan	Farsi	Unpopulated		Indochina	French
Kanuri	Kanuri	Iran	Farsi			Indonesia	Malay
Mauritania	French	Iraq	Arabic			Korea	Korean
Morocco	Arabic	Kurdistan	Kurdish	**Australia**		Manchuria	Manchurian
Polisaria	Arabic	Palestine	Hebrew, Arabic	Australia	English	Mongolia	Mongolian
Tunisia	Arabic	Syria	Arabic	Papua	English	Tibet	Mandarin
UAR	Arabic	Turkey	Turkish	Tasmania	English		

The Colonies of Earth

Nationality	Year	Star Name	Type	Gravity	Nationality	Year	Star Name	Type	Gravity
America	2160	Barnard's Star	Outpost	0.71	France	2220	Beta Comae	Colony	1.05
America	2172	Broward	Outpost	0.26	France	2231	Kimanjano	Colony	0.94
America	2194	King	Colony	3.08	France	2244	Vogelheim	Colony	1.16
America	2199	New Melbourne	Outpost	0.39	France	2246	Eta Bootes	Colony	0.73
America	2215	Mu Herculis	Colony	0.73	France	2274	DM+27 28217	Outpost	0.00
America	2224	Vega	Outpost	0.00	Germany	2224	DM+36 2393	Colony	0.60
America	2225	Red Speck	Outpost	0.23	Germany	2231	Hochbaden	Colony	0.29
America	2229	Ellis	Colony	0 92	Germany	2169	Neubayern	Colony	0.63
Arabia	2245	Beta Hydri	Colony	0.66	Germany	2207	Beta Canum	Colony	0.94
Argentina	2168	Alpha Centauri	Colony	1.01	Germany	2231	Vogelheim	Colony	1 16
Argentina	2175	DM-26 12026	Outpost	0.97	Germany	2241	61 Ursae Majoris	Colony	1.05
Argentina	2245	Omicron2 Eridani	Colony	0.98	Germany	2268	Augereau	Outpost	0.47
Australia	2196	King	Colony	3.08	Inca	2289	Rho Eridani	Colony	0.44
Australia	2196	New Melbourne	Outpost	0.39	Inca	2294	DM-3 1123	Colony	1.25
Australia	2201	Ross 863	Outpost	0.00	Independent	2257	Eta Bootes	Colony	0.73
Australia	2212	Botany Bay	Colony	0.91	ex-British	2167	Alpha Centauri	Colony	1.01
Australia	2217	Zeta Herculis	Colony	0.99	ex-German	2167	Alpha Centauri	Colony	1.01
Azania	2141	Nyotekundu	Outpost	1.02	ex-French	2248	61 Ursae Majoris	Colony	1.05
Azania	2167	Alpha Centauri	Colony	1.01	Japan	2172	Alpha Centauri	Colony	1.01
Azania	2205	Kimanjano	Colony	0.94	Japan	2211	Davout	Outpost	0.76
Azania	2280	61 Ursae Majoris	Colony	1.05	Japan	2213	Beta Hydri	Colony	0.66
Bavaria	2228	Rho Eridani	Colony	0.44	Japan	2257	61 Ursae Majoris	Colony	1.05
Brazil	2184	Alpha Centauri	Colony	1.01	Life Foundation	2258	DM-3 1123	Colony	1.25
Brazil	2258	DM-21 1377	Outpost	0.69	Manchuria	2153	Barnard's Star	Outpost	0.71
Brazil	2267	Ross 614	Outpost	0.48	Manchuria	2172	DM-26 12026	Outpost	0.97
Brazil	2284	Procyon	Colony	0.99	Manchuria	2201	Delta Pavonis	Colony	0.83
Britain	2178	Queen Alice's Star	Colony	1.05	Manchuria	2204	Xiuning	Outpost	0.70
Britain	2187	Clarkesstar	Outpost	0.00	Manchuria	2208	Epsilon Indi	Colony	1.12
Britain	2207	Beta Canum	Colony	0.94	Manchuria	2213	Hunjiang	Outpost	0.33
Britain	2217	Henry's Star	Colony	0.61	Manchuria	2214	Zeta Tucanae	Colony	1.02
Britain	2254	61 Ursae Majoris	Colony	1.05	Manchuria	2218	Serurier	Outpost	0.21
Canada	2255	DM+19 5116	Outpost	0.38	Manchuria	2219	Tau Ceti	Colony	0.93
Canada	2257	DM+3 123	Enclave	0.83	Manchuria	2235	Epsilon Eridani	Colony	1.57
Canada	2267	DM+15 4733	Outpost	0.13	Manchuria	2238	DM-15 6290	Outpost	0.86
Canada	2273	DM+20 5046	Colony	0.87	Manchuria	2238	Haifeng	Outpost	0.81
Canton	2259	Zeta Tucanae	Colony	1.02	Manchuria	2247	DM+1 4774	Outpost	0.37
Eber	0000	82 Eridani	Homeworld	1.46	Manchuria	2255	DM+4 123	Enclave	0.83
France	2145	Bessieres	Outpost	0.58	Mexico	2245	Omicron2 Eridani	Colony	0.98
France	2152	Augereau	Outpost	0.47	Mexico	2265	Tau Ceti	Colony	0.93
France	2159	Serurier	Outpost	0.21	Pentapod	2267	Beta Canum	Enclave	0.94
France	2167	Alpha Centauri	Colony	1.01	Sung	0000	DM+4 123	Homeworld	0.83
France	2175	DM-26 12026	Outpost	0.97	Texas	2258	DM-3 1123	Colony	1.25
France	2184	Davout	Outpost	0.76	Texas	2258	Rho Eridani	Colony	0.44
France	2184	Nyotekundu	Outpost	1.02	Texas	2269	82 Eridani	Enclave	1.46
France	2185	D'Artagnon	Outpost	0.65	Trilon Corp	2260	Xi Ursae Majoris	Colony	1.21
France	2196	Queen Alice's Star	Colony	1.05	UAR	2261	82 Eridani	Enclave	1.46
France	2205	Beta Canum	Colony	0.94	Ukraine	2244	Eta Bootes	Colony	0.73
France	2211	DM+36 2219	Outpost	0.02	Unmanned	2245	Van Maanen's Star	Outpost	0.08

Travel

TYPICAL TRAVEL TIMES (per 100km hex)

Terrain Type	Foot[7]	Horse[1,7]	Hover	Wheel	Tracked	Aircraft[10]	LTA[9]	Ship[9]	Hydrofoil[9]	Boat[9]
Flat	2d	1d	30m	1h	2h	10m	4h	—	—	—
Hilly	2d	1d	1h	2h	3h	—	—	—	—	—
Broken	3d	2d	3h	5h	6h	—	—	—	—	—
Mountain	5d	4d	no	no	no	—	—	—	—	—
Savannah	2d	1d	1h	5h	6h	—	—	—	—	—
Woods	2d	1d	8h	6h	8h	—	—	—	—	—
Forest	3d	2d	No	10h	12h	—	—	—	—	—
Swamp	2d	1d	3h	no	6h	—	—	—	—	—
Desert	2d	1d	30m	2h	2h	—	—	—	—	—
Volcano	+12h	+12h	+2h	+2h	+2h	—	—	—	—	—
Craters	4d	3d	1h	2h	4h	—	—	—	—	—
River[3]	+12h	+12h	1h[2]	+1d	+12h	—	—	—	80m[2]	10h[4]
Lake	no	no	30m	no	no	—	—	4h	1h	8h
Glacier	3d	2d	3h	no	8h	—	—	—	—	—
City, Town[5]	+12h	+12h	+12h	+12h	+12h	+6h	+6h	+6h	+6h	+6h
Cropland[6]	+12h	+12h	+12h	+12h	+12h	—	—	—	—	—
Road Grid	2d	−12h[8]	2h	2h	2h	—	—	—	—	—
Highway	2d	−12h[8]	12h	1h	2h	—	—	—	—	—
Calm Seas	—	—	—	—	—	—	—	4h	1h	8h
High Seas	—	—	—	—	—	—	—	5h	1h	—
Coastal Waters	—	—	—	—	—	—	—	6h	1h	8h

1. Horse or similar riding animal. 2. Time following river route. 3. Time to cross river (building rafts, etc.). 4. Time downstream; double time to go upstream. 5. Assumes passing through settlement, stopping for lunch, etc. 6. Assumes skirting crop fields. 7. Assumes 12 hours travel and 12 hours rest per day. 8. Decrease in usual time to traverse hex when using a highway. 9. Weather may increase time spent by up to one day. 10. Supersonic aircraft travel at twice this rate; hypersonic and scramjets at four times this rate. **Note:** Use the following special travel times per 100km hex: Railroad 1h, Airfilm 10m, Maglev 10m.

MAXIMUM SPEEDS

Vehicle Type	Max Speed kph	per hex
Foot, walking	5	40h
Horse	10	20h
Hovercraft	200	30m
Conventional Train	200	30m
Airfilm	600	10m
Maglev	600	10m
Wheeled Car	150	40m
Tracked Vehicle	80	75m
Subsonic Air	900	6m
Supersonic Air	1800	3m
Scramjet	4000	90s
Dirigible (LTA)	30	3h
Ship	30	3h
Hydrofoil	150	40m
Boat	15	6h

Note: Walking and riding specify double travel time, assuming half the time is spent in rest/meals/sleep. Others assume constant driving and shifts of drivers.

Airfilm is common on garden worlds; maglev is common on vacuum worlds.

TIMES

1d = 1 day; 1h = 1 hour;
1m = 1 minute; 1s = 1 second.

TRAVEL TIME—INTERFACE

Going Into Orbit

Craft	Preparation	Travel Time	Cleanup	Turn Around
Rocket	1d	1h	2h	6h
Rocket Plane	6h	1h	1h	immediate
Scramjet	3h	2h	1h	immediate
Catapult	1h	2h	none	as lifting body
Beanstalk	not applicable	5d	not applicable	immediate

Returning to Surface

Craft	Preparation	Travel Time	Cleanup	Turn Around
Scramjet	none	1h	2h	3h
Parachute	1h	2h	4h	no
Deadfall	1h	1h	none	no
Rocket	none	1h	12h	1d
Lifting Body	1h	1h	2h	no
Beanstalk	not applicable	5d	not applicable	immediate

Preparation includes fueling, preflight checks, and boarding.
Travel Time includes actual flight time and maneuvering to position in orbit.
Cleanup includes postflight checks and equipment shutdown.
Turn Around is the minimum time required for a vessel to leave its destination and begin its return to its starting point.

INTERSTELLAR TRAVEL TIME

Depending on mass and drive, between 0.15 and 9.5 ly per day.

Speed Limit: 7.7 ly travel between stars; a stop in a gravity well is required for drive safety and performance. The stop requires 40 hours.

INTERPLANETARY TRAVEL TIME

Within a gravity well (where G is greater than 0.0001) stutterwarp operates at about 0.01 percent efficiency. Multiply interstellar speed (in ly per day) by 0.645 for in-system speed in au per day.

Task Resolution

TASK FORMAT

Task: To accomplish a task: Routine. Skills and characteristics. Time.

Task Signal.

Task Statement.

Difficulty level.

Add to die roll.

Die modifiers.

Subtract from die roll.

Time interval.

TASK DIFFICULTY (1D10)

Difficulty	Roll Needed
Simple	2+
Routine	6+
Difficult	10+
Formidable	14+
Impossible	18+

FAILURE (2D6 OR 3D6)

Throw	Failure Type
2-6	Retry
7-10	Check Determination
11-14	Mishap (2D6)
15+	Serious Mishap (3D6)

MISHAPS

Throw	Consequences
2-6	Superficial Damage
7-10	Minor Mishap
11-14	Major Mishap
15+	Total Mishap

DAMAGE AND REPAIR

Damage Level	Operable?	Repair Task (Shop)	Repair Cost
Superficial	Yes	Simple	1D10× 1%
Minor	No	Routine	1D10× 5%
Major	No	Difficult	1D10×10%
Destroyed	No	Formidable	1D10×20%

TASK TYPES

Standard: Any task which states the standard task components: statement, difficulty, assets, and time.

Hasty: Any task declared hasty by the player or referee; difficulty is increased by one level, and time required is reduced by double the asset modifiers.

Hazardous: Any task declared hazardous by the referee or the rules; hazardous tasks use 3D6 on the Failure table.

Unskilled: Any task *not requiring* a specific skill for accomplishment. If a skill is stated and the character has it, it may be used, but there is no penalty for lack of the skill.

Uncertain: A task whose results are uncertain to the characters.

DETERMINATION

Characters must check determination in order to retry some tasks.

Task: To stay determined after failure of a task: Difficult. Determination. Instant.
Referee: If this task is successful, the character may retry immediately without penalty. If unsuccessful, the character may retry immediately at one increase in difficulty, or retry with no penalty after waiting 10 times the actual duration of the failed task.

SPECIAL CASES

A task may have special instructions which further detail how the task is to be performed. A note to the referee below the task may state repeatability, consequences, substitute skills or attributes, or other information.

CHECKLIST

1. Referee defines task in general terms.
2. Referee determines crucial assets.
   A. Characteristics.
   B. Skills.
3. Referee determines type of task.
   A. Standard.
   B. Uncertain.
   C. Unskilled.
   D. Hazardous.
4. Referee determines average time to complete task, and establishes time period.
5. Referee decides task difficulty level.
6. Referee records task description.
7. Player may declare a "hasty" attempt.

CHARACTERISTICS

Crucial characteristics are *divided by 4* (fractions are dropped, producing a range from 0 to 5) and are a positive DM called an asset modifier.

TIME

Time shown is *one-tenth* the average time required to complete the task.

Standard. The throw for time is 3D6, with asset modifiers subtracted; minimum result is 3.

Instant. If a task is labeled "instant," it takes no time. Split second decisions and many reactions are instant.

Absolute. If a task is labeled absolute, it takes the time specified. Many combat actions are absolute and use one action within the combat structure.

FUMBLE

A natural roll of 1 when resolving a task automatically produces a fumble and the task fails, regardless of the asset modifiers on the task. The referee may decide that such a fumble is a minor inconvenience or a major roadblock.

UNCERTAIN TASKS

When an uncertain task is attempted, both the referee and the player roll for success (the referee rolls secretly).

If the average of the rolls is equal to or greater than the difficulty level, the attempt succeeds.

If the average of the rolls is less than the task difficulty, the task fails.

Only if the player rolls a natural 1 does the task fumble.

The referee should give the player information based on the average of the rolls but should not directly tell the player if the task was a success or a failure.

Combat Resolution

ARMOR VALUES

Cover	Armor Value
Wood	.025
Loose Dirt	.03
Packed Dirt, Stone	.15
Brick, Cement	.25
Reinforced Concrete	.5
Construction Steel	.8
Hardened Steel	1.0
Aligned Crystal Steel	1.5
Construction Composites	2.0
Composite Matrix Armor	3.0

NON-PLAYER CHARACTERS

Experience	Cool	Incapaci-tation	Prim. Skills	Rel. Skills
Green	4	1	0	—
Exper.	6	2	1	0
Veteran	8	3	2	1
Elite	10	4	3	2

Cool: Coolness is the NPC's initiative level and chance to duck in area fire.

Incapacitation: Incapacitation shows the number of light wounds required to incapacitate an NPC.

WOUNDING

Potential Wound	Damage Type	DPV=1+	1D10≤DPV×10	1D10>DPV×10
Kill	Normal	Kill	Kill	Shock, KD
	Blunt	Kill	Kill	Shock, KD
	Stun	4 Stun (or DPV×times Stun, if more), KD		
Serious	Normal	DPV×Shock*, KD	Shock, KD	Light Wound, KD
	Blunt	DPV×Shock*, KD	Shock, KD	Light Wound, KD
	Stun	DPV×Stun, KD	Stun, KD	Stun
		*Note: Every odd (1,3,5...) Shock is a Stun instead		
Light Wound	Normal	Light Wound, KD	Light Wound, KD	No Effect
	Blunt	KD	KD	No Effect
	Stun	Stun	Stun	No Effect

Normal damage is significant surface and internal tissue damage (as in burns or gunshot wounds). *Blunt trauma* is impact damage or crushing (as in blows from a club, concussion, or perhaps crushing from a tire rollover). *Stun* is damage to the central nervous system (as in electric shock or incapacitating gas).

Wound Effects

Kill: The character is dead. Head hit kills are absolute; other hit kills may be eligible for resuscitation.

Shock Point: The character is dazed. Initiative is reduced by −3, but never below 1 until the character is unconscious. NPCs are made unconscious after receiving one shock point. A character is unconscious when his total of shock and stun points equals his consciousness level. A character is dead when his shock points equal his life level.

Stun Point: The character is dazed. Initiative is reduced by −3, but never below 1 until the character is unconscious. NPCs become unconscious after receiving three stun points. A character is unconscious when his total of shock and stun points equals his consciousness level.

Light Wound: The character is immobilized for the rest of the combat turn. Initiative level is reduced by 1.

Knocked Down: The character is knocked down by the attack and is dazed.

Dazed: The character cannot move or act, and is assumed prone, motionless, and under any available cover. Dazed remains in effect for a number of turns equal to the total of shock and stun points the character has received (and this effect is cumulative). If no shock or stun points, dazed applies only until the end of the combat turn. All eligibility for further actions in the combat turn is lost, regardless of initiative level. Any passed or option actions are lost.

BASIC QUESTIONS

1. Did you hit the target?
2. If so, how much damage did you do?

ATTACKS

Fire attacks involve attempts to hit a target with a projectile.

Aimed fire involves aiming a single fire attack against a single target (much as a hunter or a sniper would).

Area fire involves projecting a large volume of fire into an area with one or more targets (machine guns and bombs produce area fire).

Melee attacks involve attempts to hit an enemy within touching range with armed or unarmed blows.

ALLOWED ACTIONS

Remain stationary.
Conduct aimed fire at one target.
Conduct area fire at one area.
Move.
Conduct walking area fire.
Conduct trotting area fire.
Reload a weapon.
Change weapons.
Duck.
Special action.

Responses do not count as actions:
Block a strike.
Avoid a diving blow.

MOVEMENT

Type	Meters per Turn
Crawling (uses all available cover)	5
Walking (uses available partial cover)	20
Trotting (no cover)	40
Running (no cover)	80

ARMOR EFFECTS

Armor effects are subtracted from the Damage Point Value (DPV) of the weapon, and the remainder is used to determine the effects of the wound.

RANGES

Effective range is stated for each weapon.

Close range is half effective range.
Long range is 2× effective range.
Extreme range is 4× effective range.

Combat Resolution

COMBAT TASKS

Task: To hit a target with aimed fire at close range: Routine. Marksmanship. Absolute (1 action).

Referee: Difficulty increases one level with each increase in range (difficult at effective range, formidable at long range, and impossible at extreme range). Shotguns may not fire at extreme range. Flechette grenades may not fire aimed fire.

Task: To hit a target with indirect fire: Difficult. Lower of Forward Observer or Marksmanship. Absolute (1 action).

Task: To hit a target using laser designation: Easy. Lower of Forward Observer or Marksmanship. Absolute (1 action).

Referee: Forward observer must actually be firing his spotting laser at, and hitting, the target when the projectile hits.

Task: To strike: Routine. Melee and melee modifiers. Absolute (1 action).

Referee: Using short range weapon against opponent with long range weapon makes the attack difficult. Surprise attacks (unexpected attacks from behind) are automatically successful.

Task: To block a strike: Difficult. Melee and melee modifiers. Instant.

Referee: A successful block blocks a would-be successful strike, and the strike misses. Trying a block prohibits fire attacks (but not melee attacks) at the next initiative point.

Task: To avoid a diving blow: Routine. Agility. Instant.

Referee: A diving blow is automatic unless the target avoids it.

Task: To grapple: Routine. Melee. Absolute (1 action).

Task: To escape: Routine. Melee. Absolute (1 action).

Task: To drive at double speed: Routine. Driver. Absolute (1 action).

Task: To drive evasively: Routine. Driver. Absolute (1 action).

Task: To emplace an explosive charge (uncertain): Easy. Demolitions. 1 minute.

Referee: If both rolls fail, the charge detonates immediately. If the average is failure, the charge fails to detonate when triggered.

VEHICLE DAMAGE

1D10	Result
1	No Effect
2	No Effect
3	Crew
4	2 Crew
5	Armament
6	Mobility
7	Armament
8	Mobility
9	Catastrophic
10	Mobility
11	Catastrophic
12	Armament
13	Catastrophic
14	Mobility
15+	Catastrophic

Effects: Crew Hit=One crewmember receives 1 hit by DPV of weapon. 2 Crew=Two crewmembers hit. Armament=One weapon destroyed. Mobility=Vehicle stopped and one crew hit. Catastrophe=Vehicle destroyed and crew killed.

DEVIATION

If a weapon which fires an exploding round (from a thrown hand grenade to artillery) misses its target, it deviates. Throw 1D10 for the distance of the deviation.

Multiply the deviation distance by the distance for the type of weapon used to determine the actual deviation distance.

Scatter Diagram

7	8.9	4
6	★	3
5	0.1	2

Use the scatter diagram to determine the direction of deviation. Using direction and distance, determine the location where the rounds impact after deviation.

Weapon Type	Deviation Multiplier
Direct Fire	1 m
Indirect Fire Grenades	5 m
Indirect Fire Mortars	10 m
Indirect Fire Missiles	10 m
Indirect Fire Rockets	20 m

If an indirect fire weapon is shooting at more than half its indirect fire range, double the multiplier.

♡ Kill

◇ Serious Wound

○ Light Wound

Partial Cover

OPTIONAL WOUND RULES

Roll once on the target hits diagram for location, then roll a second time for wound severity, applying the following modifiers:

Head (1): −4
Chest (2): −2
Abdomen (3-4): −1
Upper Leg (5-6): +0
Lower Leg (7-10): +1

TARGET HITS:
Throw 1D10 for potential wound and hit location.

