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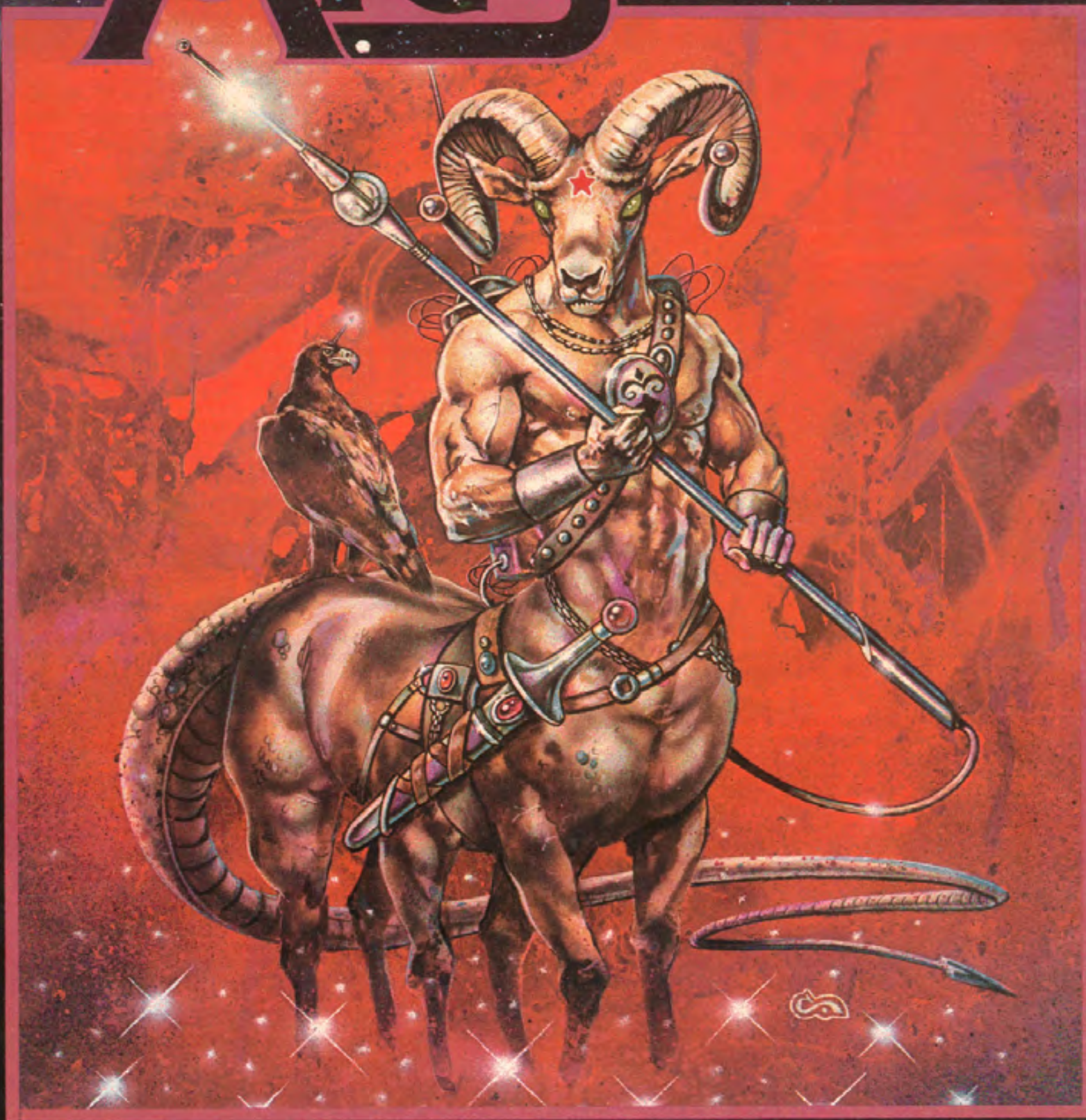

SPI

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The Expanding Universe of Traveller

Why do more people play Traveller than any other science fiction role-playing game? Because GDW knows that you can't fit the whole universe into one box.

There are nearly 50 adventures, supplements, rules expansions, games, and modules for Traveller—so far. Each one adds new ideas to make your campaign more exciting. Choose just the ones you want—the Traveller universe is as large as you want to make it.

The Traveller Adventure

Actually, it's much more than an adventure: it's a whole series of adventures making up an integrated campaign. It's a 160-page, 8½×11" book filled with enough adventure to last for months of play.

It all starts when the adventurers meet Gvoudzon, a Vargr who has a stolen treasure: a jeweled brooch with a secret message hidden within it. Gvoudzon doesn't know what the message is, but soon the adventurers find that a great many powerful people are willing to kill to get it. Soon the party find themselves involved in a museum burglary, an attack by Vargr commandos, lanthanum smugglers, bureaucratic intrigues, kidnapping, and a full-scale megacorporate tradewar. Meanwhile, they must try to make a profit as the crew of a subsidized merchant, seeking cargo and patrons among the strange worlds and stranger inhabitants of the Aramis subsector: the underground city of Leedor, the nature-worshipping dictatorship of Pysadi, the eugenic elitists of Paya, the alien matriarchy of Yebab, Junidy with its co-dominium of humans and native "Dandelions", and many others.

Also included is a complete character generation system for the alien Vargr, plus a wealth of background information on the Imperium, the Spinward Marches, and the Aramis subsector.

The Traveller Adventure is the largest **Traveller** project ever undertaken; the equivalent of 6 to 8 of our other books, it's an amazing bargain at $12.

Murder on Arcturus Station

A corporate executive has been murdered on Station Three of Arcturus Belt. It's up to the referee to decide which of the nine suspects is guilty. Was it the executive's estranged wife? His mistress? The Solomani rebel? The Aslan noble? The adventure tells how to construct each of the possible crimes: motives, clues, alibis, even misleading clues pointing to the wrong suspect.

Then it's up to the adventurers to solve the mystery by questioning the suspects, discovering clues, and using their powers of deduction. But watch out: the murderer may strike again.

Murder on Arcturus Station is a classical mystery in the tradition of Agatha Christie and Dorothy Sayers—except that it takes place in an asteroid belt, one of the suspects isn't human, and several of the others are possessed of odd cultural quirks.

At 56 pages, *Murder on Arcturus Station* is longer than most **Traveller** adventures, but it's still only $5.

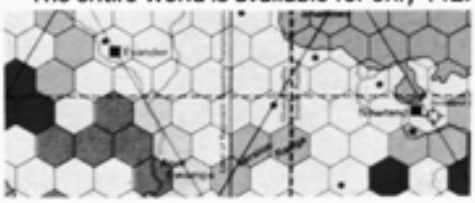
Tarsus

When a game takes in the entire universe, it's easy to forget how large and complex even a single world can be. **Traveller** boxed modules, of which *Tarsus* is the first, are intended as demonstrations of how much scope for adventure one planet, described in detail, can provide.

The 24-page world data book covers the world's history, geography, climate, flora and fauna, and the myriad other details that make this world unique in the universe.

Five scenario folders deal with a few of the possible adventure situations, including the maneuvers of various political factions and the megacorporation SuSAG, rumors of strange events deep in the tanglewald, and trouble on the family ranch. Also included are 3 maps and 12 character cards.

The entire world is available for only $12.



Scouts

Traveller Book 6 offers expanded treatment of the Scout Service similar to *Mercenary*'s and *High Guard*'s expansion of the Army and Navy. It describes the organization and history of the service, including all its various component offices and branches. A detailed character generation system offers new skills and makes provision for service in all branches of the Scout Service.

In addition, the book contains new rules for generating complete planetary systems: number, spectral type, and temperature of stars, habitable zones, and the number and orbits of all the system's planets and their moons. Rules for generating factors affecting a world's climate are also included: albedo, orbital eccentricity, average surface temperature, axial tilt, and the greenhouse effect are all taken into account.

The new rules are fully compatible with the original **Traveller** world creation rules, and systems already generated under the original rules may be expanded easily.

As an example, two complete stellar systems are included: Regina and Sol.

Price: $6.

Veterans

This supplement is a handy aid for the referee using Book 4, *Mercenary*. It contains over 200 pre-generated *Mercenary* characters from all branches of the Army and Marines, ranks from private to colonel, and tech levels from 7 to 15.

Veterans is especially useful when players are recruiting a mercenary unit. Each character is given a full resumé for the players to see; information reserved for the referee is in a separate section. Price: $5.

The Journal of the Travellers' Aid Society

The *Journal* is a quarterly magazine crammed with new **Traveller** material. Each issue contains two ready-to-play scenarios, a description of an alien race, and much more. If you're serious about **Traveller**, the *Journal* is for you.

Issue #18 is now available. Single issue: $2.50; subscriptions: $9 per year in the US and Canada, $18 (includes airmail) elsewhere.

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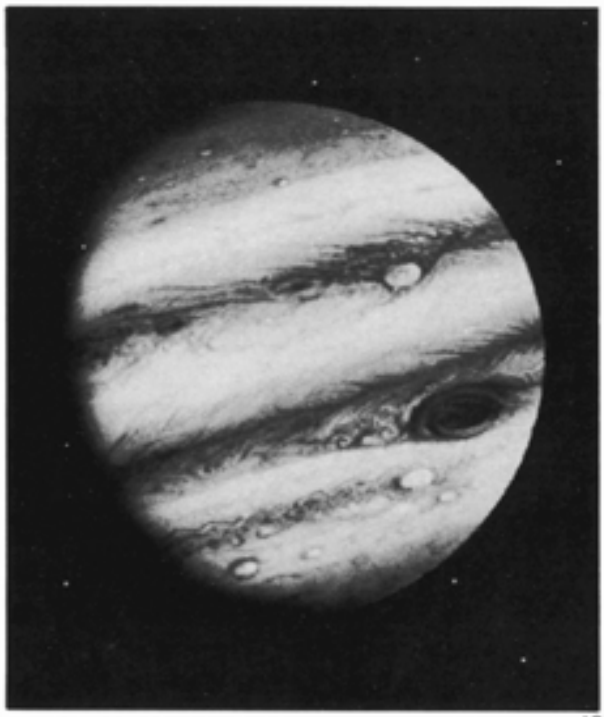
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ON THE COVER
"Equinoid" illustration by Clyde Caldwell. For more details, see page 46.

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Special Edition 2
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LOG

A few things were inadvertently forgotten when ARES™ Magazine #16 was put together. Thanks to subscriber Mr. Bill, we've learned that the quote on p.15 of that issue was not from *Hamlet*, but rather, *King Lear*. Tim Truman hereby gets credit for his artwork in "Return of The Stainless Steel Computer." Hopefully, Slippery Jim diGriz didn't mind if his name was slightly misspelled on page 3; it *looked* right, but alas. . . . Finally, we regretfully announce that the proposed "Classifieds" column has been cancelled due to lack of response. We sincerely apologize to those of you whose requests could not be met.

This issue investigates New Worlds, from outer and inner space. Six new worlds within our own solar system are described by Dave Stover, whose article on variable stars appeared in issue #14. A monumental article on creating planets for the STAR FRONTIERS™ game appears from Dave Cook, and Dale Kemper outlines the Far Frontiers Sector for TRAVELLER® gaming. "Tales of the Sky, Tales of the Land," Douglas Borsom's superb story of the trials interstellar colonists must face on the voyage to distant worlds, rounds out this side of the issue.

Inner space, the world of psionics, is covered for the GAMMA WORLD®, STAR FRONTIERS, and TRAVELLER game systems. Jim Ward's new mental mutations should keep all you mutants happy, and for the first time, a psionics system is offered for STAR FRONTIERS gamers. A last look at the strange lands of the mind takes shape in "Latent Image," our special offering for late-night readers.

Some preliminary feedback results are in for issue #16. Aside from the cover, THE HIGH CRUSADE™ game, the game reviews, and the letters column rated very well. It appears that very few readers play superhero role-playing games, and those who play post-holocaust games strongly prefer the GAMMA WORLD game system. The UNIVERSE™ and TRAVELLER games are the most often played and best-recognized SF-RPGs among our readership, with the STAR FRONTIERS and STAR TREK: The RPG™ games right behind. The most popular science-fiction boardgames are the OGRE™, STARSHIP TROOPERS™, and STAR FLEET BATTLES™ games, with the CAR WARS™, and STARFIRE™ games some distance behind. SPI science-fiction games such as THE RETURN OF THE STAINLESS STEEL RAT™ game and THE CREATURE THAT ATE SHEBOYGAN™ game rated very highly.

As we've said before, we look forward to your letters and hope that you enjoy this Special Edition of ARES Magazine.

Special notice: The address for Dale Archibald, a contributor to ARES Magazine #14 in the Software column, is not in our files. We would like for Dale Archibald to contact this magazine through Dragon Publishing.

The Editors

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I wish to express my appreciation for the noticeably improved quality of both ARES™ and S&T™ Magazines now that TSR publishes them. I also wish to comment on some reviews in ARES Magazine #15 — or perhaps I should say, comment on some reviewers.

Christopher John appears to have fallen into a common trap: He is reviewing the movie he wishes had been made, rather than the one produced. As I recall, when *Star Wars* first came out it was advertised by saying "never have so many millions been spent for just fun!" I see no reason to doubt that the entire trilogy — indeed, all three trilogies, if the other two are completed — are for anything else than "just fun." They are NOT any sort of serious science fiction (few movies are); they are essentially *The Three Musketeers* (in the latest form, which was slapstick-oriented) in space. As for his "points," I suggest that, had he liked the film, they would never have been noticed or mentioned.

I have noticed that many fans of this series have imputed to it a degree of seriousness and weight — especially in regarding "the Force" as some sort of serious philosophy. I suggest that your reviewer has fallen into this trap, leading him to attribute seriousness never intended to the film.

As for the discrepancies:

A) Yoda is older in this film; as people grow older they weaken and even die. Yoda was none too spry in *The Empire Strikes Back*, anyway. This is called "character development" when the reviewer likes the film.

B) Although the Force may be something anyone can sense, it may also be true that some families are especially good at it, it follows that only others who are especially good at it can offer them a serious challenge.

C) Han is jealous of Luke, not forgetful of Leia's feelings. I find it hard to believe that anyone would consider this a "contradiction," since it falls clearly within the pattern for romantic screen stories.

D) I remember arguing with people after *The Empire Strikes Back* who asserted that Vader could not possibly be Luke's father because, in the first picture, we were told that Luke's father was dead. This "contradiction" disappeared in this latest film; if more films are made (especially if the Clone Wars, which apparently started it all, are dealt with) we should learn more about Yoda and the Force and so (hopefully) resolve these "contradictions." This, however, is a minor problem (after all, we all have likes and dislikes).

I get the overall impression that your reviewers are trying too hard to be sophisticated and wise, when all they really need to be is informed. I really have no idea what a column like "Lexicon" is supposed to be doing, except showing off the (psuedo-) sophistication of the writer. Based on my experience with the movies reviewed, I don't think your reviews are going to help me decide what I want to see; the game reviews, however, at least have enough content (tell me enough about the game) to help me decide what to buy.

In closing, I wish to congratulate you on coming up with fiction that is actually worth reading, something rarely seen before in the magazine.

Paul S. Person
Seattle, WA

Readers who want to see more critical reaction to the Star Wars saga should consult the March 1984 issue of AMAZING™ Magazine, for A. J. Budrys' article, "The Revenge of the Empire."

My feelings about ARES Magazine #15 are summed up in the observation that the 64-page "science-fiction gaming magazine," actually had about 17 (count 'em) pages of science-fiction gaming. Worse, this included only game reviews and a shoot-em-up space opera product in which I, a long-time SPI customer, have no interest. If ARES Magazine #16 does have more SF gaming material (as promised in your reply to my last letter), I hope most of it is aimed at SPI-oriented science-fiction fans.

A few suggestions for future topics in ARES Magazine:

A) More games like STAR TRADER™ game set against the UNIVERSE™ game background. How about a battle between corporations to explore and colonize a particular planet or star system? Military games could include a campaign to suppress piracy, overthrow a dictatorship, or defend against an alien incursion.

B) Non-UNIVERSE games that use the UNIVERSE game stellar display or a similar 3-D system. Most strategic SF games are two-dimensional (e.g. GDW's "Imperium").

C) An expansion/continuation kit for VOYAGE OF THE PANDORA™ game, still the best game ever published in the magazine.

D) Science fact articles oriented toward the UNIVERSE game. In particular, I'm interested in more data on the nearby stars, such as luminosity, masses, ages, and binary/trinary orbital periods (stuff I can dig out of local libraries only with some trouble). TSR, Inc., must have a lot of background material that was used to develop the UNIVERSE game.

Gary Hladik
Saratoga, CA

Part of the problem in trying to cover UNIVERSE game material has been the lack of the same. We inherited several extremely long articles, similar to the "First Contact" article on the Sh'k'tlp race in Special Edition #1, but it is difficult to make these articles fit our space requirements. We are looking for shorter, gameable articles relating to the UNIVERSE game, and readers who'd like to contribute such to ARES Magazine are more than welcome to do so. ▲

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So you want to write the ultimate SF film book, huh, kid?

by David J. Schow

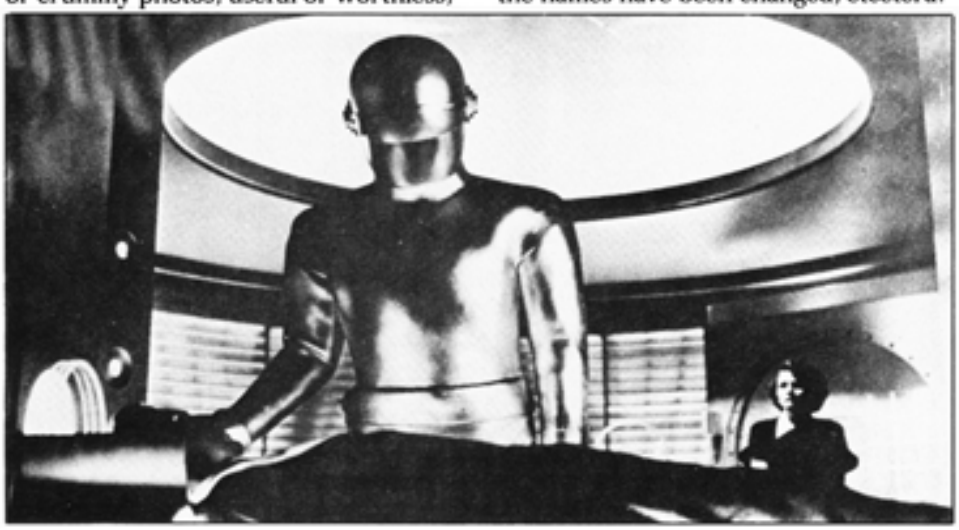
Pick a bookstore, any bookstore; new, used, specialty — it matters not. Go to the posted section for CINEMA, and there you will trip across not a selection, but a glut, a congestion, a redundant superabundance of books dealing with the warp and woof of the science-fiction film. Apart from movie novelizations and the occasional deadpan "biography" (usually some inept writer's demonstration of slavish gratitude for the honorarium of an interview with some fashionable film hack of the moment, garnished with press release hyperbole and mistaking a Big Name for a big talent . . . and don't forget the photo section, please), there are the survey books on the so-called genre itself: Baxter's *Science Fiction in the Cinema* (perceptive title, that), Rovin's *A Pictorial History of Science-Fiction Film*, and John Brosnan's usually entertaining books seem to be the most enduring titles. As for straight, completist references, there are really only two: Don Willis' *Horror and Science-Fiction Films: A Checklist* (two volumes, with a third in the works), and Walt Lee's three-volume *Reference Guide to Fantastic Films*. There are also more eccentric, focused, and personal works, like Bill Warren's *Keep Watching The Skies* (due for a second volume shortly).

Good, bad, mediocre, with rare, flashy or crummy photos, useful or worthless, they all have a pivotal thing in common: There's something wrong in every damned one of them.

Watching a science-fiction fan scan the latest SF film book, hot off the rack, generates a sensation much like that of a boozy Las Vegas lounge audience awaiting the next punchline from a particularly raunchy comedian — the anticipation of a forthcoming explosion. The lull, followed by the kicker. *Eureka!* The first error in the new book has been located.

Now the browser may re-shelve the faulty volume, secure in the knowledge that, (a) his meager bank balance is safe from plunder by some self-styled "expert" who didn't bother to sleuth out the proper trivia before inking a book contract, (b) he may fall asleep, tummy glowing with the reaffirmed belief that, if just once he got a shot at such a book, he would not screw it up badly, and (c) he can slumber, dreaming of being on panels at SF conventions, serving the twofold end of spreading his painstaking knowledge ever thicker while promoting his flawless book ever further.

Our hapless theoretical buff will probably never be slapped by the reality that contracts for such books traditionally yield a poverty-bracket income . . . provided that five or six are done per year. He'll probably never have a nightmare like the one that follows — which is an absolutely true story. It happened. Only the names have been changed, etcetera.



Once upon a time about a decade past, Johnny T. Faust (Joe's little brother; see ARES™ Magazine #15) struck a deal with a subsidiary of Doublecross Publishing. The imprint was called Scheiss House and consisted of two — count 'em — two editors, one of whom was 85 years old and could barely make out the rims of his bifocals. The deal was to write a survey book on science-fiction film with *lots of pictures*. Faust asked a buddy of his, Phoebe Phikel, to write half the copy while Faust accumulated the stills needed to attractively fill 200-plus pages. All of the preparations "seemingly" ran smoothly until the photos were submitted and the deadline was imminent . . . and Phikel hadn't typed a syllable. Faust, in the heat of panic, typed the entire manuscript in twelve days flat.

Against all the rules of justice that are supposed to abide in the cosmos, the book, *SF Films You'd like to Remember to Forget*, did well for Scheiss House. Its excellent shelf life lead to seven or eight printings in trade paperback. Why was this book so popular? Answer: All those pictures, at such a reasonable price, before SF film books were really vogue.

The year is now 1979, and *Star Wars* has made box office history. Momser, the geriatric Scheiss House editor, phones Faust: "Say, y'wanna do a followup book that'll allow us to use a *Star Wars* picture on the cover, and thereby mint us all mucho bucks for minimum work?"

"Fab," says Faust, cashing his advance check. "But I wish to subcontract the actual writing, as I am in *le deep merde* with George Lucas, and the book will rely heavily on *Star Wars* for its appeal, no?" Shaving a few bucks from the advance, Fause farms *"SF Films You'd Like to Remember to Forget II"* out to a pal of his, Mike Fatrodent, a journeyman typist who himself has excreted several "books" for Doublecross. "You do the text, I'll do the photos, okay?" proposes Faust, skimming an extra fee for his trouble.

By Christmastime, Faust is in pain. Fatrodent has dropped a manuscript into his waiting lap that can be smelled from Iceland on a clear day; deadly dull, illiterate, libelous and badly typed on erasable bond. "If I submit this 400-page meadow muffin to Momser," muses Faust, "he will, how you say, kill me." He

turns to another pal, a correspondent on the opposite coast. "Say, Ollie — you don't have a book credit yet. How'd you like to take a crack at rewriting Fatrodent's manuscript for what's left of the advance? It ain't much, but your name'll be in lights!"

Ollie gladly accepts a nominal fee (drawn by Faust from the simple interest on the advance) and begins typing. He soon discovers that all the book's "exclusive interviews" were lifted by Fatrodent from genre magazines current while he was hacking out Draft #1. Ollie quickly offers to substitute his own personal critiques and reviews. "Whew," says Faust, long-distance from New York. "Thanks bunches. I'll cut you a bigger slice of the royalties and get you sole credit instead of a co-credit. Okay?" Ollie signs an agreement to this effect. But Faust still won't accept collect calls.

Faust is ecstatic when Ollie delivers the new version. "You've really left Fatrodent eating your dust," he writes, turning in Ollie's balance-due check a mere seven months late, and forwarding a letter from Momser expressing his pleasure at "Faust's" book. Ollie accepts all this in good humor. This is his first chance at a breakthrough. Momser, however, is less than enamored of Faust's selection of photos. The contract between Scheiss House and Faust allows for publication of the book any time within a three-year period following its acceptance. Draft #2 is shelved until better photos surface. And so it goes . . . for two and a half years.

Momser's uniform response to Ollie's repeated inquiries is: "We still hate the pictures, but Faust is working on it. Meanwhile, can you, uh, update the manuscript to include the films of 1981 and 1982? Thanks." Ollie complies . . . wearily.

Frustrated because all the original money for the book is gone, Faust declares, "This is nuts. Don't do any more free rewrites, Ollie baby; I'll get you some of Fatrodent's royalty money from a *different* project to compensate, since he flubbed Draft #1. Okay?"

Death time for the contract looms close; a matter of weeks, now. If Scheiss House does not publish the book by Christmas of 1982, they have to return the manuscript, and forfeit the advance investment, according to the contract.

Suddenly Momser notifies everyone that Ollie's draft is "badly written" and "unacceptable," and the next thing anybody bothers to tell Ollie is that his manuscript is now sitting on Fatrodent's desk awaiting a "third draft." Knowing that Fatrodent is — charitably speaking — an illiterate, a hack, and a plagiarist, Ollie is bristling. His original research and interview material have just been handed over *in toto* to a creature of low professional cunning (and negative taste) who recognizes a plum opportunity to grab the book (and the royalties) back for himself, with no legwork whatsoever. How did Fatrodent worm his way back into the picture? Simple: He offered Momser a free rewrite in return for his name on the spine of the book.

Momser, of course, feels no obligation to Ollie, who was a subcontractee having no connection with the *real* contract, which was between Scheiss House and Faust. The publishers view Ollie's labor of love just as schlockmeister movie producers view script drafts — it's all just grist for the mill. Faust's feelings? "I'm sick of this whole thing. Hey, if Fatrodent's version is too much like yours, Ollie, we'll up your percentage of the royalty. Okay?"

Three thousand miles away, Ollie screams into the phone: "You can't buy me off! If Fatrodent's gonna fingerdip my work, I don't want my name even remotely connected to such quicksand dreck! I wouldn't touch his bilge with a cattleprod! All I want is my book back!"

"Correction," says Faust. "*My* book. Remember our contract?"

And lo, from the west there emitted a strangled, Lovecraftian gurgling, to wit, poor Ollie trying to laugh and cry simultaneously into the phone.

And then there are all those budding, perfectionist SF film book writers out there, dreamily dozing, just waiting for the chance to concoct a masterpiece. Even if Ollie howled his larynx out, he could never wake them. ▲

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This photo montage shows a few of the family of satellites that Saturn owns, taken by the Voyage 1 spacecraft during its fly-by in November, 1980. Clockwise, the moons shown are the massively-cratered Dione (in front of Saturn), Enceladus, Rhea (showing its famous "bullseye"), orange Titan, Mimas, and Tethys. These moons are not shown to scale.

NEW WORLDS

The Major Satellites of the Solar System

by Dave Stover

The first great age of solar system exploration is drawing to a close. Over the last two decades, spacecraft have surveyed the worlds of the inner solar system; from Mercury to Mars, and have voyaged beyond the asteroid belt to chart Jupiter and Saturn, with their rings and satellites. More has been discovered about the solar system in the last 20 years than in all of the thousands of years preceding the 1960s. If there is a lesson to be learned from this, it is that the solar system is far more complex than we ever dreamed.

ALL PHOTOS COURTESY OF NASA

The discoveries of the 1970s shattered our neat, orderly view of the planets and satellites. Once considered as afterthoughts to the worlds they orbited, the satellites are now regarded as worlds in their own right, with compositions, geographies, and histories as complex as that of our own Earth. The distinction between "planets" and "satellites" has grown blurred and indistinct, as the major satellites of Jupiter, Saturn, and Neptune have turned out to be as large as two of the so-called "major planets," Mercury and Pluto. Indeed, by 1980, astronomers wondered whether Pluto, with only 1/7th the mass of Earth's Moon, could be called a planet at all.

This article takes a look at some of the new worlds of the solar system, the major satellites. For the purposes of this article, a "major satellite" is defined as one with a diameter greater than 2000 kilometers. Leaving out the Earth's Moon, six such new worlds exist: Io, Europa, Ganymede, Callisto, Titan, and Triton. Each is described separately below. Truly, no two worlds are alike.

Io

Jupiter possesses four large satellites: Io, Europa, Ganymede and Callisto, proceeding outward from the planet. They were the first astronomical objects discovered by Galileo with his telescope in 1610, and are commonly referred to as the "Galilean satellites." Only with the Pioneer and Voyager missions of the '70s did these worlds become more than faint, virtually featureless disks in a telescope.

Io is the closest of the four to Jupiter, orbiting 421,000 kilometers from Jupiter's center. Though it is about the same distance from Jupiter as the Moon is from Earth, Jupiter's far greater gravity forces Io through one revolution in only 42½ hours.

Some 3,640 kilometers in diameter, Io is slightly more massive than the Moon. Though virtually the Moon's twin in size, it is enormously different in composition. Visually, Io is a world of orange and red spotted with white and dark patches. Its surface is dominated not by the silicates of the inner planets nor the assorted ices of the other outer solar system satellites, but by reddish, sulfuric, volcanic compounds.

Io is a world of vulcanism. It possesses the solar system's largest, most active volcanoes, the only ones we are aware of aside from those on Earth. Voyager 1 photographed eight enormous volcanic eruptions on Io when it flew by that moon in 1979; the eruptions shot material from 70 to 300 kilometers high, at speeds of one-half kilometer per second — over 1000 miles per hour.