TERRAIN KEY

Symbol	Terrain	Symbol	Terrain
	Plain, Flat		
∧	Hilly		
∧∧	Mountains		

2300AD

World Name

Geodesic Map Triangle No.	Triangle Hex No.

–100km–

REGION MAP

GEODESIC TRIANGLE
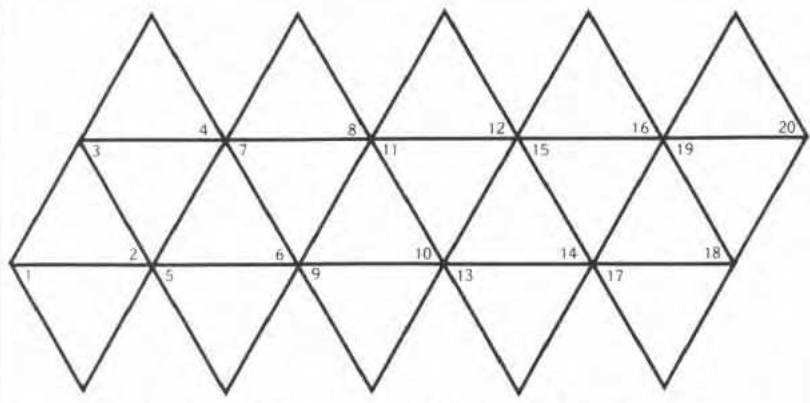
GEODESIC MAP CONFIGURATION

GEODESIC MAP TRIANGLE SIZES

WORLD SIZE	TRIANGLE SIDE	WORLD SIZE	TRIANGLE SIDE
1	1	16	10
2	1	17	11
3	2	18	11
4	3	19	12
5	3	20	13
6	4	21	13
7	4	22	14
8	5	23	14
9	6	24	15
10	6	25	16
11	7	26	16
12	8	27	17
13	8	28	18
14	9	29	18
15	9	30	19

Side A

Side B   1   2   3   4   5   6   7   8   9   10   11   12   13   14   15   16   17   18   19
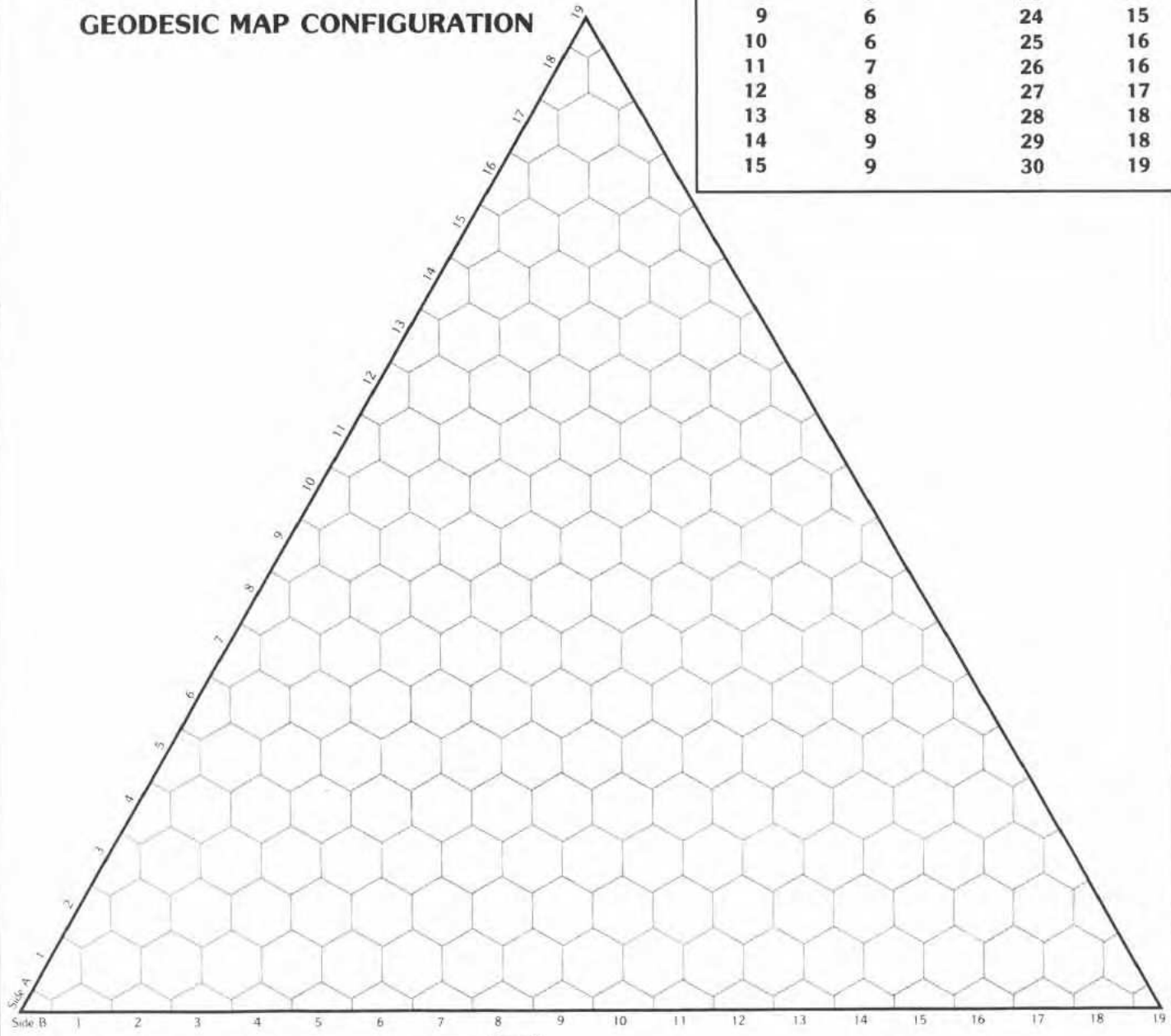
GEODESIC MAP TRIANGLE NO. ☐   ├———┤ = **1000 kilometers**

Star Data

Primary Star Name		Spectral Type, Size	Companion Star Name		Spectral Type, Size
XYZ Coordinates		Magnitude	Companion Orbit Radius		Magnitude
Mass	Radius	Luminosity	Mass	Radius	Luminosity
Life Zone: Inner Limit/Optimal/Outer Limit			Life Zone: Inner Limit/Optimal/Outer Limit		

World Data

Orbit Radius	World Name				World Type
	World Core Type	Diameter (km)	Density (Earths)	Mass (Earths)	Gravity
Temperature	Atmosphere Type	MMW Retained	Atmos. Pressure	Oxygen Pressure	Water Percentage

Colony/Outpost Data

Population	Nationality	Settlement Character
Date Settled	Bases	
Commentary		

Colony/Outpost Data

Population	Nationality	Settlement Character
Date Settled	Bases	
Commentary		

Vehicle Data

Type		Mass/Weight	Crew		Armor
Combat Movement		Evasion	Sensor Range		Signature
Max Speed	Cruise Speed	Cargo	Endurance	Price	
Comments					

Vehicle Data

Type		Mass/Weight	Crew		Armor
Combat Movement		Evasion	Sensor Range		Signature
Max Speed	Cruise Speed	Cargo	Endurance	Price	
Comments					

Vehicle Data

Type		Mass/Weight	Crew		Armor
Combat Movement		Evasion	Sensor Range		Signature
Max Speed	Cruise Speed	Cargo	Endurance	Price	
Comments					

Starship Data

Ship Name	Class	Movement
Registry (or Armed Force)	Nationality	Year Built

Sensor Operator Skill Level	Passive Signature	Passive Sensors
	Active Signature	Active Sensors

Hull Hit Capacity	Sensors
Power Plant Hit Capacity	Computer
Crew	Remote Station
	Weapons Mount
Screens	Continuing Damage

Damage Control

List characters and skill levels of damage control personnel.

Weapons

List weapons with their gunner's skill, targeting bonus, damage.

List remote objects and Remote Pilot skill.

NPC Data

Name	M/F	Body Type	Age	Career	Skills Prim.	Rel.	Phys.	Ment.	Motive	Notes

Weapons Data

Weapon	Mass/Wt.	Bulk	ROF	RPB	Mag	Aimed	Area	AFV	DPV
				Rate of Fire		Rounds per Burst		Magazine Capacity	

<!-- Ammunition spans ROF/Rate of Fire, RPB/Rounds per Burst, Mag/Magazine Capacity. Range spans Aimed, Area. AFV: Area Fire Value. DPV: Damage Point Value -->

Weapon	Mass/Wt.	Bulk	ROF	RPB	Mag	Aimed	Area	AFV	DPV

Terror's Lair

DECK
5

Introduction

Terror's Lair is a programmed adventure. What this means is that, as it is, it does not require a director (referee) to run it. Instead, you are the adventurer (player), and the text performs the referee's task with a little help from you. To play this adventure, you take on the persona of American Marshal Obadiah Thomas, a narcotics agent. His description is as follows:

AMERICAN MARSHAL OBADIAH THOMAS

Obadiah Thomas was born on Earth, in America—Jacksonville, Illinois, to be exact—in the year 2266, making him 34 years old at the present. A small but athletic man, Thomas served one three-year stint in the army, then became involved in police work immediately upon reentering civilian life. He soon became a narcotics agent, his present occupation. After 12 years of police work, Thomas has now attained the rank of marshal.

Attributes: For easy reference, Marshal Thomas' attributes and skills are listed in the sidebar.

Equipment: On this mission, Thomas carries only a few pieces of special equipment. He is wearing a pair of Pentapod biocontact lenses, and he also has a locksmith kit, a 100kg blue Stik-kit, a portacomp, and a light pistol (a Hancock Nine-Twenty-Three Enforcer). The portacomp is carried in a briefcase. Descriptions of this equipment are listed in the *Adventurer's Guide*, and pertinent details will be mentioned as necessary during the adventure. Thomas has no other equipment worth listing here, but you may assume that he has such things as some cash, a pen and pocket notebook, and similar items if you desire.

Personality: Marshal Thomas is an honest, dedicated, experienced officer of the law. Beyond this, you can imagine his character to be as you like. He could be clever and ever energetic, dependable but disillusioned about human nature, no-nonsense spit and polish, or anything else you can think of. The important thing is to develop a personality that you can relate to before beginning play. This will help to provide you with direction in making decisions for Thomas during the adventure.

YOUR MISSION

Just under two years ago, American narcotics agents were closing in on a major AmeriCo drug smuggler named Felix Berthold. One of Berthold's underlings had begun leaking information to federal agents, and with his help they set a trap to arrest Berthold when he took possession of a new shipment of narcotics on its way toward Earth.

The federals wanted Berthold badly. Until he came along, they had been able to limit Earth's drug traffic to the planet. But Berthold had somehow found a way to get narcotics through Earth's Orbital Quarantine Command, allowing him to obtain his drugs from other worlds. When limited to Earth, drug traffic could be attacked at both production and distribution ends; with the production end moved to other planets, drug traffic was much harder to control. Also, Berthold's success indicated a flaw in the makeup of Orbital Quarantine Command—a flaw that frightened officials who wanted to keep Earth clean from extraterrestrial contamination.

So a trap had been set. But somehow, Berthold found out about it early, killed the federals' mole, moved his financial holdings to King, and escaped to that world himself. Once there, he underwent the DNAM (DNA Modification) treatment necessary for him to live in King's three Gs and settled into the Australian colony of New Huntsland. The federal agents did not want to pursue him to the planet's surface themselves (King's ultraheavy gravity and sulfur-laden atmosphere being a deterrent), and New Huntsland's colonial government, being very protective of its autonomy, was unwilling to extradite him. (Nor would the American colony of New Columbia help.) A deadlock had been reached, and the American narcotics agency turned its eyes to other fish.

After nearly two years, however, Berthold decided that he could not stand King any longer. The heavy gravity and the sulfurous air had taken their toll on him, and realizing that King's inhabitants live half as long as other colonists, due to the heavy stress on their bodies, Berthold decided to leave. He quietly bought a mansion among the British holdings on Tirane (at Alpha
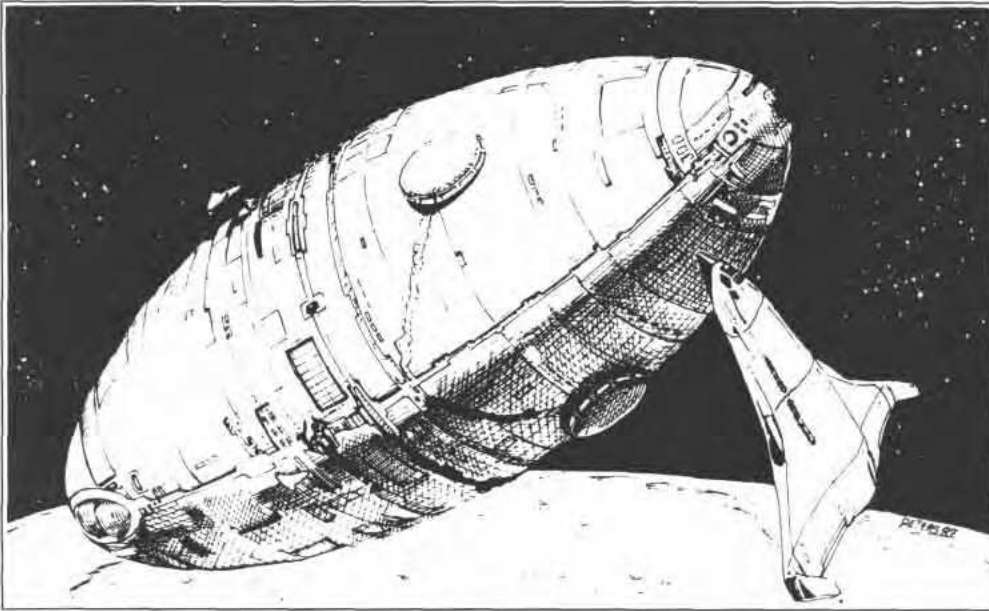
THE NEW ORLEANS

The New Orleans is one of the largest vessels ever built by humankind, and it is devoted to luxury. The vessel is the first of five New Orleans-class passenger liners, others in the class being the Columbus, the Sacramento, the Ann Arbor, and the Philadelphia. The New Orleans is an immense vessel shaped like an elongated egg about 150 meters long by 50 meters in diameter. It holds exactly 1000 passengers, as well as 177 crew, in luxurious comfort.

Simulated gravity is achieved by spinning the entire ship on its axis. This makes the entire outer hull the "floor" of the ship with gravity slightly less toward the tapered ends than amidships. Near the axis, of course, gravity is near zero, and the Coriolis effects there are very disorienting. Only the most experienced of crew members ever enter the ship's core, and then only when necessary to service the heavy spin and drive machinery located there.

Three large, circular constructions recessed into the floor of the ship (or protruding from the hull, depending upon your point of view) serve as parks, with "outdoor" stages for performances, and an outer ring of ports that offer a view of the stars. A 100-member steward section sees to the passengers' needs. Three hundred well-spaced life boats (called survival balls) ensure that in the event of an emergency, everyone would be able to escape the ship.

The New Orleans' warp efficiency is only about 0.6 with a full load.

Centauri) and left the planet; no one knows for sure just how.

Narcotics officials received notice of the mansion purchase and the transfer of funds to Tirane, and identified Berthold as the one behind them. From the government of New Huntsland, which had been watching Berthold closely looking for an opportunity to prosecute him under their own laws, the American officials learned the date of his departure. They determind that he must have taken passage on the *Ann Arbor*, a luxury liner headed for Earth. But they had no way of knowing for sure which of the 150 passengers that boarded at King was their quarry.

You, American Marshal Obadiah Thomas, have been assigned to capture Felix Berthold. When the *Ann Arbor* arrived at Earth's orbital station, all passengers going on to Tirane transferred to the *New Orleans*, another passenger liner. You have joined them undercover as a microelectronics parts salesman. The *New Orleans* will be in Earth orbit for only another six hours, finishing the discharge of its stutterwarp drives. You have been tasked with determining which of the passengers is your target and arresting him—without endangering the safety of other passengers—before the ship leaves Earth and takes him to sanctuary at Tirane. Berthold certainly does not have any such qualms, which makes your task more difficult.

In your favor, however, is the fact that all inhabitants of King are mesomorphs as a result of the DNAM treatments. Also, as King's atmospheric density is 2.7 atm at sea level, the planet's colonists are unable to breathe a normal density atmosphere without the aid of rebreather masks that fit over their mouths and noses. Citizens of King should stand out easily among the rest of the passengers—just look for stocky people with rebreather masks.

HOW TO BEGIN

On the next pages, you will find numbered paragraphs, each representing a specific unit of the adventure— a scene, a critical task, or whatever. Read paragraph number one. At the end of that paragraph, you will be offered several choices of actions, each followed by a number in parentheses representing other paragraphs. When you choose you action, turn to the paragraph indicated and follow the process of read/choose/turn until you have reached the conclusion.

Do not just read through the paragraphs from beginning to end. The paragraphs are mixed around so that reading in this manner will make little sense, especially as several alternate story lines are possible. Once you have reached the end, you can play back through again, making different choices, and even playing a different character if you wish.

One other thing: Each paragraph begins with a time value in parentheses. Keep a running total of the time listed in the paragraphs. Each time you reach paragraph 15, check to see if you have reached a total of four or six hours—if so, follow the instructions at that paragraph.

1. (15 minutes.) Sitting at a table in one of the *New Orleans'* recessed parks, you sip a cup of coffee and watch the stars wheel by with the vessel's rotation. About once a minute, Earth rises into view of the ports—it fills them all at this distance—and swings out of sight overhead. Several seconds later, the ports darken automatically as the sun swings past, only to lighten once again immediately afterward. Earth rises, sun rises, Earth rises, sun rises—it's as if time were accelerated and a day were passing every minute.

Behind you, at the park's center, a crowd of passengers watch a small circus troupe performing. A trio of acrobats hold their attention, performing amazing flips, leaps, and twirls. Go to paragraph 64.

2. (2 minutes.) Inventing all sorts of excuses why you cannot wait to talk to Freidmansen, you finally convince the manservant to help you. He says that his employer is at the Blue Lily Casino, playing poker. You give him Lv30 for his assistance. If you wish to go to the Blue Lily to speak with Freidmansen, go to paragraph 5. Otherwise return to paragraph 15 and choose again.

3. (No extra time.) Go to paragraph 23.

4. (No extra time.) Warfol's answers are convincing, and so are the family photos on his bunk. Squinting so that your biocontacts will magnify them, you can see that his oldest child, who is obviously a native of King, must be about eight or nine years old. She looks a lot like her father. Warfol is obviously not the man you are looking for. You thank him for his time, apologizing for the inconvenience, and return to the park to review your other options. Go to paragraph 15 and choose again.

5. (30 minutes.) Leaving the suite, you make your way through the crowded main corridors to the Blue Lily, a high priced casino. Go to 40.

6. (No added time.) Go to paragraph 46.

7. (15 minutes.) Willy Freidmansen has a suite on the main deck, number 111. Working your way among the other passengers in the corridors, past restaurants, shops, and entertainment galleries, you finally find the side passage in which Suite 111 is located. When you knock upon the door, a manservant opens it. Upon asking to speak with Mr. Freidmansen, you receive the reply that, "Mr. Freidmansen is out at the moment. May I tell him who called?"

Do you show the manservant your badge (go to paragraph 13), or do you claim to have a business interest and show your microelectronics company ID (go to paragraph 18)?

8. (2 minutes.) Within just a few moments, the door slides open and you find yourself facing a stout little man wearing a bath robe and a rebreather mask. He looks a little pale, no doubt nervous at having an American Marshal call on him.

"Come on in, Marshal," he says. "Excuse the mess, I was just unpacking." The mask's resonators give his voice a strange, metallic sound. Do you go in (go to paragraph 9), or do you insist on interviewing him in the doorway (go to paragraph 29)?

9. (Add the time rolled for the task included here.) His cabin is small; the bed is covered by the scattered contents of two suitcases. Surreptitiously examining them for clues, you ask Warfol a few pointed questions. To interrogate Warfol, make a task roll, as listed below.

Task: To interrogate Warfol: Routine. Psychology and Intelligence. 1 minute.

Your Psychology Skill (for the questions) and Intelligence modifier (to spot clues on the bed) add up to 3, making it easier to pass this difficulty 6 task. If you roll successfully, go to paragraph 4; if you fail your roll but do not roll a mishap, go to paragraph 30; if you roll a mishap, go to paragraph 17.

10. (2 minutes, plus time spent in combat—remember that each round equals 30 seconds.) Conduct fire combat between yourself and Felix Berthold. He is an Experienced Smuggler/Pirate NPC (Coolness of 6, Sidearm of 1, Incapacitation of 2, Mentally oriented). He will remain behind the cover of the corner (which protects all hit locations except 1, 2, 3, 6, 8, and 10—in his zest to kill you he is not using the cover as well as he might) firing away at you with his Mueller-Rivera P-3 until one of you is dead, or he runs out of ammunition. (Notice that from the laser pistol's description in the *Adventurer's Guide*, he can fire five shots per round, and the DP Value is 0.6.) After that, he will try to run back down the corridor and lose himself in the crowd. If you chase him, to catch him you must succeed at a competition task roll as follows:

Task: To outrun an opponent (Competition): Routine. Dexterity minus opponent's dexterity. Instant.

Referee: This task is performed as a movement option during the combat turn, and so can be rolled twice per turn.

If you succeed once at the above task, you have caught up with Berthold, but you will still have to perform melee combat with him to capture him. If you roll a mishap, you fall while dodging around these twisting corridors and he gets away. In any case, if you do not catch up to him within seven rounds, he finds a crowd of people and vanishes into it.