Io is a world in constant turmoil, where volcanic activity is not intermittent, as on Earth, but almost continuous. Jupiter's other satellites tug and pull at Io, and the small changes they produce in its orbit subject Io to tremendous tidal flexing from Jupiter's gravity. This tidal action heats the moon's interior and causes volcanic activity. Vulcanism on Io has been so intense that most of the satellite's heavier elements have sunk to its interior, while volatile substances such as ices have boiled off into space. Io is thus much denser than Jupiter's other major satellites, which still possess large quantities of volatiles.

Io's sulfur-rich surface materials are periodically melted, thrown up by eruptions, covered by debris after falling back, and then melted and erupted again. Since Io's escape velocity is about 2.6 kilometers per second, slightly more than the Moon's, some of the volcanic material leaves the surface at greater than escape velocity and falls toward Jupiter to be deposited on four small inner moons — interplanetary pollution at its best.

The normal temperature on Io is a chilly -150° C, but volcanic activity creates "hot spots" on the surface having more tolerable temperatures of up to 30° C. The eruptions range from 300° C to 450° C and involve molten sulfur and related compounds (sulfur melts at 112° C). The volcanic eruptions of Io are several hundred degrees cooler than the silicate lava of terrestrial volcanoes. As a result of vulcanism, Io possesses a very thin atmosphere of sulfur dioxide, sulfur, and sodium.

A 175-pound man would weigh only 32 pounds on Io, since Io's surface gravity is just 0.18 Earth-normal (a little bit more than the Moon's). A visiting astronaut would find the view from Io not quite as spectacular as that from closer satellites like Amalthea, though it would still be exciting enough. Jupiter would be a disk 20 degrees across in the Ionian sky, 40 times as wide as the full Moon seen from Earth and 220 times as bright. A "day" on Io is 42 hours long, and the sun would be eclipsed by Jupiter each day for 2½ hours. The end of each eclipse brings with it what astronomers have called the post-eclipse brightening of Io. The surface temperature drops during the eclipse, causing a whitish layer of sulfur dioxide frost to form on the ground and increase the satellite's brightness. Once the sun reappears,

the frost disappears in minutes.

The night sky of Io is lit by a diffuse yellow glow — the satellite's "sodium torus," a band of sodium ions dislodged from Io by solar radiation and volcanic activity. The torus stretches along Io's orbit; as sunlight strikes the sodium band, the ions give off a yellowish glow, forming auroras like to those seen in northern and southern regions of Earth.

For a small world, Io can boast many spectacular sights: immense volcanoes hurling magma hundreds of kilometers into the sky, a great view of Jupiter, a rugged red surface dominated by sulfuric lava flows, and its own night version of our Northern Lights. Unfortunately for tourists, Io is deep within Jupiter's magnetosphere, a field of charged particles held by the planet's magnetic field. Since Jupiter's magnetic field is thousands of times stronger than Earth's Van Allen belts, its radiation belts are larger and deadlier. All the inner Jovian satellites, including the four Galilean moons, are within this magnetosphere and are bathed in lethal radiation.

It may not be impossible to devise shielding against the radiation; when we begin manned exploration of the Jovian satellites, we might have such shielding available. If so, it's not inconceivable that the volcanoes of Io will someday be one of the solar system's prime tourist attractions, putting anything Earth has to offer to shame.

Table 1: Io

Discovery: 1610, by Galileo
Mass (Earth = 1.00): 0.0149
Diameter: 3,640 km
Period of revolution around Jupiter: 1 day, 18 hours, 28 minutes
Average distance from Jupiter's center: 421,600 km
Surface gravity (Earth = 1.00): 0.18
Surface materials: Sulfuric compounds
Composition: Sulfuric compounds, silicates
Escape velocity: 2.6 km/sec

Europa

Europa is the smallest of the Galilean satellites, 3,130 kilometers in diameter and about two-thirds as massive as our Moon. It orbits Jupiter at a distance of 670,900 kilometers, making one orbit in 3½ Earth days. Europa's surface gravity is a trifle less than our Moon's, 0.14 Earth-normal; a 175-pound man would weigh 25 pounds on Europa.

Like the Earth, Europa possesses a planetary ocean. Europa's surface temperature, however, is -150° C, and its ocean is frozen solid. Creamy in color, this layer of water-ice is 100 kilometers thick, covering Europa's rocky interior. An intricate network of broad, shallow valleys criss-cross the ice, some up to 70 kilometers across and stretching for thousands of kilometers, but no more than a few hundred meters deep. Along with the tan-colored valleys are lighter, icy ridges a few kilometers across, rising no more than a few hundred meters above the surface.

Europa is the solar system's smoothest world. There are no craters present; the original surface, dating back to the era of intense crater formation 4 billion years ago, is now hidden by the ice. More recent craters are few and far between, as the ice (just as Earthly glaciers do) covers them and reduces the surface to smoothness once more. If Europa were the size of the scratched-up ping-pong ball it resembles, it would be smoother than a ping-pong ball. Any relief maps we make of Europa are bound to be rather dull.

Like all the Galilean satellites, Europa was formed from a cloud of icy and rocky debris circling Jupiter long ago. Europa marks an intermediate stage in satellite evolution between Io and the two more distant Galilean satellites, Ganymede and Callisto. Europa grew warmer than the distant moons, probably through the same mechanism that heated Io — tidal action. Although Ganymede and Callisto remained a mixture of rock and ice throughout, the water on Europa was forced to the surface as "lava," leaving a rocky core beneath.

Early Europa may have resembled the Arctic or Antarctic Oceans on Earth. Thick pack ice floated on a world-wide sea, with currents beneath creating fissures and cracks in the surface. As the sea froze over completely, fresh water erupted through the cracks and froze, forming the valleys and ridges which dominate the Europan landscape. Since the tidal action on Europa was not as severe as on Io, volcanic action never got started and Europa retained its icy covering while Io did not. Anyone standing on Europa would see a desolate and forbidding ice-field, flat and stretching out to the horizon, broken only by low icy ridges and shallow valleys.

It was Earth's oceans that gave birth to life on our planet. Some scientists speculate that Europa's frozen planetary sea might have given rise to life there as well. Below the surface may be pockets of liquid water kept warm by tidal forces or radioactivity. With carbon, nitrogen, and the other "elements of

life" present as impurities in the ice, life might have developed in those pockets as it did on our world. The answer could hinge on how long-lasting the watery pockets are; if a permanent ocean of liquid water exists below the frozen surface, then who knows? Protected by miles of overlying ice from Jupiter's intense radiation belts, could it be that life came into being and still survives on, or rather, within Europa?

It's a long shot, but even if life doesn't exist on Europa, there may still be useful information found about the first evolutionary steps leading to the development of life. No definite conclusion will be reached, of course, until manned exploration of the world begins — certainly incentive enough to visit.

The smaller planets and most of the larger moons of the solar system are shown to scale in this photo montage, created from photographs takens by NASA spacecraft. These worlds range in size from Earth's 12,756 km diameter, to Europa, 3,126 km across. By comparison, the diameters of Venus, Mars, and the Moon are 12, 104, 6,796, and 3,476 km respectively.

Table 2: Europa

Discovery: 1610, by Galileo
Mass (Earth = 1.00): 0.0082
Diameter: 3,130 km
Period of revolution around Jupiter: 3 days, 13 hours, 14 minutes
Average distance from Jupiter's center: 670,900 km
Surface gravity (Earth = 1.00): 0.14
Surface materials: Water-ice and impurities
Composition: Ice and rock
Escape velocity: 2.1 km/sec

Ganymede

With a diameter of 5,280 kilometers, Ganymede is 500 kilometers larger than the planet Mercury, though less than half as massive; it is the largest satellite in the solar system. Orbiting a bit more than a million kilometers from Jupiter, Ganymede completes one revolution in 7 days, 3 hours. Though twice as massive as our Moon, Ganymede is considerably less dense. As a result, its surface gravity is less than that of the Moon (0.15 Earth-normal). A 175-pound man would weigh about 25 pounds on Ganymede.

Ganymede is a mixture of rock and ice, both on the surface and within. During the satellite's formation, most of the silicates probably sank to form a rocky core, covered by a mixture of rock and ice analogous to Earth's mantle. The crust is a mixture of darker soils and lighter icy areas.

Ganymede's surface is similar to that of Mars in some respects. On Mars, there are both relatively old, heavily cratered regions and less cratered regions apparently resurfaced in the recent past. The ancient, cratered areas on Ganymede, perhaps dating from four billion years ago or more, are relatively dark. Meteor impacts may have vaporized the surface's original icy covering, leaving only dark rocky soil behind.

Only portions of the original crust survive. Internal heating at some point in Ganymede's history caused the crust to break apart into sections, similar to the tectonic plates that make up the Earth's crust. Water — the equivalent of lava on Ganymede — flowed up through the fissures between the plates, resurfacing and obliterating large areas of the older crust.

On Earth, continental drift occurs when currents of magma in the mantle, beneath the crust, pull the plates along. Collisions between the plates are responsible for the formation of Earth's great mountain ranges. The crust is in constant flux; over millions of years, one plate may be forced beneath another where the two meet, being turned into molten rock as it moves downward into the mantle. Meanwhile, new plate material continues to form along Earth's

mid-oceanic ridges.

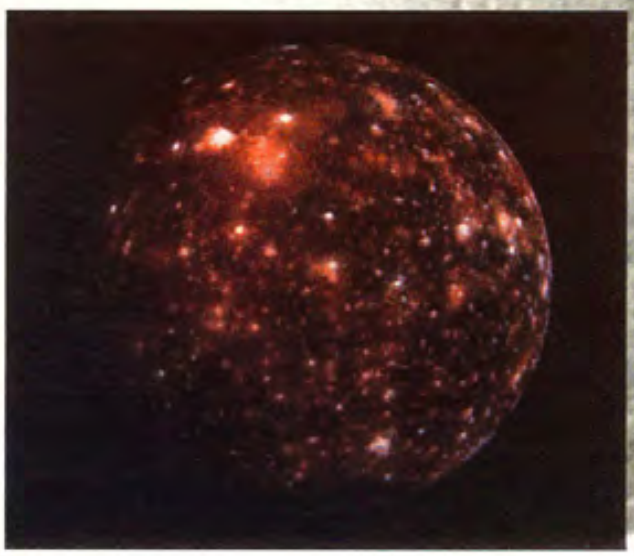
Though the crust of Ganymede is divided into plates just as the Earth's crust is, the situation is far less dynamic. No real continental drift has ensued because Ganymede lacks sufficient internal heat. Instead, only minor shifts have occurred as the plates bang away at each other along their edges. There are, then, no folded mountains on Ganymede akin to those of Earth.

Ganymede's polar caps extend about halfway to its equator, and are composed of a thin layer of water-frost. Ganymede lacks an atmosphere, and is at about the same temperature as the other Jovian satellites, -150° C.

Table 3: Ganymede

Discovery: 1610, by Galileo
Mass (Earth = 1.00): 0.0250
Diameter: 5,280 km
Period of revolution around Jupiter: 7 days, 3 hours, 43 minutes
Average distance from Jupiter's center: 1,070,000 km
Surface gravity (Earth = 1.00): 0.15
Surface materials: Ice, silicates
Composition: Ice, rock
Escape velocity: 2.8 km/sec

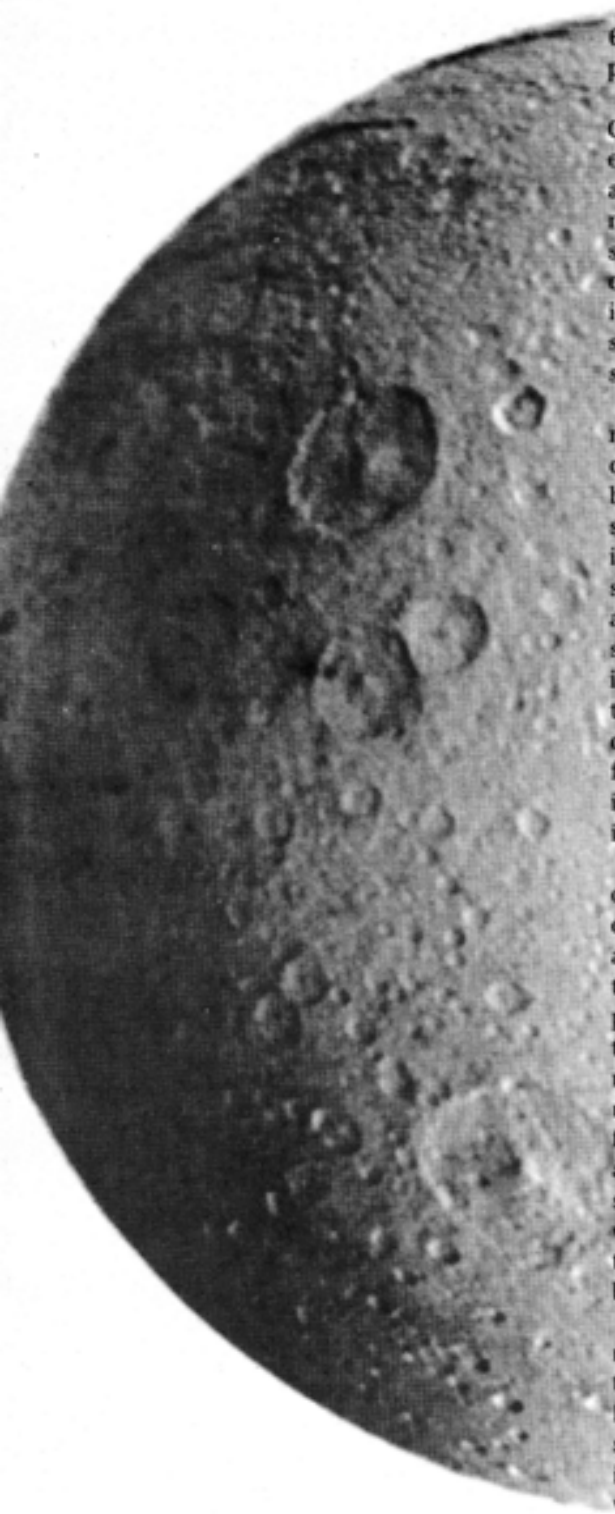
There is a possibility that pockets of liquid water may exist below the Ganymedan surface, similar to those astronomers speculate may exist within Europa. Recent experiments suggest that ice maintained under high pressures and low temperatures may be stronger than hitherto thought; thus ice deep below the Ganymedan surface wouldn't necessarily be "squeezed out" under high pressures, and Ganymede may be a rock-ice mixture throughout. If considerable amounts of subsurface ice exist, then liquid water might also be found, warmed by the satellite's internal heat. If there's water, is there life? Once again, as with Europa, it's a long shot — but, as yet, the possibility cannot be ruled out.



Callisto

Orbiting two million kilometers from Jupiter, Callisto takes just under 17 days to finish one revolution. It is the size of the planet Mercury, with a diameter of about 4,800 kilometers, but is much less dense and is less than a third as massive as the former world. Surface gravity on Callisto is only 0.12 Earth-normal, while Mercury's surface gravity is 0.39 Earth-normal. A 175-pound man would weigh

(Upper left) A photo montage of Jupiter and its four largest moons, taken by Voyager 1 in March, 1979. From top to bottom are Jupiter, Io, Europa, Ganymede, and Callisto.
(Upper right) A photo mosaic of Io, taken by Voyager 1 from 376,951 km. Features as small as 8 km across are visible. The "rotten orange" look is the result of sulfurous vulcanism.
(Lower center) Voyager 2 photographed Callisto from 1,094,666 km. The bright areas mark recent craters.



68 pounds on Mercury, and only 21 pounds on Callisto.

The contrast between Mercury and Callisto illustrates the essential differences between the worlds of the inner and outer solar system. Mercury is nearly as dense as Earth, composed of silicates and possessing a nickel-iron core. Callisto is a mixture of rock and ice, with the ice predominating; the satellite's low density suggests it lacks a sizeable rocky core.

The ice that forms the bulk of Ganymede is covered with a layer of dark, dusty rock. This surface layer is probably carbonaceous silicate, a mixture of silicates and carbon compounds similar in composition to the meteorites occasionally found on Earth. Many asteroids are also carbonaceous in nature; the study of carbonaceous surfaces may be important in determining the first evolutionary steps of carbon-based organic compounds towards life. Callisto's surface layer probably formed as meteor impacts vaporized the original icy covering and left rocky material behind.

Callisto lacks the internal energy that on Ganymede disrupted the original crust, created plates, and resurfaced and obliterated many of the older cratered areas. The crust remained in one piece, and more and more impact craters accumulated as time went by to make Callisto one of the solar system's most cratered worlds. The craters are fairly flat and shallow; deeper craters are slowly filled in by ice flows. The surface of Callisto probably does not vary by more than a kilometer in elevation, giving it some of Europa's pingpong ball smoothness.

Like Europa and Ganymede, Callisto might possess pockets of liquid water trapped deep in its sub-surface ice. Because Callisto lacks a significant source of internal heat, due to its largely ice-water makeup, such pockets are very unlikely.

The lack of internal heat may be a boon for scientists interested in the early history of the solar system. Far enough from Jupiter that tidal forces are not an important factor, and lacking other sources of internal energy, Callisto's surface has not been disrupted in the same way that the surfaces of Io, Europa, and Ganymede have been. The only erosive forces present are occasional meteor impacts and the slow-flowing ice that levels out deep craters. As a result, Callisto's surface is largely unchanged from the solar system's early days, and may tell us a great deal about how our family of worlds came to be.

Table 4: Callisto

Discovery: 1610, by Galileo
Mass (Earth = 1.00): 0.0178
Diameter: 4,840 km
Period of revolution around Jupiter: 16 days, 16 hours, 32 minutes
Average distance from Jupiter's center: 1,880,000 km
Surface gravity (Earth = 1.00): 0.12
Surface materials: Carbonaceous silicates, ice
Composition: Ice, rocks
Escape velocity: 2.4 km/sec

Titan

Only one of Saturn's moons, Titan, can be called a "major satellite" under our classification system, but it is a world of major interest indeed. The solar system's second largest satellite, with a diameter of 5,140 kilometers, and the only satellite to possess an appreciable atmosphere, Titan is one of the strangest and most exciting objects in the outer solar system. It is about twice as massive as the Moon, but considerably less dense, with a surface gravity 0.15 Earth-normal; on Titan, a 175-pound man would weigh about 26 pounds.

We've known about Titan's atmosphere since 1944, but only with the Voyager missions was information obtained on its composition and density. Atmospheric pressure on Titan is 1.6 that at sea level on Earth; Titan's atmosphere is largely nitrogen, with considerable quantities of methane and at least trace amounts of hydrogen cyanide, ethane, ethylene, and acetylene. On Titan, it may snow frozen gasoline.

Although the Voyager missions told us a great deal about Titan, photographs of the satellite were rather disappointing. Titan is covered with a thick, apparently unbroken orange haze. Faint bands and stripes were visible in the clouds, probably caused by atmospheric circulation patterns; a darker polar cap was noted, but that was all that could be seen. A good look at the surface will have to wait for orbiter and lander missions.

Before the Voyager flights, there was speculation on the possibility of life on Titan. Titan is, after all, the only satellite with a fairly thick atmosphere; on its surface are many elements and compounds, like nitrogen, methane, and hydrocarbons, that existed on prehistoric Earth. Though far from the sun, a sufficiently dense atmosphere of the proper composition might create the so-called "greenhouse effect." This occurs when the visible light from the sun

Titan's atmosphere is largely nitrogen . . . it may snow frozen gasoline.

penetrates the atmosphere and heats the planetary surface; the surface, in turn, gives off longer-wave infrared radiation which is prevented, by certain gases in the atmosphere, from escaping into space. As a result, the surface is kept warmer than it would otherwise be.

On Earth, small quantities of carbon dioxide and water vapor in the air keep our average planetary temperature considerably higher than it would be otherwise. On Venus, a nearly 100% carbon dioxide atmosphere has raised the surface temperature to 500° C. Does the greenhouse effect also occur on Titan, raising its temperature above what might otherwise be expected so far from the sun?

The answer seems to be no. The temperature of Titan's surface is in the neighborhood of -180° C; the atmosphere provides little or no greenhouse effect.

Table 5: Titan

Discovery: 1655, by C. Huyghens
Mass (Earth = 1.00): 0.0230
Diameter: 5,140 km
Period of Revolution around Saturn: 15 days, 22 hours, 41 minutes
Average distance from Saturn's center: 1,222,000 km
Surface gravity (Earth = 1.00): 0.15
Surface materials: Ices, silicates, hydrocarbons
Composition: Ices, rock
Escape velocity: 2.7 km/sec

That does not rule out the possibility of life, but it drastically reduces the chances. The surface of Titan is likely a frozen, foggy, lifeless swamp. Depending on surface temperature differentials, methane might exist as gas, liquid, and solid, performing the same role water does on Earth. Liquid nitrogen might be present on the surface, as well as many varieties of hydrocarbons and other organic compounds. No one knows about the level of geological activity on Titan, but some scientists speculate that any volcanoes there would erupt liquid methane and water. The surface layer is probably a mixture of ices and silicates, with a rocky core beneath.

The odds are against finding life on this distant world, but conditions there could tell us much about the various steps leading to life's creation. Titan is sure to be one of our first stops when the exploration of the outer solar system begins in earnest.

Triton

The most distant major satellite from Earth is Triton, the larger of Neptune's two moons. Very little is known about it, and answers to our questions may be some time in coming. A Voyager flyby of Neptune is possible in 1989 if equipment and funding last that long. When the exploration of Triton finally gets underway, much will be learned about the apparently calamitous history of the outer solar system.

Triton was discovered about 140 years ago, soon after the discovery of Neptune itself. In the absence of spacecraft-supplied data, estimates of its size vary between 3,000 and 4,500 kilometers; the best estimates make Triton a bit larger than the Moon, about 3,800 kilometers across.

Nearly five billion kilometers from the sun, Triton is *cold* — its surface temperature is estimated at -235 degrees C, only 50 degrees above absolute zero. Triton's surface is probably a desolate, dark expanse of dirty methane-ice. Neptune, a pale green in color, would be sixteen times as wide in Triton's sky as the Moon in ours, casting a cold, blue-green glow over the landscape and intensifying the feeling of frigid desolation.

Accurate determinations of Triton's mass are difficult to make at present; estimates give the satellite about two-thirds the mass of our Moon. Its surface gravity, if that estimate is correct, would be about 0.11 Earth-normal, making a 175-pound man weigh only 19 pounds.

A peculiar satellite in several respects, Triton faces a disastrous future. The innermost of Neptune's two known moons, it orbits the planet at a distance of 355,600 kilometers, less than the distance from the Earth to the Moon. Though almost perfectly circular, Triton's orbit is tilted by an angle of 20 degrees to Neptune's equator, and the satellite orbits its primary backwards in a clockwise direction, contrary to the orbital direction of all the planets and most satellites in the solar system. Worse yet, Triton's orbit is decaying; tidal forces exerted on it by Neptune are causing it to spiral in toward the planet. Within the next 10 to 100 million years, Triton will hurl into Neptune's atmosphere, utterly destroying it.

All orbits change. Our Moon, for instance, is slowly moving away from us due to the tidal interaction between it and the Earth (at the same time, Earth's day is increasing in length). Given long enough, the Moon would recede to a certain distance and then spiral inward toward collision with our planet. By then, however, the sun will use up its nuclear fuel reserves, expand into a red giant, and destroy both Earth and Moon, making the problem academic. Triton is the only celestial object known heading to its destruction within a relatively short period of time.

At some point, a great catastrophe must have occurred in the outer solar system. Such a disaster would account for the orbital oddities of Triton and of Neptune's other satellite, tiny Nereid, which has the most elliptical orbit of any planet or satellite in the solar system. What happened is not known. It might have been the invasion of a comet swarm which disrupted the orbits of Neptune's satellites; perhaps a rogue planet wandered through the outer solar system, leaving chaos in its wake.

Table 6: Triton

Discovery: 1846, by W. Lassell
Mass (Earth = 1.00): 0.0096
Diameter: 3,800 km
Period of revolution around Neptune: 5 days, 21 hours, 3 minutes (retrograde)
Average distance from Neptune's center: 355,600 km
Surface gravity (Earth = 1.00): 0.11
Surface materials: Methane and water ices
Composition: Largely ice, some rock
Escape velocity: 2.0 km/sec

The solution may also tie in with the eccentric orbit and peculiar nature of the planet Pluto, or the fact that Uranus, unlike any other planet, rotates on its side with its axis nearly in the plane of its orbit around the sun. The five moons of Uranus, however, follow orbits more circular and less tilted than those of any others in the solar system. Any solutions to these mysteries we arrived at now would be more science fiction than science. We can only wait for more data to arrive on the nature of the cataclysm which left such disorder in its wake. ▲

Tales of the Sky Tales of the Land

by Douglas Borsom

The wind was up outside, and even the chinking he and Kate had put in at the end of summer couldn't keep it out. The cabin seemed dark and confining. The man was bone-weary, his arms still aching from the day's labor. And he knew the ache would still be in them tomorrow at dawn when he went back to the fields. How could he face that again? How could he face day after endless day of this back-breaking work, only to come home nights to this tiny, drafty cabin that seemed a witness to his failures?

Illustration by Rick Sternbach

The stirring of the children in the loft brought his mind back. He glanced over at Kate, who had the carburetor to their flier dismantled before her, wiping the parts with a clean rag. She gave him the look that meant it was his turn to settle the children down.

After the brightness of the fireside, it took his eyes a moment to adjust to the dark of the loft. Two large mounds marked the children and their blankets. Just the sense of the tiny heads poking from the bundles stirred a powerful sense of protection in him and dulled the anger he'd felt about having to quiet them.

"What's going on up here?"

"We're waiting for our story, Daddy." That was the younger one. Silent through his early childhood, he hadn't spoken until he was nearly four; then it had been fully formed sentences that amazed and delighted his father.

"Yes, Daddy. Please." Two years older, Mary was all shyness and good manners. These hid an iron-like determination and a quick mind that would, in another twenty years, see her elected governor of the colony.

But now she was a six-year-old child who wanted a story from her daddy.

"If you promise to go right to sleep when I finish. And Jack, you must promise not to pull the dog's tail."

"Oh, I do."

"And Mary, you must promise to help me early tomorrow with the barn work." A token demand. Mary loved the work.

"Yes, Daddy."

"Then I'll tell you another story of when I was a little boy — not much older than Jack — and of the great men who brought us here." In the darkness, the children fastened their eyes on him. The man rubbed his face in weariness and thought back.

"In the third hundred twenty-seventh year of the voyage, a terrible disaster struck *Argo*."

At .2C, it hadn't taken much. Ninety percent of the little plug of nickel had vaporized when it hit the hull. Of the rest, another seventy percent was lost penetrating the bulkhead. Only a few milligrams, now traveling at subsonic speed, actually came in contact with the planet simulation deck computer. It was enough. The primary was wrecked; the back-up took over. No problem. When the designers had planned *Argo* for her three-and-a-half-century voyage, they had to assume improbable disasters and plan accordingly.

But there must be a limit to redundancy, and the planners hadn't foreseen that a meal-worm from stores would, against all odds, find its way down three decks and through a tiny tear in the air filter into the planet sim computer room. The designers had certainly never thought a worm would get into the guts of the back-up, only to die there, lying across a pair of etched leads.

The worm's body wasn't much of a conductor, but it didn't have to be. The back-up computer ran its self-diagnostics and found nothing wrong. Not much.

Carson had finished a week's stint in hell, yesterday, and had celebrated the fact last night with an ag specialist from G deck. All morning his hungover head had played and replayed the old limerick: "There was a young woman from G, whose proportions were something to see. . . ." The rest of it was just as bad, a ghost from his secondary-school days coming back to haunt him. When he'd been fourteen, it had seemed clever, especially the way one could exchange *d*, *e*, *p*, or *t* for *g*, altering the last lines of the limerick to fit the sexual attributes of the women from these other decks — sort of an all-in-one limerick. He'd thought he'd blessedly forgotten it years ago, but there it was back in his aching head, bugging him.

Carson managed a smile. The headache was worth it, though. Surprisingly enough, the limerick was right about this particular woman from G. Still smiling, he reached for the terminal and called her. No answer. So he left a message to the effect that he'd like her to have dinner with him and his family at her convenience. Then he groaned his way to the shower. Usually after a multi-day term on the planet simulation deck, scouts were given a day off. But Carson was behind in his second specialty and needed this day in the geo-forms lab for catching-up work.

He was still drying himself when the priority call came through.

Carson took just enough time to stop at the mess and shove toast and eggs in his face before taking the lift to B deck. One didn't keep the governor waiting. He recognized most of the people in the conference room and was surprised to find Fuller, Anderson, and Thatcher — all scouts — among them. When the call had come through, Carson assumed it had to do with the geo-forms team. They'd been working on establishing exploration priorities and had run into a scheduling conflict with the water resources people. Scratch that. He looked at Fuller and raised an eyebrow. But Fuller just gave a small shrug. The governor would tell them when he was ready.

It wasn't until when Chief of Engineering LaBlanc came in that the old man seemed to think the party complete and asked them to be seated. He didn't waste time with preliminaries.

"We've got trouble on the planet simulation deck. A training party of four has been killed. Three other parties have returned with a total of two dead and several casualties. Still another group was under attack and reported one killed before its radio went dead."