For fire combat, besides the six rounds in your pistol, you also have four extra clips of ammunition with you. During the rounds in which you reload, Felix will continue firing (his laser holds energy for 35 pulses), but you may consider yourself completely covered.

If you defeat Berthold, go to paragraph 37; if he defeats you, go to paragraph 57; and if he gets away, go to paragraph 68.

11. (No extra time.) Go to paragraph 13.

12. (15 minutes.) Martin Warfol's cabin is listed as number 317, meaning it is two decks coreward, where the gravity is lighter. Leaving the park, you work your way along the ship's corridors, passing many chattering passengers, until you find an elevator. You get in and key it to level three.

A few seconds later, the door hisses open, and you find yourself looking out into a empty corridor. It is narrower and more austere than those on deck one—the smaller, cheaper cabins are on this deck.

Working your way down the corridor, you eventually find the door to Cabin 317. You tap on it; the sound echoes hollowly in the hall. A deep but metallic voice, slightly muffled by the door, calls out from inside, "Who is it?"

Do you identify yourself as an American Marshal (go to paragraph 8), or do you maintain your cover as a microelectronics salesman (go to paragraph 19)?

13. (1 minute.) The manservant coolly informs you that he will tell Mr. Freidmansen you called. He then closes the door with a "Good day,

sir.'' Go to paragraph 63.

14. (45 minutes.) You are unable to hear enough of the men's conversation to make any sense—without giving yourself away. And the casino doesn't look like a good place to question Freidmansen directly. You decide to go back to your cabin for now and make other plans. Go to paragraph 15 and choose again.

15. (5 minutes.) Who do you want to approach: Martin Warfol, listed as a 31-year-old male pharmacist (go to paragraph 12); Willy Freidmansen, listed as a 45-year-old banker (go to paragraph 7); or Marlena Andrews, listed as a 25-year-old mining specialist (go to paragraph 22)? (If four hours have passed since you boarded the ship, go to paragraph 67; if six hours have passed, go to paragraph 52.)

16. (No extra time.) Warfol shouts through the doorway, "Go away, I haven't got time to talk to any microelectronics salesmen!" His deep voice is slightly muffled by the door, but there is a metallic tone to it as well. If you go away, return to paragraph 15 to choose again; if you continue to knock at the door, insisting that he talk with you, go to paragraph 3.

17. (3 minutes.) Warfol grows angry with your questions and refuses to answer any more. Unwilling to compromise your position by using violence to convince him, you decide to leave for now and watch his cabin for a while. Go to paragraph 58.

18. (Add the time that you roll for the task, below.) The manservant explains that Mr. Freidmansen is taking this trip for pleasure, not business, and is very unlikely to be willing to talk to you until after the ship reaches Tirane. To convince him to let you know where you can find Freidmansen, make a roll for the task below.

Task: To determine Freidmansen's whereabouts: Difficult, Eloquence, Education, and Bureaucracy or Psychology. 1 minute.

In your case, either Bureaucracy or Psychology will add 0 to your roll for this difficulty 10 task, but Eloquence and Education together will add a total of 5. If you roll successfully, go to paragraph 2; if you fail your roll but do not roll a mishap, go to paragraph 11; if you roll a mishap, go to paragraph 21.

19. (Add the time rolled for the task, below, rounding to the nearest minute.) You decide that it would be better not to reveal your true identity to Warfol. Telling him that you are a microelectronics salesman, you ask if he will speak with you. To convince him to open the door, you must roll for the following task.

Task: To convince Warfol to talk with you: Routine, Eloquence. 10 seconds.

Your Eloquence adds a modifier of 2 to your roll for this difficulty 6 task. If you roll successfully, turn to paragraph 31; if you fail your roll but do not roll a mishap, turn to paragraph 16; if you fail and roll a mishap, turn to paragraph 23.

20. (10 minutes.) Once inside, you carefully search the cabin, looking for clues. Among a stack of files on the bedside table, you discover a partially filled out insurance form. With it are the birth certificates for Warfol's three children, born in King's orbital birthing facility (the planet's crushing gravity is too much for young children to bear). The ages prove to you that Warfol has lived on King for at least the past nine years, so he cannot be your quarry. You rearrange the things you have moved, to cover signs of your search, and wishing Warfol and his family well, you leave. Return to paragraph 15 to try another option.

21. (4 minutes.) A ship's steward wanders by. The manservant calls him over and says that you are being an annoyance. While the steward asks you what the trouble is, the manservant closes the cabin door. You may now either reveal your badge to the steward, in which case he will have the manservant open the door again (go to paragraph 13), or you may excuse yourself and return to paragraph 15 to choose again.

22. (15 minutes.) Checking your copy of the ship's roster, you see that Marlena Andrews is in Cabin 245. You proceed through the crowds of fellow passengers strolling the corridors until you reach an elevator. Six other passengers get on with you, making for close accommodations. You ride up to the second deck, where two of them get off and a stocky, young woman in a bathing suit and a rebreather mask gets on. This has to be the woman you are looking for.

"Pardon me, are you Marlena Andrews?" you ask her.

"Why yes, I am," she answers in a husky voice, made somewhat tinny by the resonators in the rebreather. "Do I know you?"

"Well, no," you answer. "I'm a representative of a microelectronics firm, and I'd like to talk to you sometime about applications in mining on King."

She suggests that you come to lunch with her to discuss it. If you accept, go to paragraph 62. If you decide that since she is obviously not your quarry, it is not worth your time, you can make an excuse not to accept—go to paragraph 48.

23. (3 minutes.) Warfol refuses to answer your requests to speak with him. Instead, unknown to you, he calls security and complains that you are annoying him. Within a few short moments, two ship's stewards approach and ask to see your identification. If you show them your badge, go to paragraph 24; if instead you show them your microelectronics company ID, go to paragraph 28.

24. (2 minutes.) You can either return to 15 to choose again, or you can now reveal to Warfol that you are an American Marshal (go to paragraph 8). In either case, the stewards apologize to you and leave.

25. (30 minutes.) The effect of the Foraline is that because of the great fear it causes you, you must subtract 1 from every normal task die roll, and 2 from any task roll that exposes you to danger of any kind. Because of the high concentration you received, it will last until you reach a paragraph that instructs you otherwise. If it were not for your training, your iron will, and the fact that you understand what is causing the panic, the effects would be much worse.

You return to your cabin to decide on what you should do next. Along the way, you jump at every noise, but Berthold does not attack you yet. Go to paragraph 15 and choose again.

26. (1 hour.) Listening in on the men's conversation, you soon learn that two of them are Freidmansen's brothers. From their talk, he has been on King for 15 years, meaning he cannot be the man you are looking for. Return the cook's coat and tie, thank the doorman, and go to paragraph 15 and choose again.

27. (No added time.) Deep in reverie, you almost miss the sound of footsteps in the corridor behind you, but your exceptional hearing saves you. You make a sudden step forward, and a small spot on the corridor wall next to your head suddenly flares, spraying droplets of molten metal onto you. The pain brings you fully alert. Someone is firing a laser at you.

There is no cover nearby, so you drop to the floor, making yourself a smaller target (to simulate this, disregard hits in locations 4, 5, 6, 7, and 8), and you pull out your pistol. Your eyes search the corridor behind you for your opponent, and you see him—it's one of the dwarves from the circus! Suddenly you realize that a rebreather mask could be hidden within that false beard, and the stocky form fits what would be expected from a citizen of King.

This must be Felix Berthold, and he is just around the last corner you turned, about 20 meters away. Luckily these corridors wind enough to prevent him from firing at you from a distance, or your pistol would be less accurate than his laser, giving him an advantage. Go to paragraph 10.

28. (45 minutes.) The stewards escort you back to your own cabin, telling you that if you continue to annoy Warfol, they will have to place you in the brig. You may now go back to 15 and choose again.

29. (Add the time rolled for the task, below.) Warfol might have set up a trap of some sort in his cabin, so you decide not to enter. Instead, you question him in the doorway. To interrogate Warfol, make a task roll, as listed below.

Task: To interrogate Warfol: Routine. Psychology. 1 minute.

Your Psychology Skill adds a modifier of 0 to your roll for this difficulty 6 task. If you roll successfully, go to paragraph 4; if you fail your roll but do not roll a mishap, go to paragraph 30; if you roll a mishap, go to paragraph 17.

30. (No extra time.) You can't tell for certain if Warfol is your man or not. You decide to leave for now and watch his room for a while. Go to paragraph 58.

31. (1 minute.) The cabin door slides open. Standing just inside is a stout little man wearing a bathrobe and a rebreather mask. He looks to be a little impatient, as if he were busy doing something that you have interrupted. He does, however, invite you inside. Do you enter the cabin (go to paragraph 9), or do you decline, claiming to be in a hurry (go to paragraph 29)?

32. (15 minutes, plus the time rolled for the task, below, rounded to the nearest minute.) The doorman is very willing to help an officer of the law. Calling a friend from the kitchen, a cook about your size, he explains that you need to borrow a jacket and tie for a few minutes. The cook takes you to the employee's locker room behind the kitchen and lends you something from his locker.

A few moments later, you are wandering among the casino's tables. At a table in the back of the main room, five extravagantly dressed gentlemen are playing cards. One of them is stocky and wears a rebreather. As you listen to their conversation, make a roll for the task below.

Task: To hear a clue: Difficult. Stealth and Intelligence. 30 seconds.

Your Stealth Skill adds a modifier of 1 to your roll for this difficulty 10 task, and your Intelligence adds a modifier of 3, for a total of 4. If you roll successfully, go to paragraph 26; if you fail your roll but do not roll a mishap, go to paragraph 14; if you roll a mishap, go to paragraph 34.

33. (30 minutes.) After parting with Marlena Andrews, you head back to your cabin for privacy to think over what you have learned so far. Go to paragraph 39.

34. (30 minutes.) One of the men at the table notices your interest in their conversation and grows offended. He gets up from his chair and heads toward you, scowling.

"Just who the heck do you think you're staring at?" he demands. "I think I'll just push your nose in for you."

The other men begin to rise as well, some of them calling for him to calm down, others just watching with amused expressions. Over his shoulder, you can see the shocked expression of a waiter, who heads off suddenly, most likely to get the manager.

Do you show your antagonist your badge (go to 55), do you try to calm him down without giving away your identity (go to 65), or do you attack him (go to 60)?

35. (Add the number of minutes you spend in combat—remember, each turn is 30 seconds.) Conduct unarmed combat between yourself and your large opponent. He is an Experienced, Core World NPC who is physically oriented. Therefore, he has an initiative of 6, is incapacitated by two light wounds, and has a modifier of 3 to tasks that list a physical attribute as necessary. Use common sense in deciding what sorts of attacks he will make (strikes, diving blows, etc.). If you conquer him, go to paragraph 61; if he conquers you, go to paragraph 53.

36. (No added time.) As you walk along, your exceptional hearing picks up the faint sounds of footsteps behind you. They seem to be coming from around the corridor that you just left. You spot the dark recess of a cargo hold door just ahead and slip into it, watching the way you came from. The footsteps reach the corner and stop—your stalker must know that you are on to him. You see a head peer around the corner—it's one of the dwarves from the circus! Suddenly you realize that a rebreather mask could be hidden within that false beard, and the stocky form fits what would be expected from a citizen of King. It must be Felix Berthold. Then a hand appears with a laser pistol. A spot on the edge of your hiding place flares. You are glad you chose this cover (treat it as covering all hit locations except 1, 2, and 10).

You draw your pistol. Luckily Berthold's corner is only about 20 meters away. Otherwise he could fire at you from a longer range where his laser would be more accurate than your pistol. Go to paragraph 10.

37. (Time not applicable.) Congratulations! You have completed your mission. Leaving the *New Orleans*, you deliver Berthold to your superiors and receive a commendation. You also receive one experience point for each suspect you checked out, and another for capturing Berthold. Finally, you also gain a renown point in the Core.

Now it is time to prepare this adventure to be run for a group of players.

38. (No added time.) Go to paragraph 46.

39. (15 minutes.) There is a knock at your cabin door. When you answer it, a ship's steward hands you an anonymous note that reads, "Berthold is planning to escape in lifeboat number 11 in about an hour. A friend."

You decide that even though it might be a trap, you have to follow it up, so you hurry to lifeboat station number 11. Go to paragraph 51.

40. (2 minutes.) A bruiser in a blue tuxedo stands guard at the door, collecting a Lv25 cover charge from all entrants and gauging them for appropriate dress. Realizing that your present pullover and slacks are somewhat too informal, you are faced with a decision. You can either give up on Freidmansen for now (go to paragraph 15 and choose again), or you can show the doorman your badge and ask for the loan of a jacket and tie (go to 32).

41. (No added time.) Go to paragraph 46.

42. (Time not applicable.) Can Obadiah Thomas capture Felix Berthold during the next seven days and get him back to Earth? That is a question you must decide in expanding this adventure for your players. For now, the adventure is over. Give Thomas an experience point for each suspect he checked out.

43. (3 minutes.) The big guy calms down after a few minutes, but he wants to know why you picked the group he is in to listen to. Do you tell him (go to 49), or do you reply that it is confidential (go to 66)?

44. (No added time.) Suddenly you spot a figure peering furtively from around a corner down the corridor the way you came. You jump into the recessed doorway of another lifeboat, hearing the sound of a laser burning the wall where you were standing. You draw your pistol and prepare to fire back. The doorway you are in provides cover for all hit locations except numbers 1, 2, and 10, and the range is about 20 meters. Lucky for you the corridors twist so much, or Berthold could have chosen a longer distance where your pistol would be less accurate than his laser. Go to paragraph 10.

45. (No added time.) Go to paragraph 44.

46. (10 minutes.) You find the entry hatch open. You listen carefully, but do not hear anything suspicious, so you carefully slip inside, pistol at the ready. Your biocontacts kick in their infrared detectors, so you can scan for a warm body in the darkness without flipping on the light. No one seems to be here, so you settle down to wait.

Suddenly, the lifeboat hatch clashes closed. At almost the same instant, you hear a small "pop," followed by the hiss of escaping gasses. At first, you suspect that someone set a charge to breach the hull and sealed you inside to suffocate. But you quickly discover that this is not the case.

Instead, a canister of gas has been set off, and from the smell, you are sure you know what it is. It is Foraline, a gas used to disperse rioters. It works upon the brain, producing an emotional reaction of fear to the slightest threat. After a crowd is treated to Foraline, a handful of police are able to disperse hundreds of rioters just by marching into the area.

But it was never intended to be used in such concentrated doses. You begin to panic at the thought that an entire can might be fatal to you in this small lifeboat. Then you recognize the panic as a result of the gas. You feel for the can in the darkness, following the sound of its hissing, and when you finally find it, you slap a Stik-kit patch on it to prevent any more from escaping. Then you feel for the lifeboat's control panel and flip the interior lights on.

By a great effort of will, you slow your breathing and force yourself to go to the hatch. What if someone's waiting outside with a weapon, you think. A rational corner of your brain chides you that that is only the Foraline speaking, and you open the hatch and step outside. A note lies on the ground at your feet. It is from Felix Berthold. "I'm waiting for you, and I'll strike when you least expect it," it reads.

Well, your mission just got tougher. Not only does Felix Berthold know that you are looking for him, but the Foraline has you panicking at the thought of facing him. It might take hours for it to wear off—hours that you cannot afford to waste. Go to paragraph 25.

47. (Time not applicable.) Felix Berthold got away this time. But Obadiah Thomas' supervisor understands. Now you must prepare this adventure for your group. But first, give Obadiah Thomas an experience point for each suspect he checked out during the adventure.

48. (1 minute.) You decide not to use time better spent seeking Felix Berthold to have lunch with Marlena Andrews. Return to paragraph 15.

49. (15 minutes.) Considering that you have already made yourself very visible, you decide to tell Freidmansen's group what your mission is. They provide you with substantial proof that Freidmansen has been on King for 15 years now, so he cannot be the man you are looking for. Go to 15 and choose again.

50. (5 minutes.) Miss Andrews talks with you for a few minutes more, then excuses herself, explaining that she has another appointment. You sit and watch the circus while you finish your drink, then review your options to decide what to do next. Go to paragraph 15.

51. (10 minutes, plus the time rolled for the task, below.) When you get to the lifeboat, you carefully scan the area, every sense alert. Roll for the following task and add your Stealth rating. (In order to preserve the uncertainty of the task involved, the difficulty of the following task statement is not stated.)

Task: To scan the area: Difficulty? Stealth. 30 seconds.

If you roll a 1, go to paragraph 38; on a 2-4 go to 41; on a 5-8 go to 6; and on a 9 or 10 go to 45.

52. (No added time.) You have done your best, but you have not captured Felix Berthold, and the New Orleans is leaving for Tirane in just a few minutes. You have two options at this point: you can stay on the ship and spend the next seven days searching for him, hoping that you can get officials at Tirane to help you get him back to Earth (go to paragraph 42), or you can give it up for now and leave the ship to report back to your supervisor (go to paragraph 47).

53. (Time not applicable.) You spend the next four hours in the ship's sick bay before the ship's doctor will let you out. By that time, the captain has learned who you are, and you are released. You gain −1 renown point in the Core for the ruckus you caused. The ship has left Earth in the meantime, and is on its way to Tirane.

Felix Berthold has probably learned of your presence, and he has had time to seek a good hiding place. Can you find him before the ship reaches Tirane? And if you do, will you be able to transport him back to Earth? These are questions you will have to decide in running this mission for your players. For now, Obadiah Thomas' adventure is over. Perhaps you would like to start again from scratch.

54. (1 minute.) While you stand talking, the big guy swings. Go to 35 and conduct combat, but give him one free attack before you begin the combat turn sequence, due to the surprise of his attack.

55. (2 minutes.) Trying to be as unobtrusive as possible about it, you pull out your badge and show it to Freidmansen's friends. Unfortunately, you know that nearly two dozen people in the Blue Lily saw you do so. So much for your cover. Go to paragraph 43.

56. (15 minutes.) You go for a walk through the ship's corridors, figuring the exercise will help you think. You seek out the quieter corridors, trying to avoid the sea of people that push their way along the others, their voices like an ocean's roar. Eventually, you find yourself alone in the companionway leading to the cargo hold. Roll for the following task. (In order to preserve the uncertainty of this task roll, the task statement is left undefined.)

Task: (Undefined): Routine. Stealth. Instant.

If you roll a 1-4, go to paragraph 27; if a 5-10, go to paragraph 36.

57. (Time not applicable.) Sorry, your luck has run out. This is the end of the adventure for Obadiah Thomas, but perhaps you would like to try again with another character.

58. (35 minutes.) You find a spot far down the corridor from Warfol's cabin where a stairway leads downward. From here, by squinting to make your biocontacts magnify, you can keep an eye on his door without being too obvious about it. You lean back against the wall and wait.

A half an hour passes without event. Warfol's cabin door opens and he steps out. He heads for the elevator. You follow him at a distance and watch him get in; the indicator above the door shows that it is going down. You go back to Warfol's cabin and use your locksmith set to open the door. Go to paragraph 20.

59. (5 minutes.) Miss Andrews begins to look at you a bit suspiciously, but she doesn't say anything to indicate what she is thinking. After a few more minutes, however, she excuses herself, claiming another appointment, and leaves. Go to paragraph 33.

60. (No extra time.) You decide to hit him before he knows what is coming. Go to 35 and conduct combat, but give yourself one free attack before beginning the combat turn sequence, due to the surprise of your attack.

61. (90 minutes.)The manager arrives shortly, along with half a dozen of the ship's security personnel. They cart the two of you off to the ship's brig for questioning. After showing them your badge, they release you. You gain − 1 renown point in the Core for the ruckus you caused. Go to 15 and choose again.

62. (15 minutes, plus the time rolled for the task, below.) Miss Andrews leads you back to the park for lunch, where you buy two orange drinks and a couple of wieners made of rat meat. She remarks to you how much things have changed in the past 300 years, one instance being the fact that before the Twilight War, no one realized how tasty rat was. The other instance she points out is her difficulty in eating in typical human society. She has to lift her rebreather mask to take a bite of wiener, then replace it while she chews.

"This is one reason people from my world make so few trips off planet," she explains. Over her shoulder, you can see a crowd gathered, watching the circus you noted earlier. Now there are a pair of mimes acting out what looks like a wild hovercraft ride. Offstage, you can see a trio of clowns, one tall, thin one and two short, stocky ones, one with a very full false beard, waiting for their turn on stage.

Miss Andrews questions you at length about your microelectronics products, and you show her your pamphlets, hard pressed to answer all of her questions. This woman really knows her stuff.

Make a task roll to keep her convinced that you are, indeed, an electronics salesman. In order to simulate an uncertain task, no difficulty level is listed, so you will not know for sure whether you succeeded or not until a later time. The task statement is:

Task: To convince Marlena Andrews: Difficulty? Eloquence and Computer. 3 minutes.

If you roll a 1, you know that is a miss, go to paragraph 59; on anything else, go to 69.

63. You can now either go to paragraph 15 and choose again, or you can find an unobtrusive place to watch Freidmansen's door (go to paragraph 70).

64. (5 minutes.) Opening your briefcase, you push aside the microelectronics parts pamphlets and key a passenger list up on your portacomp. It lists three citizens of King on board the *New Orleans*. Debating with yourself over the best course of action, you decide to begin at each of the three passengers' cabin, where you will stand the best chance of catching him or her alone. Go to paragraph 15.

65. (1 minute.) To talk the big fellow into calming down, you will have to roll for the following task.

Task: To calm your opponent: Routine. Psychology and Eloquence. Instant.

Your Psychology skill and Eloquence characteristic together add a 2 to your roll for this difficulty 6 task. If you succeed, go to paragraph 43; if you fail go to 35; if you roll a mishap, go to 54.

66. (15 minutes.) You explain that the nature of your mission is confidential, hoping that word of this fiasco doesn't get to Felix Berthold and put him on his guard. At your request, Freidmansen and his companions provide you with ample evidence that Freidmansen has been on King for a little over 15 years, so he cannot be your quarry. Go to 15 and choose again.

67. (No added time.) At any time during this adventure, did you reveal to anyone that you are an American Marshal? If you did, go to paragraph 56; if you did not, return to paragraph 15 and choose again.

68. (2 hours.) Try as you might, Berthold has managed to escape you. The only thing left to do is search until the vessel *New Orleans* is about to leave Earth orbit. Go to paragraph 52.

69. (No extra time.) If you rolled a 7 or better, go to paragraph 50; if you rolled less than 7, go to paragraph 33.

70. (40 minutes.) Eventually, a stocky man in a rebreather mask returns to the cabin. This must be Freidmansen, you think, wondering if he is also Felix Berthold. You wait and watch for him to leave again. Before long, he exits again and heads down a main corridor, working his way through the crowds. You follow him and see him enter the Blue Lily, a ritzy casino. Go to paragraph 40.

Near Star List

This *Near Star List* provides basic information for stars within 50 light-years of Sol. Based on Gliese's *Catalog of Nearby Stars*, edition 1969 (with updates by Halliwell and others), it is the best compilation of accurate data currently available in one place.

INFORMATION

This *Near Star List* contains the following:

Star Name (and Spectral Data): This list provides a generally accepted name or catalog number for each star. The cataloged spectral type and size of the star is given with the name; because some data for stars are incomplete, this may conflict with the standard data provided in the spectra column. Size is given as a number or Roman numeral; a number indicates less certain data.

X, Y, and Z Coordinates: Each star's position is specified in terms of X, Y, and Z axes in units of one light-year.

Spectra: Stars are identified by their spectra and size.

Magnitude: Known absolute magnitude is provided.

Identification Number: Stars are given a unique identification number based on the sequential numbers in Gliese. Gliese numbers are multiplied by 10 (Gliese number 457 is 4570.0 in this catalog). Members of a multiple system (aside from the primary component) are identified by decimal 10ths: .1, .2, etc.

Star Name		X	Y	Z	Spectra	Magn.	No.
26 Draconis G1 V	A	-2.6	-22.8	42.9	G1 V	4.46	6840.0
26 Draconis M0.5 5	B	-2.6	-22.8	42.9	M0 V	7.19	6840.1
44 I Bootis G1 5	A	-18.3	-18.6	28.7	G1 V	4.87	5750.0
44 I Bootis G2 5	B	-18.3	-18.6	28.7	G2 V	5.47	5750.1
44 I Bootis SB G2 5	C	-18.3	-18.6	28.7	G2 V	6	5750.2
61 Cygni A K5 VE	A	6.2	-6.0	6.8	K5 V	7.58	8200.0
61 Cygni A UC	B	6.2	-6.0	6.8	M0 V	13	8200.1
61 Cygni B K7 VE	C	6.2	-6.0	6.8	K7 V	8.39	8200.2
61 Ursae Majoris G8 VE	A	-24.4	2.2	16.7	G8 V	5.55	4340.0
70 Ophiuchi K0 VE	A	0.2	-16.7	0.7	K0 V	5.67	7020.0
70 Ophiuchi UC	B	0.2	-16.7	0.7	M0 V	13	7020.1
82 Eridani G5 V	A	9.5	11.2	-13.9	G5 V	5.29	1390.0
85 Pegasi G3 V	A	34.6	-0.1	17.5	G3 V	5.38	9140.0
AC+ 1 1951-103 M1 5E	A	13.0	46.1	1.4	M1 V	8.8	1820.0
AC+ 2 2155-242 M4 5	A	9.9	-31.7	1.6	M4 V	11.13	7480.0
AC+ 3 2259-31 M2 5	A	30.0	14.1	2.3	M2 V	10.9	700.0
AC+ 3 2528-176 M2 5	A	10.1	-48.3	2.6	M2 V	9.83	7300.0
AC+ 8 142-393 M2 5E	A	7.9	-33.8	5.0	M2 V	9.9	7350.0
AC+10 22-181 M4 5	A	33.8	31.7	8.6	M4 V	11.4	1200.0
AC+10 95-26 M4	A	-45.4	-6.5	8.1	M4 VI	10.6	4760.0
AC+12 1800-213 M5.5 5		1.7	18.8	4.1	M5 V	12.73	2130.0
AC+13 1185-145 3 C	A	24.2	-37.6	10.5	M2 V	11.8	7841.0
AC+13 1301-119 M2 5	A	-34.5	24.4	10.1	M2 V	9.8	3610.0
AC+13 14332 M4 5	A	-18.8	-1.8	39.1	M4 V	11	4630.0
AC+16 247-80 M2 5E	A	8.4	-38.7	11.7	M2 V	9.59	7310.0
AC+16 734-144 M2 V	A	31.8	-18.5	10.7	M2 V	10.3	8440.0
AC+17 534-105 M4 5E	A	15.9	-12.6	6.3	M4 V	11.27	8290.0
AC+17 536-125 M2 5E	A	36.0	-19.0	13.3	M2 V	9.5	8510.0
AC+18 1890-112 M4	A	-20.0	-26.8	10.7	M4 V	11.8	5890.0
AC+19 1165-38 M5	A	9.5	42.8	15.6	M5 VI	10.5	1920.0
AC+20 1463-148 M2 6	A	7.1	-24.6	9.7	M2 VI	11.15	7450.0
AC+20 1463-154 M2 6	B	7.1	-24.6	9.7	M2 VI	11.14	7450.1
AC+20 76187 A 7	A	19.6	-23.5	-11.3	A0 VII	12	7991.0
AC+22 308-605 M3	A	26.7	-28.0	15.7	M3 V	11.4	8130.0
AC+23 468-46 M3 5	A	-19.2	5.3	8.4	M3 V	10.93	4080.0
AC+24 747-102 A 7	A	24.9	-31.9	18.7	A0 VII	10.85	7940.0
AC+25 7918 M4 5E	A	17.5	14.8	10.8	M4 V	11.12	1090.0
AC+32 54804 M5 5	A	6.3	-21.7	14.3	M5 V	12.2	7470.0
AC+32 54804 M5 5	B	6.3	-21.7	14.3	M5 V	12.5	7470.1

Star Name		X	Y	Z	Spectra	Magn.	No.
AC+32 86401 A 7	B	39.8	-3.3	25.2	A0 VII	12.1	9052.1
AC+32 86422 M5 5	A	39.7	-3.3	25.2	M5 V	10.9	9052.0
AC+33 10883 M1	A	17.8	32.6	24.6	M1 VI	9.5	1620.0
AC+33 25644 M4 5	A	-3.7	15.7	10.6	M4 V	11.03	2510.0
AC+38 23616 M5 5E	A	-4.4	14.4	12.0	M5 V	12.62	2680.0
AC+38 23616 SB	B	-4.4	14.4	12.0	M0 V	13	2680.1
AC+39 57322	C	25.4	-25.9	30.2	M0 V	12.3	8150.2
AC+39 57322 M3 5	B	25.4	-25.9	30.2	M3 V	11.4	8150.1
AC+39 57322 M3 5E	A	25.4	-25.9	30.2	M3 V	10.7	8150.0
AC+39 60670	B	26.4	-19.5	26.7	M0 V	11.6	8340.1
AC+39 60670 M0 5	A	26.4	-19.5	26.7	M0 V	9.6	8340.0
AC+41 726-154 M4	A	-5.4	-29.2	26.4	M4 VI	11	6710.0
AC+44 871-589 M3 5	A	17.9	-20.8	26.7	M3 V	10.5	8060.0
AC+45 133-65 M2 5E	A	20.9	22.0	31.0	M2 V	9.5	1250.0
AC+47 256-150 M2 5	A	-10.9	29.8	33.1	M2 V	10	2720.0
AC+54 1646-56 M2 5	A	-11.2	-25.2	38.4	M2 V	9.6	6250.0
AC+56 13511 M4 B	A	18.6	8.2	31.4	M4 V	11.4	630.0
AC+58 13565 M4 5E	A	18.2	10.1	33.8	M4 V	11.7	820.0
AC+58 25001 M4 5	A	3.4	8.0	14.5	M4 V	12.51	1691.0
AC+58 25002 A D	B	3.4	8.0	14.5	A0 VII	12.51	1691.1
AC+60 3496 M2.5 5E	A	19.0	4.9	35.6	M2 V	10.2	470.0
AC+61 26806 M1 VE	A	-2.6	-23.0	42.8	M1 V	9.08	6850.0
AC+65 6955 M3 5	A	6.5	-8.6	23.3	M3 V	10.95	7930.0
AC+65 6955 SB	B	6.5	-8.6	23.3	M0 V	13	7930.1
AC+66 3955 M4 5E	A	-11.1	-2.3	25.7	M4 V	11.2	4870.0
AC+70 4336 M3 5	A	-10.6	7.5	36.0	M3 V	10.25	3600.0
AC+70 4337 M4 5	A	-10.6	7.4	36.0	M4 V	10.9	3620.0
AC+70 8247 A 7	A	3.4	-12.8	37.4	A0 VII	12.75	7420.0
AC+71 532 M3.5 5E	A	7.9	2.0	24.3	M3 V	10.34	480.0
AC+79 1584 M2	A	4.2	4.7	35.2	M2 V	11.1	1330.0
AC+79 3888 M4 6	A	-3.2	0.2	16.3	M4 VI	12.38	4450.0
AC+82 1111 M3 5	A	0.0	4.3	31.3	M3 V	10.56	2260.0
AC- 7 342-397 M5 5	B	10.3	-29.3	-4.3	M5 V	12.83	7541.1
AC- 7 342-402 A 7WK	A	10.3	-29.3	-4.3	A0 VII	12.44	7541.0
AC-12 2306-155 M4	A	-30.7	-23.2	-8.3	M4 V	13	5531.0
Alpha Centauri G2 V	A	-1.7	-1.4	-3.9	G2 V	4.35	5590.0
Alpha Centauri K0 V	B	-1.7	-1.4	-3.9	K0 V	5.69	5590.1
Alpha Crucis F2 V	A	-45.0	-1.2	-20.5	F2 V	3.1	4553.0
Alpha Fornacis B	B	25.9	28.3	-21.5	M0 V	6.5	1270.1
Alpha Fornacis F8 IV	A	25.9	28.3	-21.5	F8 IV	3.5	1270.0
Alpha Hydri F0 V	A	19.4	10.9	-41.7	F0 V	2.9	830.0
Alpha Mensae G5 V	A	-0.4	7.4	-27.4	G5 V	5.39	2310.0
Arcturus K2 IIIE	A	-28.0	-18.4	11.7	K2 III	-0.24	5410.0
Augereau M2 VE	A	-12.3	3.1	12.1	M2 V	10.12	4120.0
BPM 94172 A 7N	A	13.5	-37.6	10.3	A0 VII	12.5	7551.0
Barnard's Star M5 V	A	-0.2	-5.9	0.4	M5 V	13.25	6990.0
Berthier K2 V	A	-21.5	1.7	24.5	K2 V	7.8	4381.0
Bessieres M2 VE	A	-6.5	1.7	4.8	M2 V	10.49	4110.0
Bessieres UC	B	-6.5	1.7	4.8	M0 V	13	4110.1
Beta Aquilae G8 IV	A	21.8	-40.8	5.0	G8 IV	3.5	7710.0
Beta Aquilae M3 5	B	21.8	-40.8	5.0	M3 V	10.6	7710.1
BetaCanumVenaticorumG0 V		-22.2	-3.1	19.8	G0 V	4.46	4750.0
Beta Cassiopei F2 IV	A	25.5	0.7	42.2	F2 IV	1.37	80.0
Beta Cassiopei SB	B	25.5	0.7	42.2	M0 V	13	80.1
Beta Comae Berenices G0 V	A	-22.9	-7.2	12.8	G0 V	4.66	5020.0
Beta Hydri G1 IV	A	4.4	0.4	-20.1	G1 IV	3.8	190.0
Beta Trianguli Australis F2 IV		-10.1	-15.9	-37.4	F2 IV	2.4	6010.0
Beta Virginis F8 V	A	-32.6	1.6	1.1	F8 V	3.6	4490.0
Botany Bay K7 V	A	-8.6	-24.7	17.3	K7 V	8.19	6380.0
Broward M5 5	A	-5.1	-11.8	-2.9	M5 V	12.1	6280.0
C1 A 7	A	-16.4	-1.0	21.6	A0 VII	13.7	4591.0
Capella A G8 III	A	6.1	29.5	31.2	G8 III	-0.6	1940.0
Capella B F5 III	B	6.1	29.5	31.2	F5 III	.34	1940.1
Capella H A M2 5	A	6.1	30.0	31.5	M2 V	9.55	1950.0
Capella H B M5 5	B	6.1	30.0	31.5	M5 V	13	1950.1
Castor A A1 V	A	-15.6	36.9	25.0	A1 V	2.1	2780.0
Castor A SB A1 V	B	-15.6	36.9	25.0	A1 V	2.1	2780.1
Castor B A5 V	C	-15.6	36.9	25.0	A5 V	2.9	2780.2
Castor B SB A5 V	D	-15.6	36.9	25.0	A5 V	2.9	2780.3
Catherine's Star	B	-22.7	0.9	17.7	M0 V	12	4510.1

Star Name		X	Y	Z	Spectra	Magn.	No.
Chi Draconis F7 V	A	0.7	-7.8	24.0	F7 V	4.13	7130.0
Chi Draconis SB	B	0.7	-7.8	24.0	M0 V	13	7130.1
Chi1 Orionis G0 V	A	1.1	30.2	11.1	G0 V	4.43	2220.0
Clarkesstar M4.5 5E	A	-5.8	-19.2	-3.0	M4 V	10.79	6440.0
D'Artagnon M	A	-0.8	-10.4	-16.2	M0 V	14	6930.0
DM+ 0 2989 M0.5 VE	A	-35.1	-7.5	0.3	M0 V	8.31	4880.0
DM+ 0 4810 K8 5E	A	27.6	-16.1	0.6	K8 V	9.2	8460.0
DM+ 1 2447 M2 5	A	-23.1	9.9	0.4	M2 V	10.2	3930.0
DM+ 1 4774 M2 VE	A	18.5	-1.1	0.6	M2 V	10.19	9080.0
DM+ 2 348 M3 5	A	27.4	17.4	1.9	M3 V	10.03	870.0
DM+ 2 3482 K6 VE	C	0.2	-16.7	0.7	K6 V	7.45	7020.2
DM+ 2 4076 K4 5E	A	21.4	-37.1	2.3	K4 V	6.9	7750.0
DM+ 3 3465 K3 5	A	-4.1	-40.0	2.5	K3 V	6.06	6880.0
DM+ 4 123 K2 V	A	22.0	4.4	1.9	K2 V	6.55	330.0
DM+ 4 4048 M3.5 VE	A	5.9	-17.8	1.6	M3 V	10.31	7520.0
DM+ 4 4157 M1 5	A	16.3	-38.4	3.2	M1 V	8.82	7630.0
DM+ 5 1668 M5 5	A	-4.5	11.4	1.1	M5 V	11.98	2730.0
DM+ 5 1668 UC	B	-4.5	11.4	1.1	M0 V	13	2730.1
DM+ 5 3409	B	-4.5	-31.5	3.1	M0 V	14	6781.1
DM+ 5 3409 M1 V	A	-4.5	-31.5	3.1	M1 V	9.36	6781.0
DM+ 5 3993 M2 V	A	9.1	-37.1	3.9	M2 V	8.87	7400.0
DM+ 6 2182 K3 VE	A	-29.0	22.7	3.7	K3 V	6.93	3490.0
DM+ 6 398 K3 V	A	18.2	14.4	2.7	K3 V	6.54	1050.0
DM+ 6 398 M4 5	C	18.2	14.4	2.7	M4 V	12.37	1050.2
DM+ 6 398 UC	B	18.2	14.4	2.7	M0 V	13	1050.1
DM+ 7 4052 K5 V	A	15.5	-42.2	5.8	K5 V	7.4	7562.0
DM+ 9 2636 M1 5	A	-44.4	-5.6	7.1	M1 V	9.1	4710.0
DM+10 1032	B	-1.1	30.8	5.6	M0 V	12.7	2280.1
DM+10 1032 M3 5	A	-1.1	30.8	5.6	M3 V	10.65	2280.0
DM+10 2531 G0 V	A	-39.6	-13.3	7.1	G0 V	4.65	5040.0
DM+11 2576 M1 V	A	-22.7	-9.2	4.5	M1 V	9.65	5140.0
DM+11 2576 SB	B	-22.7	-9.2	4.5	M0 V	13	5140.1
DM+11 878 M0 5	A	4.2	36.5	7.3	M0 V	8.5	2080.0
DM+12 1944 M5 5	A	-32.4	33.9	9.8	M5 V	9.8	3300.0
DM+13 2618 M2 5E	A	-37.6	-9.8	8.7	M2 V	9.4	4940.0
DM+13 2901 G6 5	A	-30.7	-32.5	10.6	G6 V	4.6	5791.0
DM+15 2620 M4 VE	A	-14.1	-6.9	4.2	M4 V	10.02	5260.0
DM+15 3364 G6	A	0.9	-43.6	12.4	G6 VII	8	7030.0
DM+15 4733 M2 5E	A	20.5	6.1	6.2	M2 V	9.5	8800.0
DM+15 4733 SB	B	20.5	-6.1	6.2	M0 V	13	8800.1
DM+16 2404 K8 5	A	-45.6	-7.8	12.9	K8 V	7.3	4810.0
DM+16 2658 M3 5	A	-34.5	-25.8	12.1	M3 V	10	5520.0
DM+16 2708 M0 5E	A	-23.9	-22.3	9.5	M0 V	10.1	5690.0
DM+17 1320 M1 5	A	-4.5	29.5	9.4	M1 V	9.71	2390.0
DM+17 2611 K2 V	A	-34.0	-11.5	11.1	K2 V	6.28	5050.0
DM+17 2611 M2 5E	B	-34.0	-11.5	11.1	M2 V	9.3	5050.1
DM+18 1214 K3 5E	A	-3.8	36.9	12.6	K3 V	6.4	2330.0
DM+18 2776 M1 5	A	-28.8	-13.9	10.4	M1 V	9.76	5250.0
DM+18 3606 M1 5	A	2.6	-46.1	15.4	M1 V	8.8	7080.0
DM+18 683 M2.5 5E	A	10.8	29.8	10.8	M2 V	9.87	1760.0
DM+19 279 K1 V	A	20.7	9.6	8.3	K1 V	5.88	680.0
DM+19 2881 K1 V	A	-26.9	-24.9	12.8	K1 V	5.66	5670.0
DM+19 2881 SB	B	-26.9	-24.9	12.8	M0 V	13	5670.1
DM+19 5036 G4 V	A	40.1	-11.8	15.6	G4 V	4.82	8820.0
DM+19 5116 M4 5E	A	19.6	-2.7	7.0	M4 V	11.33	8960.0
DM+19 5116 M6 5E	B	19.6	-2.7	7.0	M6 V	13.4	8960.1
DM+20 5046 K5 V	A	19.6	-12.1	8.8	K5 V	13	8411.0
DM+20 802 K3 V	A	15.3	41.3	16.7	K3 V	7.3	1740.0
DM+20 85 K0 V	A	31.6	5.1	12.2	K0 V	5.75	270.0
DM+21 587 G1 5	A	21.5	38.1	17.6	G1 V	5.09	1600.0
DM+21 652 M1 5EB	A	12.8	29.5	12.8	M1 V	8.1	1690.0
DM+22 2302 M2 5E	A	-34.3	9.1	14.5	M2 V	9.2	4100.0
DM+24 2733 M1 5	A	-34.9	-27.7	19.6	M1 V	8.84	5480.0
DM+24 2733 M2 5	B	-36.1	-26.1	19.6	M2 V	9.1	5480.1
DM+24 2786 G2 5	A	-31.6	-28.5	19.0	G2 V	5.15	5640.0
DM+24 2786 SB	B	-31.6	-28.5	19.0	M0 V	13	5640.1
DM+25 2874 K7 V	A	-27.2	-28.5	18.4	K7 V	9.32	5790.0
DM+25 3173 M2 5	A	-8.5	-29.7	14.9	M2 V	9.6	6490.0
DM+25 3719 K2 5	A	10.6	-37.7	18.9	K2 V	6.6	7432.0
DM+25 613 K7.5 E	A	21.3	31.4	18.5	K7 VII	9	1540.0
DM+26 4734 M5 V	B	34.6	-0.1	17.5	M5 V	10.6	9140.1