Damned carelessness was Carson's first thought. Planet sim was dangerous. It had to be. That deck was the ship's only hope that, after ten generations of life in a two-klik steel drum, the would-be colonists might have a chance to survive on a planetary surface. Such preparedness cost the lives of a few people each month and left the ship with an occasional cripple. The price was accepted and, grudgingly, paid.

But to lose seven people in a day . . . well, someone must have screwed up.

"We'll begin a review of our training program," Fuller was saying, but the governor waved his hand.

"That might be useful, but it isn't relevant to our losses last night. We've got real trouble. The planet sim computer apparently has malfunctioned. The deaths are a result of an imbalance in the realism of the simulation deck."

The governor was quiet for awhile, as if to let it sink in. Carson spoke up next.

"I volunteer to lead a party to pick up the group under attack." For the first time, he noticed how drawn the governor looked.

"No thank you, Mr. . . ." — the old man looked at a sheet in front of him — "Carson, is it?"

"Yes, sir."

"The group under attack will have to take care of itself. It was sent out as a rescue crew, and I won't waste more people on a mission like that.

"At 2:35 this morning we had a minor run-in with a very small meteor. Apparently, it took out the number one planet

sim computer, and the back-up kicked in. But there's something wrong with the back-up. At the time of the meteor strike, we had four parties on the simulation deck. Simultaneous with the take-over of the back-up computer, these parties experienced unusually heavy conditions. We sent the rescue squad in to make pickups, and they ran into trouble."

"Pardon me, sir," said Fuller. "Who was in the rescue group?"

The governor looked at the sheet again. "Howells, McKenzie, Norton, Cross, and Lowenstein."

Carson could hardly believe it. These were all scouts, people he'd trained with. Cross had been in his graduating class. She'd taken first honors for pistol and knife. Lowenstein had been in the class ahead of him. Maybe the biggest guy on the ship, certainly one of the strongest. And tough and fast and smart — all the things a scout was supposed to be. If that rescue squad had taken casualties, then conditions on planet sim must be hellish.

"Sir," Fuller asked, "how long before the computer is disabled? Those are our friends down there."

The governor looked tired. But the governor always looked tired. For the first time, Carson had a glimmering why that might be. "Indeed? Well, they are my people. And I've lost seven of them in the last ten hours. Maybe more. LaBlanc?"

The Chief of Engineering stood. "We can't get at the computer without crossing the planet sim deck." He must have pressed a stud somewhere, because a holo of the deck appeared at the center of the conference table. "As you know, planet sim occupies the lowest deck. This was done because the *Argo* designers wanted to make survival training as difficult as possible. So, they put it where ship's spin generates the highest centrifugal force. The controlling computers are housed in a hull blister underneath the planet sim deck. Unfortunately, there are no accommodations for easy access to the computer room."

"We've got two choices. We can send a team outside, weld a makeshift airlock over the control blister, and then cut through the hull. Of course that means we take the spin off the ship first, because no one can do the job effectively while hanging upside down in a 1 ¼-G environment. Taking off spin should take no more than sixty hours, assuming the entire ship works at preparations. Welding the airlock and cutting through the outer hull may take another ten or fifteen hours."

Carson knew what LaBlanc was getting at. In seventy hours there wouldn't be anything of the trapped group to rescue.

"Or, a repair team and scout escort can go down to planet sim, and traverse a little more than a klik from an entry port to the control blister."

That was it. Carson had a tight feeling in his stomach. Now he knew why the scouts were here.

"What about cutting power?" Fuller asked.

LaBlanc gave a sour smile. "Planet sim carries its own twenty-hour back-up. The override is in the control blister. We're working to cut power to the deck itself, but that involves cutting through a double bulkhead and rewiring the power buses serving decks F2 through S2."

"What a mess." Carson hadn't meant to say it out loud. The governor managed a smile.

"Very apt. The fastest way to help the rescue group is for us to get a tech crew to the control blister. This crew will be escorted by you four scouts. Report to the armory and get what you think is appropriate. I've been told you are all very good people. Please, remember that the conditions on planet sim are apparently much worse than anything you've experienced. I was told the five in the rescue group were also very good people. Think about that for a bit. And remember, you're not going for points this time." The governor was referring to the fact that, on standard training runs, points were deducted for the killing of simulated non-threatening, possibly useful, life-forms. "Burn anything that comes near you. You'll meet a tech crew on S in thirty-five minutes.

"And just one other thing. If it makes you feel any better, there's a crew with cutting and welding torches on ship's hull right now, attempting to make its way to the control blister."

Of course, thought Carson. You can't take the spin off the ship, and men can't work on the hull with the spin on. You begin with those assumptions; then, if you're the governor, you decide which of these two is less impossible to accomplish than the other, and you send men out to do it. No wonder he looked tired.

"That's all." The governor turned from the table and spoke in a low voice to LaBlanc. Carson made it to the door first.

There wasn't a lot of conversation during the elevator ride to the armory. Every so often Carson would find himself staring at one of his team. Eyes would meet, then quickly shift away.

The familiarity of the routine in the armory seemed to loosen everyone up. The scouts talked it over and decided Fuller would be heavy weapons man; the others would carry pellet guns, long knives, and impact armor. A climate check of sim deck turned up blizzard.

"Shit," swore the redheaded Thatcher. "I'd just as soon wade through crap as through drifting snow."

"Take it easy. What's the temp?"

"Minus twelve, and thirty klik-per-hour winds. Visibility will suck, but at least we can use infra-red. How about it, Carson? You were down there yesterday. Could you see through the soup?"

"Yesterday, it was tropical rain forest."

"Great!" Thatcher again. "You mean in twenty-four hours it cycled from jungle to arctic? That damned computer must be out of its mind."

"Aren't we all? Let's snap it up. We've got three minutes to get down to S2."

The tech crew — a tall woman named Hotchner, and King, a gangly kid with prominent teeth — was waiting for them when they arrived. Wrapped up in going over a repair procedure, they ignored the scouts.

Word of the trouble must have circulated, because there was a small crowd milling around the planet sim port. Mostly kids. Adults would be too busy with their daily routine.

Before the gateman cycled the port, Carson checked Fuller's power pack. "Shoulder harness OK?"

"No problem." Fuller was a big man, which was the primary reason he'd been chosen for heavy weapons. "I could carry it all day."

"Nice thought." Carson waved Thatcher and Anderson over. "Who wants to be the leader?"

Thatcher gave an evil smile. "Everyone who doesn't want to volunteer take one step back. How about you, Carson?"

"Gee, thanks."

"It's fine with me," Anderson said.

"That makes it unanimous," Fuller added. "Carson will give orders."

Sighing, he resigned himself to the inevitable. He took the dead-reckoner and the radio link with the governor's office and snapped them to his belt. "OK. I'll take point. Thatcher

take right flank; Fuller, left. Anderson, the rear. We keep the techs in the middle all the time." He waved to the techs. "You folks armed?"

King held up a machine pistol and gave an eager smile that made Carson cringe. "Pellet guns, that's all. These tool packs are pretty heavy."

"OK. If the going in the snow gets bad, we'll transfer your tool kits to my people. But if possible, you'll carry them. I don't want my crew to lose their mobility."

"Fine," Hotchner said. "I don't especially care to have my tools bounced around by your jarheads." She smiled when she said it. She was a big woman. Carson wondered if she'd like to wrestle when this was over.

"The leader of the ship called his people together and told them what had happened. The smartest men and women advised the leader on what to do. But, as often happens, none of the easy answers would work; only the most difficult ones would."

"Mary, Jack, sometime in your lives you'll find yourselves in trouble, and the only way out may be very difficult, maybe impossible. Then you must do the thing that is hard, and try your very best. Then, even if you fail, you'll have done the right thing."

What about *Argo*? Mary wondered. What had happened? She knew that the ship was safe and that everything must have turned out all right, because they were here today beneath the blankets that felt warm and with Daddy who smelled like Daddy. Since he'd been on the ship anyway, he wouldn't have let anything too bad happen. But even so, she wanted to know the story.

"So some very brave people told the leader that they would try to fix the ship and help find the lost people. The leader told them it would be dangerous, but the people knew this was the only thing to be done. The leader wished them luck, and they went on their adventure."

They lined up at the port, and Carson gave the signal to the gateman.

Even with the weather report, Carson was surprised at how much snow had accumulated in the day since he'd left. Thatcher had been right: it would be rotten visibility. He took the ladder three rungs at a time. The area around a ladder was supposed to be safe, but one never knew. Once down, he took up position near the ladder base, pistol in glove, and waited for the others.

The snow fell fast and reckless in the 1¼-G of the planet sim deck. *Oh, my aching ankles,* Carson thought. *Thank God this is only for an hour or so.*

Fuller was next down and stood at Carson's back. Then Thatcher and the two techs. Last came Anderson.

"Anderson and Fuller, go to infra-red. Thatcher and I will stay on straight visual. Anything spotted is located by clock co-ordinates. I'm twelve. Fuller, yell if you have to use the flamer so that we can get out of the way. Techs, stay in the middle. Don't use your pistols unless you're sure you have a clear field of fire. Questions?"

There weren't any. So far, everything was by the book. After twenty meters, the ladder disappeared in swirling snow. There was a light crust: not enough to support a man, but enough to pull at the feet when walking. There must be more than fifty centimeters on the deck already, with man-high drifts around stanchions and places where the overhead blowers didn't reach. Fifty centimeters! Carson wondered if there was a limit to the water available to planet sim for snow. Did anyone know? Did it matter? 1¼-G. What would the governor have said if they'd suggested taking spin off the ship?

"Movement at ten o'clock. Under the snow, and paralleling us about fifteen meters off."

"Thanks, Thatcher." Carson found the spot she'd indicated. Something low humped along beneath the snow. How could any living animal track them that way? Carson couldn't say. But maybe on an ice world such an animal could evolve. Here on planet sim, the humping snow was one of three possible mechanical shapes: teeth, snake, or springer. From its apparent size, Carson guessed that this one was a springer. He leveled his pistol in a two-handed grip and squeezed off two rounds. The hump flattened, then streaked off behind them in a wake of snow.

"Son of a bitch!"

"Nice shooting, guy."

"Shut up, Thatcher." Fuller said, coming to his support. "You know it's hard as hell to hit anything under snow." Fuller's defense just made Carson feel worse.

"Why didn't you use Fuller's flamer?" asked King.

"Because it would have filled the area with hot steam, making it impossible to see in the visual or the infra-red. And state changes in water eat up so damned much energy that the flamer still might not have killed it." Carson checked the dead-reckoner. They'd come maybe a hundred meters. It seemed as if the snow was getting thicker.

"Two humps. No, three. Oh, shit. Five." It was Anderson.

"Where?"

"Semi-circle. From three to seven o'clock. Still about twenty-five meters off."

"Anyone else see them?" Fuller was the only other one speaking. He and Anderson were both on infra-red. "Don't waste your time on them unless they break a ten-meter radius. But let me know if they start to move in."

The pack followed them for a few minutes, then faded back. Anderson claimed he caught an occasional glimpse of them at the edge of visibility, but Fuller couldn't confirm. Carson watched the techs for signs of fatigue. He was breathing heavily from the slogging, and he was sure the tech hadn't exaggerated when she said the tools were heavy.

Then the snow stopped and the wind died. The air seemed strange in the new silence. Carson could feel heat on his face. The overhead blowers kicked in, and a desert wind whistled hot air over them.

"Watch it. The snow is starting to melt," Carson said. The wind screamed, ripping at their clothing. Then quickly, it was cold again, very cold. On his left wrist, where glove had pulled away from sleeve, Carson's skin went numb. "Goddammit. Watch that you don't get stuck on the ice." The wind quit and the snow began again, harder than ever.

"Anderson, are your bogies still back there?"

"Can't see them. But I think they are. Shit." Carson turned to find Anderson sprawled on top of the snow. "The crust is a bitch. Really slick with this new snow on it."

If it had been hard slogging through the snow, it was worse now, gingerly walking on its ice-crusted surface. Every so often, Carson's feet would break through the ice, and he would sink up to his knees. But the techs and Fuller, with the heavy flamer packs, were having trouble. The ice wouldn't support them, and they had to break their way through it. Somehow, the snowstorm got thicker. At this rate, Carson

would soon have to distribute the tool packs among the scouts.

Carson thought of the people out on the hull at this moment, hanging upside down, the spin of the ship trying to hurl them into space. Knowing that they were out there somehow made things a little easier to take. Those poor bastards. This was a cakewalk compared to being out on that spinning hull. Plowing through the snow seemed to become easier.

Ahead, through curtains of snow, he caught a movement. "Something directly in front of us. Can't make it out. But I think it's moving on top of the snow." Carson squinted and brought the pistol up. "Jesus. . . ." It came at them incredibly quickly, a snake whipping across the icy crust. Carson had just enough time to thumb the pistol to automatic and pull the trigger before the snake was upon him. It lashed out, and his legs shot from beneath him. A mechanical head, all teeth, snapped up at his face; then the teeth and head were gone, as pellets tore the snake apart. Carson saw Fuller move forward, concern on his face, and he started to wave him off. "Watch for others."

"Carson, that pack is back. There are six now," Anderson called. "They're closing. . . ."

"Snake!" yelled the big tech. She had her pistol out. Carson stayed down and rolled over to add his fire to hers. Behind him, he could hear Anderson's machine pistol drumming and the steady crack of Thatcher's gun. Then it went black: not the darkness of a moonless practice under simulated starlight, but black without moon or stars, only a hungry black velvet eating up every last photon. Someone howled.

"Infra-red!" Carson nodded once quickly, and the goggles flipped down. The snakes were like phantom lightning, streaking across the infra-red black of the snow. One was sliced up, its momentum still animating it on the slick ice.

The howling began again. At the edge of his vision, Carson saw a glowing halo of light. Fuller must be using the flamer. Another snake appeared but someone, either he or the tech, blew off its head with an incredibly lucky shot. No more snakes.

"How's it going back there?" He'd just gotten this out when something flashed up from beneath the snow. Pure reflex put Carson's forearm between the snapping jaws and his face. Needle teeth closed on his arm, but he felt only pressure through the impact armor. He wedged the gun barrel between teeth and fired. The springer dropped away.

"Anderson's down," came Fuller's voice. "But I can't tell how bad it is with IR."

"A springer got my ankle," said King. "It hurts like hell. I'm putting a tourniquet on it."

"Cover him, Fuller."

"He's covered. How about you, Carson. Are you all right?"

"I think I'm still all here. Thatcher, check Anderson with your hands. See if you can find a pulse."

"Already tried. No go. But my position may be — " the lights, dazzling, came on — "wrong. Aw, no." Her voice said as much as her words. "He's dead."

"Although these people were very brave, very smart, and very determined, some of them were hurt. One man, a hero named Anderson, was killed. You know what that means, don't you, Jack?"

"Like Dusty?"

"Like Dusty. Except Anderson was a person. And it is a much bigger thing for a person to die. The reason a person dies can be very important. Anderson died because he was trying to help other people. This is a great thing. But it is still very sad."

Jack was sleepy and ready for the rest of the story. But his father went on talking in his serious voice. "These things are hard to understand. But you don't need to understand all at once. And anytime you want to talk about it, you just come to me or your mother. All right, Mary?"

"Yes, Daddy."

"Jack?"

"Yes. Yes."

There was blood all over the ice. Bits and pieces of dead springer littered the red snow. The heat was back on, warm and steady.

"Thatcher, check out the tech. Fuller, how's your pack charge?"

"Nearly ninety percent."

Around them, the snow was melting. A light, warm rain began falling. They left Anderson where he'd fallen. Pick-up could be made after the computer was repaired. King's ankle was neatly ringed by teethmarks; though the wounds were bad, the ankle was still serviceable. King had put the tourniquet on so tight that his foot was already numb. Thatcher readjusted it and patted his cheek.

"You want to slow the bleeding, not amputate the foot." The kid blushed furiously.

Fuller had some bruises; Thatcher, a nasty cut across her face. Hotchner was untouched. Thatcher and Fuller shifted to a position slightly behind the techs, to cover the loss of Anderson. Carson stayed on point. Because of the relative brightness, Carson had everyone shift to visual. The deck-plates were naked to the rain by the time they were ready to move again.

Before they'd covered a hundred meters, Carson was sweating like a pig. Rain forest time, he thought. And sure enough, pneumatic growths rose from the deck.

The first time Carson had seen planet sim's rain forest, he'd laughed aloud. The inflated pseudo-trees looked so damned silly. They were like surreal party decorations, hanging from the overheads and rising to meet the ceiling. It hadn't taken him long to realize that these goofy-looking balloons provided excellent cover for attackers, as well as excellent cover from them. Snakes, springers, and teeth — all treated the balloons as if they were solid. And while a trainee could blast right through a balloon and destroy a mech, he lost points for doing so. To complicate things, in the rain forest, teeth sprouted ten long legs with which they climbed the pneuma-growths. They had this habit of dropping down suddenly onto the careless. Carson had almost lost an eye that way.

"King and Hotchner, keep an eye overhead. Yell if you see teeth. Remember, this isn't a training run. Go ahead and blast through balloons to get at mechs."

The dead-reckoner showed them two-thirds of the way to the control blister. King was limping badly, but he would make it. Thank God it wasn't a week-long training run, where real first aid to the ankle would have been required to prevent infection by the yeasts that came along with the forest. King would be fine until the repairs were made.

For awhile, nothing bothered them.

"Teeth! A whole lot of them! Straight ahead!" Hotchner yelled.

Carson took a quick look at the trees. Ahead they glittered

with mechs.

"Jesus," said Thatcher. "I didn't think there were that many teeth on the entire deck."

"We'll circle around. It shouldn't take us long to bypass them." Carson started moving off to the left. Above them, the mechs scurried from tree to tree. The party stopped. The mechs stopped. They still blocked the way.

"Damn. Thatcher, keep an eye behind us," Carson shouted. "I don't want anything crawling up our ass while we take care of the mechs."

"What are you going to do?" asked Thatcher.

"I said this wasn't a training run. Fuller, cut those balloons down. Everyone except Thatcher watch the teeth. They may make a mass attack. Still clear behind?"

"Clear."

Go ahead, Fuller."

The flamer went through the balloons like they weren't there. The air filled with wind and falling teeth. Most of the teeth lost limbs upon impact. These either lay still or jerked themselves around in tight little circles, their teeth snapping aimlessly. The undamaged ones charged the group. Fuller's flamer swept over them. It was that easy.

On the last leg of the journey, the computer played by the rules. Carson's group cheated. Again and again, mechs took cover behind the trees. The flamer and machine pistols tore through balloon trees and mechanisms alike.

The computer seemed to sense something wasn't right. The mechs all disappeared, and it became very quiet. Carson's flesh felt crawly. Something was happening, and he didn't think he was going to like it.

"Why's it so creepy?" King asked. No one answered. All around them, the pneuma-growths stretched floor to ceiling. Nothing moved; no mechs glittered from pseudo branches.

"Dammit. Something's wrong." Thatcher was looking quickly around her. "I can't put my finger on it, but something is screwy. Anyone else feel it, or do I just have trainee's nerves?"

"You're not alone," Carson said as he caught Hotchner staring at one of the trees. He followed her gaze. There was something odd about the tree. No, not just that tree, but all of them. "Sweet Jesus, everybody down. The computer's pumping up the trees!"

All around them, the balloon shapes grew. The team lay flat on the deck, facing outwards like the spokes of a wheel, watching for other attacks. With hypnotic slowness, the trees bloated larger in the silence. Carson's group waited.

"Don't you think there must be some sort of safety valve?" It was King, and he sounded scared. He looked around nervously. "I think they've stopped growing. I'm sure. I'm sure they aren't getting any bigger."

"Just stay down," said Carson.

Overhead came a noise like rubber on glass. The trees had reached the ceiling and were being pressed back upon themselves. For a moment the scene held.

Then there was a report like an airlock blowing, then a second report, and a third. An avalanche of noise hit Carson — a wall so solid his teeth rattled, and he thought his chest would cave in. Wind tore at him, buffeting him and ripping him from the deck, and tossing him into the pounding noise. He lost sight of the others. The sound completely enveloped him. He became nothing but two ears listening to a scream that wouldn't end. Then the noise was gone as quickly as it had come. More slowly, it left his head.

He found Fuller and the others off to one side. They stood slowly, touching themselves, each other, discovering that they were, miraculously, still whole. All about them lay huge sheets of rubber fabric.

Thatcher picked up a fragment of ruptured tree, then let it flutter to the deck. She shook her head. "Have you ever seen anything sillier looking?" She snorted, then sat down suddenly and began laughing, pounding the deck in glee. When she finished, they straightened their clothes, shouldered their packs, and went on.

The computer wasn't quite finished. It threw them twenty seconds of bright daylight, alternating with twenty seconds of pitch black. It ran the temperature up to nearly forty degrees and sent a wave of snakes at them with springers riding on their backs. That last attack cost Carson the last joint of one of his little fingers.

But after awhile, the control blister port appeared in the distance. Even before they got there, Carson was calling LaBlanc to get those poor bastards in off the hull, wondering how long it would take to reach the downed rescue crew.

He found his wife staring into the fire. Her hair seemed to catch the flame and hold it for itself. She looked up and smiled when he sat next to her. "Asleep?"

"Yeah. I told them about the time the planet sim computer acted up."

"Can you remember that, or just what the books say?"

"Oh, I still remember. You never forget your heroes. I was very young, but I went down to S2 that day and watched them leave on the mission. One of them, a man, reached out and tousled my hair. Two meters tall and steel muscles, every one of them."

"Strange, I don't recall my mother fitting that description."

He managed a laugh and poked her gently in the ribs. "Your mother was the steeliest of them all." Suddenly overwhelmed with the need for room, he stood and stretched. "I think I'll take a walk around the farm."

His wife nodded, her thoughts already turning to wherever they'd been before he'd interrupted her. "Take your gun with you," she said absently.

The night was fine and clear; the sky, high and black and full of stars. From the hilltop, the cabin and barn were like miniatures on a green-black carpet. They seemed a small return for all the years of work. But pride — so tiny at first he couldn't name it — nudged its way through the man's weariness. It was a small farm, but he and Kate had built it. And someday, who could say what it might become?

He pivoted slowly on the hilltop. Off to the south he made out a curl of smoke from the Garveys' chimney. Between him and his nearest neighbor stood two kliks of forest that would have looked odd to the Earthborn, but they were natural and wonderful to the man. What a planet they'd found! He could still marvel at its beauty.

Overhead, a moving sliver of light caught his eye. *Argo*, still in its polar orbit, still doing resource surveys and weather watch. His mind went back to the story he'd told his children. There'd been giants in those days; people great and brave. After all they'd been through just to get here, he supposed he could find a way to go on. Perhaps, it was always this way.

The man sighed — a sound so slight it was almost lost to the wind. He was part of a chain which he understood as little as his son Jack did. Maybe understanding wasn't important.

He glanced again at the Garveys' woodsmoke. On Sunday he would take a bushel of apples over. He turned down the hill toward home. ▲

HOME SWEET HOME

Creating planets for the STAR FRONTIERS™ game

by David Cook

Rex Dexter, planet explorer extraordinaire, cracked the hatch of his scoutship open. Snakelike threads of vapor reached into the airlock, then the hatch swung open with a distinct pop. Having studied the aerial maps, he knew the place was bad, but as he looked out, his historic first words were stifled in his throat.

Before him stretched a red plain, strewn with yellow-speckled boulders. To his eye, the ground had the same gentle swelling consistency as his mother's oatmeal. Plants, resembling giant fuzzy blue mold, swayed gently in the roasting breeze; they threw complex shadows from the light of the eight bright moons overhead. The air was dense enough to feel like paste; it clogged his lungs, nearly choking him. His feet dragged, held in the grip of 6 Gs. "Oh s_____," he said, "not again!"

Illustration by Jeff Easley

Does this happen to you? Are your science-fiction characters constantly landing on planets that resemble Gumbyland? Do you keep expecting Duck Dodgers (of the 24th and a half century) to appear around the next rock? Do you have the feeling that the planets you are landing on are not quite realistic?

This article presents a method for creating realistic star systems and planets for use in the STAR FRONTIERS game. The method given below attempts to be accurate, allowing the referee to create planets that are reasonable and scientifically possible. Wherever possible, the best scientific theories and information have been used in making this system. However, at the same time, very little is positively known about how planets are formed or even whether habitable planets are common.

The tables below should be used in the order listed. However, creating planets should not be always done just by dice rolls. If the referee has some plan or idea of what he wants, he should design the planet by choice, not letting random rolls dictate the outcome.

Likewise, the referee should not expect these rules to do everything for him. The planets created will have descriptions of the physical factors — the gravity, size, average temperature, amount of water, etc. It is still necessary for the referee to give the planet "life" — creatures, places of interest, colorful descriptions, and a history. No amount of tables can do this, nor any number of rules. This work must be done by the referee.

If the referee is designing a completely new area, the first step is to create the Sector Map. This may be done using graph paper, hexagon paper, or even a blank sheet of paper. The referee should start by rolling for ten to twenty stars on the Stellar Configuration Table (found below). The General Column of the two die ranges should be used. As the referee learns what each star system is, he should place it on the map (wherever he chooses). The map symbols on the following page may be used to indicate each type of star or object. After the referee has done this, he should place an additional 2-20 stars on the map, this time using the Habitable System Column of the table. This will ensure that there are at least several habitable systems in the sector. The referee should not attempt to place all the stars that would be found in a sector, since, in reality, a sector map could have hundreds of stars in its area. Only enough stars to provide many exciting adventures need be placed.

Realistically, it is very unlikely that so many habitable systems would be found in one area of space. However, the more realistic possibility of 1 habitable planet every 1,000,000 cubic light years (or thereabouts) is not very exciting or useful for most science-fiction games.

For those referees wanting greater realism for their sector map, the third dimension may be added. Stars do not all exist on the same plane (as a sheet of paper would seem to indicate), they fill an area. This may be done by assigning a plus or minus number to each star. This number is the number of squares above or below the level of the paper the star actually exists on. True distances between stars may then be found by doing some simple math, using the formula for finding the hypotenuse of a

triangle. However, this is not a math class. Furthermore, this math can be tedious if there are many stars involved. Therefore, adding in the third dimension is optional. The diagram below shows a perspective view of this mapping system.

Once a system map has been created, the referee may begin designing the actual systems that are found around each star. The following tables are used for creating star systems. They will determine the arrangement of the stars, the type of star, and the number of planets in the system. If the referee does not need to know this information, these tables may be skipped.

Creating systems

Stellar Configuration: When placing the stars on the sector map, the referee should determine the stellar configuration (or type and arrangement) of the star(s) at each location. This is done by rolling or choosing from the table below. The General Die Roll applies to most stellar systems. If the referee does not want to bother with these stars he may roll on the Habitable Die Roll column of the table.

Stellar Configuration Table

Gen. Die Roll	Hab. Die Roll	Configuration
1-10	01-40	Sunlike star, habitable planets
11-18	41-72	Binary*: sunlike and dwarf, habitable planets
19-24	73-97	Binary*: two sunlike stars, habitable planets
25	98-99	Binary*: sunlike and giant star, habitable planet
26-93	—	Non-sunlike star, non-habitable planets
94-99	—	Any type star, no planets
00	00	Special feature**

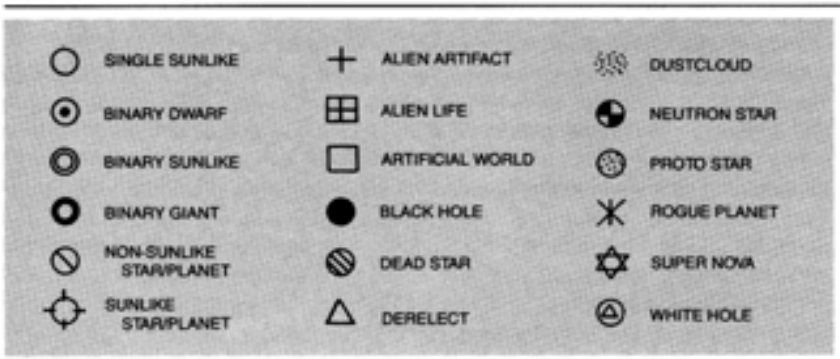
* A binary star system is one that has two stars that orbit each other. In this system, the binaries will either be close or far. In a close binary, two stars circle each other so that they almost appear to be touching. In a far binary, one of the stars is at least as far away as Jupiter is from the Sun. It is suggested that most stars in a binary system be far apart from each other.

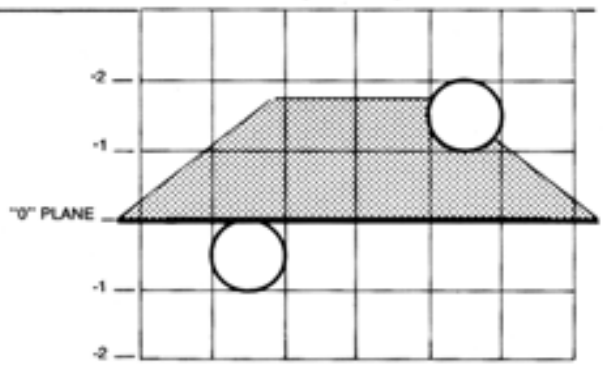
** Special features represent things in space which either are extremely rare or do not fit into other categories. These serve as sources of possible adventures for the PCs. To determine what the special feature is, the referee should either make one up, select one from the table below, or roll percentile dice and consult the table below. The special features are explained after the table.