Star Name		X	Y	Z	Spectra	Magn.	No.
DM+26 4734 SB M3 V	C	34.6	-0.1	17.5	M3 V	10.6	9140.2
DM+27 2055 K3 V	A	-40.2	2.7	20.7	K3 V	8	4431.0
DM+27 2296 K6 5	B	-24.9	-12.6	14.3	K6 V	7.7	5280.1
DM+27 28217 M3 5	A	-29.0	2.5	14.7	M3 V	10.7	4360.0
DM+27 4120 M0 5E	A	32.9	-24.0	21.1	M0 V	9.11	8350.0
DM+27 4120 SB	B	32.9	-24.0	21.1	M0 V	13	8350.1
DM+28 1660 G8 V	A	-26.1	28.5	21.0	G8 V	5.3	3240.0
DM+28 4704 KO VE	A	39.1	0.6	21.4	K0 V	5.46	50.0
DM+30 2512 K8 V	A	-29.8	-20.8	20.8	K8 V	8	5460.0
DM+31 2240 K9 VE	A	-33.8	7.7	20.5	K9 V	7.9	4140.0
DM+31 2240 M2 5	B	-33.8	7.7	20.5	M2 V	9.5	4140.1
DM+31 3767 M1 5	A	15.8	-32.3	22.3	M1 V	9.72	7670.0
DM+31 3767 M2	B	15.8	-32.3	22.3	M2 V	10.7	7670.1
DM+32 2896 G2 V	A	-6.8	-37.1	24.0	G2 V	4.71	6720.0
DM+32 828 M	A	20.8	13.4	-15.7	M0 V	10.4	910.0
DM+33 529 M0 5	A	30.2	27.4	27.7	M0 V	8.7	1160.0
DM+34 2323 K4 V	A	-35.0	-4.5	23.5	K4 V	8.2	4711.0
DM+35 2436 M0 5	A	-25.4	-8.9	19.0	M0 V	9.5	5070.0
DM+35 2436 M3	B	-25.4	-8.9	19.0	M3 V	12.1	5070.1
DM+36 1638 M3.5 5E	A	-11.3	27.6	21.9	M3 V	10.32	2770.0
DM+36 1638 SB	B	-11.3	27.6	21.9	M0 V	13	2770.1
DM+36 1970 M2 5	A	-30.5	23.5	28.5	M2 V	9.4	3530.0
DM+36 1979	B	-19.4	14.4	17.5	M0 V	13.2	3560.1
DM+36 1979 G8 IV	A	-19.4	14.4	17.5	G8 IV	5.6	3560.0
DM+36 2219 M1 VE	A	-27.9	1.2	19.9	M1 V	9.7	4500.0
DM+36 2393 M2 5E	A	-23.5	-10.4	18.5	M2 V	9.1	5190.0
DM+37 748 M1.5 5E	A	23.1	26.4	27.5	M1 V	9.6	1340.0
DM+38 3095 K2 V	A	0.9	-27.5	21.7	K2 V	6.24	7060.0
DM+39 154 K2 VE	A	34.2	5.7	29.0	K2 V	6.6	280.0
DM+39 2376	B	-28.3	9.9	24.0	M0 V	11.8	4000.1
DM+39 2376 M2 5E	A	-28.3	9.9	24.0	M2 V	8.95	4000.0
DM+39 2947 G8 V	A	-15.4	-27.6	25.7	G8 V	6.18	6110.0
DM+40 45 M0 5	A	35.2	2.2	30.3	M0 V	8.3	140.0
DM+41 2147 G0 V	A	-32.2	9.1	28.7	G0 V	4.4	4070.0
DM+41 219 F8 V	A	31.8	9.6	29.7	F8 V	4.2	534.0
DM+41 2695 M0 5P	A	-15.9	-33.7	32.4	M0 V	8.1	6190.0
DM+42 1956	B	-22.9	23.4	29.4	M0 V	5.33	3320.1
DM+42 1956 F5 V	A	-22.9	23.4	29.4	F5 V	3.5	3320.0
DM+42 2296 M0 VE	A	-33.4	-2.9	30.5	M0 V	8.5	4620.0
DM+43 1953 K5 V	A	-28.4	19.8	32.1	K5 V	7.31	3650.0
DM+43 2796 M3 5	A	-1.8	-23.0	21.7	M3 V	10.6	6940.0
DM+43 4305 M4.5 5E	A	10.3	-3.6	10.5	M4 V	11.65	8730.0
DM+43 4305 SB	B	10.3	-3.6	10.5	M0 V	13	8730.1
DM+44 4548 M2 5E	C	24.3	0.2	24.7	M2 V	9.76	20.0
DM+45 2014 K4 V	A	-27.9	-1.8	27.6	K4 V	8.2	4592.0
DM+45 2247 M0 5	A	-20.3	-20.1	29.1	M0 V	8.6	5720.0
DM+45 2505 M3.5	B	-3.2	-16.4	15.0	M3 V	11.28	6610.1
DM+45 2688 M0 5	A	2.1	-33.1	33.7	M0 V	9.3	7090.0
DM+45 2743 M2 5	A	4.0	-27.5	28.4	M2 V	9.4	7200.0
DM+45 4408 K9 5E	A	24.5	0.3	25.0	K9 V	8.8	40.0
DM+45 4408 M0 5E	C	24.5	0.3	25.0	M0 V	8.84	40.2
DM+45 4408 SB	B	24.5	0.3	25.0	M0 V	13	40.1
DM+46 1551 G1 V	A	-28.5	18.9	35.6	G1 V	4.2	3680.0
DM+46 1635 K7 V	A	-29.5	12.4	32.9	K7 V	8.1	3970.0
DM+46 1889 M2 5	A	-19.4	-8.8	22.2	M2 V	10.1	5210.0
DM+47 2112 M3 5E	A	-24.3	-14.1	29.5	M3 V	9.5	5370.0
DM+47 2112 M3 5E	B	-24.3	-14.1	29.5	M3 V	9.6	5370.1
DM+47 612 M1.5 5E	A	17.3	12.0	23.1	M1 V	9.5	960.0
DM+48 1829 M2 5	A	-27.6	16.0	35.8	M2 V	9.2	3780.0
DM+48 2108	B	-17.6	-6.2	20.7	M0 V	10.1	5080.1
DM+48 2108 M2 5E	A	-17.6	-6.2	20.7	M2 V	9.3	5080.0
DM+49 1280 M2 5E	A	7.7	26.5	32.7	M2 V	9.2	1810.0
DM+50 1832 K3 V	A	-24.0	3.1	28.6	K3 V	8	4312.0
DM+50 2030 M0 5P	A	-25.4	-13.2	34.3	M0 V	8.3	5320.0
DM+51 2402 K6 VE	A	4.0	-28.2	36.0	K6 V	7.9	7190.0
DM+51 2402 SB	B	4.0	-28.2	36.0	M0 V	13	7190.1
DM+52 2294 G8 5	A	5.6	-25.3	34.2	G8 V	13	7321.0
DM+52 857 K8 VE	A	7.3	18.5	26.2	K8 V	8.6	1720.0
DM+52 911 M0 5	A	7.6	28.2	38.8	M0 V	9.06	1840.0
DM+53 1320 M0 VE	A	-8.8	7.9	15.6	M0 V	8.72	3380.0
DM+53 1321 M0 VE	B	-8.8	7.9	15.6	M0 V	8.82	3380.1

Star Name		X	Y	Z	Spectra	Magn.	No.
DM+53 934 K1 VE	A	2.0	20.7	28.1	K1 V	6.07	2110.0
DM+53 935 M1 5	A	2.0	20.7	28.1	M1 V	9.62	2120.0
DM+55 1519 M2 5E	A	-24.5	-1.1	34.5	M2 V	9.3	4580.0
DM+56 1458 K7 VE	A	-20.1	8.5	32.6	K7 V	8.29	3940.0
DM+56 1459 F8 V	A	-20.1	8.5	32.6	F8 V	4.44	3950.0
DM+56 2966 K3 V	A	11.8	-2.6	18.5	K3 V	6.41	8920.0
DM+57 2735 M2 5E	A	20.2	-3.4	32.3	M2 V	9.7	8950.0
DM+59 1915 M4 5	A	1.0	-5.8	9.9	M4 V	11.15	7250.0
DM+59 1915 M5 5	B	1.0	-5.8	9.9	M5 V	11.94	7250.1
DM+60 1003 M0 5P	A	-4.8	23.5	42.2	M0 V	7.7	2470.0
DM+61 195 M2 5E	A	13.7	3.6	26.9	M2 V	9.72	490.0
DM+61 195 SB	B	13.7	3.6	26.9	M0 V	13	490.1
DM+61 2068 M2 VE	A	7.6	-8.2	21.0	M2 V	9.18	8090.0
DM+61 366 K5 V	A	13.4	7.6	28.6	K5 V	7.4	833.0
DM+62 1916 G5	A	17.0	-15.1	43.8	G5 VII	8.1	8230.0
DM+62 274 K1 V	A	18.7	7.9	39.7	K1 V	6.1	593.0
DM+63 137 K7 V	A	19.3	5.5	40.5	K7 V	8.29	520.0
DM+63 229 K5 V	A	17.5	8.1	38.9	K5 V	7.78	690.0
DM+63 238 K0 V	A	11.4	5.5	25.6	K0 V	5.91	750.0
DM+63 869 M1 5	A	-15.2	9.4	35.0	M1 V	8.6	3730.0
DM+66 1281 G5 V	A	10.8	-16.0	44.6	G5 V	5.07	7880.0
DM+66 34 M2.5 5E	A	13.1	1.6	31.2	M2 V	10.42	220.0
DM+66 34 M4.5	B	13.1	1.6	31.2	M4 V	12.3	220.1
DM+66 717 M1 V	A	-10.9	2.0	25.0	M1 V	9.7	4240.0
DM+67 1014 K0 V	A	-2.6	-16.6	40.1	K0 V	5.81	6750.0
DM+67 1014 SB	B	-2.6	-16.6	40.1	M0 V	13	6750.1
DM+67 552 M1 5	A	-9.9	12.6	38.5	M1 V	8.76	3100.0
DM+67 552 SB	B	-9.9	12.6	38.5	M0 V	11.7	3100.1
DM+67 935 M0 VE	A	-6.2	-12.7	33.7	M0 V	8.37	6170.0
DM+67 935 M3 5	B	-6.2	-12.7	33.8	M3 V	10.47	6170.1
DM+68 946 M3.5 V	A	-0.6	-5.7	14.2	M3 V	10.79	6870.0
DM+68 946 SB	B	-0.6	-5.7	14.2	M0 V	13	6870.1
DM+71 482 K5 V	A	-8.0	8.5	33.8	K5 V	8.48	3250.0
DM+71 482 M0 5	B	-8.0	8.5	33.8	M0 V	8.7	3250.1
DM+74 1047 K3 V	A	8.9	-0.4	33.8	K3 V	6.25	9090.0
DM+74 1047 M2	C	8.9	-0.4	33.8	M2 V	11.5	9090.2
DM+74 1047 SB	B	8.9	-0.4	33.8	M0 V	13	9090.1
DM+74 456 K5 5	A	-12.1	2.5	42.2	K5 V	7.05	4200.0
DM+74 456 M2	B	-12.1	2.5	42.2	M2 V	10.7	4200.1
DM+76 785 M0 5	A	5.2	-8.1	41.8	M0 V	8.3	7860.0
DM+80 238 G8 5	A	-3.6	6.9	45.9	G8 V	5.78	2900.0
DM- 1 2892 M0 5	A	-30.8	-17.6	-1.5	M0 V	9.6	5360.0
DM- 1 3220 K0 VE	A	-13.2	-33.3	-1.4	K0 V	5.56	6310.0
DM- 1 3474 M1 5E	A	3.4	-45.2	-1.6	M1 V	8.7	7100.0
DM- 1 4323 M1 5	A	45.2	-18.0	-1.0	M1 V	9.15	8640.0
DM- 1 565 K5 5E	A	23.4	38.6	-1.1	K5 V	7.6	1570.0
DM- 1 565 M3 5E+	B	23.4	38.6	-1.1	M3 V	11	1570.1
DM- 1 565 SB	C	23.4	38.6	-1.1	M0 V	13	1570.2
DM- 2 129 K1	A	45.2	11.0	-1.7	K1 VII	8.3	440.0
DM- 2 2901 F6 V	A	-36.0	28.4	-2.1	F6 V	3.9	3480.0
DM- 2 2902 K0	B	-36.0	28.4	-2.1	K0 VI	6.4	3480.1
DM- 2 3000 M0 5	A	-36.2	22.8	-2.6	M0 V	9.8	3720.0
DM- 3 1061 K3 V	A	8.2	43.2	-2.4	K3 V	7.11	2000.0
DM- 3 1061 M2	B	8.2	43.2	-2.5	M2 V	12	2000.1
DM- 3 1110 K5 V	A	6.6	44.6	-2.8	K5 V	6.9	2040.0
DM- 3 1123 M1 VE	A	2.5	18.9	-1.3	M1 V	9.12	2050.0
DM- 3 2001 K2 VE	A	-18.4	40.5	-2.8	K2 V	6.5	2820.0
DM- 3 2002 K5 5	B	-18.5	40.5	-2.8	K5 V	8.3	2820.1
DM- 3 2870 M2 5	A	-25.8	13.4	-1.8	M2 V	9.6	3820.0
DM- 3 2870 SB	B	-25.8	13.4	-1.8	M0 V	13	3820.1
DM- 3 3508 K6 5	A	-43.0	-19.5	-3.3	K6 V	8.8	5211.0
DM- 3 3508 SB	B	-43.0	-19.5	-3.3	M0 V	13	5211.1
DM- 3 4233 M2 5	A	0.2	-23.6	-1.3	M2 V	10.08	7010.0
DM- 4 2226 M3	A	-17.7	28.9	-2.6	M3 VI	9.9	2970.0
DM- 4 2490 G3 5	A	-26.1	27.9	-3.6	G3 V	5.65	3270.0
DM- 4 4225 K5 V	A	-8.9	-34.6	-3.2	K5 V	7.53	6530.0
DM- 4 4226 M3.5 V	A	-8.9	-34.6	-3.2	M3 V	9.87	6540.0
DM- 5 1123 K3 V+	A	7.9	28.6	-3.1	K3 V	6.4	1830.0
DM- 5 1123 SB	B	7.9	28.6	-3.1	M0 V	13	1830.1
DM- 5 1844 K6 5	A	-6.8	30.4	-2.8	K6 V	6.68	2500.0
DM- 5 1844 M2	B	-6.8	30.4	-2.9	M2 V	10.2	2500.1

Star Name		X	Y	Z	Spectra	Magn.	No.
DM- 5 5674 K2 5	A	35.2	-21.2	-3.4	K2 V	13	8421.0
DM- 5 5715 M3 5	A	25.5	-13.8	-2.5	M3 V	10.67	8490.0
DM- 5 642 K5 V	A	28.1	34.3	-4.4	K5 V	7.2	1410.0
DM- 6 4663 M2 5	A	-2.3	-42.1	-4.5	M2 V	9.5	6960.0
DM- 6 4663 SB	B	-2.3	-42.1	-4.5	M0 V	13	6960.1
DM- 7 4003 M5 5	A	-13.8	-16.0	-2.8	M5 V	11.5	5810.0
DM- 7 699 M0 5	A	22.5	36.1	-5.3	M0 V	8.44	1560.0
DM- 7 781 A 7	B	7.0	14.0	-2.2	A0 VII	11.09	1660.1
DM- 7 781 M4.5 5E	C	7.0	14.0	-2.2	M4 V	12.73	1660.2
DM- 8 2582 M0 5	A	-33.2	31.9	-7.0	M0 V	8.7	3340.0
DM- 8 2582 SB	B	-33.2	31.9	-7.0	M0 V	13	3340.1
DM- 8 4352 M4.5 5	B	-5.8	-19.2	-3.0	M4 V	10.8	6440.1
DM- 9 3413 K0 IV	A	-40.1	0.3	-7.2	K0 IV	5.06	4540.0
DM-11 2741 M2 5	A	-33.1	21.3	-8.5	M2 V	9.54	3690.0
DM-11 3759 M4 5	A	-15.8	-12.3	-4.4	M4 V	12.38	5550.0
DM-12 2449 G8 V	A	-22.6	33.3	-9.0	G8 V	5.49	3020.0
DM-12 2918 M4 5	A	-22.8	17.6	-6.9	M4 V	11.02	3520.0
DM-12 2918 M4 5	B	-22.8	17.6	-6.9	M4 V	11	3520.1
DM-12 4523 SB	B	-5.1	-11.8	-2.9	M0 V	13	6280.1
DM-13 2267	B	-21.1	40.7	-11.3	M0 V	5.36	2910.1
DM-13 2267 G1 V	A	-21.1	40.7	-11.3	G1 V	4.91	2910.0
DM-13 544 K0 VE	A	18.4	16.9	-5.8	K0 V	6.57	1170.0
DM-14 5936 K1 VE	A	34.5	-33.3	-12.1	K1 V	6.25	8190.0
DM-14 5936 M0	B	34.5	-33.3	-12.1	M0 VI	9.3	8190.1
DM-15 6290 M5 5	A	14.4	-4.6	-4.0	M5 V	11.77	8760.0
DM-16 214 K3	A	43.6	14.8	-13.1	K3 VII	8.8	560.0
DM-17 3813 G6 V	A	-24.7	-8.5	-8.5	G6 V	5.12	5060.0
DM-17 6768	B	40.1	-5.3	-12.4	M0 V	10.8	8970.1
DM-17 6768 M5	A	40.1	-5.3	-12.4	M5 VI	10.4	8970.0
DM-17 6769 K5 5E	A	40.1	-5.3	-12.5	K5 V	8	8980.0
DM-17 954 G1 5	A	12.9	38.3	-12.4	G1 V	4.92	1770.0
DM-18 3019 M C	A	-31.1	10.7	-11.3	M0 V	12.3	4010.0
DM-18 359 M3 5	A	23.4	13.8	-8.8	M3 V	10.46	840.0
DM-18 4986 K3 V	A	5.6	-45.7	-15.8	K3 V	6.2	7160.0
DM-19 3242 M C	B	-30.2	5.4	-11.3	M0 V	11	4250.1
DM-19 3242 M0 5	A	-30.2	5.4	-11.3	M0 V	8.7	4250.0
DM-19 5899	B	29.5	-35.3	-16.0	M0 V	13.1	8000.1
DM-19 5899 M2 5	A	29.5	-35.3	-16.0	M2 V	9.5	8000.0
DM-20 4123 M2 V	B	-12.3	-11.7	-6.6	M2 V	9.21	5700.1
DM-20 4125 K5 VE	A	-12.3	-11.7	-6.6	K5 V	7.06	5700.0
DM-20 643 K7 V	A	23.0	28.8	-13.5	K7 V	8	1420.0
DM-21 1051	B	5.9	22.3	-9.1	M0 V	11.1	1850.1
DM-21 1051 M1 5	A	5.9	22.3	-9.1	M1 V	9.04	1850.0
DM-21 1377 M1 VE	A	-0.7	17.3	-7.0	M1 V	9.33	2290.0
DM-21 3781 K6 V	A	-33.8	-17.1	-15.2	K6 V	7.67	5290.0
DM-21 4352 K5	A	-18.5	-40.6	-17.9	K5 VII	9.5	6220.0
DM-21 5081 G4 5	A	7.1	-45.6	-17.8	G4 V	5	7220.0
DM-21 6267 M2 5E	A	23.6	-9.1	-9.7	M2 V	9.5	8670.0
DM-21 6267 SB	B	23.6	-9.1	-9.7	M0 V	13	8670.1
DM-22 1210 K2 V	B	1.8	24.4	-10.2	K2 V	6.6	2160.1
DM-22 2345 F6 V	C	-27.7	33.8	-18.1	F6 V	5.8	3140.2
DM-22 6219 M0 5	A	45.7	-1.6	-18.6	M0 V	9.7	9110.0
DM-23 11940 K5 V	A	-32.9	-29.9	-19.9	K5 V	7	5650.0
DM-23 15935 G7 5	A	17.4	-30.8	-15.0	G7 V	5.6	7735.0
DM-23 17699 M1 5	A	22.2	-6.3	-9.8	M1 V	8.46	8840.0
DM-23 332 M0 5E	A	43.7	9.5	-19.2	M0 V	8.06	400.0
DM-23 693 M1 5E	A	29.2	15.3	-13.9	M1 V	8.6	790.0
DM-23 8646 G0 5	A	-34.0	23.7	-18.2	G0 V	4.2	3640.0
DM-23 9765 M	A	-28.7	6.7	-13.3	M0 V	12.1	4131.0
DM-24 12677 M2 5	A	-17.9	-38.4	-19.4	M2 V	9.6	6200.0
DM-24 15668 K5 5	A	19.0	-36.1	-18.3	K5 V	5.5	7700.0
DM-24 16193 G8 5	A	26.9	-33.0	-19.0	G8 V	5.6	7960.0
DM-25 225	B	39.4	6.0	-18.7	M0 V	5.7	250.1
DM-25 225 G5 V	A	39.4	6.0	-18.7	G5 V	5.7	250.0
DM-25 3913 K0 VE	A	-10.3	38.8	-19.5	K0 V	6	2590.0
DM-26 12026 K1 VE	A	-3.3	-15.6	-8.0	K1 V	6.38	6630.0
DM-26 12026 K1 VE	B	-3.3	-15.6	-8.0	K1 V	6.41	6630.1
DM-26 12036 K5 VE	C	-3.3	-15.6	-7.9	K5 V	7.66	6640.0
DM-26 16501 K	A	41.2	-9.7	-20.9	K0 VII	11.6	8910.0
DM-26 828 G5 V	A	35.0	23.8	-20.9	G5 V	5.6	950.0
DM-26 8883 K5 V	A	-28.4	0.5	-14.8	K5 V	7	4530.0