Special Feature Table

Die Roll	Feature
01-03	Alien artifact
04	Alien lifeform
05-06	Artificial world
07	Black hole
08-20	Dead star
21-22	Derelict spaceship
23-50	Dust cloud
51	Neutron star
52-71	Protostar
72-80	Rogue planet
81-99	Supernova remnant
00	White hole

Alien artifact: An alien device just floating in space. It could be space mines left from some ancient battle or an unmanned deep space probe. Whatever it is, it is likely to be a source of adventures for the player characters.
Alien lifeform: Some unknown creature, able to live in deep space without any life-support is found here. The referee will have to create the creature.
Artificial world: Instead of a star system with planets, there is a world created or drastically altered by unknown beings. Such worlds could include artificial suns and planets, ringworlds, or Dyson spheres.
Black hole: A collapsed star with a gravitation field so intense that even light cannot escape its pull. The exact effect of the black hole will depend on the game being played.
Dead star: A burnt out cinder of a star. The surface will still be very hot, but may be able to support some type of alien life.
Derelict spaceship: A spacecraft in deep space. It may be a recent ship, abandoned after a pirate attack, a lost slower-than-light colony ship, a damaged fighting ship unable to return to base, or whatever else the referee desires.
Dust cloud: If a dust cloud is rolled, the referee should roll 1-10. This is the number of cubic light-years filled by the dust cloud. Dust clouds may be a hazard to navigation.
Neutron star: A collapsed star of extreme density and high gravity. Although not as intense as a black hole, a neutron star emits high amounts of energy that could pose a hazard to communication and navigation.
Protostar: This area is considered a dust cloud for the purposes of navigation. It is really a star in the beginning steps of forming.
Rogue planet: A planet pulled out of orbit from its star and now traveling by itself between stars. The planet may have been inhabited, and the inhabitants may still be alive under the surface of the planet.
Supernova remnant: A rapidly expanding aura of hot gases and particles. Long distance communication may be difficult in the area.
White hole: Currently a theorized counterpart to a black hole. Where a black hole absorbs everything, a white hole would release enormous amounts of energy and matter. They could therefore be exit points for the matter drawn in by a black hole. The amount of energy given off by a white hole is so great that any ship of known design would be totally destroyed if it came too





close. Therefore, white holes are considered hazards to navigation.

Stellar class: In astronomy, all stars are given a stellar class to indicate the brightness and size of the star. However, not all stars can support habitable planets. Some are too hot and others are too small and cold. Some stars give off too much dangerous radiation. A small range of stars (from F2 to K1) are thought to be right for habitable planets. These are called sunlike stars in these rules. The stellar class of the sunlike star will have an effect on the number of planets around it. The referee should roll on the table featured right to find the stellar class of the sunlike star in the system.

Class: The letter and number combinations listed give the Stellar Class for information purposes.

Planet Mod.: This is the Planet Modifier. It is used when determining the number of planets in the system, as explained below.

Length of Year: The approximate length of a year in Earth days (24 hours) for an Earthlike, habitable planet.

Range: There are three different orbit ranges that a character-habitable planet can be in — close, middle, and far. These will have an effect on the temperature of the planet. You may choose an orbit range or roll randomly to determine it.

Color: The colors for stars listed blend into each other. A G9 star would be orange with a slight amount of red to it.

Sunlike Stellar Class Table

Die Roll	Class	Planet Mod.	Length of Year Range Close	Med.	Far	Color
01-05	F2	-2	605	810	1030	Yellow-White
06-10	F3	-2	550	750	970	
11-15	F4	-2	500	675	845	
16-20	F5	-2	450	620	785	
21-25	F6	-1	420	530	690	Yellow
26-30	F7	-1	390	500	635	
31-35	F8	-1	360	470	605	
36-40	F9	-1	335	440	555	
41-45	G0	0	325	380	455	
46-50	G1	0	285	370	480	
51-55	G2	0	260	350	440	
56-60	G2	0	245	315	405	
61-65	G4	-2	215	280	370	
66-70	G5	-2	205	265	335	Orange-Yellow
71-75	G6	-4	200	250	300	
76-80	G7	-4	195	235	270	
81-85	G8	-4	193	220	255	
86-90	G9	-5	191	210	225	
91-95	K0	-5	190	200	210	
96-00	K1	-5	189	195	200	Red-Orange

Planets in the System: Not all star systems with planets will have the same number of planets. Furthermore, not all planets are the same. These rules divide planets into four categories — Planetoids, Minor Planets, Terrestrial Planets, and Jovian Planets. Because of the way planets are formed, the different types will be at different positions from the star. The table below determines the number and type of planets that will be found in a star system. To use the table roll 1-10 and find the proper column. Then roll another 1-10 and add or subtract the Planet Modifier obtained from the Stellar Class Table. Treat modified die rolls of less than 1 as 1 and greater than 10 as 10. Find where the proper row and column meet. The information there will give the numbers and general types of planets in the system. This information is arranged from planets closest to the star to planets farthest from the star.

After this information is found, the referee should place each planet on a system display or some type of solar map. At the center of the display is the star. Each ring out from the sun is a possible planet orbit. Each planet should be placed on an orbit ring. If there are more rings than planets in the system, the referee may skip any rings he or she desires. The shaded area of the display is the star's Habitable Zone. All character-habitable planets should be placed in this zone.

Planet Type Table

Second Die Roll	First Die Roll 1-2	3-4	5-6	7-8	9-10
1-2	1H	1M/2H	1M/2H/1J 1J	1M/1H/1J/1T	2M/2H/1J
3-4	2M/1H/A	1M/1H/2J	1H/A/1J	1M/A/2H/1J/1T	3M/1H/2T
5-6	1M/A/1H/1P	2M/2H/2J	1M/2H/1J/1T	2M/2H/2J/1P	1M/ 1P/1H
7-8	2M/2H/A/3J	3M/2H/3J/1P	3H/A/2J/2T	3H/A/2J/2T 1T	2M/3H/4J
9-10	2M/3H/2J/2T	1M/3H/5T	3M/3H/4J/2T	3H/4J/4T	3M/A/1H

Explanation of results

#: The number of planets of that given type.

M: Minor Planet — a small chunk of rock much like Mercury in size.

H: Terrestrial Planet located in the Habitable Zone — Venus, Earth, and Mars are considered Terrestrial planets.

A: Asteroid Belt

J: Jovian Planet — a gas giant planet, more a cloud of gases. Jupiter and Saturn are Jovian Planets.

T: Terrestrial Planet not in the Habitable Zone.

P: Planetoid — a small chunk of rock, barely large enough to be spotted.

Creating Planets

The following tables (Planetary Diameter and Gravity and Satellites) are used to create any planet, whether habitable or not. If the planet is not habitable, these are the only tables used. If the planet is habitable, the remaining tables of the article are used to generate more information.

Planetary Diameter, Gravity, and Atmosphere: The following table determines the approximate size, gravity, and atmosphere of both habitable and non-habitable planets. Size and other factors have a great deal to do with the gravity of any given planet. The table below already has these factors figured into its results. The table is divided into four categories — Planetoids, Minor Planets, Terrestrial Planets, and Jovian Planets.

Planetary Diameter and Gravity Table

Second Die Roll	Dia.	First Die Roll 1	2	3	4	5	6	7	8	9	10
Planetoids											
1-4	Less than 1500	NE	NE	NE	NE	NE	NE	NE	NE	NE	.1N
5-6	1500	NE	NE	.1N	.1N	.1N	.1N	.1N	.1N	.1N	.1N
7-8	2000	.1N	.1N	.1N	.1N	.1N	.1N	.1N	.1N	.2N	.2N
9-10	2500	.1N	.1N	.1N	.1N	.2N	.2N	.2N	.2N	.2N	.2N
Minor Planets											
1-3	3000	.1N	.2N	.2N	.2N	.2N	.2N	.2N	.2N	.2N	.3N
4-6	4000	.2N	.2N	.2N	.2N	.2N	.3N	.3N	.3N	.3N	.3N
7-8	5000	.2N	.3N	.3N	.3N	.3N	.3N	.4N	.4N	.4N	.4N
9	6000	.3N	.3N	.3N	.4N	.4N	.4N	.4N	.5N	.5N	.5N
10	7000	.3N	.3N	.4H	.4H	.4H	.5H	.5H	.5H	.5B	.6B
Terrestrial Planets											
1	8000	.4H	.4H	.4H	.5H	.5B	.5B	.6B	.6B	.6B	.7*
2	9000	.5B	.5B	.6B	.6B	.6B	.7*	.7*	.8*	.8*	.8*
3	10000	.5B	.6B	.6B	.6B	.7*	.7*	.8*	.8*	.8*	.9*
4	12000	.7*	.7*	.8*	.8*	.9*	.9*	1.0*	1.0*	1.1*	1.1*
5	14000	.8*	.8*	.9*	1.0*	1.0*	1.1*	1.1*	1.2*	1.3*	1.3*
6	16000	.9*	.9*	1.0*	1.1*	1.1*	1.2*	1.3*	1.3*	1.4*	1.5*
7	18000	1.0*	1.1*	1.1*	1.2*	1.3*	1.4*	1.4*	1.5*	1.6H	1.7H
8	20000	1.1*	1.2*	1.3*	1.3*	1.2*	1.5*	1.6H	1.7H	1.8H	1.8H
9	22000	1.2*	1.3*	1.4*	1.4*	1.5*	1.6H	1.7H	1.8H	1.9H	2.0H
10	24000	1.3*	1.4*	1.5*	1.6H	1.7H	1.8H	1.9H	2.0H	2.1H	.2H
Jovian Planets											
1	30000	.3B	.4H	.5H	.6H	.6H	.7H	.8H	.9H	1.0H	1.1H
2	40000	.3H	.5H	.7H	.7H	.8H	.9H	1.0H	1.2H	1.3H	1.5H
3	50000	.5H	.6H	.8H	.9H	1.0H	1.1H	1.3H	1.5H	1.7H	1.9H
4	70000	.6H	.9H	1.2H	1.3H	1.5H	1.6H	1.7H	2.0H	2.3H	2.6H
5	90000	.8H	1.0H	1.5H	1.7H	1.9H	2.0H	2.3H	2.6H	3.0H	3.4H
6-7	110000	.9H	1.4H	1.8H	2.0H	2.3H	2.5H	2.8H	3.2H	3.7H	4.1H
8-9	130000	1.1H	1.6H	2.2H	2.4H	2.7H	2.9H	3.2H	3.8H	4.3H	4.9H
10	150000	1.3H	1.9H	2.5H	2.8H	3.1H	3.4H	3.8H	4.4H	5.0H	5.6H

First, find the proper category of planet type. Next, roll 1-10 and find the proper column across the top of the table. Then, roll 1-10 and find the correct row down the side. Find where the column and row meet. To give the gravity and atmosphere of the planet. The diameter is listed beside the second die roll.

Explanation of results

Dia.: The number in this column is the diameter of the planet in kilometers.

@.1 through 5.6: The gravity of the planet in tenths of a G; 1.0 equals normal Earth gravity.

NE: Negligible gravity. The strength of the gravity on the planet is not enough to have any game effect. The rules for weightlessness should be used when characters are on the planet. Obviously, the planet will not have an atmosphere. Characters will have to wear spacesuits when on the surface.

N: The planet has no significant atmosphere. Characters will have to wear spacesuits when on the surface.

H: Hostile Atmosphere. The planet has an atmosphere, but it is not breathable by the player character races. The atmosphere may be poisonous methane and ammonia, hydrogen and helium, frozen solid or any of a number of other dangerous combinations. Characters will have to wear spacesuits while on the planet's surface.

B: The atmosphere of the planet is breathable by the character races, if the planet is in the habitable zone of the star. However, other conditions (gravity, average temperature, etc.) make the planet unsuitable for colonization. No character may remain on the planet for more than six months. If the planet is not in the Habitable Zone on the system display, the atmosphere is considered hostile.

***:** The planet is character-habitable if in the Habitable Zone of a sunlike star. Conditions allow it to be colonized.

Satellites: Many planets will have satellites orbiting them. These will range in size from chunks of rock, barely visible from the ground, to large moons. In addition to satellites, some planets, especially larger ones, will have rings around them.

To determine the number of satellites around any planet, character-habitable or not, the following table and its modifiers should be used. The referee should find all modifiers that apply to the planet and add them to the roll of 1-100. The modified result should be found on the table below.

Modifiers
Gravity × 10
Diameter/1000

Satellites

Die Roll	Satellites
01-107	None
108-118	1-2 planetoids
119-129	Ring*
130-136	1-5 planetoids
137-149	1-10 planetoids
150-170	Ring**
171-250	2-20 planetoids
251-306	2-20 planetoids and 1 minor planet

* If a ring result is obtained, another modified die roll should be made. If the planet already has rings, treat the result as 1-5 planetoids.

** If a ring result is obtained, another modified die roll is made. If the planet already has rings, treat the result as 2-20 planetoids.

If the referee desires, he may determine the diameter, gravity, and atmosphere of the satellite by rolling on the proper section of the Planetary Diameter and Gravity Table. However, if the referee does not intend for the player characters to ever reach the satellite, this is not necessary.

Character-Habitable Tables: The following tables should only be used for character-habitable planets. If the planet is not character-habitable, no further information is required.

Length of Day: The following table is used to find the length of the day (in standard 60 minute Earth hours) on any character-habitable planet. It is possible for a day to be longer or shorter than the amounts listed. However, if this were so, the conditions on the planet would not be suitable for living creatures.

To determine the length of the day, roll percentile dice and read the proper row. This will give a range of hours, either 1-5, 1-10, or 1-20. The referee should then roll the proper die to determine the exact number of hours in the day.

By doing a little simple arithmetic, the

referee can find the length of the year in planet days. Multiply the number of Earth days in the planet's year by 24. Divide this total by the number of hours in the planet's day. The result is the number of planet days in the year. (Year in Earth days * 24 * hours in year. Hours in year/hours in planet day = number of planet days in year.)

Day Length Table (Earth hours)

Die Roll	# of Hours
01-07	6-10 hours
08-20	11-15 hours
21-50	16-20 hours
51-75	21-30 hours
76-85	31-40 hours
86-90	41-50 hours
91-95	51-70 hours
96-99	71-90 hours
00	91-95 hours

Equatorial Inclination: Most planets tilt on their axis. This tilt will have an effect on the seasons of the planet. The greater the tilt, the more severe the seasons will be. This will affect the average temperature of the planet according to the season. To find the equatorial inclination, roll percentile dice and read the result on the table below. This will list the degree of inclination, the general effect on the seasons, and the Average Temperature Modifier.

Equatorial Inclination Table

Die Roll	Degrees Inclination	Seasonal Effect	Av. Temp Change
01-15	0	No seasons	0°
16-35	10	Mild seasons	+5/-5° C
36-55	20	Earthlike seasons	+10/-10° C
56-70	30	Strong seasons	+15/-15° C
71-85	40	Extreme seasons	+20/-20° C
86-00	50	Drastic seasons	+25/-25° C

Average Temperature: With the orbit range and inclination of a character-habitable planet, the referee can determine its average yearly temperature. To do so, match the planet's orbit range on the table below with the orbit range for the planet on the Stellar Display. This will give a spread of degrees for the average temperature of the planet. The referee should roll 1-10 and add the base number (if any). The result is the average yearly temperature for the temperate zone of the planet. To find the average temperatures for the different seasons, the referee should add and subtract the Average Temperature Change given above for the planet's inclination. The lowest number is the winter temperature, the highest number is the summer temperature. Remember, these temperatures are only average. Some days will be hotter or colder. Furthermore, many other factors may affect the temperature of a planet (these may be created by the referee).

Orbit Range	Base Temp. In C
Close	20° C
Medium	10° C
Far	0° C

Percentage of Water: All character-habitable planets will have some amount surface area covered by water. Obviously, planets with a low percentage of water will be dry and barren for the most part. Planets with a high percentage of water will have many island chains, and will often be humid or sometimes tropical. It is impossible (by today's knowledge) to have a character-habitable planet that has less than 10% water or more than 90% water. The first would be a dry, barren ball and the second would be a misty globe.

Surface Water Table

Die Roll	Adjustment
01-25	+10
26-75	0
76-00	-10

To use the above table, roll percentile dice and check the number rolled against the adjustment line. Add or subtract this amount from the die roll. The result is the percentage of surface water on the planet.

Optional Tables

Age of Planet: The age of the planet will affect the results of the Lifeform, Resource, and Unusual Features Tables, and should be determined before these tables are used. The young planets will be less likely to have highly developed lifeforms, and will have different resources and unusual features as compared to older planets. Determining the age of the planet will give a modifier that is used on the three tables. It is not necessary for the referee to record this modifier, although he if desired.

To determine the modifier, find the proper stellar class for the star below. The amount listed is either added or subtracted from the die roll.

Stellar Class	Age Modifier
F stars	-2
G0 - G3	-1
G4 - G6	0
G7 - G9	+1
K Star	+2

If the result is positive, that number should be added to the die rolls on the proper tables. If the result is negative, that number should be subtracted.

Lifeforms: If the referee has not decided what types of creatures will inhabit the planet, he may use the following table for a general idea. It is important to note that the categories used are extremely general. Many different kinds of creatures fall under each category. Secondly, the creatures and evolutionary order are all from Earth. This certainly does not mean that these creatures will be found on other planets, only something similar to them. A flowering plant on another planet might be sticky pads of seeds that open, get caught on a passing creature, and eventually drop off the creature at a different place. A semi-intelligent creature might have five small brains controlling different parts of its body and a larger brain controlling the smaller brains. The referee should remember to create all alien creatures with imagination and common sense.

Lifeform Table

Die Roll	Typical Lifeform Equivalents
1 or less	Single celled bacteria, red algaes
2	Simple sponges, corals, jellyfish
3	Worms, lichen, snails, clams, green algaes
4	Fish, insects, ferns, mosses
5	Lungfish, frongs, Sago palm (not a true palm tree)
6	Lizards, pine trees, snakes, palm trees
7	Dinosaurs, birds, rats, flowering plants
8	Mammals, grasses, oak (and other trees)
9	Apes, chimpanzees, dolphins, whales, primitive man
10+	Intelligent beings (equal to character races)

To use the table, roll 1-10 and add or subtract the planet age modifier. The result will be the general level of development of lifeforms on the planet.

Special Feature Table

Die Roll	Feature
0 or less	Extreme geothermal activity
1	High air pressure
2	Retrograde spin
3	Twin Planet
4	No feature
5	No feature
6	No feature
7	Violent weather
8	Alien artifact
9	Low air pressure
10	Greenhouse effect
11+	Tainted atmosphere

Explanation of results

Extreme geothermal activity: The planet is still quite hot and active. On its surface are volcanos, geyser basins, and fault lines. There is a 5% chance per week that an earthquake will occur in the region of the player characters. These quakes will knock characters off their feet and cause minor damage. The referee should place many active volcanos and geyser basins on the world map.

High air pressure: The air on the planet is denser than Earth normal but still liveable.

Retrograde Spin: The planet rotates in the opposite direction from most planets. The sun will rise in the west and set in the east.

Twin Planet: The planet actually circles another planet and both circle the star. The referee should note the twin planet on the stellar display. Five should be added to the length of the planet's day. The other planet of the twin planet group may or may not be habitable. Roll 1-10; a 1-3 indicates a Minor Planet, a 4-8 is a Terrestrial Planet, and a 9-10 is a Jovian Planet. Determine the size and gravity as a normal planet of the proper type. The length of day will be identical to the first planet.

Violent Weather: Storms and high winds are common on the planet. There is a 50% chance each day, that high winds will prevent any flying movement and will halve ground movement.

Alien Artifact: Something (a city, wrecked spacecraft, etc., of unknown alien construction is found on the planet.

Low Air Pressure: The air is less dense than that of Earth. Characters will require oxygen while on the planet. Characters without oxygen will suffer a small amount of damage every 12 hours (or part thereof).

Greenhouse Effect: The ground is always shrouded by a thick cloud cover, casting it into continual twilight. The temperature of the planet is increased by 15 degrees.

Tainted Atmosphere: Some agent in the air (a pollen, chemical, micro-inscet, etc.,) makes the use of a filter mask required. For every 30 minutes in the atmosphere without a filter mask the character will suffer serious damage.

Technological Stage: If the referee decides or determines that a planet has intelligent creatures, this does not necessarily mean they are equal in technology to the player character races. Instead, the beings are at *some* technological stage. To find their technological stage, roll one die and consult the table below. Each line is divided into four different parts for different areas of technology. These areas are transport, power sources, types of weapons, and information storage. An Earth equivalent for each category is given. The referee, if he chooses to do so, may raise or lower the stage of technology in any of the categories. For example, a 4 is rolled. The referee (because he wants it that way) decides the planet is poor in metals. Therefore, he lowers the Weapon category by two, giving the following combination — sails; water/wind; spear/bow; books/scrolls.

Technological Stage Table

Die Roll	Technological Categories			
	Transport	Power	Weapons	Data
1	Foot	Muscle	Muscle	Memory
2	Animal	Animal	Spear/bow	Painting/carving
3	wheels/oars	animal	metal weapons	alphabet
4	sails	water/wind	crossbow	books/scrolls
5	steam/airship	steam	gunpowder	printing
6	internal combustion	electric/ gasoline	rapid fire weapons	radio/ television
7	electric	man-made fuel	gases	early computer
8	jet/rocket	fission	nuclear	micro-chip computer
9	interplanetary	fusion	large beam weapon	magnetic bubble
10	Equal to character races			

Settlement Size Table

Adjusted Die Roll	Settlement Size
2-4	10-50 individuals
5-7	10-100 individuals
8-11	100-1000 individuals
12-15	1000-10,000 individuals
16+	More than 10,000 individuals

Settlement Size: To assist the referee in preparing maps of inhabited areas, he may use the above table to find the size of an average settlement on the planet. The result from the table will list the population of an average town on the planet. To use the table, roll 1-10 and add the number of the Technological Stage of the inhabitants.

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THE FAR FRONTIERS
A TRAVELLER® Game Sector Supplement

Editors' introduction: The Far Frontiers sector forms the basis for FASA Corporation's TRAVELLER game adventures. It is considered to be an "unofficial" sector in the TRAVELLER game's Third Imperium universe, located immediately coreward of the Vanguard Reaches sector designed by Paranoia Press.

Beyond the borders of the Imperium lies the Far Frontiers sector, located some thirty to forty parsecs spinward of the nearest world under direct Imperial control. The sector is split roughly in two; the coreward portion is dominated by the Zhodani Consulate, while the rimward half is made up of numerous small client states and isolated worlds.

Though not under Imperial control, the Far Frontiers sector is of considerable importance, and strategic planners in both Imperial and Zhodani services are interested in events in the area. To the Zhodani, the sector is known as the "Stars of Destiny" and are considered to be under Zhodani dominion. Absorption, however, has been painfully slow, so much so that Imperial involvement in the area has halted the process.

To the Imperium, the region represents an important link in the "Policy of Containment" set down during the reign of Paula II. This policy promoted close ties between a number of client states and the Imperium. Those along the Consulate Frontier were of particular importance since they furnished a potential base for activities against the Zhodani in times of crisis, and forced the Zhodani to extensively rethink their program of expansion along the Imperial border and in the Far Frontiers.

General overview

The designation "Far Frontiers" is usually applied to the whole of the sector lying immediately to coreward of the Vanguard Reaches and to spinward of the Zhodani Consulate. Properly speaking, however, the designation is limited to the Rimward Reach, the half of the sector lying outside the Consulate's borders. Only this portion of the sector will be described in this article.

Most client states in the Rimward Reach have entered into political alliances with the Imperium or the Zhodani Consulate, with only a few preserving a cautious neutrality. Between these interstellar states are other, non-aligned systems. Most interesting of these is Freedonia in the Inverness Subsector, which has combined a high tech level with shipbuilding industry to make it more valuable to all its near neighbors as an independent, neutral state.

History of the Far Frontiers

The Far Frontiers sector has been inhabited by sentient beings for the last 6,000 years. The sector was originally settled by a minor human race known as the Vlazdumecta. They are believed to be genetically related to the Zhodani and might be an offshoot of their gene pool.

During the period of initial Zhodani interstellar expansion, however, their homeworld was absorbed along with many Vlazhdumecta colony worlds. Most of the remaining independent colonies, many in the Far Frontiers, were not self-sufficient. After the collapse of the Vlazhdumecta colonial empire hundreds of these planets lapsed into low-tech barbarism, many never recovering. This continued for the next several millenia as the surviving Vlazhdumecta worlds in the Far Frontiers adjusted to their new situation.

This adjustment period was only disturbed once in the next 4,000 years by outside influences. Around -4200 Imperial, a number of Vlazhdumecta planets were plundered by a race of outsiders known only as the Sky Raiders. They are mentioned in folklore and legends from a number of planets in the Jungleblut and Taemerlyk subsectors, and are said to have dropped from the skies, spreading death and destruction in their wake. Plunder and pillage seems to have been the main object of these raids, and most of what was taken were rare metals and other items of lasting value. Most of the worlds attacked could have been no more developed than tech level 4 or 5. It has been estimated that the tech level of the Sky Raiders was 9 or 10.

Recent theories concerning their origin explain that the Sky Raiders were the remnants of the Loeskalth race which had been absorbed by the Vilani expansion of the First Imperium in the Gushemege sector, near the present day border of the Third Imperium. Fleeing in a huge asteroid starship, the Loeskalth eventually arrived in the Far Frontiers where they played their legendary role as the Sky Raiders. It is interesting to note the similarities between the situations of the Vlazhdumecta and the Loeskalth. If the latter had not been so aggressive, these two races might have been able to cooperate in forming a new interstellar society. Who knows how the history of the area could have been changed by them? The point is moot, however, because after a few decades of planetary pillaging the Sky Raiders dropped out of sight, not to be heard from again.

The inhabited worlds of the Far Frontiers continued to develop over the centuries, unknowing and uncaring of the major changes going on around them. With the collapse of the Rule of Man in -1776 Imperial, the Long Night began, throwing most of interstellar society into isolation. For the next 1500 years the only contacts the Far Frontiers had with outsiders were occasional Solomani or Darrian traders. By -300 Imperial, these areas were beginning to recover from their long period of stagnation and many planets were again interested in colonial expansion. Soon such areas as the Spinward Marches were being rapidly settled by Solomani and Vilani colonists. Finally the first settlers came to the even more distant Far Frontiers Sector.

By the beginning of the Third Imperium there were a dozen planets colonized by humans in the Far Frontiers sector. This number rapidly increased over the next few centuries until 536 Imperial, when the first human state in the sector was formed, the Protectorate.

As more Imperial citizens settled in the Far Frontiers, the Vlazhdumecta dropped to the position of the lower class. The colonists brought advanced

technology to the Vlazhdumecta worlds, but for the price of this development the new settlers took control of the worlds they colonized. Almost all Vlazhdumecta worlds had their names changed to suit the new colonists. Through it all, these changes did little to upset the mild-mannered, somewhat fatalistic Vlazhdumecta, coming as it did with so much new found prosperity.

After 600 Imperial, new settlers poured into the Far Frontiers to get in on its booming economic growth, and because of the tension and internal strife in the Spinward Marches and other sectors, caused by the many frontier wars between the Third Imperium and the Zhodani Consulate. In time the refugees fleeing from Zhodani expansion increased until almost all suitable planets for colonization in the Far Frontiers were inhabited.

After 700 Imperial, the many settled worlds in the Far Frontiers began to join together to form states for mutual protection and profit. With the many major changes continuing in the mainstream of civilization near the Imperium, the Far Frontiers was basically ignored. Visited every ten years or so by Imperial scout or merchant vessels, little news reached the inhabitants of the sector concerning the activities of the Imperium until it was long out of date. The Zhodani were much nearer, but too concerned with happenings on the Imperial border to worry about the various states in the Far Frontiers. Some military and economic aid was given occasionally to ardent Zhodani supporters, but this was rarely enough to disrupt the balance of power in the area.

Over the years, local interstellar states began to be known for their pro-Imperial or pro-Zhodani stance, reflecting the antagonisms of their larger and more powerful mentors. Throughout this period neither the Imperium nor the Zhodani had any interest in promoting these sympathies. Only out-of-date warships were ever able to be purchased from the disposal yards of the Imperium, and Zhodani aid was just as rare. Diplomatic missions of both powers were at most capital worlds, but all parties were primarily interested in maintaining the status quo. This policy remains in effect to this day.

States of the Far Frontiers

Domain of Alntzar: A Zhodani client state in the Jungleblut subsector. Once the dominant force in the region, the Domain was split by internal warfare some three hundred years ago. It is strongly suspected that pro-Imperial interests were behind this upheaval, as the Imperium benefited greatly from the removal of a strong pro-Zhodani government in the area and consequent weakness in the flank of the Consulate during the Third Frontier War.

Regardless of the cause of the disintegration, the result of the crisis was a vast diminution of the size and power of Alntzar. A number of star systems which rebelled at this time later emerged as the nucleus of the League of Suns. With the League and the Trelyn Domain nearby, the Pro-Imperial strength in the Jungleblut subsector far outweighs the power of the Domain of Alntzar. The Zhodani Consulate gives the Domain token support, but has little interest in assisting the state in re-establishing its old prestige.

Weakened and rather decadent, the Domain of Alntzar has been replaced as the League of Suns' most important competitor by the emergence of the Descarothe Hegemony at the turn of the last century. Since then, the balance of League military attention along the Domain's borders has been considerably reduced. Transfers to the Hegemony borders have been ordered to meet the threat from this smaller, but far more aggressive, interstellar state.

Colonade Administration District: A pro-Zhodani state extending into the Wulfeck subsector of the Far Frontiers sector, and the Issoudun and Andwella subsectors of the Vanguard Reaches. The region was originally settled by Vlazhdumecta who acquired starfaring technology from the Zhodani. The arrival of Imperial colonists, between 400-600 Imperial, found the inhabitants of the area more reluctant to deal with outsiders than most Vlazhdumecta worlds. With their technical superiority, however, the newcomers were able to convince the inhabitants of the wisdom of cooperation. The Administration District was formally established as a loose federation of worlds united by bonds of trade and mutual defense, by a treaty dated 576 Imperial. At this time, the District included signatory members from as far away as the Antideluvia and Cabala subsectors. These areas, and all of Wulfeck, Issoudun, and Andwella subsectors, were claimed as Colonade space.

In the period 576-750 Imperial, the District adopted a policy of friendship and assistance to incoming settlers. There were a number of undeveloped worlds within the District and the Colonade government was more than happy to have settlers establish themselves there, providing they swore allegiance to the CAD.

In 753 Imperial, the Colonade worlds in Antideluvia subsector became increasingly restive under District authority. They declared their independence from the District and enforced this declaration in notable victories over Colonade forces at Atlantis and Arbelletia in the Antideluvia subsector. The Colonade at length agreed to recognize the independence of what some historians have called the "Splinter Worlds." These systems soon reorganized themselves into the present-day Salinaikin Concordance.

During the continuing tensions between the Third Imperium and the Zhodani Consulate, the Colonade Administration District became a staunch supporter of the Zhodani cause. Being the most distant human state in the Far Frontiers from the Imperium, the Colonade government naturally thought it had more in common with the nearby Zhodani. In 873 Imperial, the first of several mutual assistance treaties between them were signed. Some Zhodani aid has arrived in the District over the years since, but these treaties' merit is highly dubious at the present time. This has not seemed to diminish the loyalty the Colonade Administration District has for the Zhodani. In fact, the Colonade world of Zherlicka (Wulfeck, 0504), an important terminus on the jump route to the Consulate, is often called "Little Zhodane," due to the highly visible Zhodani presence there in the form of diplomatic and trade missions of larger than usual size.

The Colonade Administration District is one of the most powerful Zhodani client states in the Far Frontiers. Although very little actual aid gets through from the Consulate (as is the case for the other states in the Far Frontiers), the Colonade government remains a possible staging area for any future operations the Zhodani might wish to conduct in the Rimward Reach of the Far Frontiers.

Descarothe Hegemony: An independent state in the Jungleblut subsector. The Hegemony is composed of Desaekhe (the capital), three systems conquered by that world during a period of aggressive expansion at the turn of the century, and the low tech world DeBeers in the Cabala subsector, recently taken as a face-saving gesture after a confrontation with the League of Suns. Although officially an association of independent worlds, the Descarothe Hegemony is in fact a budding empire

like dozens of other petty states in the Frontier sectors beyond the Imperium.

As recently as 1088 Imperial, Desaeke was a backwater world with a poor agricultural base and feeble industry. In that year the High Tribunal, a committee of five semi-feudal lords of the planet's principal continent, was formed. Tribunal military forces brought the rest of the world under control in less than a decade.

By 1103 Imperial, the newly-formed Descar Navy had completed training and forced two neighboring systems to join the Hegemony. Outfitted with obsolete Zhodani ships and equipment (acquired from the pro-Zhodani Domain of Alntzar), Descar naval bases and facilities are as yet relatively low quality installations with little major firepower, and are normally rated as equivalent to scout bases. Other Hegemony-armed forces still lag behind in the quality of their equipment, for the most part outfitted with tech level 7-8 items. Some tech level 9 elite units exist, mainly in the secret police and tribunal guards. A few totally outdated tech 6 formations can be found in the Descarothe Army.

Federation of Alsas: A pro-Imperial state in the Alsas subsector of the Far Frontiers sector, the Federation of Alsas is composed of twelve star systems. Dominated by the capital planet of Afellahlah, these systems joined together three hundred years ago for mutual defence. Most of the member planets leave the job of Federation defence to the armed forces of Afellahlah, thereby avoiding the expense of equipping themselves but allowing the Afellahlah government a lot of leeway in deciding Federation policy. Although not actively expansionistic, the Federation of Alsas is not opposed to intervening in the affairs of the independent planets surrounding it. The Afellahlah Navy is the strongest in the area, and there is rarely any argument to their judgement. Outlying systems do reap the benefit of having a strong neighbor to control pirate factions in the subsector, and regular patrols are conducted by Afellahlah.

The Four Worlds: The only pro-Zhodani state in the Taemerlyk subsector. The Four Worlds rebelled from the Union of Garth during a Zhodani-supported insurrection in 788 Imperial. Throughout their membership in the Union of Garth, the Four Worlds were never satisfied with the kind of representation they received in the Union's Parliament of Industry. These four planets felt that the other members of the Union considered them backward and did not regard them as equals. They made a secret pact with the Zhodani Consulate in 785 Imperial, leading to covert military and economic aid for an agreement that Zhodani ships and personnel could use any port facilities in the Four Worlds. This culminated in the successful revolt of the Four Worlds from the Union of Garth long before they or their stronger ally, the Protectorate, could react. After a strong warning from the Zhodani not to interfere, the chance of recapturing the Four Worlds was lost.

The Four Worlds continue to be a strong supporter of the Zhodani Consulate, although the treaty signed by the two governments is rarely invoked and Zhodani warships are not usually in the area. There is a brisk trade arrangement carried out by independent Zhodani merchants and Four Worlds tradesmen, so many Zhodani exports of tech level 10 or lower can be found in the marketplaces of the area. There is still considerable tension between the Four Worlds and the Protectorate/Union of Garth alliance, and all three powers maintain sizable squadrons of warships on their respective borders.

The Four Worlds are ruled by an impersonal bureaucracy headquartered on Uldor. Most of the population is satisfied with this arrangement and have no qualms about their friendship with the Zhodani. The area remains a major trouble spot in the Far Frontiers, and all Four World systems have been rated as Amber Zones.

Haladon Cooperative: A pro-Imperial state in the Cabala subsector, the Haladon Cooperative is one of the newest governments in the region. Formed less than 200 years ago by a group of merchant princes who controlled many systems in the area, it has proven one of the most successful governments in the sector. The Cooperative was formed to end the constant fighting between the major merchant families in the area over the centuries. Finally, a coalition in 937 Imperial, led by Josiah P. Haladon, a well known free trader who made millions of credits importing Imperial goods into the Far Frontiers, organized the Haladon Cooperative. Giving over his fortune to start the fledgling government, he ended the continuous interstellar trade wars. The other major merchants, seeing the advantages of cooperation and the end of the long, costly fighting, went along with the proposal and the Haladon Cooperative came into being.

Since its inception, the Cooperative has been a stabilizing influence in Cabala subsector. With excellent trade and diplomatic relations with neighboring states, the Cooperative has developed to its full potential as a major power.

The Cooperative is pro-Imperial due to the many business contacts from that region. This does not seem to bother its pro-Zhodani neighbors in the Colonade Administration District or the Zelphic Primacy, and relations have always been cordial. The Zhodani take little notice of the Cooperative.

The Haladon Cooperative is a haven for large merchant and free trader alike. With laws aimed at encouraging interstellar trade, it is one of the most impressive and diverse marketplaces in the Far Frontiers sector. There are no private companies or corporations in the Cooperative. All members share the profits and expenses in relation to how many ships, warehouses, etc., they own in the subsector. However, any merchant or trader who owns at least one vessel or planetary outpost has voting privileges equal to the merchant-prince families with far larger holdings in the Cooperative Council. Even some sector-wide corporations have been allowed in the Cooperative, as long as they abide by these rules of equality. Cooperation continues in this manner.

The Haladon Cooperative is one of the most progressive states in the Far Frontiers sector. With a sense of fair play and integrity which rivals that of Freedonia, the Cooperative should continue to progress in the future.

The League of Suns: A pro-Imperial state in the Jungleblut subsector, the League was originally formed by planets rebelling from the Domain of Alntazar in 819 Imperial. The League has provided a stable island of peace and prosperity in the region for the past three hundred years.

The League is a loose coalition of worlds with governmental functions centered on Alzenei. Treaty arrangements with the Imperium provide for Imperial use of local facilities for ships and squadrons operating in the area in exchange for support against encroachment by surrounding Zhodani client states. This treaty is not of great importance due to the fact that major Imperial warships have not been seen in the area in over a century.

A peaceful state, the League's primary interstellar enforcement arm is the League Survey Service, a scout organization with military appendages. Most bases, except for that on Kokkelen, are strictly scout operation centers. Kokkelen Base is the home of the LSS naval

Illustration by David Nolte

arm, which has been stationed on the world for most of the League's history as a check against Alntzar. Recent problems with the Descarothe Hegemony (over mercantile rights and control of Quarant/Jungleblut, in 1103 and 1105 Imperial) have produced plans to update the Scout Base on Alzenei to co-equal status with that of the naval base of Kokkelen.

The Protectorate: The Protectorate is the most powerful pro-Imperial state in the Far Frontiers sector. Covering a large area of the Taemerlyk and Inverness subsectors, it is composed of twenty-nine stellar systems, which, in combined defence and singleness of purpose, have maintained their independence in the face of Zhodani expansion. The Protectorate is governed by a loose political body called the High Council. The Council is composed of one representative from each member planet, and has striven to retain the policy of isolationism set down when the Protectorate was formed in 536 Imperial.

Self-sufficiency is the primary aim of Protectorate planning. Accordingly, many items that were almost exclusively imported in the past (usually from the Imperium) are now in the intermediate stages of being produced domestically. This is particularly apparent in the Protectorate shipbuilding industry. Headquartered in the orbiting construction yards of the planet Wa-Lu/Taemerlyk, government subsidized warship and merchantman construction has reached a level second only in quality to the nearby independent planet Freedonia.

The Protectorate ended its neutral stance and became a supporter of Imperial policy in the year 788. At this time, a Zhodani-inspired insurrection took place in the neighboring Union of Garth, a region originally settled by Protectorate colonists and always a close ally. This rebellion resulted in the formation of the Four Worlds, a state which has maintained pro-Zhodani sympathies since gaining its independence from Garth. This situation continues to cause considerable danger as all three powers involved maintain naval squadrons along their borders, and incidents occur with frightening regularity.

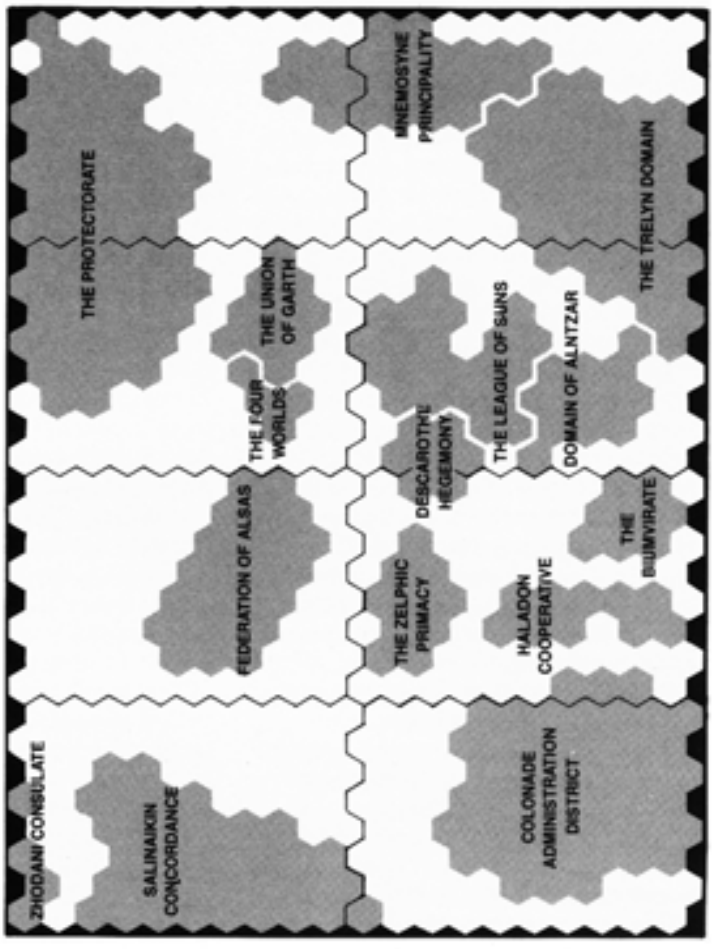
The Protectorate government is composed of a number of agencies. The Protectorate Naval Administration operates as a local peace-keeping force in times of calm, but when activated to full alert status it serves as the central cadre for the combined Protectorate Planetary Navies. Based on Calamain/Taemerlyk, the PNA keeps its main fleet units in reserve and only activates them in time of emergency or for training cruises.

Another major governmental agency is the Internal Security Force. The ISF is responsible for the maintenance of order within the interstellar community; composed of the Combined Services Contingent (undercover agents) and the Para-military Arm, the ISF also doubles as the cadre of the Combined Protectorate Army in times of crisis. The ISF is headquartered on the frozen planetoid Titus, in the capital system of Caractacalla/Taemerlyk.

The last major government department is the Protectorate News Service, responsible for the gathering and distribution of interstellar and planetary news. Programs are produced and transmitted from PNS office studios or from other private communication systems. The PNS also operates an interstellar shuttle service with a number of leased scoutships.

The Protectorate is a stabilizing influence in the Far Frontiers. Interested in continuing the status quo, the Protectorate can be relied upon to maintain its domination of interstellar affairs in the Taemerlyk and Inverness subsectors.

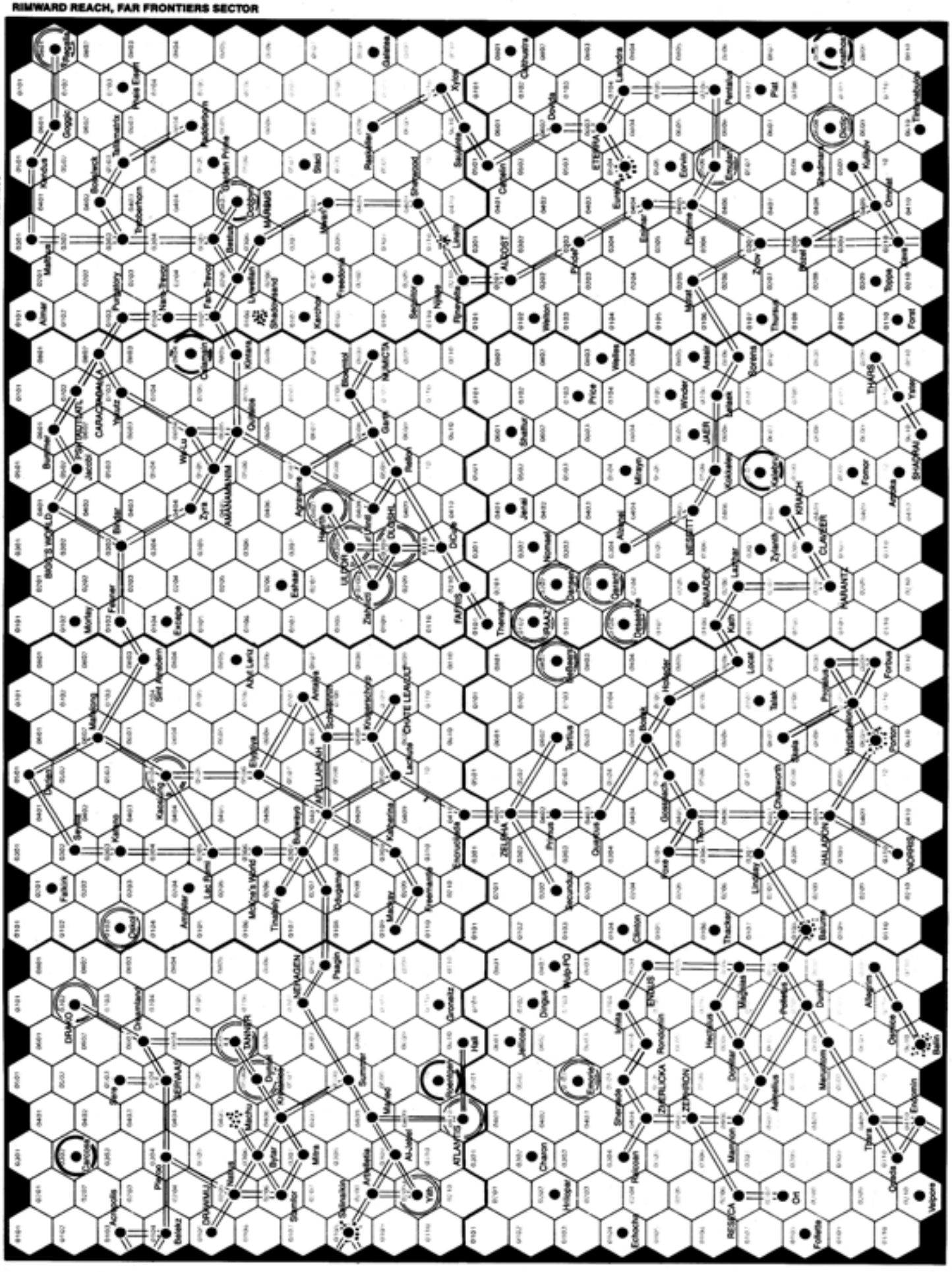
Salinaikin Concordance: The Salinaikin Concordance is the last truly neutral state in the Far Frontiers. Located in the Antideluvia subsector, the Concordance was formed by Kalel Escott Salinaikin, founder of the respected Salinaikin Institute of Knowledge. Seeing the growth of Zhodani economic influence after the subsector split away from the Colonade Administration District in the early 750s, Salinaikin took it upon himself to meet with



Stellar Empires of the Rimward Reach The fifteen interstellar political bodies of the Far Frontiers Sector's rimward half are shown. Most of the coreward end of the sector (the eight subsectors extending upward from the top of the map) is taken up by the Zhodani Consulate.

Rimward Reach, Far Frontiers Sector

The following tables describe the individual worlds of the rimward half of the Far Frontiers sector, using the world code system outlined in TRAVELLER® Game Supplement 10, *The Solomani Rim*. Abbreviations used in the "remarks" section include the following: **Agric** = Agricultural world, **Ast** = Asteroid system, **Capital** = Capital system of local empire, **Desert** = Waterless world, **Ice-cap** = Ice-capped world, **Indus** = Industrial, **IRP** = Information Relay Point, **Merc** = Mercenary-owned, **Mining** = Major mining facilities, **NA** = Non-agricultural, **NI** = Non-industrial, **PF** = Prison Facility, **RS** = Research Station (government-controlled or private), **Un** = Uninhabited, **Vacc** = Vacuum world, **Water** = Waterworld. The far right columns shown Amber (A) or Red (R) Zones, Gas Giants (G), and political affiliations.


RIMWARD REACH, FAR FRONTIERS SECTOR
INVERNESS
TASMERLYK
ALSAS
ANTEDILUVIA
MNEMOSYNE
JUNGLEBLUT
CABALA
WULFECK

leaders of the various two or three-system splinter groups and lobby for unity. Salinaikin met much resistance at first, but his logic and reasoning ability, delivered with a gentle persuasion and a touch of humor, began to gain converts. His idea of a loose political grouping, in which member worlds were autonomous in their own affairs and united in mutual defence and trade, seemed more desirable than the continuous squabbling between various political factions.

Still, it took the fear of subsumation into the Zhodani Consulate to convince these planetary leaders of Salinaiken's wisdom. Representatives from two dozen worlds met on Acropolis/Antideluvia, and after months of deliberation ratified the declaration of the Salinaikin Concordance, named in honor of the man who helped bring it about. Salinaikin did not live to see the triumph of his ideas, having passed away two months before the convention. His name lives on, however, not only in the name of the state, but in the name of the asteroid belt where the capital is located.

In the past three and a half centuries of its existence, the Concordance has retained its neutrality and generally good relations with its neighbors. To ensure this, the Joint Defence Fleet was established and based at the central naval facility in the Machu asteroid belt. The individual planets in the Concordance have remained free to develop as they please. Although many prefered to be as self-sufficient as possible, others chose specialization. Bytar became known as an information center, its massive underground computer banks storing data for the worlds of the Concordance and its neighbors. Belekz became a major shipping and business center, with branch offices of all the major corporations in the sector located in its capital city. Pleroo is the agricultural center of the subsector and is considered the bread basket of the Concordance.

Although there are still tensions around and within its borders, such as the rivalry between the Tannerite and Drakian religions, the unrest concerning the Servaas dictatorship, the continued enslavement of the sub-humanoid natives of the planet MaReid by their Vlazhdumaecta overlords, the open sanctuary on Groneitz where criminals, terrorists, and political undesirables find refuge from the law, and the sometimes questioned wisdom of the Concordance's contract with the Summer Mercenary

Antideluvia Subsector

Name	Statistics	Remarks	
Acropolis	0103 A887556 9 NS	Agric/NI	G S
Belekz	0104 A553413 A	NI	S
Drawmij	0105 E569955 7		G S
Salinaikin	0108 A000547 E N	Ast/Capital/NI	A G S
Natlus	0205 C859457 7	NI	G S
Stamfor	0206 D442885 7	Poor	G S
Arbelletia	0208 C235435 9	NI	G S
Yith	0209 C223558 C S	NI/Poor/RS	A G S
Carcosa	0302 X400000 0	Vacc/Un	R G
Pleroo	0304 BA86698 6 N	Agric/NI/Rich	G S
Bytar	0306 A135212 E	NI/IRP	G S
Mitra	0307 B975740 A N	Agric	G S
Al-Jebel	0309 A330454 C N	Desert/NI/PF/Poor	G S
Machu	0405 B000400 D N	Ast/NI	G S
Kretakios	0406 C998423 6 S	NI	G S
Maried	0408 C656650 8	Agric/Mining/NI	G S
Atlantis	0410 E768955 7	Rich	A G
Sere	0503 E6305A8 8	Desert/NI/Poor	G S
Servaas	0504 AA979B9 B N	Indus	G S
Dunsel	0506 E7628D9 3		A G S
Summer	0508 A8867A0 D NS	Merc	G
Roentgen	0510 E8C7673 8	NI	R G
Dreamland	0603 C431631 9 N	NA/NI/Poor	G
Tanner	0605 A763AD9 A N		A G
Hali	0610 B8A6759 B		G
Drako	0702 B865AC9 A N		A G
Nehagen	0707 A677A99 B N	Indus	G
Groneitz	0710 C696738 3	Agric	G
Psagin	0807 A101722 C S	Ice-cap/NA/Vacc	

The Antideluvia subsector contains 30 worlds with a combined population of 62.48 billion inhabitants, including 326,000 Droyne (primarily from Pleroo and Dreamland). The highest population is 13 billion, at Drako. The highest tech level is at Salinaikin and Bytar. Worlds labelled "S" belong to the Salinaikin Concordance.

Alsas Subsector

Name	Statistics	Remarks	
Oskol	0103 X300209 A	NI/Vacc	A G
Mackay	0109 C5B3618 A	NI	
Falkirk	0201 E100100 0	NI/Vacc	G
Amristar	0204 D493654 7	NI	G
Tinahely	0206 B76A786 B	Rich/Water	G F
Odugama	0207 C651564 A	NI/Poor	F
Freemantle	0209 X3B0000 0	Desert/Un	
Sevilla	0302 E440459 9	NI/Poor	G
Katano	0303 D120200 C N	Desert/NI/Poor	
Lac Remi	0305 C9648D8 8		G F
McKne's World	0306 C652545 9	NI/Poor	F
Bulawayo	0307 D886563 8	Agric/NI	G F
Katherina	0309 B130300 C	Desert/NI/Poor/RS	G
Afellahlah	0402 A6659C9 C NS	Capital	G F
Encrucijada	0410 X000000 0	Ast/Un	G
Darien	0501 X100000 0	Vacc/Un	
Kaosiung	0504 X6A0510 4	NI	A G
Elyptiya	0506 A664885 B	Rich	G F
Lachute	0509 C767764 7	Agric/Rich	F
Mafelong	0602 X4C0000 0	Desert/Un	G
Schwennin	0607 B472619 A	NI	G F
Krugerschorp	0608 C887569 9	Agric/NI	G F
Antalya	0707 C763645 A	NI/Rich	G F
Chate Leavult	0709 C661993 9	Ice-cap	F
Sint Amsbern	0803 XB76000 0	Un	G
Azut Leriz	0805 X766000 0	Un	G

Alsas subsector contains 26 worlds with a population of 15.3 billion. The highest population is 9.1 billion at Afellahlah; the highest tech level is C, found at Katano, Katherina, and Afellahlah. Worlds labelled "F" belong to the Federation of Alsas.

Cooperative to provide starport and security forces for the state, the past centuries have been years of peace, tranquility, and growth. In spite of these tensions, the Concordance remains secure in its neutrality at the spinward-most reaches of the Far Frontiers sector.

The Trelyn Domain: A pro-Imperial state located nominally within Mnemosyne subsector, though extending into the Vanguard Reaches sector to rimward. The Domain was formed by a group of Imperial industrialists from the Allarton Corporation in 941 Imperial, to exploit and develop the non-aligned areas of the Trelyn subsector of the Vanguard Reaches. This area was later expanded to include parts of the Mnemosyne subsector of the Far Frontiers. Governed as a separate state to the part of the Domain in the Vanguard Reaches, the area manager for Allarton Corporation controls the Domain area in the Far Frontiers. The Trelyn Domain has been able to maintain good relations with its neighbors in the last century; even the pro-Zhodani Mnemosyne Principality has come to terms with the realities of peaceful co-existence.

The Union of Garth: A pro-Imperial state in the Taemerlyk subsector, the Union was originally settled by citizens of the Protectorate over five hundred years ago. Granted independence in 695 Imperial, the Union of Garth quickly became a strong supporter of the Protectorate, accepting military and economic aid. This situation continued until 788 Imperial, when a Zhodani-supported insurrection of the four Union worlds of Uldor, Dloshl, Hearth, and Zishilicti threw the Union of Garth into civil war. Some rumors that this was due to the equal status given to Vlazhdumecta in relation to human settlers have never been proven. In any case, the Four Worlds allied themselves in a secret pact with the Zhodani, who sent lend-lease warships and weapons for future treaty considerations. In a well-coordinated assault, all Union installations on the four planets were captured and the Four Worlds broke free from the Union.

To ensure that no attempt at recapture would be made, diplomatic messages were sent to the Union of Garth and the Protectorate from the Zhodani, advising them of the wisdom of non-interference. Both governments were unprepared for war, and were forced to heed the warning (but not before the Protectorate was invaded by a squadron of Zhodani colonial cruisers in a show of force). This

Taermerlyk Subsector

Name	Statistics	Remarks	
Morlay	0102 D798542 4	Agric/NI	G
Fenner	0103 A230335 D NS	NI/Poor	G
Excape	0104 D300513 A	NI/Vacc	G
Eshaar	0206 E6C4839 3		
Zishilicti	0208 BAA6698 A	NI	A G W
Fafris	0210 B6B49A7 9		
Bindar	0303 B6A3654 A	NI	G P
Uldor	0308 A787A98 B N	Capital	A W
Dloshl	0309 B697998 A	Indus	A G W
DiCule	0310 C695643 5	Agric/NI	G
Bigg's World	0401 A797A99 9	Indus	G P
Zyra	0404 A9878D9 B		P
Hearth	0407 B456798 A	Agric	A W
Ulintl	0408 B543885 A N		U
Jacobi	0502 X610000 0	Desert/Un	G P
Amanamanim	0505 A574A46 B N	Indus	P
Agravaine	0507 A5006A9 A	NA/NI/Vacc	G U
Rellon	0509 B880666 6	NI	G U
Bummer	0601 ACCA489 B	NI	G P
Wa-Lu	0604 A372513 B S	NI	G P
Quitalos	0605 A667889 B N	Rich	G P
Garth	0608 A669753 B N	Capital/Rich	G U
Pshtaijtlatl	0702 A795974 B S	Indus	G P
Yakutz	0703 A885889 B S	Rich	G P
Bloemtol	0708 E7C3657 A	NI	G U
Caractacalla	0802 A793AC9 C NS	Capital/Indus	G P
Calamain	0804 A000460 B NS	Ast/NI	B G P
Kintara	0805 A454679 9	Agric/NI	G P
Numicta	0808 D9A7A69 6		G U

The Taemerlyk subsector contains 29 stellar systems with a total population of 67.6 billion. The highest population is 24 billion at Caractacalla; the highest tech level is D, at Fenner. Note that all naval bases within the Propectorate, with the exception of Calamain, are for the respective planetary navies. Some planets still retain their ancient Vlazhdumecta name, but most have been renamed by the early human settlers. Worlds labelled "W" belong to the Four Worlds; those labelled "U" belong to the Union of Garth; those labelled "P" belong to the Protectorate.