Star Name		X	Y	Z	Spectra	Magn.	No.
DM-27 14659 K1 V	A	13.1	-20.3	-12.5	K1 V	6.13	7850.0
DM-27 14659 SB	B	13.1	-20.3	-12.5	M0 V	13	7850.1
DM-28 16676 M3	A	21.5	-29.5	-19.4	M3 V	11.1	7910.0
DM-28 302 M	A	20.5	5.0	-40.8	M0 V	11.8	460.0
DM-28 694 K2 V	A	31.5	19.7	-20.2	K2 V	6.5	861.0
DM-29 8019 M4	A	-33.0	19.1	-22.2	M4 VI	10	3770.0
DM-30 19175 K5 V	A	33.5	-14.6	-21.4	K5 V	7.1	8620.0
DM-30 19255 K5 VE	A	36.2	-13.6	-22.3	K5 V	7.2	8680.0
DM-31 17815 M0 VE	A	15.9	-18.7	-15.1	M0 V	8.87	8030.0
DM-31 325 K3 V+	A	39.1	8.7	-23.8	K3 V	6.4	420.0
DM-31 325 SB	B	39.1	8.7	-23.8	M0 V	13	420.1
DM-31 6229 K0 V	A	-21.1	27.1	-21.0	K0 V	5.9	3090.0
DM-31 9113 M2.5	A	-30.1	3.5	-19.2	M2 VI	9.6	4330.0
DM-32 16135 M4.5 5E	A	15.5	-18.7	-15.6	M4 V	11.09	7990.0
DM-32 16135 M4.5 5E	B	15.5	-18.7	-15.6	M4 V	11.2	7990.1
DM-32 17321 K5 VE	A	20.7	-6.2	-13.5	K5 V	7.03	8790.0
DM-32 5613 A 7S	A	-15.6	18.6	-15.7	A0 VII	12.3	3180.0
DM-32 8179 K0 V	A	-26.0	3.1	-16.8	K0 V	6.09	4320.0
DM-34 11626 K3 V	A	-3.7	-18.8	-13.4	K3 V	7.03	6670.0
DM-34 11626 K5 V	B	-3.7	-18.8	-13.4	K5 V	7.9	6670.1
DM-34 11626 M2	C	-3.7	-18.8	-13.4	M2 V	10.89	6670.2
DM-34 4036 F5 V	A	-17.9	34.0	-22.8	F5 V	4.4	2920.0
DM-34 4036 K3	B	-17.9	34.0	-22.8	K3 VI	7	2920.1
DM-35 3233	B	-9.3	37.3	-27.4	M0 V	5.1	2550.1
DM-35 3233 F8 V	A	-9.3	37.3	-27.4	F8 V	4.8	2550.0
DM-36 13940 K3 V	A	7.8	-12.6	-10.9	K3 V	6.56	7830.0
DM-36 13940 M5 5	B	7.8	-12.6	-10.9	M5 V	12.7	7830.1
DM-36 2458 M2	A	1.7	27.8	-20.6	M2 V	11.5	2180.0
DM-37 10500 A 7S	B	-19.8	-29.3	-27.4	A0 VII	12.1	5990.1
DM-37 10500 G6 V	A	-19.8	-29.3	-27.4	G6 V	5.34	5990.0
DM-37 10765 M4	A	-8.7	-17.8	-15.2	M4 VI	11.2	6180.0
DM-37 10765 M7	B	-8.7	-17.8	-15.2	M7 V	16.6	6180.1
DM-37 8437 G3 5	A	-33.9	-10.6	-27.3	G3 V	4.6	5012.0
DM-38 1058 M5	A	22.6	24.8	-26.6	M5 VI	11.4	1300.0
DM-38 4789 K1 V	A	-17.2	20.1	-21.3	K1 V	6.46	3200.0
DM-39 10940	B	-10.6	-36.7	-31.5	M0 VI	9.5	6460.1
DM-39 10940 K5 V	A	-10.6	-36.7	-31.5	K5 V	7.6	6460.0
DM-39 14192 M0 VE	A	7.2	-6.5	7.8	M0 V	8.75	8250.0
DM-39 7301 G5 V	A	-25.4	1.7	-21.5	G5 V	4.85	4420.0
DM-40 5404 M	A	-20.9	14.9	-22.3	M0 V	12.3	3580.0
DM-40 9712 M4	A	-8.9	-11.5	-12.7	M4 VI	11.2	5880.0
DM-41 1288 K	A	16.1	29.6	-29.3	K0 VII	9.5	1612.0
DM-41 328 G2 V	A	25.1	11.5	25.2	G2 V	4.66	670.0
DM-42 249	B	31.6	6.0	-29.2	M0 VI	8.3	320.1
DM-42 249 K5 V	A	32.4	6.2	-30.0	K5 V	7.8	320.0
DM-42 5678 K5 V	A	-20.2	12.9	-22.6	K5 V	7.62	3700.0
DM-43 12343 K7 VE	A	1.2	-32.4	-30.8	K7 V	7.71	7070.0
DM-43 7228 K5 VE	A	-28.8	2.6	-28.1	K5 V	7.3	4350.0
DM-44 3045 M4.5	A	-5.0	19.6	-19.8	M4 V	11.8	2570.0
DM-44 3045 M4.5	B	-5.0	19.6	-19.8	M4 V	12	2570.1
DM-44 775 K6 VE+	A	19.2	15.0	-23.6	K6 V	8.4	1030.0
DM-44 775 SB	B	19.2	15.0	-23.6	M0 V	13	1030.1
DM-45 1184 M4.5 B	A	16.6	21.9	-27.4	M4 VI	10.7	1450.0
DM-45 13677 M0 V	A	7.5	-11.8	-14.2	M0 V	9.04	7840.0
DM-45 5378 M4	A	-17.3	11.8	-21.4	M4 VI	10.8	3670.0
DM-45 5627 M5.5	A	-25.9	15.4	-31.4	M5 VI	11	3750.0
DM-45 7872 M1	A	-29.7	-4.4	-30.7	M1 V	10.9	4770.0
DM-46 11370 G8 V	A	-3.4	-16.8	-18.1	G8 V	6.12	6660.0
DM-46 11370 M0 V	B	-3.4	-16.8	-18.1	M0 V	9.28	6660.1
DM-46 11540 M4	A	-1.6	-10.3	-11.1	M4 VI	11.03	6740.0
DM-46 12902	B	10.1	-30.8	-33.5	M0 VI	9.3	7500.1
DM-46 12902 K9 V	A	10.1	-30.8	-33.5	K9 V	9.3	7500.0
DM-46 3046	B	-8.8	25.3	-28.7	M0 V	7.5	2690.1
DM-46 3046 K2 V	A	-8.8	25.3	-28.7	K2 V	6.7	2690.0
DM-46 943 K4	A	19.8	21.7	-31.3	K4 VII	11.9	1260.0
DM-47 13928 G2 V	A	25.0	-16.8	-33.0	G2 V	4.9	8380.0
DM-47 502 M0	A	30.8	13.9	-36.0	M0 V	10	652.0
DM-48 1011 K7 V	A	14.6	19.6	-27.8	K7 V	8.29	1460.0
DM-48 11837 M0	A	-3.3	-25.8	-29.5	M0 V	10.1	6800.0
DM-48 12818 M4	A	6.2	-25.4	-29.4	M4 VI	10.6	7390.0
DM-49 2340 K0	A	-4.7	29.5	-35.7	K0 VII	9.2	2400.0
DM-51 10924 M	B	-3.5	-23.6	-30.1	M0 V	14.4	6760.1
DM-51 10924 M0	A	-3.5	-23.6	-30.1	M0 V	10.1	6760.0
DM-51 12998 K2 V	A	23.4	-17.5	-36.3	K2 V	6.4	8330.0
DM-51 13128 M0	A	25.1	-15.5	-36.9	M0 VI	9.6	8410.0
DM-51 532 K0 V	A	19.4	12.2	-28.5	K0 V	5.86	860.0
DM-51 5974 K0	A	-16.9	1.4	-21.3	K0 VII	11.7	4380.0
DM-51 6859 M3	A	-16.5	-2.6	-21.2	M3 V	11.06	4790.0
DM-53 8617 K7 V	A	14.9	-18.1	-31.0	K7 V	8.45	7980.0
DM-53 889 K5 V	A	10.9	22.0	-33.2	K5 V	7.15	1670.0
DM-54 487 M	A	21.3	14.3	-35.8	M0 V	12	930.0
DM-54 9222	B	21.0	-10.4	-32.2	M0 VI	9.6	8530.1
DM-54 9222 G1 V	A	21.0	-10.4	-32.2	G1 V	4.9	8530.0
DM-56 328 K5 VE	B	10.7	4.8	-17.8	K5 V	6.83	660.1
DM-57 6303 K0 V	A	-12.4	-23.6	-41.7	K0 V	6.64	6150.0
DM-58 5564 K3 V	A	-13.4	-9.0	-27.0	K3 V	6.74	5420.0
DM-58 7076 K	A	2.7	-24.4	-39.7	K0 VII	11.1	7140.0
DM-58 8327 G4 V	A	22.7	-10.5	-40.1	G4 V	4.5	8570.0
DM-59 2351 M1	A	-12.0	10.0	-27.2	M1 V	11	3410.0
DM-60 3532 K7 V	A	-17.2	2.8	-31.8	K7 V	7.34	4280.0
DM-60 3532 M0 VE	B	-17.2	2.8	-31.8	M0 V	8.36	4280.1
DM-60 7821 K	A	17.6	-10.7	-35.8	K0 VII	10.9	8420.0
DM-62 780 M0 5EP	A	2.4	19.5	37.4	M0 V	8.45	2150.0
DM-63 110 K5 V	A	30.6	38.5	3.1	K5 V	7.2	1430.0
DM-68 1095 K0 V	A	-17.5	-2.4	-44.6	K0 V	6.3	4720.0
DM-68 47 K	A	10.4	3.2	-26.7	K0 VII	11.5	540.0
DM-73 1672 K3 V	A	10.4	-1.1	-34.3	K3 V	6.9	9020.0
Davout M5	A	-1.3	-10.9	-10.7	M5 V	12.8	6820.0
Delta Aquilae F0 IV	A	16.4	-43.5	2.4	F0 IV	2.6	7600.0
Delta Aquilae SB	B	16.4	-43.5	2.4	M0 V	13	7600.1
Delta Eridani K0 IVE	A	16.5	23.7	-5.1	K0 IV	3.77	1500.0
Delta Pavonis G8 V	A	3.8	-6.5	-17.1	G8 V	4.76	7800.0
Delta Trianguli G0 VE+	A	23.2	15.3	18.7	G0 V	4.8	920.0
Delta Trianguli SB	B	23.2	15.3	18.7	M0 V	13	920.1
Denebola A3 V	A	-41.4	2.4	10.9	A3 V	1.54	4480.0
Ellis M3 VI	A	-6.5	-14.3	17.6	M3 VI	10.97	6230.0
Epsilon Ceti	B	35.7	29.2	-9.9	M0 V	4.8	1054.1
Epsilon Ceti F8 V	A	35.7	29.2	-9.9	F8 V	4.77	1054.0
Epsilon Eridani K2 VE	A	6.4	8.4	-1.9	K2 V	6.13	1440.0
Epsilon Eridani UC	B	6.4	8.4	-1.9	M0 V	13	1440.1
Epsilon Indi K5 VE	A	5.2	-3.1	-9.4	K5 V	7	8450.0
Eta Bootis G0 IV	A	-26.8	-14.3	10.2	G0 IV	2.72	5340.0
Eta Bootis SB	B	-26.8	-14.3	10.2	M0 V	13	5340.1
Eta Cassiopei G0 V+	A	10.0	2.0	16.1	G0 V	4.6	340.0
Eta Cassiopei M0 V	B	10.0	2.0	16.1	M0 V	8.66	340.1
Eta Cephei K0 IVE	A	14.1	-16.3	39.8	K0 IV	2.72	8070.0
Fomalhaut A3 V	A	18.2	-5.4	-10.9	A3 V	2.03	8810.0
G 5-43 M3 6	A	22.7	29.3	9.3	M3 VI	11.9	1433.0
G 7-17 M9 7	A	22.2	38.0	14.8	M9 V	14.7	1572.0
G 24-16 M6 5E	A	18.1	-24.3	5.0	M6 V	13.2	7912.0
G 29-38 A 7	A	42.2	-6.3	3.7	A0 VII	12.5	8952.0
G 44-42 M4	A	-35.5	11.2	9.4	M4 V	13.5	4030.0
G 47-9 M5	B	-26.2	28.5	21.0	M5 V	12.5	3240.1
G107-69 M6 6	A	-10.8	26.8	32.4	M6 VI	13.2	2752.0
G107-69 SB M5 5	B	-10.8	26.8	32.4	M5 V	15.8	2752.1
G107-70 A 7	C	-10.1	25.1	30.4	A0 VII	15.4	2752.2
G107-70 SB M5 V	D	-10.3	25.1	30.4	M5 V	15.4	2752.3
G195-19 A D	A	-20.6	18.4	37.5	A0 VII	13	3391.0
G197-50 3 C	B	-24.4	-1.1	34.5	M3 V	14.7	4580.1
G200-38 K1	C	-23.1	-16.8	38.5	K1 VII	12.7	5490.2
Gamma Leporis F6 V	A	1.8	24.4	-10.2	F6 V	4.05	2160.0
Gamma Pavonis F8 V	A	8.9	-7.4	-25.6	F8 V	4.53	8270.0
Gamma Serpenti F6 V	A	-20.3	-33.1	10.9	F6 V	3.4	6030.0
Gamma Virginis F0 V	A	-32.5	-5.6	-0.7	F0 V	3.46	4820.0
Gamma Virginis F0 V	B	-32.5	-5.6	-0.7	F0 V	3.48	4820.1
Groombridge 34 M1 V	A	8.1	0.5	7.8	M1 V	10.32	150.0
Groombridge 34 M6 V	C	8.3	0.5	7.9	M6 V	13.29	150.2
Groombridge 34 SB	B	8.3	0.5	7.9	M0 V	13	150.1
Haifeng M8 5E	A	13.0	7.3	3.3	M8 V	13.91	831.0
Henry's Star G8 VI	A	-22.7	0.9	17.7	G8 VI	6.71	4510.0
Hochbaden K6 5	A	-24.9	-12.6	14.3	K6 V	7.26	5280.0
Hunjiang M4 V	A	11.4	0.1	-8.9	M4 V	10.39	10.0

Star Name		X	Y	Z	Spectra	Magn.	No.
Iota Horologii G3 IV	A	22.3	18.9	-36.2	G3 IV	4.63	1080.0
Iota Pegasi F5 V	A	34.4	-19.0	18.4	F5 V	3.14	8480.0
Iota Pegasi SB	B	34.4	-19.0	18.4	M0 V	13	8480.1
Iota Persei G4 V	A	17.0	17.8	28.7	G4 V	3.72	1240.0
Iota Piscium F7 V	A	45.4	-4.6	4.2	F7 V	3.39	9040.0
Iota Ursae Majoris	D	-22.9	23.6	36.8	M0 V	10.2	3310.3
Iota Ursae Majoris A7 V	A	-22.9	23.6	36.8	A7 V	2.24	3310.0
Iota Ursae Majoris M1 5	B	-22.9	23.6	36.8	M1 V	9.9	3310.1
Iota Ursae Majoris SB	C	-22.9	23.6	36.8	M0 V	13	3310.2
Kapetyn's Star M0 V	A	1.9	8.7	-9.1	M0 V	10.85	1910.0
Kappa Reticuli G5 VE	A	19.8	23.0	1.6	G5 V	4.99	1370.0
Kimanjano K4 V	A	-20.8	-3.6	14.3	K4 V	8.2	4802.0
King K7 V	A	-4.0	-24.2	0.9	K7 V	8.15	6730.0
Kruger 60 A M3 5	A	6.3	-2.8	10.8	M3 V	11.87	8600.0
Kruger 60 B M4.5 5E	B	6.3	-2.8	10.8	M4 V	13.3	8600.1
L 24 52 A 7	A	4.1	-4.0	-40.9	A0 VII	13	8201.0
L 49-19 K	A	6.3	-2.0	-25.9	K0 VII	12.1	8770.0
L 68-27 M	B	-6.9	-0.8	-20.3	M0 V	14.4	4670.1
L 68-28 K0	A	-6.9	-0.8	-20.3	K0 VII	12.5	4670.0
L 74-113 M	A	-4.7	-13.4	-45.9	M0 V	12.2	6370.0
L 89-27 M	A	16.5	10.1	-45.5	M0 V	12.6	850.0
L 97-12	A	-3.4	6.3	-17.5	M5 V	15.5	2930.0
L 115-21 M	A	8.8	-15.5	-39.7	M0 V	12.5	7740.0
L 115-21 M	B	8.8	-15.5	-39.7	M0 V	13.8	7740.1
L 119-21 K	A	14.4	-5.7	-34.2	K0 VII	12.7	8650.0
L 127-97 M	A	12.8	11.8	-35.7	M0 V	10.3	1180.0
L 145-141 A0 7	A	-6.8	.5	-14.3	A0 VII	13.01	4400.0
L 182-44 M	A	-3.5	23.4	-38.6	M0 V	12.2	2380.0
L 192-72 M C	A	-22.5	4.5	-35.7	M0 V	12.2	4220.0
L 258-146 K	A	-20.3	-9.6	-30.7	K0 VII	14	5240.0
L 283-7 A	B	25.2	-15.5	-36.9	A0 V	11.7	8410.1
L 316-62 M3	A	-21.0	21.3	-32.4	M3 V	13.7	3330.0
L 339-19 G	A	-7.7	-20.3	-22.3	G0 VII	14.5	6330.0
L 347-14 M7.5	A	4.3	-12.3	-13.4	M7 V	14.9	7540.0
L 355-62 M	A	21.0	-13.3	-26.9	M0 V	11.9	8386.0
L 362-81 A 7S	A	19.4	-0.1	-18.4	A0 VII	13.48	9150.0
L 396-7 M C	A	-28.8	3.8	-25.1	M0 V	12.5	4310.0
L 480-69 K	A	-18.9	-25.3	-24.4	K0 VII	13.4	5900.0
L 489-58	B	7.3	-33.2	-27.2	M0 V	15	7320.1
L 489-58 G0 6	A	7.3	-33.2	-27.2	G0 VI	11.4	7320.0
L 597-31 M	A	-5.6	42.3	-21.8	M0 V	11.9	2360.0
L 674-15 M 5	A	-9.6	14.9	-7.0	M0 V	15	3000.0
L 675-81 M	A	-16.5	19.8	-11.2	M0 V	13.5	3170.0
L 678-39 K	A	-20.0	14.8	-9.8	K0 VII	13.1	3570.0
L 714-88 M5	A	32.0	-23.3	-18.0	M5 V	14	8360.0
L 715-89 M	A	33.5	-19.6	-14.0	M0 V	12.8	8430.0
L 717-22 M4 5E	C	23.6	-9.1	-9.7	M4 V	11.8	8670.2
L 724-32 M5 5E	A	20.4	6.3	-6.7	M5 V	12.4	541.0
L 736-30 M3	A	10.9	35.7	-12.1	M3 V	12.1	1800.0
L 737-9 M5.5	A	7.8	33.0	-11.2	M5 V	11.9	1900.0
L 745-46 F0 7	A	-13.8	30.1	-10.4	F0 VII	12.9	2830.0
L 745-46 M 5	B	-13.8	30.1	-10.4	M0 V	18.4	2830.1
L 768-119 M5	A	-16.0	-22.7	-9.8	M5 V	11.9	5950.0
L 789-6 M7 5E	A	9.5	-3.7	-2.9	M7 V	14.6	8660.0
L 820-19	B	-26.4	28.3	-8.9	M0 V	12.3	3260.1
L 820-19 M6	A	-26.4	28.3	-8.9	M6 V	12	3260.0
L 824-28 M0 5	A	-33.7	16.7	-7.8	M0 V	10.8	3860.0
L 829-26 M	A	-38.4	2.5	-7.9	M0 V	13	4430.0
L 850-62 M5.5	A	11.6	-43.1	-10.9	M5 V	13.9	7410.0
L 856-54	B	27.0	-28.8	-10.1	M0 V	15.2	8100.1
L 856-54 M5	A	27.0	-28.8	-10.1	M5 V	14	8100.0
L 870-2 A 7	A	37.5	16.6	-3.8	A0 VII	12.3	640.0
L 886-6 A 7	A	-11.9	44.7	-5.2	A0 VII	15.2	2610.0
L 897-16 M C	A	-29.5	11.1	-3.7	M0 V	12.8	3990.0
L 901-10 M4.5	A	-39.0	1.5	-4.9	M4 V	11.6	4520.0
L 935-50 A	A	41.6	-8.9	-5.1	A0 V	14.9	8931.0
L 968-22 M0 5	A	-24.9	13.0	-1.2	M0 V	11.12	3810.0
L 989-20	B	-8.9	-39.3	-1.3	M0 V	11.7	6600.1
L 989-20 G	A	-8.9	-39.3	-1.3	G0 VII	11.5	6600.0
L 997-21 A 7S	A	16.8	-31.2	-0.8	A0 VII	13.51	7720.0
L1064-75 M5	A	2.9	-49.3	1.3	M5 VI	11.6	7083.0
L1113-55 M4 5E	A	2.9	-49.3	1.4	M5 VI	11.6	7083.0
L1154-29 M5 5	A	35.9	2.0	8.5	M5 V	13.5	120.0
L1272-21 M6	B	-20.0	-26.8	10.7	M6 V	15	5890.1
L1303-10 M6	A	17.6	13.6	10.2	M6 V	15.1	1020.0
L1346-53 M4	A	-15.4	-26.8	11.6	M4 V	14.2	6090.0
LP101-15 M4 5E	A	-9.9	-24.9	41.5	M4 V	12	6301.0
LP101-15 SB	B	-9.9	-24.9	41.5	M0 V	13	6301.1
LP101-16 7	C	-9.9	-24.9	41.5	M0 V	14.1	6301.2
LP425-140	A	-14.1	17.2	7.4	M6 V	19.9	3161.0
LP658-2 K 7E	A	0.6	19.5	-1.5	K0 VII	15.62	2232.0
Lacaille 9352 M2 VE	A	8.9	-2.3	-6.8	M2 V	9.59	8870.0
Lambda Aurigae G0 V	A	7.1	36.5	31.3	G0 V	3.84	1970.0
Lambda Serpenti G0 V	A	-19.3	-28.6	4.5	G0 V	4.3	5980.0
Lowne 1	A	18.9	40.3	15.6	M6 V	15	1681.0
Mu Arae G5 V	A	-2.4	-27.2	-34.7	G5 V	4.9	6910.0
Mu Cassiopei G5 VI	A	13.9	4.0	20.4	G5 VI	5.75	530.0
Mu Cassiopei M8 5	B	13.9	4.0	20.4	M8 V	8.75	530.1
Mu Herculis G5 IV	A	-1.6	-23.3	12.2	G5 IV	3.89	6950.0
Mu Herculis M4 5	C	-1.6	-23.3	12.2	M4 V	11.26	6950.2
Mu Herculis M4 5E	B	-1.6	-23.3	12.2	M4 V	10.8	6950.1
Neubayern K7 VE	A	-8.4	4.4	11.1	K7 V	8.32	3800.0
New Melbourne M1 5	A	-2.6	-24.2	8.1	M1 V	10.14	6860.0
Nu Phoenicis F8 V	A	29.5	9.7	-32.1	F8 V	4.2	550.0
Nyotekundu M8 5E	A	-7.3	2.1	0.9	M8 V	16.68	4060.0
Omicron2 Eridani K1 VE	A	7.0	14.0	-2.2	K1 V	5.99	1660.0
Pi3 Orionis F6 V	A	7.7	23.6	3.0	F6 V	3.76	1780.0
Pollux K0 III	A	-13.4	27.8	16.5	K0 III	.98	2860.0
Procyon A F5 IV	A	-4.7	10.3	1.0	F5 IV	2.64	2800.0
Procyon B F 7	B	-4.7	10.3	1.0	F0 VII	13	2800.1
Proxirna Centauri M5 5E	A	-1.6	-1.2	-3.8	M5 V	15.45	5510.0
Psi Capricorni F4 V	A	22.3	-26.0	-16.3	F4 V	3.7	8050.0
Psi5 Aurigae G0 V	A	-6.6	34.5	33.5	G0 V	4.37	2450.0
Qinyuan M5.5 5	A	7.6	3.4	-2.8	M5 V	15.27	650.0
Queen Alice's Star K4 V	A	-13.7	-2.1	14.3	K4 V	8.2	4771.0
Red Speck M3 5	A	-3.2	-16.4	15.0	M3 V	10.91	6610.0
Rho Eridani K2 V	A	10.7	4.8	-17.8	K2 V	6.67	660.0
Ross 28 M5	A	11.6	22.2	32.7	M5 V	12.7	1640.0
Ross 41 M5	A	4.2	27.6	4.7	M5 V	12.78	2030.0
Ross 42 M4 5E +	A	6.0	45.4	7.9	M4 V	10.73	2060.0
Ross 42 SB	B	6.0	45.4	7.9	M0 V	13	2060.1
Ross 52 M5	A	-22.8	-21.2	13.6	M5 VI	11.5	5680.0
Ross 52 M5	B	-22.8	-21.2	13.6	M5 V	12.1	5680.1
Ross 64 M6	A	-2.4	24.4	10.6	M6 V	13.6	2320.0
Ross 92 M6	A	-26.8	19.0	13.4	M6 V	15.5	3590.0
Ross 119 M	A	-33.8	1.2	6.0	M0 V	14.1	4521.0
Ross 128 M5 5	A	-10.9	0.7	0.2	M5 V	13.5	4470.0
Ross 165	B	12.5	-25.9	14.6	M0 V	13.6	7660.1
Ross 165 M4.5 5	A	12.5	-25.9	14.6	M4 V	12.6	7660.0
Ross 188 M6	A	23.5	-30.8	30.6	M6 V	14.4	7920.0
Ross 193 M4 5E	A	33.8	-35.7	-4.4	M4 V	11	8120.0
Ross 226 M4	A	21.1	-6.5	39.4	M4 V	13.5	8780.0
Ross 248 M6 5E	A	7.3	-0.7	7.1	M6 V	14.8	9050.0
Ross 249 M1	A	27.8	-1.8	31.8	M1 V	11.5	9070.0
Ross 417 M5	A	-3.5	46.7	-5.5	M5 V	13.2	2313.0
Ross 486 M4 5	A	-36.2	-14.2	-1.3	M4 V	10.9	5120.0
Ross 486 M6 5	B	-36.2	-14.2	-1.3	M6 V	13.8	5120.1
Ross 508 M6	A	-21.8	-26.3	10.8	M6 V	14.8	5850.0
Ross 555 M4	A	32.2	16.6	-7.1	M4 VI	10.9	780.0
Ross 594 M7	A	9.9	23.2	21.0	M7 V	13.7	1700.0
Ross 614	B	-1.6	12.8	-0.7	M0 V	16.58	2340.1
Ross 614 M7 5E	A	-1.6	12.8	-0.7	M7 V	13.08	2340.0
Ross 619 M5 5	A	-11.4	18.0	3.3	M5 V	13.66	2990.0
Ross 627 F 7	A	-35.6	6.0	14.3	F0 VII	13.9	4270.0
Ross 695 M4 5	A	-28.1	-2.8	-9.2	M4 V	11.9	4650.0
Ross 802 M5	A	-20.9	-28.3	-8.8	M5 V	13.6	5920.0
Ross 845 M5.5 5E	A	-37.4	-23.9	-9.3	M5 V	12.8	5402.0
Ross 848 M5	A	-28.9	-19.8	-5.8	M5 V	12.8	5450.0
Ross 863 M3	A	-7.1	-28.9	11.7	M3 V	11.6	6550.0
Ross 867 M5 5E	B	-6.2	-33.0	16.7	M5 V	12.6	6690.1
Ross 868 M4 5E	A	-5.7	-30.6	15.4	M4 V	11.2	6690.0
Ross 974 K 6	A	-39.9	-10.6	-1.4	K0 VI	12.3	4950.0