Inverness Subsector

Name	Statistics	Remarks	
Aimar	0101 E972678 3	NI	G P
Purgatory	0103 A7A9301 B	NI	G P
Naro-Trevor	0104 A655524 9	Agric/NI	G P
Faro-Trevor	0105 A767745 8	Agric/Rich	P
Shadowsand	0106 C000419 B	Ast/NI/Mining	
Kerchov	0107 C257567 D	Agric/NI	G
Njisse	0110 C755352 A	NI	
Llywellan	0205 BA6A788 B	Rich/Water	G P
Freedonia	0207 A7686C0 F N	Agric/NI	G
Sequitor	0209 X566459 3	NI	
Rjnevelte	0210 B626557 D	NI	
Malthus	0301 B323501 9 S	NI	P
Trebberhorn	0303 C6587D9 8	Agric	G P
Bestus	0305 A685621 B	Agric/NI	G P
Marsus	0306 A9989B9 A N	Indus	G P
Linelit	0310 C000310 7	Ast/NI	
Bosslwck	0402 A7958A9 B N		G P
Dobbyn	0405 B976775 8	Agric	A P
Mwari	0407 B444411 A	NI	G
Sherwood	0409 C584574 5	Agric/NI	G
Kendus	0501 D500889 7	Vacc	P
Tallamatrix	0503 A593853 A N		G P
Garden Prime	0505 B1314D9 B	NI	
Staci	0507 E300579 5	NI/Vacc	
Goggic	0601 A694610 B S	NI	G P
Padderborn	0604 D444466 7	NI	G P
Raskeller	0608 X928440 6	NI	G M
Saulente	0610 C868755 B S	Agric/Rich	G M
Phais Eisert	0703 X210000 0	Desert/Un	G P
Xylon	0710 E6A2426 4	NI	G M
Regalia	0801 D521200 7	NI/Poor	A G P
Galatea	0808 E689600 5	NI	G

Inverness subsector contains 32 star systems with a total population of 36.5 billion. The highest planetary population is 8.7 billion, on Marsus. The highest tech level is F, on Freedonia. Note that all naval bases within the Protectorate are for the respective planetary navies. Worlds labelled "P" belong to the Protectorate; those labelled "M" belong to the Mnemosyne Principality.

caused the Protectorate and the Union of Garth to abandon their neutral stance and become Imperial supporters. Since that time, Imperial and Zhodani interest in the area has diminished and little is seen of those powers save for various diplomatic missions.

The Union of Garth is ruled by King Bors XXIX, as of 1101 Imperial. Every ten years the King comes up for reappointment by the Parliament of Industry on Garth. This governmental body is composed of the various planet's leading merchants, technologists, and corporate executives. Besides passing laws and raising taxes, the Parliament insures the continued advance in technological levels of the various Union planets.

The Zelphic Primacy: An extremely pro-Zhodani state in the Cabala subsector. The Zelphics are humans of Solomani/Vilani stock who have taken on the Zhodani society as their own. As in the Consulate, psionics are of extreme importance. Zelphic society is split into three classes depending on psionic potential; Nobles, Psi-positives, and Psi-nulls. Many aspects of Zhodani culture have been duplicated, including dress, morals, and anti-Imperial tendencies.

The capital of the Zelphic Primacy, Zelpha, has trade agreements with the Consulate effective before the First Frontier War (circa 58 Imperial). Despite a number of coup attempts by the Imperium, the Zelphic Primacy has expanded into four neighboring systems, since renamed in order of conquest: Primus, Secundus, Tertius, and Quarcus. With continuing aid from the Consulate, it seems unlikely that the Imperium or any of the neighboring pro-Imperial states will see a change of government there in the near future.

Relations with other pro-Zhodani states in the Far Frontiers are cordial. However, with the exception of the Haladon Cooperative, the Zelphic Primacy has no contact or diplomatic missions with any pro-Imperial government in the region. As recently as 1050 Imperial, the Primacy clashed with the Biumvirate, a pro-Imperial society also in the Cabala subsector, over the planets Gosspach (Cabala 0505) and Hollader (Cabala 0705). After increasing evidence showed the possibility of a Primacy attack on these neutral worlds, the Biumvirate sent a naval squadron to each one. Shots were exchanged with Zelphic warships at Hallader, leading to a major battle at Gosspach with considerable losses on both sides. An uneasy truce was

Wulfek Subsector

Name	Statistics	Remarks	
Echocha	0104 C443457 9	NI	G
Follette	0108 D2525A9 7	NI	
Hrilopar	0202 E622300 6	NI/Poor	G
Reseca	0206 C465997 A		G C
Ort	0207 D66A669 7	NI/Water	C
Velpore	0210 EA99422 8	NI	
Charon	0302 X442000 0	Un	
Balcoan	0304 A782788 9 S	NI	G C
Onada	0310 B7676B5 9	Agric	C
Zherlicka	0404 A876939 E N	Indus	G C
Zephron	0405 B631939 C	NA	G C
Mamnon	0406 B583898 C		C
Thara	0409 A678773 A		G C
Endomin	0410 B765899 B S	Rich	G C
Emorie	0503 E650520 3	Desert/NI/Poor	A G
Sherzade	0504 BA92654 A	NI	G C
Aemelius	0507 C311543 9	Ice-cap/NI	G C
Jellicoe	0601 B7748D9 B		G
Rondomin	0604 B221751 9	NA/Poor	C
Domitar	0606 D443400 8	NI	G C
Meruritom	0608 CBA0511 A	NI	G C
Balin	0610 B000300 B	Ast/NI/RS	C
Dingus	0702 E776500 4	Agric	G
Ichita	0704 C282799 A		G C
Hectalus	0706 D324555 8	NI	G C
Dunkel	0708 C8664B6 C	NI	C
Osmice	0710 B432885 B	NA	G C
Wulp-PQ	0802 X582000 0	Un	G
Endus	0804 D778973 C	Indus	G C
Magnias	0806 B685697 A	Rich	G C
Polletus	0807 B7B1559 B S	NI	G C
Allegrim	0809 C465410 A	NI	G C

There are 32 worlds in Wulfek subsector, with a total population of 12.6 billion. The highest population is 3.4 billion on Zherlicka, and the highest tech level is E, also at Zherlicka. Worlds labelled "C" are part of the Colonade Administration District.

Cabala Subsector

Name	Statistics	Remarks	
Clinton	0104 C175882 8		G
Thacker	0106 B294742 9		G
Balume	0108 A000537 B S	Ast/NI	G C
Secundus	0202 B440669 A	Desert/Poor	Z
Foxe	0305 A521535 C	NI/Poor	G H
Lindsay	0307 A6798C9 B S		G H
Norris	0310 A596940 B	Indus	G H
Zelpha	0401 A9549B9 B N	Capital	G Z
Primus	0402 B27A769 9	Water	G Z
Quarcus	0403 B957869 9 S		G Z
Thorn	0405 A632732 B S		G H
Chatsworth	0407 A3A15C7 A	NI	H
Haladon	0408 A7659C9 C	Capital	G H
Gosspach	0505 B311427 8	NI	G
Tertius	0602 C241469 9	NI	G Z
Bosak	0604 A635721 D		G
Skela	0607 B564688 A S	NI	G B
Porton	0609 B000553 B	Ast/NI	B
Hollader	0705 E6865D9 7	NI	G
Talak	0707 D687839 6		G
Hyperbelon	0709 A366838 A N	Capital	G B
DeBeers	0802 D453369 5	NI/Poor	A G D
Locat	0806 X341300 A	NI/RS	
Protalus	0808 B734534 A	NI	G B
Forbus	0809 C446581 9	Agric/NI	G B

Cabala subsector contains 25 worlds with a population of 22.2 billion. Zelpha has the highest population, 9.1 billion, and the highest tech level is D on Bosak. Worlds labelled "C" belong to the Colonade Administration District; those marked "Z" belong to the Zelphic Primacy; "H" worlds belong to the Haladon Cooperative; "B" worlds are part of the Biumvirate; "D" worlds belong to the Descarothe Hegemony.

declared, worked out by the Haladon Cooperative, insuring the independence of the two planets. Primacy forces were compelled to retreat. Despite this setback, the Zelphic Primacy remains a staunch Zhodani supporter in the Far Frontiers.

Mnemosyne Principality: A pro-Zhodani state in the Mnemosyne subsector, including three systems in the Inverness subsector. This state is still undergoing upheavals since the overthrow of a corrupt, autocratic government 37 years ago. At the end of that civil war all members of the Principality's royal family were hunted down and murdered. Since then, the state has been under the control of Prince-Regent Hautal Goinsprach. The Regency is expected to continue until a suitable person is found to sit on the throne.

At the time of the government's collapse, all planets declared themselves independent. After several years this proved both economically and practically infeasible. During this time the planet Emulan (Mnemosyne 0506) declared itself part of the Trelyn Domain. A number of nearby Principality worlds were preparing to attack Emulan when a peaceful settlement was reached. The Principality and the Domain agreed to share the world, though it strained their relations.

The position of the Mnemosyne Principality is shaky at best. With a number of special interest groups constantly at cross purposes, it seems another civil war will break out soon.

The Biumvirate: A pro-Imperial state in the Cabala subsector, the Biumvirate is a stable, well governed political unit of five stellar systems. The government is organized into two separate but equal bodies: the Civilitas and the Militas. All areas dealing with planetary affairs, population, and economics are controlled by the Civilitas, while matters of interplanetary defense, space regulation, and interstellar diplomacy are dealt with by the Militas. The system works extremely well as all parties are more concerned with the well-being of the government than their own particular differences. ^

Thanks to the Thursday Night Travelling Poker Club: Dave Bunke, Paul Noble, Jim Schneiders, Mark Wernke, Joe Faust and Dave Miles. Special thanks to Dave Bunke and Bill Barton for their assistance in preparing this.

Dedicated to Charles H. and Helen L. Kemper, who sacrificed so that I might succeed.

Jungleblut Subsector

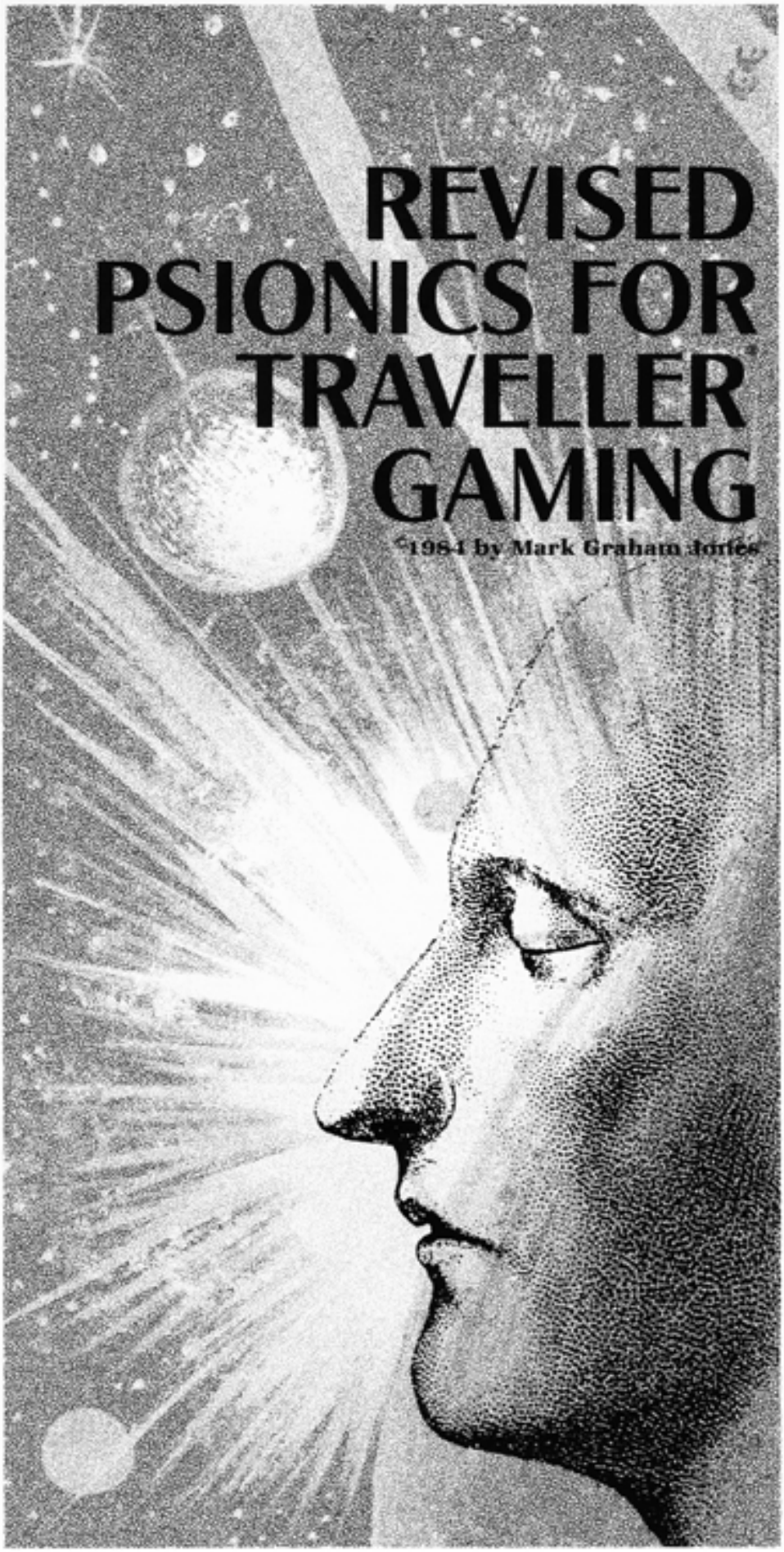
Name	Statistics	Remarks	
Thenstor	0101 C9C6488 A S	NI	G
Iraaz	0102 C45696A 6 S		A D
Desaekhe	0104 C663739 9 S	Capital	A D
Kath	0106 C675777 4 S	Agric/NI	G A
Dansen	0202 D445667 5 S	Agric/NI	A G D
Qarant	0203 E558260 7	NI	A G D
Gniadek	0205 B661AB9 B		L
Lazthar	0206 B7A7566 A N	NI	G A
Harantz	0208 A8859CA B	Capital	A
Nomael	0302 C767886 8	Rich	L
Alzenei	0304 B768895 C S	Capital/Rich	L
Zylanth	0307 E100233 9	NI/Vacc	G A
Claveer	0308 B55098C B N	Desert/Poor	G A
Jenai	0401 E857756 5	Agric	L
Nesbitt	0405 C555A94 A S		G L
Kraich	0407 B212940 C	Indus	G A
Mirayn	0504 D989737 7		G
Kokkelen	0506 B88987A B N	Rich	G L
Kalebru	0507 X667404 0	NI	R G
Fomor	0509 E68A78A 7	Rich/Water	G A
Amoka	0510 D385523 3	Agric/NI	G T
Shattur	0601 C877687 6	Agric/NI	G L
Jaer	0605 C3109BC 9 S	Desert/Indus/NA	L
Shadrai	0610 B55799A A		T
Price	0703 C888513 8	Agric/NI	G L
Winder	0705 C966697 9 S	Agric/NI/Rich	G
Lelaek	0706 A767652 B NS	Agric/NI/Rich	G
Yster	0710 A577511 C N	Agric/NI	G T
Welles	0803 E642642 3	NI/Poor	G
Assair	0805 C554333 6 S	NI	
Sorens	0806 B778763 A		T
Thars	0809 B64298A B	Indus/Poor	G T

Jungleblut subsector possesses 32 worlds, with a population of 113.78 billion. The most heavily populated world is Gniadek, with 23.4 billion; the highest tech level, C, is found at Yster, Kraich, and Alzenei. Worlds labelled "D" are part of the Descarothe Hegemony; those labelled "A" belong to the Domain of Alntzar; "L" worlds belong to the League of Suns; "T" worlds belong to the Trelyn Domain.

Mnemosyne Subsector

Name	Statistics	Remarks	
Welton	0102 D642541 5	NI	G
Thursus	0107 C955873 8		T
Forst	0110 D694899 7		T
Alcost	0201 B476976 A	Indus	G
Mutat	0205 B812422 9	Ice-cap/NI	G T
Toppa	0209 E260633 4	Desert/NI	T
Pindel	0303 B863440 9		G
Zylov	0307 A962798 B N		G T
Bozel	0308 B938695 A	NI	G T
Xava	0310 C624730 8		G T
Enimar	0404 B38A557 A S	NI/Water	G T
Pixtome	0405 C1B1589 B	NI	G T
Omniat	0409 B886441 9	NI	G T
Cartelin	0501 B985589 8	NI	M
Eureka	0504 B000610 B S	Ast/NA/NI	G M
Eorvin	0505 D656878 7		T
Emulan	0506 C669369 6		A G X
Shadmara	0508 E8C1200 9	NI	T
Kulikov	0509 C721587 A	NI	G T
Dovida	0602 B983657 A	NI/Rich	G M
Eterra	0603 A8679C9 C N	Capital	G M
Dictic	0608 E951500 6	NI/Poor	A
Tintanabulos	0610 X111200 8	Ice-cap/NI	
Lalandra	0704 B742726 A S		G M
Pentalus	0706 C957690 9	Agric/NI	G M
Piat	0707 D131531 4	NI/Poor	
Calthustra	0801 D749459 8	NI	G M
Anathos	0808 E800419 C	NI/RS/Vacc	R G

The Mnemosyne subsector contains 28 inhabited systems, with a total population of 36.8 billion; Eterra has the highest population of any world, with 8.6 billion. Eterra and Anathos both have the highest local tech levels, at C. Worlds marked "T" are of the Trelyn Domain; "M" worlds are from the Mnemosyne Principality. Emulan ("X") is a treaty world shared by the two above-mentioned states.



Revised Psionics is a flexible system of rules designed for TRAVELLER® game campaigns in which the possession and use of psionic abilities is an important, but not all-encompassing, part of play. The basic premise of this system is that psionic talents are hereditary and quite rare, so that few people will be capable of any psionic activity with or without training; even fewer still will possess more than one of these talents. These talents tend to be limited, and seldom mingle. This eliminates the necessity of hiding the Psionics Institute in order to prevent everyone from being psionic, or fanning anti-psionic prejudice to keep players in line (though such prejudice may still exist). It also allows for the existence of Wild Talents (Jack Vance's term for individuals with natural abilities), and of groups — usually families but possibly even whole communities — whose common genetic heritage (and psionic talents) set them apart from the rest of mankind.

To this end, the system varies from the original TRAVELLER game rules in a number of ways, primarily in its approach to the distribution of psionic talents and in the effects of the different levels of ability in each talent. The number of talents available has been reduced from six to four, and the psionic strength and level(s) of ability rolls have been separated. These changes and others serve a twofold purpose: first, to limit the number of talents available to a character, while enhancing the potentials of each talent; and second, to allow for greater individual variations in the use of one's abilities. The rules which follow detail these changes.

Psionic Potential

In Revised Psionics, only a limited number of individuals are capable of any psionic activity. Of these, there are a small number who possess a natural ability to use their talents without training, while others possess unruly talents which respond only poorly — if at all — to even the most extensive training. The majority, however, require testing and training by the Psionics Institute in order to discover and develop their gifts.

To determine whether a character has any psionic potential, the player rolls two 6-sided dice (2d6), with a result of 11• indicating that the character does possess some potential for psionic activity. If such potential exists a second 2d6 roll is made to discover whether the character is capable of untrained activity. A roll of exactly 2 or 12 indicates a Wild Talent; any other result is ignored.

Wild Talents: A Wild Talent is an individual whose psionic abilities do not require training in order to be used. A roll of exactly 12 indicates the presence of a completely controlled talent. Such a character may normally be assumed to be aware of the limits and uses of his talents, and to be capable of his maximum level(s) of ability. The referee should consider the possibility, however, that cultural conditioning or prejudices might inhibit the character's natural tendency to make us of his talents.

A roll of exactly 2, on the other hand, indicates a strong but extremely erratic talent. Such character gets a +1 on his psionic strength and level of ability scores, but his talent operates only subconsciously, allowing only the most rudimentary control. No amount of psionic training will ever enable the character to achieve reliable control of his talents, but testing (to identify his talents) and training will increase his chances of success when attempting to exert his talents consciously. Untrained, the attempt requires an 11+ to succeed; after training the required roll is only 8+ for success.

If the referee wishes to keep players in the dark as to their PC's potential until and unless they are tested *in play*, then he/she must make these rolls secretly, recording the results for possible later use, and informing the players only when their characters would be aware of their talents; that is, when the character is a Wild Talent, or is tested. How much the character knows about his talent or talents is up to the referee. Wild Talent or not, once a character is determined to possess potential, the next step is determining his psionic strength, which in turn provides an index to his psionic range.

Psionic Strength

The Psionic Strength rating is a measure of the maximum number of strength points normally available to a character for psionic activity and serves to determine his personal range limits. It does not determine the maximum level of activity of which he is capable (as it does in the original rules); that is determined by separate die rolls discussed later. The Psionic Strength rating is defined by a 2d6 roll, for a result of 2 to 12. An erratic talent adds +1 to this, and poor health brought about by aging may reduce it, but otherwise there are no modifiers. The use of psi-drugs may temporarily increase the number of strength points available for psionic activity, but they do not increase the character's strength rating.

The only effect of aging on a character's psionic strength occurs when the debilitating effects of age reduce a character's physical characteristics severely enough that the total of his *Strength, Dexterity,* and *Endurance* is less than his psionic strength rating. If his occurs (due to aging, not to wounds or exhaustion), the Psionic Strength rating is reduced to equal that total. If that total is later increased, the Psionic Strength rating will rise to equal it until it is again at its original level.

Psionic Ranges: A character's basic range for the use of his talents is equal to his Psionic Strength rating in meters. Within this basic range he is capable of his maximum level(s) of ability at *no range cost*. At greater distances the cost is one point for each increment (equal to his basic range) by which he extends his range. To determine the character's maximum range, simply square his Psionic Strength score and add this value to his basic range. The result is his maximum range in meters.

Although this system of ranging obviously makes it impossible for characters to operate at the extended ranges described in the original rules, it should not be considered too confining. Though the ranges have been drastically reduced, within the new limits these talents are far more useful. The benefits of being able to use a talent at up to 12 meters without range costs should not be overlooked. *Telekinesis*, in particular, is much more effective than previously described. The limited ranges are balanced by a much swifter rate of recovery of psionic strength points.

Recovery: Psionic activity sometimes requires the expenditure of psionic strength points, which are subtracted from the character's available strength. When and if the number of available points reaches zero he will be incapable of further psionic activity until he has recovered some or all of this strength points. The recovery of psionic strength points is independent of any physical activity, and occurs automatically once the character ceases to expend them.

The rate of recover is one point every fifteen minutes, beginning fifteen minutes after the cessation of psionic activity (including the use of psi-drugs).

Psionic Talents

In Revised Psionics there are only four possible classes of talents: *Telepathy, Telekinesis, Clairvoyance,* and *Awareness*. *Teleportation* has been eliminated as a class of talents as it is entirely too powerful. Each of the talents is divided into 10 levels of ability which describe the levels of skill required to perform increasingly difficult or demanding tasks. Each level of ability increases the scope of the character's abilities, either in terms of better control or more power. At level 10 in any class, the character acquires a "Special Talent, "one related to that class of abilities, and which is unique to that individual. No individual may possess more than one special talent.

Number of Talents: To determine the number of talents any character may possess, roll one die. A result of less than 6 means that the character possesses only one talent. A roll of 6 requires a second 1d6 throw: a 1 or 2 indicates only one talent, a 3 or 4 indicates one additional talent, and a 5 or 6 indicates two additional talents (for a total of three talents). In no case may a character possess more than three of the four possible talents, and only one may be a Special Talent.

How the talents are chosen is left up to the referee. The talents may be assigned, rolled for randomly, or chosen by the players. Each talent must also be assigned a level of ability rating.

Level(s) of Ability: If a character possesses only a single talent, roll 2d6-2 (treating a result of zero as 1) to determine his psionic level of ability. If the character possesses more than one talent, one must be designated the *primary* talent; any others, *secondary*. The level of ability rating of the primary talent is determined by rolling 1d6 and adding +4 to the result, for a score of 5 to 10. The level of ability scores for all secondary talents are determined by rolling 1d6-2 for each, though none may be reduced to less than level 1 in this way. A poor level of ability roll cannot deprive a character of his talents.

Special Talents: Any character who rolls up a level 10 talent acquires a "Special Talent. "Special talents are just that — talents which are in some way unusual.

though not necessarily more powerful, subtle or dangerous, simply different. The referee should make each special talent unique. Specific suggestions for special talents can be found under the level 10 descriptions of each talent.

Telepathy

Telepathy is by far the most common talent, and consists of the ability to contact other minds directly. This contact is usually for purposes of communication, which is the essence of *Telepathy,* but occasionally special talents use this contact as a means to an end other than communication. The contact is entirely passive at lower levels of ability, and consists of opening oneself up to the impressions which inevitably accompany the presence of other minds. Only at the higher levels does one gain the ability to actively seek out and contact or influence others.

Sensitivity: This is the lowest level of telepathic activity, and the level at which all newly trained telepaths begin. At this level of ability the talent has become operative, but the character is as yet unable to focus his talent or to *Shield* himself from uncomfortable or dangerous contact. His talent operates constantly, picking up snatches of thoughts, feelings and sensations from everyone within range — usually only the basic range, but exceptionally strong or violent impressions will come through at greaters ranges (at normal costs). If more than four people are within range of the talent the mental noise becomes uncomfortably loud, even painful.

This state of affairs will last until the character learns to *Shield* himself (that is, he achieves level 2), and on crowded worlds, during long spaceflights or in similarly confining situations the sensitivity can be quite disturbing. Most individuals can endure this state of affairs for a reasonable length of time — at least until they learn to *Shield* themselves. Characters who *cannot* learn to *Shield* themselves (and this includes most telepaths whose primary talent lies elsewhere), however, often begin to exhibit emotional or mental disorders over extended periods of time; alcoholism and drug addiction are common among such individuals.

Sensitivity is a level 1 ability, with no strength point cost to perform, and range costs only when and if the character begins to pick up impressions from beyond his basic range.

Shield: At this level of ability the telepath learns to create a mental *Shield* with which to shut out unwanted or

dangerous impressions. The *Shield,* once acquired, remains in effect at all times unless a conscious effort is made to lower it or to reinforce it. The *Shield* is sufficient to screen out the "noise" associated with the presence of other minds, but the telepath may utilize his own talents through it, and another telepath may reach through it to locate the individual, to communicate or to employ any special talent he may possess — unless the *Shield* is reinforced.

The *Shield* normally requires no strength point cost to maintain, but a reinforced *Shield* will cost 1 point per hour. During this period expended strength points may not be recovered, and the character cannot be detected or affected by any normal telepathic talents, or by most special talents. Nor may the character exercise his *own* telepathic abilities during this time; the extra protection is achieved at the price of blocking off his own telepathic talent as well. If one telepath attempts to use his talents against another unwilling telepath, the defender may attempt to reinforce his *Shield* to prevent this from occurring.

When *any* attempt to contact or influence an unwilling telepath's mind (including psionic *Assault*) occurs, compare the average of the Psionic Strength and telepathic level of ability scores of each character; the difference (attacker minus defender) is applied as a die modifier (DM) to the throw to succeed (9+). Failure to make the roll indicates that the defending character managed to reinforce his *Shield* in time, but success indicates that the attacker has gained a foothold. He may now employ his talents as desired, but the defender may continue to resist, rolling once every 15 seconds (every combat round) until he succeeds in reinforcing his *Shield,* or until the attacker releases him.

Shield is a level 2 ability; costs are as stated above.

Life Detection: The most elementary level of control is the ability to detect the presence of other minds. *Life Detection* enables a character to sense the presence of other minds, their numbers, the general type of minds, and their approximate location. *Life Detection* works best on humans and aliens, but will also detect the existence of reasonably intelligent animals. Telepaths are normally open to *Life Detection,* but telepaths with reinforced *Shields* are undetectable. Individuals whom the telepath knows well will be recognized if they are contacted by this ability.

Life Detection is a level 3 ability, requiring 1 point per minute to perform.

Empathy: Somewhat greater control of the telepathic talent allows the character to sense, in a general way, the desires and motives of another individual, as well as to share any physical sensations (pain, pleasure, discomfort, etc.) or moods (anger, jealousy, lust, happiness) that the subject is experiencing. Such *Empathy,* properly applied, can be quite useful in healing — or hurting — other individuals, or in determining beforehand how someone might react to an attempt to bribe, threaten, or seduce them. *Empathy* can also be used to ingratiate oneself to another individual, or manipulate his reactions.

Unless the character is capable of level 6 or greater activity, *Empathy* will not allow the character to project emotions or sensations, but only sense them. The character must rely on other, nonpsionic means to utilize the information this talent provides him.

Empathy is a level 4 ability, and requires 1 point per minute is perform.

Read Thoughts: At this level of ability the telepath learns to pick up not only the emotions and sensations of others, but their conscious thoughts as well. He may read only their current, active thoughts, and the individual may or may not be thinking about a subject in which the telepath is interested. Nontelepaths will never be aware that their thoughts are being read; telepaths, unless tightly *Shielded,* can be read as easily as other individuals, but they will be aware of it — and can reinforce their *Shields* to block out such probing. If the other telepath resists, see the assault rules under *Shield.*

Read Thoughts is a level 5 ability, and requires 1 point per minute to perform.

Send Thoughts: It is at level 6 that the telepathic character first attains the degree of skill necessary to project, as well as to receive, thoughts, sensations

and emotions. He may contact any individual except a tightly *Shielded* telepath.

Send Thoughts is a level 6 ability, requiring 1 point per minute to perform. The level 5 and 6 abilities can be used together by alternately sending and receiving thoughts — at full cost for each, regardless of what fraction of a minute either takes — but this is an expensive and time-consuming method of communication. If two telepaths are communicating, it is much easier for each simply to send his thoughts to the other, rather than to switch between sending and receiving. If a non-telepath is involved, then the former method must be employed, unless the telepath is capable of using *Converse*.

Converse: This level 7 ability enables a telepath to communicate efficiently with another character, at minimum cost and with minimum effort. The telepath establishes a channel through which the thoughts of either character can be sensed by the other (even a non-telepath), permitting them to speak freely to one another.

Converse is a level 7 ability, requiring 1 point per minute to perform.

Probe: At this level of ability the telepath attains the skill needed to gain access to those levels of the mind normally out of reach even of the *Read Thoughts* ability. He is capable of reaching deep into the subject's mind, even gaining limited access to his memories. He may use this ability to verify statements of intent or knowledge made by the subject, and to discover the subject's true motives and beliefs.

This extremely close mental contact makes it impossible for the subject successfully to mislead the telepath, but is also inevitably accompanied by a mutual (and involuntary) sharing of emotions and memories. This openness is quite distasteful, rather like the level 1 *Sensitivity*, and a telepath will generally try to avoid subjecting himself to it unless absolutely necessary.

Probe is a level 8 ability, requiring 3 points and approximately 5 minutes to perform.

Link: At this level of ability the full potential of the normal telepathic talent is realized. The telepath is capable of creating mental *Links* of indefinite duration with one or more persons. This must be done at no more than basic range (Psionic Strength rating in meters), but the telepath may then make use of the *Link*(s) at up to his maximum range. All costs for the *Link* are paid when it is created, and thereafter no costs are incurred when making use of it. The minimum cost for creating a mental *Link* is 3 strength points.

The initial cost of three points establishes a tracing *Link* with the subject, allowing the telepathic character to *Life Detect* him at any time without paying performance or range costs. For each additional strength point invested in the *Link*, the maximum level of activity the *Link* can sustain (without cost) increases by a like amount. A four point *Link* would provide for *Empathy* between the characters, five points would allow the telepath to read the thoughts of his subject, and so forth.

These costs are subtracted from the telepath's Psionic Strength score for the duration of the *Link*'s existence. A telepath with a strength of 12 would be reduced to an effective strength of only 9 for as long as the *Link* is maintained, for instance, but would regain those points (at the normal rate of recovery) when the *Link* is severed. Like the level 8 ability, upper level *Links* involve a loss of mental privacy which most characters would find disturbing.

Link is a level 9 ability, with variable costs as above.

Special: When inventing and assigning special talents, the referee must keep in mind the nature of the normal talent. Except in rare cases, the special talent should be consistent with the nature and function of the normal talents. Furthermore, a *special* talent is not always synonymous with an *additional* talent; it might simply be a more effective or subtle variation on a lesser talent. In any event, the referee should attempt to make each special talent truly unique, adding a little variety and uncertainty to encounters with psionic characters.

Special telepathic talents might include the following:

Full Shield: The character's shield is effectively "reinforced" permanently, but costs nothing to maintain and does not interfere with the recovery of psionic strength points. The character may use his own talents freely despite the presence of the *Shield*.

Stealth: The character is capable of using his *Life Detection, Empathy,* and *Read Thoughts* abilities to influence or eavesdrop upon another telepath without alerting the subject. Each ability requires twice the normal performance cost when used in this manner.

Assault: The character may apply his mental strength in a violent manner, injuring and perhaps killing his victim. If a *Shielded* telepath is attacked, the *Assault* rules under level 2 are used; otherwise, the telepath inflicts 1d6 of damage for every 3 strength points invested in the *Assault*.

Of course, there are many other possibilities, but no special talent should be significantly stronger than those described here.

Telekinesis

Telekinesis is the most spectacular psionic talent, since it involves the manipulation of objects and/or forces without physical contact, by force of will. The normal telekinetic talent requires a physical object on which to focus, so that the character cannot form "walls of force" or press an entire bank of buttons at once (though a special talent might be capable of this), and includes sufficient sensory *Awareness* to permit the intelligent manipulation of the object. The telekinetic force acts uniformly upon the entire mass of the object and cannot be applied so as to fracture or crush it (though, of course, the object may be hurled or levered against another object to achieve the same result). An object controlled by *Telekinesis* moves in a smooth glide, as if moving under its own power.

Telekinetic talents are classified by the maximum mass that a character can manipulate. The levels table below indicates the maximum mass which can be controlled at each level of ability.

Level 1	1 kilogram	2.2 lbs.
Level 2	4 kilos	8.8 lbs.
Level 3	9 kilos	19.8 lbs.
Level 4	16 kilos	35.2 lbs.
Level 5	25 kilos	55.0 lbs.
Level 6	36 kilos	79.2 lbs.
Level 7	49 kilos	107.8 lbs.
Level 8	64 kilos	140.8 lbs.
Level 9	81 kilos	178.2 lbs.

As is evident from the preceding chart, the normal talents can lift and move a mass equal to the character's level of ability score *squared*, in kilograms. The cost to lift or move any mass equal to one-half *or more* of one's load limit is 1 point per minute; to lift or move *less* than half the maximum load costs *nothing*. The basic rate of movement is one meter per second. For each additional point invested in movement, the speed will increase by one meter per second velocity.

The telekinetic talent remains essentially unchanged (except for the maximum mass affected) regardless of the character's level of ability with his talent. That is, aside from the mass each can manipulate, a level 1 talent is

functionally identical to a level 9 talent. A special talent, however, may be different from the normal telekinetic talent. Such a talent is frequently powerful, but of limited scope, with little utility beyond its specific function.

There is also the possibility that the telekinetic talent might apply to forces rather than to physical objects. The character might be capable of manipulating energy, enabling him to control or disrupt electrical devices, generate heat, and so on.

Special telekinetic talents might include:

Telekinetic Shield: The character is capable of creating a close-fitting protective field which reduces the effect of all physical attacks upon him by a number of points equal to his normal Psionic Strength score, at a cost of 1 point per combat round.

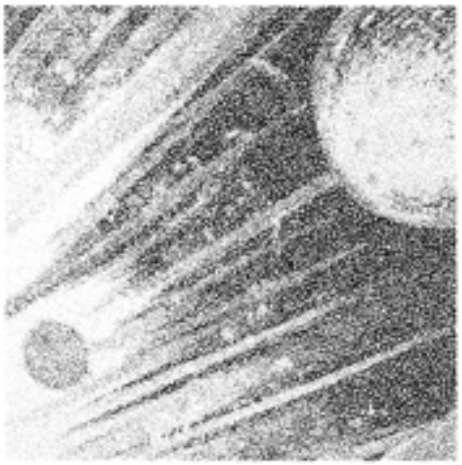
Telekinetic Blow: The character can apply his talent in a brief, sharply focused manner, doing 1d6 of damage for every 3 points he invests in the blow. This is sufficient to smash fragile objects, and perhaps to damage and render inoperable solid items (such as revolvers) as the referee decides.

Energy Control: The character's talent applies to forces rather than to physical objects. He may interfere with or prevent the operation of any electronic or electrically powered device within range of his talent, at a cost of 1 point per minute. He may also inflict 1d6 of electrical damage to such devices at a cost of 3 points for every die of damage caused, due to short circuits, power surges, and so forth (accompanied by lots of sparks, hissing and popping). This is a particularly powerful ability, and therefore should be assigned in place of the normal talent, not in addition to it.

Clairvoyance

Clairvoyant talents are those psionic abilities primarily devoted to information-gathering. The clairvoyant talent functions in basically two ways: first, as a means of observing events taking place beyond the reach of one's physical senses, of discovering the nature and/or location of hidden objects (lost, or locked in a safe, for example); second, the talent can be used to pick up "vibrations" from objects such as tools or weapons, to learn about the events in which they were involved.

A character's level of ability score determines his chances of successfully applying his talent to a particular problem. Whenever a character attempts to make use of his clairvoyant talent, 2d6-2



are rolled. If the result is equal to or less than the character's level of ability score, he succeeds in the attempt and obtains the information (or some portion of it). The greater his success (i.e., the lower the die roll result), the more complete will be the information he obtains. Obviously, a minor talent will seldom obtain detailed information while a powerful talent will routinely acquire a great deal of useful information.

When attempting to observe events taking place at a distance (or otherwise hidden from him), or when trying to locate hidden objects, the character expends 1 strength point per attempt (taking approximately one minute to do so), plus range costs, if any. In the case of an object or event the location of which is unknown, range costs are paid only if successful. The referee must subtract the necessary number of points from the character's psionic strength score. If the hidden object is located beyond the character's psionic range he automatically fails to find it, but also pays no range costs for the attempt.

A character may also concentrate on personal possessions, tools, and weapons, seeking to learn something about the most recent or frequent handler. The character expends 1 strength point per attempt (approximately one minute). If successful, he can sense something of interest about the subject. Exceptionally strong and/or recent impressions will be detected first; less intense or earlier impressions on subsequent attempts.

The clairvoyant talent also tends to manifest itself differently among different people, though it follows a predictable pattern in any one individual. One character may hear voices, another may see visions, and a third might simply *know* with unshakeable certainty but no concrete evidence. In any event, these revelations are entirely personal — bystanders will see and hear nothing out of the ordinary.

Special clairvoyant talents are seldom under conscious control, and tend to be survival-oriented. They might include:

Danger Sense: The character is never "surprised" in combat, nor by ambushes, traps, etc. This talent generally manifests itself as a vague uneasiness which puts the character on his guard, but not necessarily allowing him to avoid the danger. This subconscious talent is controlled by the referee and costs no psionic strength points to perform.

Precognition: This talent is similar to *Danger Sense,* but is specific and may manifest itself suddenly. A clairvoyant character reaching for a booby-trapped switch might recoil as if burned, suddenly becoming aware of the danger. This subconscious talent costs no strength points to perform.

Awareness

Awareness, which is that class of talents involving sensory awareness of an control over the functions of one's own body, is quite different from the preceding talent. *Awareness* requires a great deal of conscious involvement, study, and practice in order to be used effectively. As skill increases the character learns first to understand, then to influence, and finally to alter and control the normal processes of the body; and at the higher levels of ability, to initiate and maintain entirely new activities.

Awareness: This is the lowest level of ability, and is just that — *Awareness,* but no control. The character is capable of turning his attention inward to observe the normal functioning of his body under various circumstances, in order to see how and why it acts as it does when he is healthy, ill, or wounded. Such understanding is a prerequisite to learning to manipulate those processes, and can be helpful in explaining to a doctor how some particular illness or injury is affecting a character.

Awareness is a level 1 ability with no psionic strength point cost to perform, and requires total concentration. The character may not perform any other task while engaged in this activity.

Monitor: At this level of ability the character acquires minimum control of his autonomic functions; he can heighten or suppress his pulse, respiratory and heart rates, control his brainwave patterns, and so forth. The primary function of this ability is to raise his pain threshhold, or block out pain entirely. Thus, the character can overcome severe pain or shock to continue fighting or fleeing, or may undergo surgery or torture without pain.

Monitor is a level 2 ability with no psionic strength point cost to perform.

Control: This is the ability to completely control all normal body processes, to retard or accelerate them, even to initiate or halt them. The character can play dead, lower or raise his body temperature, and stop and re-start his breathing, heartbeat, pulse, and brainwave activity. He can deactivate reflexes and automatic functions or heighten them. At this level of ability the character attains complete conscious control of his entire body.

This is also the level of ability at which the character attains sufficient control to accidentally kill himself. Such total mastery can easily be lethal if a mistake or accident occurs while the character is manipulating his life processes, since normal bodily functions can be disrupted or halted entirely. For instance, if a character overrides his breathing reflex so that only his conscious attention is enabling him to breathe, and he is rendered unconscious, *he will suffocate.* Such accidents are not likely, however, unless the character attempts to use this talent in too great a hurry, ignoring the precautions he was taught by the Psionics Institute, or if he is forcibly distracted (as by a physical attack) in the midst of such activity. Referees should arbitrate this as they see fit.

Control is a level 3 ability, with no strength point cost to perform.

Suspend Animation: The character is capable of sinking into a state of near-death, similar to low passage "sleep" but without danger of death. In this state the character has no need for food or water and has only minimal air needs. For each day he spends in this state he will lose one point from his strongest physical characteristic (either Strength, Dexterity, or Endurance) due to atrophying of muscles and organs from lack of exercise; if this characteristic is reduced to 1, the next highest characteristic will be reduced, and then the last. If two or three of these characteristics are equally high select one at random to deteriorate first. When all three characteristics have been reduced to 1 point each, the character will spontaneously awaken in a severely debilitated condition.

The character may set himself to awaken at a particular time or in response to a pre-arranged stimulus. If all else fails, he can be aroused by normal low passage revival procedures — but without the danger of death.

Suspend Animation is a level 4 ability with no strength point cost to perform, but results in physical deterioration.

Enhanced Endurance: This is the ability to increase the efficiency of one's recuperative powers, so that fatigue or exhaustion do not occur as rapidly as they otherwise would. This ability does not actually increase the character's Endurance score; it simply permits him to substitute psionic strength points for Endurance points when engaged in combat or any other tiring activity.

Enhanced Endurance is a level 5 ability.

Resist: At this level of ability the character acquires the ability to ignore extremes of temperatures, lack of food, water, or rest. He gains the capacity to resist some forms of damage (such as walking over hot coals) without injury. The character may also use this power to go without food, water, or sleep for a number of days equal to his psionic strength before suffering any ill effects.

Ignoring extremes of temperature requires the expenditure of one psionic strength point per point of damage "resisted." For each additional level of ability beyond level 6, an additional point of damage can be withstood for the same strength point cost. Once the character has exhausted his psionic strength he suffers normal damage from the effects of heat, cold, etc.

Resist is level 6 ability with costs as described above.

Healing: Healing allows the rapid recovery of hit points, at the rate of one point per minute in cases where natural healing would occur (though at a much slower rate). This talent will not replace or repair severely damaged or destroyed organs or limbs, though it can be used to prevent excessive blood loss, and will eventually heal the stump of a severed limb, etc. Healing requires extreme concentration, and no other activity is possible while healing takes place.

Healing is a level 7 ability and costs 1 point for each point of damage repaired.

Regeneration: Regeneration is similar to healing, except that it will eventually replace severed or destroyed organs and limbs. The loss of an arm or leg will reduce a character's permanent Strength and Dexterity scores by 20% (rounding fractions up) until such loss can be regenerated. Regeneration will do normal healing at a cost of one psionic strength point for every *two* points healed. At a one strength point to one point cured ratio, this power will regenerate any portion of the body, at a rate of one point healed per hour. Regeneration requires extreme concentration, and no other activity is possible while regeneration is taking place.

Regeneration is a level 8 ability, with costs as described above.

Discipline: At level 9 the character acquires sufficient control to "program" his talent to work automatically, freeing him of the necessity of paying close attention, and allowing him to concentrate on other matters. For instance, he can "program" his talent to heal or repair any injuries he receives at once, and if he is injured thereafter the accelerated healing will occur without delay, though he continues to perform other actions. Or, if the character finds it necessary or useful to feign death he can do so quite easily by desiring it; his subconscious will carry out the necessary actions quickly and easily.

This is an especially advanced and useful talent, and one that requires only a little foresight to be used effectively. These responses *must* be pre-arranged, not summoned up on the spot; and this programming requires deep concentration so that it can only be done if the character is not engaged in any other activity.

Discipline is a level 9 ability, with no psionic strength point cost to perform.

Special: *Awareness* specials, like special telepathic talents, frequently consist of more effective or subtle variations on one of the lesser talents. Only rarely will an entirely new ability be acquired as a special talent.

Special *Awareness* talents might include:

Youth: This talent permits the character to ignore age saving throws, using his *Regeneration* talent to prevent or correct the effects of age. The character remains young and healthy indefinitely.

Healer: This special talent permits the character to use his talents upon others as well as himself. Only one person at a time may be healed by this procedure, and physical contact is required.

Conclusion

These are the four classes of talents, and the uses of the various levels of ability within each class. Newly trained psionic characters all begin at level 1 in each of their respective talents, and advance to the higher levels of ability as they gain experience in using their talents. A character must roll 8+ on 2d6 in order to advance to the next higher level of ability, rolling once a month until he achieves his maximum level of ability. A separate die roll is made for each talent the character possesses.

The costs, uses, and effects of psidrugs are as indicated in the original rules (Book 3, *Worlds and Adventures*).

It's All In Your Mind

More mental Mutations for the GAMMA WORLD® Game

by James M. Ward

Editors' introduction: Keeping track of new mutations is like trying to dig up all the dandelions in your front yard: No matter how many you find, there will always be more around. The editors of ARES™ Magazine asked Jim Ward, an acknowledged GAMMA WORLD Game Expert, to list some of the new mental mutations appearing in the land of GAMMA WORLD gaming. They are reproduced here for fans to use in their campaigns.

The mutation descriptions follow the revised GAMMA WORLD game format in the Basic Rules Booklet. After the name of the mutation, the following information is given:

Range: The distance away from the character's body that the mutation is effective. *Touch* means the character must touch a target or victim for the mutation to function. *Body* means the mutation only affects the mutant's body.
Duration: The length of time that a mutation remains effective. *Variable* means the duration varies depending upon circumstances. *Constant* means the mutation takes effect instantly or is always in effect.
Number: How many characters may be affected by the mutation. *Self* means only the mutant will be subject to the mutation. *Variable* means a variable number of beings may be affected, depending upon the situation.
Type: All mutations listed here are mental (M); they may further be conscious and controllable (C), or unconscious and uncontrolled (U).
Use: How often a mutation may be used in a given time period.
Damage: What damage (if any) will be done by a mutation if used in combat.
Effects: What specific effects a mutation will produce. Unless noted otherwise, all dice rolls to determine effects are made each time a mutation is used.

These mutations are listed in alphabetical order. Questions about them may be addressed to this magazine, and may be answered in future articles.

Name: Activation	
Range: 5 meters	Type: C M
Duration: Variable	Use: Once every 8 hours
Number: 1	Damage: None

Effects: This mutation will cause a technological item to perform one of its normal functions, even if the object is not in working condition. The mutant does not have to physically touch the item; the mutation produces power as well, so unpowered items will be made to function as if they had a power source. It will cause a broken laser pistol to fire itself once, an unpowered flashlight to shine, or an unplugged toaster to warm its coils and pop up. If an item was designed for continuous use (like the flashlight above) it will function for 1-4 minutes. This mutation does not allow one to figure out how to operate an item, but it does allow a single effect of that item to become known.

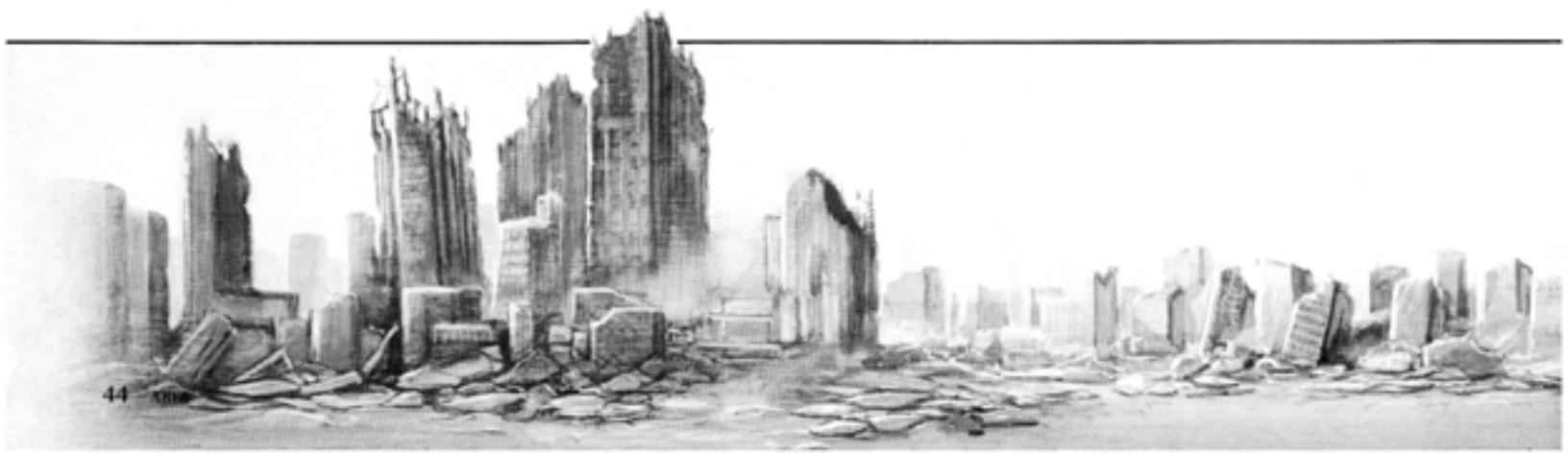
Name: Area Focus	
Range: 20 meters	Type: C M
Duration: 60 sec.	Use: Once every 3 hrs.
Number: 1	Damage: None

Effects: This clairvoyant mutation allows the character to be so in tune with his environment that he can tell what is nearby even if he cannot see it. One can sense things behind walls and doors and inside boxes. The mutant cannot properly identify objects with this power that he is not familiar with; if one had never seen a security robot, all one could tell would be that a "metal thing" was behind a closed door.

Name: Energy Absorption Field	
Range: 5 meters	Type: C M
Duration: 60 seconds	Use: Once every hour
Number: 1	Damage: None

Effects: This creates an invisible field that blocks all energy forces directed at the mutant within a 180-degree arc to the front of the character. This effect does not block projectile (kinetic) or mental energy attacks from occurring.

Name: Fire Burst	
Range: 60 meters	Type: C M
Duration: 1 second	Use: Once every 2 hours
Number: 1	Damage: Variable



Effects: This will cause any one combustable object within range to ignite. Trees will start burning, gunpowder can be set off, and clothing can be set aflame. When used against an intelligent (and flammable) being such as a mutant plant or furry animal, a roll versus its mental strength must be made for the attack to succeed. The effect of the fire produced is variable, though typical damage from fire will do 1d6 of damage every Action Turn (10 seconds) until extinquished.

Name: Glowing Truth	
Range: 10 meters	Type: U M
Duration: Constant	Use: Constant
Number: Variable	Damage: None

Effects: This mutation causes all intelligent beings within range to glow bright blue whenever they are consciously and knowingly not telling the exact truth.

Name: Image Generation	
Range: 50 Meters	Type: C M
Duration: 10 minutes	Use: Once every 2 hours
Number: Variable	Damage: None

Effects: This mutation allows the character to generate a three-dimensional image of any being or effect the mutant has seen in the last 24 hours. All who see this illusion, including robots and all other artificial intelligences, will react as if the illusion were real; no Mental Attack roll is allowed. However, physical contact with the image immediately reveals its true nature, though the image will remain for its entire duration. This mutation causes no physical damage, so a laser blast illusion will only frighten and not hurt. Walls, trees, fog clouds, and so forth may be created.

Name: Mutation Dampening	
Range: 30 meters	Type: C M
Duration: 5 minutes	Use: Once every 2 hours
Number: 1	Damage: None

Effects: The mutant can negate the single most harmful mutational power of any one being within range. The user does not have to know what the powers of the enemy mutant are; if necessary, the game referee decides which mutation is negated.

Name: Other Healing	
Range: Touch	Type: C M
Duration: Constant	Use: 3 times every 24 hours
Number: 1	Damage: None

Effects: On a one-for-one basis, mutants with this power can give any number of their own hit points to any other living creature. This means that if a creature takes 20 hit points of damage, the mutant can give it 20 of his own hit points in a healing process. Exchanged points cannot take the healed creature over its normal hit point level. This power cannot revive dead beings.

Name: Pack Acceptance	
Range: 100 meters	Type: U M
Duration: Constant	Use: Constant
Number: Variable	Damage: None

Effects: This mutation is effective only against creatures with MS and INT of 4 or less. The mutant can walk among such creatures and will be accepted as one of them. However, if such creatures would attack each other normally, they might attack the mutant as well. This power does not work when there is only one creature to be influenced.

Name: Switching	
Range: 5 meters	Type: U M
Duration: Constant	Use: Constant
Number: 1	Damage: None

Effects: This effect only works on intelligent beings that the character has spoken to for more than one hour. It is a mental attack that allows the mutant to trade one of its (generally worthless) possessions for one owned by the being dealt with. The mutant can choose which of the victim's possessions will be received in trade. For 24 hours, the victim will value the object received in the trade. After that time he will know he has been tricked and is free to take revenge on the switching mutant. A

Illustration by Larry Elmore

Mental Attack roll is allowed.

Name: Telekinetic Walking	
Range: Body	Type: U M
Duration: Constant	Use: Constant
Number: Self	Damage: None

Effects: Characters with this power can walk on air up to 100 meters above ground. In all respects the mutant will behave as if walking on a normal flat surface. Altitude is gained or lost by going up or down "stairs." The use of this mutation prevents the use of any offensive mutation while "walking on air," though offensive powers may be activated when the mutant is on the ground.

Name: Temporal Fugue Negation	
Range: 90 meters	Type: U M
Duration: Constant	Use: Constant
Number: Variable	Damage: None

Effects: This mutation completely destroys all *Temporal Fugue* creations or actions of these creations. For example, if a *Temporal Fugue* copy shoots a laser at this mutant, the laser beam will be negated before it hits. If the copies themselves get within range, they are

Illustration by Keith Parkinson

The Equinoid

by James M. Ward

The Equinoid, depicted on this issue's cover, is a new GAMMA WORLD® game mutant, created to demonstrate many of the new mental mutations listed in the previous article.

NUMBER: 1
MORALE: 10
HIT DICE: 18d6
ARMOR: 3
LAND SPEED: 6/900/18

MS: 18	**IN:** 18
DX: 18	**CH:** 15
CN: 18	**PS:** 17

ATTACKS: See Description

MUTATIONS: *Energy Absorption Field, Pack Acceptance, Telekinetic Walking, Life Leech, Modified Body Parts, Regeneration, Ultravision, Heightened Precision, and Mechanical Genius*

DESCRIPTION: Averaging 2 meters in height, Equinoids come from horse/goat stock. The primary goal of their race is to create a new technological civilization from the roots of the past. In addition to possessing a host of powerful mutations, the race creates weapons, primarily devices using hydrogen, from the science of the Ancients. Every Equinoid has some type of hydrogen device, ranging from simple hydrogen flashlights to highly sophisticated hydrogen vehicles. From their earliest racial memories, Equinoids have been experimenting with hydrogen technology. Even the youngest members of the species work on inventions of interest to the race as a whole.

Equinoids may be found in mountain ranges, where their *Telekinetic Walking* mutation gives them a huge advantage against hungry predators. Although the more primitive groups of this species use hydrogen torches to cut cavern complexes into the hills, the majority of this race lives in large, domed cities powered by both hydrogen and solar energy.

Equinoid culture requires them to completely isolate their young from outside influences, and as a result, no other intelligent race is ever allowed into their cities. Those who attempt to infiltrate are instantly killed. Under other circumstances, Equinoids treat all other intelligent races in a friendly manner until betrayed.

The spear in the illustration is a Hydrogen Flame Generator that draws hydrogen out of the air and emits it from the spear head in powerful flames. WC: 13, Damage: (a function of range)

Close Range: 1-20 meters	10d8 Fire
Med. Range: 21-45 meters	10d6 Fire
Max. Range: 46-99 meters	10d4 Fire

The sword takes hydrogen from the air and heats the blade to white-hot intensity. WC: 4, Damage: 5d8 from heat damage when striking.

also destroyed, though no harm comes to the mutant with the *temporal fugue* mutation.

Name: Use/Duration Multiplier

Range: Body	**Type:** C M
Duration: Variable	**Use:** Once every 24 hours
Number: Self	**Damage:** None

Effects: This mutation allows the character to increase the duration or use of a single other mutation by a random multiplier of 1d6. This mutation must be activated in the Action Round before the mutation it will multiple is activated. A mutation that works once every 24 hours could function up to six times in that same period, and a mutation with a 4-hour duration could work up to 24 hours. This mutation *cannot* be used to multiply itself.

Name: Water Shield

Range: 10 meters	**Type:** C M
Duration: 60 seconds	**Use:** Once every 2 hours
Number: 1	**Damage:** None

Effects: The character can telekinetically create a sphere of water and use it as a shield to block incoming missile or energy attacks. The sphere created is of constant size (1 meter diameter), and requires a volume of water sufficient to form it. This sphere of water will absorb damage from attacks as a normal mass of water would, and may be manipulated quickly and with ease by the mutant within the range restrictions. Arrows, spears, and other missiles (up to ten per Action Turn) will be drastically slowed down, doing only half-damage (round fractions down) if they hit at all. Energy beams of all types will be negated. If the sphere contacts any living being, it will splash apart without causing damage to the target.

Name: Weapons Effect Duplication

Range: 1 kilometer	**Type:** C M
Duration: 10 seconds	**Use:** Once every 4 hours
Number: 1	**Damage:** Variable

Effects: This mutation allows the character to exactly duplicate the effects of all weapons that struck the mutant in the Action Round before. In other words, if a crossbow bolt and a laser hit that mutant in the last round, the mutant can inflict the total damage taken from those two attacks on any visible foe within range. This attack will negate any resistance the enemy might have against that attack form, since the attack is a mental one (Mental Attack roll required).