Star Name		X	Y	Z	Spectra	Magn.	No.
Ross 989 M4.5 5E	C	-11.3	27.6	21.9	M4 V	11.48	2770.2
Serurier M4.5 5E	A	1.7	-8.5	-3.9	M4 V	13.3	7290.0
Sigma Draconis K0 V	A	2.5	-6.0	17.3	K0 V	5.92	7640.0
Sirius A A1 V	A	-1.6	8.1	-2.5	A1 V	1.42	2440.0
Sirius B A 7	B	-1.6	8.1	-2.5	A0 VII	11.56	2440.1
Sol G2 V	A	0.0	0.0	0.0	G2 V	4.67	0.0
Tau Ceti G8 VP	A	10.1	4.8	-3.3	G8 V	5.72	710.0
Tau1 Eridani F6 V	A	33.9	29.1	-15.3	F6 V	3.7	1110.0
Theta Bootis F7 V	A	-23.9	-17.3	37.8	F7 V	3.22	5490.0
Theta Bootis M3.5	B	-23.9	-17.3	37.8	M3 VI	10.3	5490.1
Theta Centauri K0 III	A	-33.3	-20.0	-28.3	K0 III	0.9	5390.0
Theta Persei F7 V	A	20.6	17.4	31.1	F7 V	3.62	1070.0
Theta Persei M2 5E	B	20.6	17.4	31.1	M2 V	9.36	1070.1
UV Ceti M5.5 5F	B	7.6	3.4	-2.8	M5 V	15.8	650.1
V 371 Orionis M3 5	A	6.1	48.9	1.6	M3 V	10.8	2071.0
VB 1 M VII	C	1.7	24.4	-10.1	M0 V	13	2160.2
VB 4	B	-26.0	3.1	-16.8	M0 V	15	4320.1
VB 5	B	-25.4	1.7	-21.5	M0 V	15	4420.1
VB 8	C	-5.8	-19.2	-3.0	M0 V	17.69	6440.2
VB 9 M	B	4.0	-27.5	28.4	M0 V	14.5	7200.1
VB 10 M5 5E	B	5.9	-17.8	1.6	M5 V	19.3	7520.1
VB 11 C 7	B	33.8	-35.7	-4.4	M0 V	15.8	8120.1
Van Maanen's Star G1 7	A	13.3	2.7	1.2	G1 VII	14.26	350.0
Vega A0 V	A	3.1	-20.3	16.4	A0 V	0.5	7210.0
Vogelheim K3 V	A	-29.6	-5.9	19.4	K3 V	8	4841.0
WX Ursae Majoris M8 5E	B	-12.3	3.1	12.1	M8 V	15.88	4120.1
Wolf 47 M7 5EF	A	13.7	3.6	26.9	M7 V	13.81	510.0
Wolf 219 A 7	A	24.3	35.3	14.2	A0 VII	14.5	1510.0
Wolf 358 M5 5	A	-21.7	7.0	2.8	M5 V	12.42	4020.0
Wolf 414 M5	A	-41.1	-4.8	6.3	M5 VI	11.5	4690.0
Wolf 424	B	-13.8	-1.9	2.2	M0 V	15.2	4730.1
Wolf 424 M5.5 5E	A	-13.8	-1.9	2.2	M5 V	14.98	4730.0
Wolf 433 M4 5	A	-38.4	-6.2	8.2	M4 V	10.9	4800.0
Wolf 437 M4 5	A	-27.7	-5.6	4.9	M4 V	11.68	4860.0
Wolf 457 C 7	A	-38.5	-9.9	2.6	G2 VII	15.5	4920.0
Wolf 461 M5 5E	A	-34.9	-9.1	3.7	M5 V	13	4931.0
Wolf 461 SB	B	-34.9	-9.1	3.7	M0 V	13	4931.1
Wolf 489 K 7	A	-22.6	-9.9	1.7	K0 VII	15.36	5180.0
Wolf 534 M4	A	-35.7	-24.3	-5.4	M4 V	13.9	5430.0
Wolf 629 M4 6	A	-5.8	-19.2	-2.9	M4 VI	12.73	6430.0
Wolf 629 SB	B	-5.8	-19.2	-2.9	M0 V	13	6430.1
Wolf 906 M3	A	27.8	-28.1	-4.6	M3 VI	10.6	8160.0
Wolf 918 M3	A	24.7	-23.5	-8.2	M3 VI	10.5	8210.0
Wolf 922 M4.5 5E	A	18.9	-14.7	-4.3	M4 V	12.59	8310.0
Wolf 1039 M4	A	40.4	-5.1	0.0	M4 VI	10.6	8990.0
Wolf 1056 M4 5	A	34.7	5.5	20.5	M4 V	10.54	260.0
Wolf 1084 M5 5E	A	16.5	-19.5	36.6	M5 V	14.4	8020.0
Wolf 1421 M2 5	A	-18.3	36.9	15.4	M2 V	10.7	2890.0
Wolf 1466 M0.5	A	7.9	-48.0	-9.1	M0 V	10.5	7230.0
Wolf 1539 M4 5E	A	11.9	37.6	4.4	M4 V	11.6	1790.0
Wolf 1561 M4.5 5E	A	28.0	-13.9	-5.0	M4 V	13.6	8520.0
Wolf 1561 M5 5E	B	28.0	-13.9	-5.0	M5 V	14.6	8520.1
Xi Bootis G8 VE	A	-15.4	-14.0	7.2	G8 V	5.53	5660.0
Xi Bootis K4 VE	C	-15.4	-14.0	7.2	K4 V	7.69	5660.2
Xi Bootis SB	B	-15.4	-14.0	7.2	M0 V	15.0	5660.1
Xi Ursae Majoris G0 VE	A	-25.0	4.9	15.7	G0 V	4.9	4230.0
Xi Ursae Majoris G0 VE	C	-25.0	4.9	15.7	G0 V	5.38	4230.2
Xi Ursae Majoris SB	B	-25.0	4.9	15.7	M0 V	13.0	4230.1
Xi Ursae Majoris SB	D	-25.0	4.9	15.7	M0 V	13.0	4230.3
Xiuning M1 V	A	7.8	-6.1	-11.6	M1 V	10.32	8320.0
YY Geminorum K6 V	E	-15.6	36.9	25.0	K6 V	8.26	2780.4
YY Geminorum SB K6 V	F	-15.6	36.9	25.0	K6 V	9.8	2780.5
YZ Canis Minoris M4.5 5	A	-8.5	17.7	1.2	M4 V	12.29	2850.0
Zeta Doradus F8 V	A	6.1	24.9	-40.5	F8 V	4.1	1890.0
Zeta Draconis G0 V	A	-5.0	-11.0	-33.0	G0 V	4.7	6240.0
Zeta Draconis SB	B	-5.0	-11.0	-33.0	M0 V	13.0	6240.1
Zeta Herculis G0 IV	A	-9.2	-25.1	16.4	G0 IV	2.97	6350.0
Zeta Herculis K0 5	B	-9.2	-25.1	16.4	K0 V	5.57	6350.1
Zeta Tucanae G2 V	A	9.7	0.7	-21.2	G2 V	4.96	170.0
Zeta1 Reticuli G2 V	A	10.9	12.6	-32.6	G2 V	5.28	1360.0
Zeta2 Reticuli G1 V	A	10.9	12.7	-32.6	G1 V	4.98	1380.0

COMPANIONS

Many of the systems in the *Near Star List* contain binary or multiple stars. This companion list shows each multiple star in the *Near Star List* and indicates the names of all companion stars for it.

Name: Companions

26 Draconis G1 V A: 26 Draconis B
26 Draconis M0.5 5 B: 26 Draconis A
44 I Bootis G1 5 A: 44 I Bootis B, C
44 I Bootis G2 5 B: 44 I Bootis A, C
44 I Bootis SB G2 5 C: 44 I Bootis A, B
61 Cygni A K5 VE A: 61 Cygni A B, 61 Cygni B C
61 Cygni A UC B: 61 Cygni A A, 61 Cygni B C
61 Cygni B K7 VE C: 61 Cygni A A, 61 Cygni A B
70 Ophiuchi K0 VE A: 70 Ophiuchi B, DM+ 2 3482 C
70 Ophiuchi UC B: 70 Ophiuchi A, DM+ 2 3482 C
85 Pegasi G3 V A: DM+26 4734 B, C
AC+18 1890-112 M4 A: L1272-21 B
AC+20 1463-148 M2 6 A: AC+20 1463-154 B
AC+20 1463-154 M2 6 B: AC+20 1463-148 A
AC+32 54804 M5 5 A: AC+32 54804 B
AC+32 54804 M5 5 B: AC+32 54804 A
AC+32 86401 A 7 B: AC+32 86422 A
AC+32 86422 M5 5 A: AC+32 86401 B
AC+38 23616 M5 5E A: AC+38 23616 B
AC+38 23616 SB B: AC+38 23616 A
AC+39 57322 C: AC+39 57322 A, B
AC+39 57322 M3 5 B: AC+39 57322 A, C
AC+39 57322 M3 5E A: AC+39 57322 B, C
AC+39 60670 B: AC+39 60670 A
AC+39 60670 M0 5 A: AC+39 60670 B
AC+58 25001 M4 5 A: AC+58 25002 B
AC+58 25002 A D B: AC+58 25001 A
AC+65 6955 M3 5 A: AC+65 6955 B
AC+65 6955 SB B: AC+65 6955 A
AC- 7 342-397 M5 5 B: AC- 7 342-402 A
AC- 7 342-402 A 7WK A: AC- 7 342-397 B
Alpha Centauri G2 V A: Alpha Centauri B
Alpha Centauri K0 V B: Alpha Centauri A
Alpha Fornacis B: Alpha Fornacis A
Alpha Fornacis F8 IV A: Alpha Fornacis B
Augereau M2 VE A: WX Ursae Majoris B
Bessieres M2 VE A: Bessieres B
Bessieres UC B: Bessieres A
Beta Aquilae G8 IV A: Beta Aquilae B
Beta Aquilae M3 5 B: Beta Aquilae A
Beta Cassiopei F2 IV A: Beta Cassiopei B
Beta Cassiopei SB B: Beta Cassiopei A
Broward M5 5 A: DM-12 4523 B
Capella A G8 III A: Capella B B
Capella B F5 III B: Capella A A
Capella H A M2 5 A: Capella H B B
Capella H B M5 5 B: Capella H A A
Castor A A1 V A: Castor B, C, D, YY Geminorum E, F
Castor A SB A1 V B: Castor A, C, D, YY Geminorum E, F
Castor B A5 V C: Castor A, B, D, YY Geminorum E, F
Castor B SB A5 V D: Castor A, Castor B, C, YY Geminorum E, F
Catherine's Star B: Henry's Star A
Chi Draconis F7 V A: Chi Draconis B
Chi Draconis SB B: Chi Draconis A
Clarkesstar M4.5 5E A: DM- 8 4352 B, VB 8 C
DM+ 2 3482 K6 VE C: 70 Ophiuchi A, 70 Ophiuchi B
DM+ 4 4048 M3.5 VE A: VB 10 B
DM+ 5 1668 M5 5 A: DM+ 5 1668 B

DM+ 5 1668 UC B: DM+ 5 1668 A
DM+ 5 3409 B: DM+ 5 3409 A
DM+ 5 3409 M1 V A: DM+ 5 3409 B
DM+ 6 398 K3 V+ A: DM+ 6 398 B, C
DM+ 6 398 M4 5 C: DM+ 6 398 A, DM+ 6 398 B
DM+ 6 398 UC B: DM+ 6 398 A, C
DM+10 1032 B: DM+10 1032 A
DM+10 1032 M3 5 A: DM+10 1032 B
DM+11 2576 M1 V A: DM+11 2576 B
DM+11 2576 SB B: DM+11 2576 A
DM+15 4733 M2 5E A: DM+15 4733 B
DM+15 4733 SB B: DM+15 4733 A
DM+17 2611 K2 V A: DM+17 2611 B
DM+17 2611 M2 5E B: DM+17 2611 A
DM+19 2881 K1 V A: DM+19 2881 B
DM+19 2881 SB B: DM+19 2881 A
DM+19 5116 M4 5E A: DM+19 5116 B
DM+19 5116 M6 5E B: DM+19 5116 A
DM+24 2733 M1 5 A: DM+24 2733 B
DM+24 2733 M2 5 B: DM+24 2733 A
DM+24 2786 G2 5 A: DM+24 2786 B
DM+24 2786 SB B: DM+24 2786 A
DM+26 4734 M5 V B: 85 Pegasi A, DM+26 4734 C
DM+26 4734 SB M3 V C: 85 Pegasi A, DM+26 4734 B
DM+27 2296 K6 5 B: Hochbaden A
DM+27 4120 M0 5E A: DM+27 4120 B
DM+27 4120 SB B: DM+27 4120 A
DM+28 1660 G8 V A: G 47-9 B
DM+31 2240 K9 VE A: DM+31 2240 B
DM+31 2240 M2 5 B: DM+31 2240 A
DM+31 3767 M1 5 A: DM+31 3767 B
DM+31 3767 M2 B: DM+31 3767 A
DM+35 2436 M0 5 A: DM+35 2436 B
DM+35 2436 M3 B: DM+35 2436 A
DM+36 1638 M3.5 5E A: DM+36 1638 B, Ross 989 C
DM+36 1638 SB B: DM+36 1638 A, Ross 989 C
DM+36 1979 B: DM+36 1979 A
DM+36 1979 G8 IV A: DM+36 1979 B
DM+39 2376 B: DM+39 2376 A
DM+39 2376 M2 5E A: DM+39 2376 B
DM+42 1956 B: DM+42 1956 A
DM+42 1956 F5 V A: DM+42 1956 B
DM+43 4305 M4.5 5E A: DM+43 4305 B
DM+43 4305 SB B: DM+43 4305 A
DM+45 2505 M3.5 B: Red Speck A
DM+45 2743 M2 5 A: VB 9 B
DM+45 4408 K9 5E A: DM+45 4408 B, C
DM+45 4408 M0 5E C: DM+45 4408 A, B
DM+45 4408 SB B: DM+45 4408 A, C
DM+47 2112 M3 5E A: DM+47 2112 B
DM+47 2112 M3 5E B: DM+47 2112 A
DM+48 2108 B: DM+48 2108 A
DM+48 2108 M2 5E A: DM+48 2108 B
DM+51 2402 K6 VE A: DM+51 2402 B
DM+51 2402 SB B: DM+51 2402 A
DM+53 1320 M0 VE A: DM+53 1321 B
DM+53 1321 M0 VE B: DM+53 1320 A
DM+55 1519 M2 5E A: G197-50 B
DM+59 1915 M4 5 A: DM+59 1915 B
DM+59 1915 M5 5 B: DM+59 1915 A
DM+61 195 M2 5E A: DM+61 195 B
DM+61 195 SB B: DM+61 195 A
DM+66 34 M2.5 5E A: DM+66 34 B
DM+66 34 M4.5 B: DM+66 34 A
DM+67 1014 K0 V A: DM+67 1014 B
DM+67 1014 SB B: DM+67 1014 A
DM+67 552 M1 5 A: DM+67 552 B, DM-22 2345 C
DM+67 552 SB B: DM+67 552 A, DM-22 2345 C
DM+67 935 M0 VE. A: DM+67 935 B
DM+67 935 M3 5 B: DM+67 935 A
DM+68 946 M3.5 V A: DM+68 946 B
DM+68 946 SB B: DM+68 946 A

DM+71 482 K5 V A: DM+71 482 B
DM+71 482 M0 5 B: DM+71 482 A
DM+74 1047 K3 V A: DM+74 1047 B, DM+74 1047 C
DM+74 1047 M2 C: DM+74 1047 A, DM+74 1047 B
DM+74 1047 SB B: DM+74 1047 A, DM+74 1047 C
DM+74 456 K5 5 A: DM+74 456 B
DM+74 456 M2 B: DM+74 456 A
DM- 1 565 K5 5E A: DM- 1 565 B, C
DM- 1 565 M3 5E+ B: DM- 1 565 A, C
DM- 1 565 SB C: DM- 1 565 A, B
DM- 2 2901 F6 V A: DM- 2 2902 B
DM- 2 2902 K0 B: DM- 2 2901 A
DM- 3 1061 K3 V A: DM- 3 1061 B
DM- 3 1061 M2 B: DM- 3 1061 A
DM- 3 2001 K2 VE A: DM- 3 2002 B
DM- 3 2002 K5 5 B: DM- 3 2001 A
DM- 3 2870 M2 5 A: DM- 3 2870 B
DM- 3 2870 SB B: DM- 3 2870 A
DM- 3 3508 K6 5 A: DM- 3 3508 B
DM- 3 3508 SB B: DM- 3 3508 A
DM- 5 1123 K3 V+ A: DM- 5 1123 B
DM- 5 1123 SB B: DM- 5 1123 A
DM- 5 1844 K6 5 A: DM- 5 1844 B
DM- 5 1844 M2 B: DM- 5 1844 A
DM- 6 4663 M2 5 A: DM- 6 4663 B
DM- 6 4663 SB B: DM- 6 4663 A
DM- 7 781 A 7 B: Omicron2 Eridani A, DM- 7 781 C
DM- 7 781 M4.5 5E C: Omicron2 Eridani A, DM- 7 781 B
DM- 8 2582 M0 5 A: DM- 8 2582 B
DM- 8 2582 SB B: DM- 8 2582 A
DM- 8 4352 M4.5 5 B: Clarkesstar A, VB 8 C
DM-12 2918 M4 5 A: DM-12 2918 B
DM-12 2918 M4 5 B: DM-12 2918 A
DM-12 4523 SB B: Broward A
DM-13 2267 B: DM-13 2267 A
DM-13 2267 G1 V A: DM-13 2267 B
DM-14 5936 K1 VE A: DM-14 5936 B
DM-14 5936 M0 B: DM-14 5936 A
DM-17 6768 B: DM-17 6768 A
DM-17 6768 M5 A: DM-17 6768 B
DM-19 3242 M C B: DM-19 3242 A
DM-19 3242 M0 5 A: DM-19 3242 B
DM-19 5899 B: DM-19 5899 A
DM-19 5899 M2 5 A: DM-19 5899 B
DM-20 4123 M2 V B: DM-20 4125 A
DM-20 4125 K5 VE A: DM-20 4123 B
DM-21 1051 B: DM-21 1051 A
DM-21 1051 M1 5 A: DM-21 1051 B
DM-21 6267 M2 5E A: DM-21 6267 B, L 717-22 C
DM-21 6267 SB B: DM-21 6267 A, L 717-22 C
DM-22 1210 K2 V B: Gamma Leporis A, VB 1 C
DM-22 2345 F6 V C: DM+67 552 A, DM+67 552 B
DM-25 225 B: DM-25 225 A
DM-25 225 G5 V A: DM-25 225 B
DM-26 12026 K1 VE A: DM-26 12026 B, DM-26 12036 C
DM-26 12026 K1 VE B: DM-26 12026 A, DM-26 12036 C
DM-26 12036 K5 VE C: DM-26 12026 A, B
DM-27 14659 K1 V A: DM-27 14659 B
DM-27 14659 SB B: DM-27 14659 A
DM-31 325 K3 V+ A: DM-31 325 B
DM-31 325 SB B: DM-31 325 A
DM-32 16135 M4.5 5E A: DM-32 16135 B
DM-32 16135 M4.5 5E B: DM-32 16135 A
DM-32 8179 K0 V A: VB 4 B
DM-34 11626 K1 VE A: DM-34 11626 B, C
DM-34 11626 K5 V B: DM-34 11626 A, C
DM-34 11626 M2 C: DM-34 11626 A, B
DM-34 4036 F5 V A: DM-34 4036 B
DM-34 4036 K3 B: DM-34 4036 A
DM-35 3233 B: DM-35 3233 A
DM-35 3233 F8 V A: DM-35 3233 B
DM-36 13940 K3 V A: DM-36 13940 B

DM-36 13940 M5 5 B: DM-36 13940 A	L 745-46 M 5 B: L 745-46 A
DM-37 10500 A 7S B: DM-37 10500 A	L 820-19 B: L 820-19
DM-37 10500 G6 V A: DM-37 10500 B	L 820-19 M6 A: L 820-19 B
DM-37 10765 M4 A: DM-37 10765 B	L 856-54 B: L 856-54 A
DM-37 10765 M7 B: DM-37 10765 A	L 856-54 M5 A: L 856-54 B
DM-39 10940 B: DM-39 10940 A	L 989-20 B: L 989-20 A
DM-39 10940 K5 V A: DM-39 10940 B	L 989-20 G A: L 989-20 B
DM-39 7301 G5 V A: VB 5 B	L1272-21 M6 B: AC+18 1890-112 A
DM-42 249 B: DM-42 249 A	LP101-15 M4 5E A: LP101-15 B, LP101-16 C
DM-42 249 K5 V A: DM-42 249 B	LP101-15 SB B: LP101-15 A, LP101-16 C
DM-44 3045 M4.5 A: DM-44 3045 B	LP101-16 7 C: LP101-15 A, B
DM-44 3045 M4.5 B: DM-44 3045 A	Mu Cassiopei G5 VI A: Mu Cassiopei B
DM-44 775 K6 VE A: DM-44 775 B	Mu Cassiopei M8 5 B: Mu Cassiopei A
DM-44 775 SB B: DM-44 775 A	Mu Herculis G5 IV A: Mu Herculis B, C
DM-46 11370 G8 V A: DM-46 11370 B	Mu Herculis M4 5 C: Mu Herculis A, B
DM-46 11370 M0 V B: DM-46 11370 A	Mu Herculis M4 5E B: Mu Herculis A, C
DM-46 12902 B: DM-46 12902 A	Omicron2 Eridani K1 VE A: DM- 7 781 B, C
DM-46 12902 K9 V A: DM-46 12902 B	Rho Eridani K2 V A: DM-56 328 B
DM-46 3046 B: DM-46 3046 A	Procyon A F5 IV A: Procyon B
DM-46 3046 K2 V A: DM-46 3046 B	Procyon B F 7 B: Procyon A
DM-51 10924 M B: DM-51 10924 A	Qinyuan M5.5 5 A: UV Ceti B
DM-51 10924 M0 A: DM-51 10924 B	Red Speck M3 5 A: DM+45 2505 B
DM-51 13128 M0 A: L 283-7 B	Ross 42 M4 5E A: Ross 42 B
DM-54 9222 B: DM-54 9222 A	Ross 42 SB B: Ross 42 A
DM-54 9222 G1 V A: DM-54 9222 B	Ross 52 M5 A: Ross 52 B
DM-56 328 K5 VE B: Rho Eridani A	Ross 52 M5 B: Ross 52 A
DM-60 3532 K7 V A: DM-60 3532 B	Ross 165 B: Ross 165 A
DM-60 3532 M0 VE B: DM-60 3532 A	Ross 165 M4.5 5 A: Ross 165 B
Delta Aquilae F0 IV A: Delta Aquilae B	Ross 193 M4 5E A: VB 11 B
Delta Aquilae SB B: Delta Aquilae A	Ross 486 M4 5 A: Ross 486 B
Delta Trianguli G0 VE A: Delta Trianguli B	Ross 486 M6 5 B: Ross 486 A
Delta Trianguli SB B: Delta Trianguli A	Ross 614 B: Ross 614 A
Epsilon Ceti B: Epsilon Ceti A	Ross 614 M7 5E A: Ross 614 B
Epsilon Ceti F8 V A: Epsilon Ceti B	Ross 867 M5 5E B: Ross 868 A
Epsilon Eridani K2 VE A: Epsilon Eridani B	Ross 868 M4 5E A: Ross 867 B
Epsilon Eridani UC B: Epsilon Eridani A	Ross 989 M4.5 5E C: DM+36 1638 A, B
Eta Bootis G0 IV A: Eta Bootis B	Sirius A A1 V A: Sirius B
Eta Bootis SB B: Eta Bootis A	Sirius B A 7 B: Sirius A
Eta Cassiopei G0 V A: Eta Cassiopei B	Theta Bootis F7 V A: Theta Bootis B, G200-38 C
Eta Cassiopei M0 V B: Eta Cassiopei A	Theta Bootis M3.5 B: Theta Bootis A, G200-38 C
G 47-9 M5 B: DM+28 1660 A	Theta Persei F7 V A: Theta Persei B
G107-69 M6 6 A: G107-69 B, G107-70 C, D	Theta Persei M2 5E B: Theta Persei A
G107-69 SB M5 5 B: G107-69 A, G107-70 C, D	UV Ceti M5.5 5F B: Qinyuan A
G107-70 A 7 C: G107-69 A, B, G107-70 D	VB 1 M VII C: Gamma Leporis A, DM-22 1210 B
G107-70 SB M5 V D: G107-69 A, B, G107-70 C	VB 4 B: DM-32 8179 A
G197-50 3 C B: DM+55 1519 A	VB 5 B: DM-39 7301 A
G200-38 K1 C: Theta Bootis A, B	VB 8 C: Clarkesstar A, DM- 8 4352 B
Gamma Leporis F6 V A: DM-22 1210 B, VB 1 C	VB 9 M B: DM+45 2743 A
Gamma Virginis F0 V A: Gamma Virginis B	VB 10 M5 5E B: DM+ 4 4048 A
Gamma Virginis F0 V B: Gamma Virginis A	VB 11 C 7 B: Ross 193 A
Groombridge 34 M1 VE+ A: Groombridge 34 B, C	WX Ursae Majoris B: Augereau A
Groombridge 34 M6 V C: Groombridge 34 A, B	Wolf 424 B: Wolf 424 A
Groombridge 34 SB B: Groombridge 34 A, C	Wolf 424 M5.5 5E A: Wolf 424 B
Henry's Star G8 VI A: Catherine's Star B	Wolf 461 M5 5E A: Wolf 461 B
Hochbaden K6 5 A: DM+27 2296 B	Wolf 461 SB B: Wolf 461 A
Iota Pegasi F5 V A: Iota Pegasi B	Wolf 629 M4 6 A: Wolf 629 B
Iota Pegasi SB B: Iota Pegasi A	Wolf 629 SB B: Wolf 629 A
Iota Ursae Majoris D: Iota Ursae Majoris A, B, C	Wolf 1561 M4.5 5E A: Wolf 1561 B
Iota Ursae Majoris A7 V A: Iota Ursae Majoris B, C, D	Wolf 1561 M5 5E B: Wolf 1561 A
Iota Ursae Majoris M1 5 B: Iota Ursae Majoris A, C, D	Xi Bootis G8 VE A: Xi Bootis B, C
Iota Ursae Majoris SB C: Iota Ursae Majoris A, B, D	Xi Bootis K4 VE C: Xi Bootis A, B
Kruger 60 A M3 5 A: Kruger 60 B B	Xi Bootis SB B: Xi Bootis A, C
Kruger 60 B M4.5 5E B: Kruger 60 A A	Xi Ursae Majoris G0 VE A: Xi Ursae Majoris B, C, D
L 68-27 M B: L 68-28 A	Xi Ursae Majoris G0 VE C: Xi Ursae Majoris A, B, D
L 68-28 K0 A: L 68-27 B	Xi Ursae Majoris SB B: Xi Ursae Majoris A, C, D
L 115-21 M A: L 115-21 B	Xi Ursae Majoris SB D: Xi Ursae Majoris A, B, C
L 115-21 M B: L 115-21 A	YY Geminorum K6 V E: Castor A, B, C, D, YY Geminorum F
L 283-7 A B: DM-51 13128 A	YY Geminorum SB K6 V F: Castor B, C, D, YY Geminorum E
L 489-58 B: L 489-58 A	Zeta Draconis G0 V A: Zeta Draconis B
L 489-58 G0 6 A: L 489-58 B	Zeta Draconis SB B: Zeta Draconis A
L 717-22 M4 5E C: DM-21 6267 A, B	Zeta Herculis G0 IV A: Zeta Herculis B
L 745-46 F0 7 A: L 745-46 B	Zeta Herculis K0 5 B: Zeta Herculis A

2300 MAN'S BATTLE F

Ross 417

L597-31

Psi5 Aurigae

DM +10 1032
DM -49 2340
DM +17 1320
DM -35 3233
DM +18 1214

Ross 64
DM +60 1003
L182-44

L886-6

AC +47 256-150
L745-46
DM -5 1844
DM -36 1638
G107-69
DM -46 3046
G107-70
DM -25 3913

DM -13 2267

Wolf 1421
Castor
DM -12 2449
DM -34 4036
DM -4 2226
Pollux
DM -31 6229

DM -13 2267

DM -3 2001

DM +12 1944

DM -8 2582

DM -22 2345

L820-19
DM -4 2490
DM -28 1660

DM +42 1956
iota Ursae Majoris

DM +18 2776

AC -13 1301-119
DM +36 1970
DM +6 2182

DM -2 2901

DM -2 3000

DM -23 8646

French
Arm

LP658-2

DM −44 3045

Ross 619

YZ Canis Minoris

DM −21 1377

AC +33 256

L674-15

AC +38 23616

Ross 614

DM +5 1668

Procyon

Sirius

DM +80 2

L97-12

DM +67 552

DM −59 2351

DM +71 482

DM +53 1320

AC +70 4337

AC +70 4336

Neubayern

AC +82 1111

Augereau

Nyotekundu

DM −74 456

Bessières

DM +66 717

L145-141

Ross 128

AC +79 3888

Sol

L168-28

Alpha Centauri

Queen Alice's Star

AC +66 3955

DM +68 946

Bernard's Star

DM +46 11540

DM −46 11540

Zeta Draconis

Broward

DM +67 935

L74-113

Red Spec

DM −26 1

Ellis

DM −46 11370

DM −34 1

DM −37 10765

Clarkesstar

Wolf 629

L316-62

DM −38 4789

L675-81

G195-19

DM −32 5613

DM −12 2918

LP425-140

DM −40 5404

L678-39

DM −36 1979

DM −42 5678

DM −45 5378

DM +63 869

DM −56 1459

DM −56 1458

Wolf 358

Xi Ursae Majoris

AC +23 468-46

DM −60 3532

L192-72

DM +50 1832

61 Ursae Majoris

DM −39 7301

Berthier

Henry's Star

DM +55 1519

AC +13 14332

DM −68 1095

DM −51 6859

Wolf 424

C1

DM −51 5974

DM −15 2620

DM +48 2108

DM −58 5564

DM −20 4125

DM −40 9712

DM −11 3759

Xi Boötis

DM −7 4003

Beta Trianguli Australis

G200-38

Theta Boötis

44 I Boötis

DM −45 2247

L339-19

DM −43 1953

Ross 92

DM +46 1551

L824-28

DM +48 1829

DM −45 5627

DM −3 2870

L968-22

DM +46 1635

L897-16

G44-42

DM −18 3019

DM −39 2376

DM +1 2447

DM −23 9765

Xi Ursae Majoris

L396-7

DM −32 8179

DM −43 7228

DM +27 28217

DM +36 2219

DM −26 8883

Ross 627

DM −19 3242

DM −31 9113

DM +42 2296

Beta Canum Venaticorum

Ross 695

Kimanjano

DM −45 7872

Wolf 437

Vogelheim

Beta Comae Berenices

DM +46 1889

DM −17 3813

DM −11 2576

Wolf 489

L258-146

DM +36 2393

DM +50 2030

DM +47 2112

Hochbaden

Eta Boötis

DM −1 2892

Arcturus

Ross 848

DM −11 2741

DM −29 8019

L1113-55

L829-26

Beta Virginis

Ross 119

DM +22 2302

DM +41 2147

DM +31 2240

DM +34 2323

Gamma Virginis

DM +0 2989

Wolf 461

DM +13 2618

Ross 974

DM −37 8437

DM +17 2611

DM +18 2776

DM −21 3781

DM +10 2531

Ross 486

DM +27 2055

Denebola

L901-10

DM −9 3413

Alpha Crucis

Wolf 414

DM −9 2636

AC +10 95-26

DM −16 2404

Wolf 433

Wolf 457

DM −10 2531

DM −3 3508

Theta Centauri

Chinese Arm

26 Draconis
AC +61 26806
DM −57 6303
DM −51 10924
Zeta Herculis
King
New Me
DM −48 118
Mu Arae
Botany Bay
AC +41 726-154
Ross 863
Ross 868
DM −5 3409
Ross 867
DM −4 4225
DM +32 2896
L989-20
DM −25 3173
DM −39 10940
DM −1 3220
DM −41 2695
L768-119
AC +54 1646-56
LP101-15
L1346-53
DM +39 2947
Lambda Serpenti
DM −37 10500
Gamma Serpenti
DM −24 12677
DM −21 4352
DM −16 2708
DM −19 2881
Ross 508
AC +18 1890-112
Ross 802
AC −12 2306-155
DM +16 2658
DM −25 2874
DM −23 11940
DM +13 2901
Ross 845
Wolf 534
DM +24 2733
DM +24 2733 B
DM +24 2786
DM −24 2733 B

51 5974
DM +71 482
AC +70 4337
AC +70 4336
Neubayern
Augereau
DM +74 456
DM +66 717
Ross 128
AC +79 3888
L168-28
Nyotekundu
Bessières
L1145-141
AC +82 1111
Sirius
DM +53 1320
DM +80 238
L97-12
Kapelyn's Star
Alpha Mensae
AC +58 25001
Epsilon Eridani
Tau Ceti
DM −68 47
Rho Eridani
Mu Cassiopei
Van Maanen's Star
Wolf 47
DM +61 195
DM +66 34
Zeta Tucanae
Hunjiang
AC +79 1584
Eta Cassiopei
Groombridge 34
AC −71 532
DM +74 1047
DM −73 1672
DM +56 2966
DM −15 6290
DM +63 229
DM +61 366
Haifeng
DM +63 238
DM +44 4548
L362-81
DM +1 4774
DM +19 5116
DM +57 27
Fomalhaut
DM −15 4733
DM −32 1
Sol
Proxima Centauri
Alpha Centauri
Beta Hydri
Ross 248
149.19
Kruger 60
61 Cygni
Epsilon Indi
Xiuning
Lacaille 9352
DM +43 4305
L1789-6
DM −39 14192
Gamma Pavonis
DM +61 2068
AC +65 6955
L1119-21
Wolf 424
Queen Alice's Star
AC +66 3955
DM +59 1915
Sigma Draconis
Delta Pavonis
Chi Draconis
DM −76 785
Serurier
AC −45 13677
DM −36 13940
Barnard's Star
DM +68 946
DM −46 11540
Broward
DM +67 935
Red Speck
DM −26 12026
DM −67 1014
70 Ophiuchi
D'Artagnon
Davout
AC −70 8247
L347-14
Altair
1626

NEAR STAR MAP

SCALE

one ly (light year) = 5 mm

one ly ▬

one parsec ▬▬▬

MORE INFORMATION

Additional data for each star is provided in the accompanying Near Star List. Information provided includes spectral type, size, magnitude, XYZ coordinates, and distance from earth.

STELLAR SPECTRAL TYPES

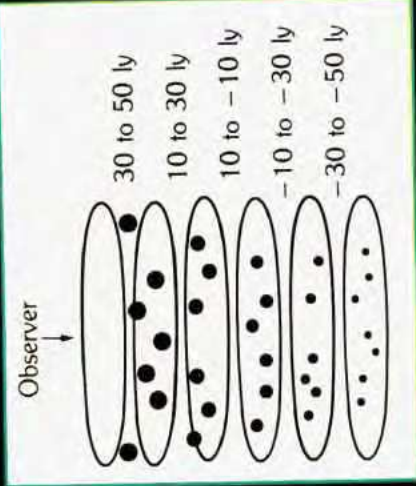| Type	Color	Temperature °K
A	Blue	7500° to 11,000°
F	White	6000° to 7500°
G	Yellow	5000° to 6000°
K	Orange	3500° to 5000°
M	Red	less than 3500°

Z AXIS DISTANCE

● 30 to 50 ly
● 10 to 30 ly
● −10 to 10 ly
• −30 to −10 ly
• −50 to −30 ly

Z axis distance is the value above or below the map plane. Symbols represent perspective distance, not stellar size.

SENSING THE Z AXIS

Observer →

30 to 50 ly
10 to 30 ly
10 to −10 ly
−10 to −30 ly
−30 to −50 ly

XYZ AXES

Z axis
X axis
Y axis

On this map, the X axis extends left-right, the Y axis extends up-down, and Z axis extends in-out (of the map sheet.)

Star labels

- AC+32 54804
- 43 2796
- erculis
- M-3 4233
- DM-58 7076
- ourne
- AC+20 1463-148
- DM-48 12818
- DM+52 2294
- Ross 165
- DM+38 3095
- DM+45 2743
- DM-51 2402
- AC-7 342-402
- DM-46 12902
- DM-43 12343
- L489-58
- DM+45 2688
- AC+8 142-393
- DM+5 3993
- DM+25 3719
- AC+16 247-80
- Wolf 1466
- L1064-75
- AC+3 2528-176
- DM-18 4986
- DM-21 5081
- DM+18 3606
- DM+15 3364
- DM-1 3474
- 663
- DM-23 15935
- L997-21
- DM+31 3767
- DM-28 16676
- Ross 188
- AC+24 747-102
- DM-24 16193
- DM-19 5899
- Ross 193
- DM-14 5936
- L714-88
- DM+27 4120
- Wolf 918
- AC+20 76187
- G24-16
- Psi Capricorni
- AC+39 57322
- AC+22 308-605
- Wolf 906
- L856-54
- AC+2 2155-242
- BPM 94172
- DM+2 4076
- AC+13 1185-145
- DM-24 15668
- DM+4 4157
- DM+7 4052
- Delta Aquilae
- Beta Aquilae
- L850-62