FRONTIERS OF THE MIND

Psionics in the STAR FRONTIERS™ Game

by Jon Mattson

When I first purchased TSR, Inc.'s new science-fiction role-playing game, I was quite impressed with it and immediately set about adapting my already existing SF campaign to suit the new rules system. After a number of characters had come and gone, however, I realized that something was missing: there were no rules present to cover the use of psionic abilities (paranormal powers derived from the mind), which have become a hallmark of modern science fiction. These abilities have a place in science-fiction campaigns, and the following is a system for using them in the STAR FRONTIERS game.

Psionic ability

When characters are generated, each player must roll for an additional ability score, Psionic Ability (PSI), using the same die-rolling procedure as used for any other score. There are no racial modifications for this roll, although Human characters can add their 5-point bonus to this score, and it is not "paired" with any other ability. In every other respect, PSI is treated as a normal attribute.

The referee should determine how psionic skills are acquired by a character. It may be necessary for someone to seek out a psionic mentor (remember a certain little green fellow on a swampy world?) or a psionic organization that will train him properly. Either way, an interesting series of adventures could be set up in which adventuring groups hunt for such sources of information.

Psionic skill

Psionic powers are actually skills which must be learned just like any other skills. The Psionic Primary Skill Area (PSA) consists of several skills, each of which must be learned separately and can have different levels. A skill cannot be used unless the character in question has at least one level in that particular ability. In addition, a character who has not chosen the Psionic PSA cannot learn any of the psionic skills unless his PSI score is 60 or higher.

Unlike other skills, there is a limit to the number of psionic skills a character may know. A character who has chosen the Psionic PSA may know a maximum number of skills equal to his PSI score divided by 15 (rounding fractions to the nearest whole number). Characters who do not choose the Psionic PSA may not use any psionic abilities. Psionic characters may bring a number of skills equal to their PSI score divided by 25 (dropping fractions) above level 4, the other abilities remaining at level 4 or less. (Editors' note: It might be a good idea to limit the number of psionic characters in a campaign to keep game balance and limit the spread of such powers).

Skill Cost Table

	Psionic PSA
Level 1	6(12)
Level 2	12(24)
Level 3	18(36)
Level 4	24(48)
Level 5	30(60)
Level 6	36(72)

As with other skills, the experience point cost is doubled for psionic skills when the Psionic PSA is not taken.

The various psionic skills are described below. The "success rate" is the same as for other skills. "Cost" indicates the number of Psionic Energy Points (PEPs) the character must expend per game turn to use the ability. A character's PEP score is equal to the average of his PSI and (unwounded) STA scores. As psionic skills are used, points are subtracted from the PEP score until it reaches zero (0), at which time psionic skills cannot be used. PEPs are regained at a rate of 3 per hour of rest, or 1 per hour of activity. If an ability fails (i.e., the success roll is not made), the character will only lose half as many PEPs as would have been expended had the ability been successfully used (round fractions up).

If a psionic character is resting peacefully, he or she may use up to two talents at once as long as one of them is either *Clairvoyance* or *Mind Contact*. In this case, however, the total PEP cost of the two skills is increased by 10% (round fractions up). If any other sort of action is taken, even something as simple as pushing a button, both talents are immediately disrupted and ended. Only one talent at a time may be used otherwise.

The use of psionic abilities requires concentration; if that concentration is broken, the effect will be ruined. Any violent shock (such as a very loud noise, being struck physically, and so forth) has a chance of disrupting a psionic's concentration and ending a talent's use prematurely. The psionic is allowed an ability check vs. LOG to see if he maintains his concentration, possibly with modifications if the referee sees fit under the circumstances (for example, getting shot may produce a severe negative modifier, while someone whispering nearby would produce a positive modifier). The only exception to the above is with use of *Energy Manipulation*, which will absorb part or all damage from a blow automatically before a disruption check is required. If all of the damage from a blow is absorbed by this talent, no disruption check need be made. If some damage "leaks through," then a normal disruption check is made.

A character may also use an ability at a level lower than actually known, useful when one runs low on PEPs. Thus a character with level 6 *Telekinesis* could use this skill at level 5 or less if she wished to save PEPs.

Psionic skills

Clairvoyance

Success rate: 35% • skill level
PEP Cost: level of use • 2

This ability allows a character to get a clear mental picture of a person, place, or object within a radius of 10 meters per level of ability. At level 4 and higher, the user may also mentally "hear" sounds within the area (this is called *Clairaudience*).

Energy Manipulation

Success rate: ½STA (unwounded) • skill level
PEP Cost: 3 per level of use

This ability allows the character to channel energy harmlessly away from his body. Each level of this talent used will absorb 5 points of beam energy or 3 points of kinetic energy (from gyrojet, melee, projectile, or hurled weapons, from falling damage, etc.) Note that the success rate depends upon *actual* skill level with this ability, not the level at which PEPs are being used. This ability will last for one game turn, and may always be activated before other combat actions occur so long as the user is not surprised by an impending attack or damage-causing situation.

Mind Contact

Success rate: ½ INT • skill level
PEP Cost: level of use • 1

This ability allows communication with the minds of other beings in various ways, depending upon the level at which this skill is used:

Level 1: This level allows the psionic to Sense the presence of any life forms.
Level 2: This level allows the character to use *Empathy* on a being, as per the Psycho-Social skill of the same name.
Level 3: This level allows one to *Shield* his mind from other psionic powers, so that he is allowed an ability check vs. PSI to avoid such powers being used against him, over and above any other saves the character may be permitted.
Level 4: A psionic may *Read Minds* at this level of ability. The immediate, conscious thoughts of other living beings may be detected (in their original language only), but the user cannot send any thoughts to other beings. Any being within the line of sight may have its mind read.
Level 5: At this level, a psionic may simultaneously read the mind of another being and send his or her own thoughts into the being's mind; this is called *Telepathy*.

The range of all *Mind Contact* skills equals the user's PSI score expressed in meters.

The referee may create new psionic powers, but should use discretion when doing so.

Illusion Creation

Success rate: 30% • skill level
PEP Cost: level of use • 4

This ability allows the psionic to exert a form of mind control over another being, such that the being affected will perceive an illusion created by the psionic. The illusion will have visual, auditory, olfactory, and tactile components (i.e., the victim will be able to see, hear, smell, and touch the illusion as if it were real); however, the illusion cannot cause damage by appearing to attack the victim (though it can produce startlement, of course). Anyone viewing the illusion must make an ability check versus LOG with a penalty of 5 times the level of the illusion or will perceive the illusion to be real. If the check is failed, the viewer will know the illusion is not real but may worry that he is "seeing things" unless otherwise aware of the presence of the psionic and his talents.

Mind Control

Success rate: 5 • skill level
PEP Cost: 2 • level of use (initially); victim's STA/10 per minute thereafter

This ability allows the psionic to control the mind of another living creature; only one being can be so affected at any time. When the initial attempt is made to control another being, the victim receives an ability check of the average of his LOG and PER scores, with a penalty equal to twice the level of use of this talent, to avoid control. If the check fails, the being is controlled for one minute; each minute thereafter, the psionic must expend PEPs at a rate equal to the victim's STA score divided by 10 (fractions rounded up).

Orders which are very much against the victim's will (such as suicide) will produce another ability check on the part of the victim, with a bonus of +40%. The range of this talent is equal to the user's PSI score in meters, and the victim must be within sight. Once control ends, the victim will be fully aware of what he did while controlled, and will know his actions were controlled and not voluntary. This talent will not work on any being with a higher PSI score than the user.

Telekinesis

Success rate: 30% • skill level, plus or minus modifiers below.
PEP Cost: level of use, squared, per minute

This is the ability to move objects merely by thinking about it. The range of this power equals the user's PSI score in meters. The success rate is modified by the mass of the object to be moved, as given in the table below:

Time	Penalty
1 hour/level	0
2 hours/level	-10
3 hours/level	-20
4 hours/level	-40

The duration of this talent is one minute per use, with continuous use possible so long as PEPs are available. Unwilling intelligent creatures who can grab handholds are allowed an ability

check vs. STR, with a penalty equal to 4 • the level of use, to avoid the attack.

Teleportation

Success rate: 35% • skill level, plus or minus modifiers listed below
PEP Cost: level of use, squared

This ability allows the psionic to instantly transport himself and an additional mass of material (equal to 5 • his PSI score, in kilograms) to any spot of his choice within his line of sight, without crossing the space between. The chance for success is modified in two ways, by the distance across which the psionic is teleporting and by the familiarity of the place teleported to. Modifiers for the above are in the following two tables:

Mass	Modifier to success rate
1g or less	+5
1.1-10g	0
11-100g	-5
101g-1kg	-10
1.1-10kg	-20
11-100kg	-40
101-1000kg (max)	-70

Area is . . .	Modification
In sight *	+5
Very well-known	0
Fairly well-known	-5
Seen once	-10
Never seen, but well-described	-20
Never seen, but general location is known	-40
Random	-60

Distance is	Modification
Up to 1 kilometer	0
10 km or less	-2
100 km or less	-4
1000 km or less	-8
10,000 km or less	-16
100,000 km or less	-28
300,000 km or less (maximum range)	-48

* — "In sight" includes the use of television cameras, *Clairvoyance*, and so forth. If the roll fails, the psionic has a percentage chance equal to his PSI score of not teleporting at all, but if this roll fails the user will teleport randomly, missing his destination by up to 1/10th the total distance he attempted to teleport across. The spot arrived at will be on a straight line between the psionic's starting point and his planned destination. The referee then determines if the miss was short or long (50%/50% chance), and rolls a random number to place the character somewhere within the maximum miss range and the desired destination.

For example, a character tries to teleport from an orbiting starship to a planet's surface 190 km below. He fails to do so, and teleports randomly. The referee determines that he undershot and rolls a 20-sided die for the number of kilometers he missed by. Obtaining a 4, the character is declared to be 4 km above planet's surface and falling fast. Unless the character has a parachute, the game's over. If a character teleports into a solid object, the character dies instantly.

Other Abilities

The referee may of course create new psionic powers, but should in all cases use discretion when doing so. Having too many psionic characters can throw a campaign out of balance completely. The talents listed here may be used as guidelines for creating others.

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LATENT IMAGE

by Gary Woolard

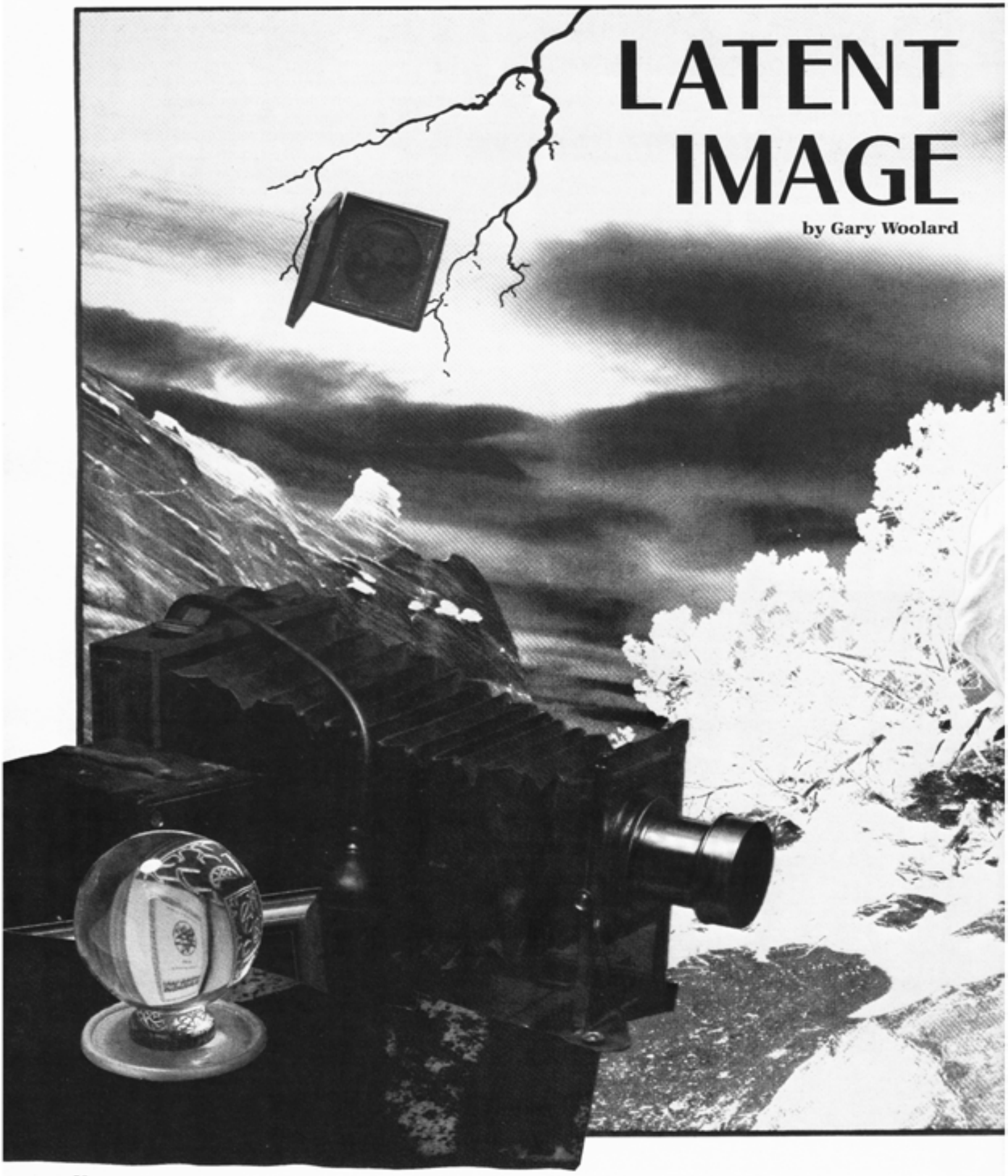


Illustration by K. Bartyzel

Gallic acid.

Iodide of potassium. Silver nitrate.

Antimony. Lunar water. Double mercury.

Wet collodion. Gravure. Talbotype. Physautotype. Daguerrotype.

The litany rolls by. Forgotten chemistries mixed, catalyzed, applied to glass plates and slid into light-tight cases to await exposure. The small man muttered happily as he washed his tanks of their latest brew, unmindful of fingers stained brown by acids. Then he withdrew a large notebook from a drawer and, squinting under the amber light of the darkroom, jotted down the specifics of his new formula.

It was an old book, bound in thin black leather that cracked under his fingers. It had been rebound at least once; the pages were of a thick, yellow vellum. The gilt outline of a title was barely visible: *Alchemical Record*. He scratched his notations in a quick, angular hand: odd formulations that bore as much resemblance to astrology as to chemistry. J. Kenneth Barnes believed in the propitious moment.

He slammed the book shut with satisfaction just as the bell of the shop door rang. He returned the notebook, turned out the amber light, and strode into the front of the shop, still whispering. "Physautotype, kalotype, the double mercury. . . ."

Frank Ash and Ellie Fairwis were playing tourist in San Francisco. Chinatown, streetcars to Ghiradelli Square, shrimp salad in styrofoam cups. They ate by the mermaid fountain and talked, making small jokes.

Frank found a kite shop and bought a small one with bright yellow streamers, which they took down to the park below the square. But the wind from the bay was too gusty to fly it, so they wrapped it up again and walked along the pier. Nothing important needed to be said, and the silences, where they fell, came comfortably. Eventually they found themselves on Battery Street, heading south.

Frank was the first one to notice the shop. Its windows were glazed with fine gray dust, and the display backing was faded from too much morning light. The sign over the door read:

THE LATENT IMAGE
J. Kenneth Barnes, Prop.

"What have we got here?" he said. He peered through, trying to make out a photograph behind the glass. He saw a sepia plate of a light-haired woman with a strong chin and a determined set to her lips. She wore a high-necked gown, formal and corseted, with puffed sleeves. Her hair was pulled back severely beneath a ridiculously large sun-hat. Across her bodice was a wide ribbon with the initials **W.C.T.U.** emblazoned across it.

"Antique photographs, maybe?" He turned back to Ellie. "Who do you think it is? Carrie Nation?"

Gary Woolard was born in 1949 in Van Nuys, California, where he was raised, so he claims, by his mother, Peter Pan, and John W. Campbell, Jr. "A typical baby boom child," he reports. "I saw America through the back window of a 1955 Chevy as my family chased the American Dream from coast to coast and back again." In the course of this, a life-long interest in science fiction and fantasy evolved into his present avocation as "apprentice guerilla-ontologist."

"The one who took an axe to the beer halls?"

There were other pictures. Here was a gentleman with muttonchop sideburns, his neck held stiffly by a Confederate Army collar heavy with gold braid, his eyes burning coldly into the lens. There was a young Victorian couple; she sitting primly in an overstuffed chair, he standing beside, a hand resting comfortably on her shoulder.

Ellie pointed to one. "Who do you think this is, Frank?"

It was a fellow with starched collar and watch fob, his waxed mustache shining black. His eyes met the camera with a cool, confident look. "I don't know. Maybe a Pinkerton's man."

"Yeah, he does look sort of sneaky. And what about him?" she pointed again. "A banker? Some kind of robber baron, at least. A Stanford or a Vanderbilt."

It was a game; and they went from one portrait to the next, guessing from clothes and bearing the inner secrets of each face. They passed from desperado to Texas Ranger; from sea captain to fundamentalist minister; from riverboat gambler to a Kansas farm couple.

They ended, finally, at a picture of a woman leaning seductively against a love seat. The strap of her evening gown slid carelessly from a shoulder, and her breasts rested immodestly within its decolletage. The camera had revealed the bold make-up, the bee-stung lips, even the rich brocade wallpaper behind her.

"Not," said Ellie, "a dance hall hostess?"

"I'd bet she made more money upstairs than down, kid."

"No takers." Suddenly Ellie noticed a row of snapshots, almost hidden at the bottom edge of the display. She bent down to them. "Frank," she said, "I think it's her!"

"Who's her?"

"The girl in the love seat. Look!"

It was, indeed, the girl in the love seat. The make-up was gone, the bold seductive look was now brisk and efficient. "I don't get it," Frank said.

"See," she whispered, "they're all here."

She leapt up, laughing. "It's favorite fantasy time — they're all fakes! Don't you see? It's one of those costume photography places where you dress up like Grandpa and get your picture taken. Oh Frank, let's!"

"You know," he said, "it's almost disappointing. That lady of the evening is probably just" — he shrugged his shoulders — "a frustrated housewife."

"I'll bet not very. And the train engineer over there never got a Lionel for Christmas."

"Right! and the banker . . . ?"

She looked at the portrait again, shook her head. "Nope, he's still a banker." She took his hand. "Come on, it'll be fun."

"Sure seems odd, though," he said. "This section of town."

There was a small copper bell hung over the doorway. It chimed as they went in.

The interior seemed to be a cross between costume shop and museum of historical trivia. Ellie went straight for the racks of clothes while Frank glanced across the walls. There were more photographs, of the same somber-faced and tinted variety. And posters, for Barnum & Bailey's, the Great Exposition of 1898, Putnam's Herbal Soda.

There were weapons hung on the walls. Cavalry sabres, a harpoon, single-shot carbines. An open-hammered scattergun. Colt revolvers in well-oiled holsters.

At the back of the room stood an old view camera, its rubber trigger bulb dangling. It was a monstrous device of brass and leather and varnished wood, mounted on a geared track. Frank ran a finger across the long bellows, withdrew it quickly when he heard a rear curtain slide open.

"Good afternoon," said the small man as he walked behind the counter. "May I help you?"

"Hi," said Frank. "Did you . . . ?" he gestured vaguely at the walls. "Are you the photographer?"

"J. Kenneth Barnes, at your service." The man offered nothing more. Frank wondered if he should recognize the name.

"They're very realistic. I mean, we weren't sure at first that they weren't . . ."

Ellie broke in. "How come they're all so serious?"

"Serious," Barnes said. "Yes. A different sensitivity, isn't it?" His fingers bounced lightly from the counter, pointing from portrait to portrait as he spoke. "Photography, you see, is today a snapshot art, fit to capture the fleeting emotion and sidelong glance. But it wasn't always." He turned to Frank, suddenly anxious. "I still use glass plates, you understand? Not the Polaroid process. They take time."

"You can send them to the hotel," Ellie said. "Can't he, Frank?"

"Yeah, I guess so."

"Good. Good." The old man beamed. "Patience, nowadays . . . well, help yourselves to the costume racks. The changing rooms are back there" — he pointed — "and I'll be setting up the camera if you need any help."

Frank joined Ellie at the racks while J. Kenneth Barnes puttered with his equipment, still talking. He seemed oblivious to their hearing. "Patience. Yes. I mix my own chemicals, you see. That's what I was doing when you came in. It's very important. These new photographers buy their chemicals, their quick-printing papers, from Kodak, mix according to charts, cure according to thermometers, all the same charts and thermometers." He cranked the bellows, checked f-stop, took a view to find his depth of field, did it over again.

"So they all look the same. And they begin to think that that is how the world appears, and shoot only those things which fit the charts, the thermometers, the paper. All drab!" He slid open the film carrier, squeezed the bulb, and inspected the diaphragm as it closed, opened. He nodded, and began to set up the flash trays, pouring measured amounts of magnesium powder. J. Kenneth Barnes believed that only the old ways gave the proper lighting.

"The old ways, the old masters," he said. "Talbot, Daguerre, each experimented with capturing the latent image, the subtext of the light, you might say. A certain numinous quality." He paused — "Yes, a numinous quality" — and went back to get the film trays.

When he returned, he found the couple standing ready. Frank wore the uniform of an officer in the old U.S. Cavalry, while Ellie wore a simple high-necked dress of a pattern which might have come from an ancient Sears Roebuck catalog. "Ah, certainly!" Barnes said. "Manifest destiny, and the great migration! Over here, if you please." He indicated a Victorian chair that stood in front of some rolled-up backdrops. "The lady seated, with the dashing officer standing protectively beside her? I know just the backdrop." He set the scene with a practiced efficiency and walked back to the camera.

"They went wrong, eventually," he continued. "They too were impatient. Impatient to get the image out of the glass, impatient to fix it. They tried to speed up the process, when they should have slowed it down. They could have held time still; perhaps even turned it around.

"Still, one shouldn't fault them." He slid the first of the glass

Illustration by Jack Gaughan

plates into the carrier, ducked under the silk hood for a final check, then locked the carrier into position. "They were the last alchemists, after all, trying to capture the tension, the essence, of that polarity between the subject and the image. Heads up, please, look proud!" He waited. "That's better. Good!

"They had an intuitive understanding of what Mr. Heisenberg said formally, years later — that you can't divorce the observer from the event. And that is sheerest alchemy! For the key to alchemy was, has always been, the insertion of some human essence, some vital catalyst into the formulations of natural law!"

He squeezed the trigger bulb.

It seemed just a flash, a soft *boom* as the light and smoke of the magnesium flare filled the room.

But time was caught. Bent between intersections of opposing wavefronts, curved like a bubble, held in dynamic tension like a spiderweb.

And like a spiderweb caught, a bubble pricked . . . time collapsed.

* * *

The first thing Second Lieutenant Franklin Ash saw when he regained consciousness was the buzzards. He had only one weak eye for the effort. Blood had matted down over the other from a scalp wound, and even the good eye was puffed and swollen from the dry heat and sand of the Apacheria. He dug his fingers into the sand and pulled himself up to a sitting position.

The movement frightened the buzzards. They took wing in ungainly hops, but only settled back to the ground again a bit further from him.

His head didn't feel bad, only numb. But his right leg was pounding like a hot anvil. Gingerly he felt through the torn cloth and the blood, trying to estimate the extent of the wound. The round had gone into the lower leg, and it seemed to have passed through. But it was hard to tell; just the light touch of his fingers made him dizzy and nauseous. He knelt over and vomited.

He wiped his mouth and looked around him.

They'd taken the water. The water, the weapons, and the horses. A breath of wind came up, and with it a quick fluttering movement of something on the rise at the edge of the hardpan, near the manzanita. It happened again, and he recognized the lavender print of Ellie's dress. They'd left her there, then. He supposed that was a good sign. But the buzzards were moving closer to her, and he had to get over there. The last thing he could do for Ellie was to keep her from the buzzards.

He tried to rise, but it was too painful. He began to crawl the eighty yards across the sand on two arms and one knee, dragging his bad leg behind him. He fainted halfway up the rise.

They shouldn't have gone so far from the fort, of course. But sometimes the frustration built to an almost tangible thing, a hatred of the ugly adobe barracks, and limiting stockade walls, and the eyes of three hundred and nine other human beings.

So he had taken her for a morning ride. A romantic, private ride, full of manzanita and yucca, the verbena and crocuses which covered the desert with color. Ellie was delighted. The verbena matched the colors of her cotton print dress.

Frank's kite experiments formed the excuse. Communication across the vast distances of the Southwest had plagued the Army, and attempts at a practical signal apparatus were often discussed. Frank was convinced that a rugged, efficient kite might be the answer, and tested various designs in his free hours. There had been laughter at first, but if the lieutenant succeeded where others had failed, it would be a great boost in his military career.

But this morning the kite had remained in its case, in spite of the light desert breeze. This morning was to have been a picnic. . . .

They were picking flowers on the rise ("A bouquet for breakfast," she'd said) and she asked him to go back down to the horses for more water. He was just unslinging a canteen when he heard her scream. Lieutenant Ash spun around.

Three Apaches had come over the other side of the rise, out of nowhere. One had Ellie by the hair, laughing as he pulled her off her feet. The other two were running down the side of the rise, trying to flank him. White Mountain bravos; they still wore the reservation cards on their blouses.

The range was too great for a sidearm. Quickly Ash tore his Springfield from its scabbard and loaded a shell. Using the saddle as an armrest, he took aim on the bravo that held Ellie and fired. It was a miss. He saw the round kick up sand high and left.

He ejected the cartridge case and reloaded. Ellie was still screaming.

At least one of the bravos was returning fire; Frank heard a bullet hum past. His horse shied and pulled away, taking the lieutenant's cover with him.

The cartridge was jammed. Ash swore as he ejected it, and reloaded carefully. That was when the first round struck him and kicked his leg out from beneath him.

Ash fell and rolled, clutching the carbine to his chest. He forced himself into a kneeling position, and brought the weapon to his shoulder once again. It was suddenly heavy in his arms.

He knew it would be his last shot.

One of the bravos, off to the right, was aiming. Ash ignored him. He concentrated instead on Ellie and the bravo that held her. He could see that she was still screaming, but couldn't hear her. He could only hear the blood rushing in his ears.

He forced his muscles to relax, forced them into the old Army catechism: breathe, aim, slack, squeeze. He brought the forward sight onto the bodice of her dress, tried to visualize the third button down.

He squeezed.

The blast tore her from the Indian's grip. Her body flew backwards, bounced once in the sand, and lay still. The Indian

stopped laughing, and just stared at his hand that had gripped the girl's hair.

It was then that Ash took the second round that grazed his scalp and knocked him unconscious.

A firewood detail from the fort found them; Frank Ash woke to the feel of damp rags cleaning his wounds. The touch felt feathery and distant. "T'sallright, lieutenant, we gotcha," he heard.

Frank Ash spent a month in the hospital at Tucson. He was tended efficiently, with a minimum of fuss. Daily, the doctor would come in to examine his wounds for inflammation, but there was little infection. "It's the hot desert air," the doctor said. "Damnedest thing I ever saw out here, they heal real clean."

Frank spent a lot of time staring at the cracks in the white adobe walls, and at the spaces between them. The natural patterns seemed to make maps, territories of islands and great deserts. He thought about kites, and the hot dry air, and calico material that matched the verbena in spring.

Officers from the post visited a few times, talked of politics and horses and army life. Alsace-Lorraine had gone to the Germans; there would soon be electrical lighting in New York City. The bravos who had ambushed Frank and Ellie were White Mountain Apaches who had gone on a *tiswin* drunk and busted from the reservation. They'd been rounded up, plus a few more, down in the Sonora. One had been shot, and the rest were sent to the San Carlos reservation.

The only regular visitor he had was a young Indian girl who came each morning to refill the ollas, the water gourds which hung from the ceiling to cool the room. She was proud of her English, and prattled Bible stories and Jesus Christ at him. She didn't seem to mind that he never replied.

Lieutenant Ash was pronounced fit for light duty and sent back to the post. He took with him a slight limp and a Bible the Indian girl gave him the day he left.

He found his quarters as he had left them a month before. The regulation bunk was still made. His good boots stood inside the doorsill, the dress kepi hung above them on its antelope horn.

A thin smell of glue was in the air.

He found the open bottle on his work bench, a brush dried solidly into it. He remembered re-gluing a strut on that kite before the picnic; he must have left it open in his haste.

Other materials on his desk: thin wooden strips, shaped and trimmed, were organized into little piles by length and thickness; a large roll of string, with marking ribbons attached every ten feet. Sketches of kites he'd designed and built. An oversize chart of all his experiments — surface area, estimated wind speed, weight carried, estimated altitude.

A large box kite sat on the floor next to the work bench. He'd decided it was too clumsy to take with them that day. He ran a finger across the doped silk. It left a streak on the dusty surface. He stared for awhile at the dust on his finger, and felt his leg throb.

He rose and went to the door. Alchito, the half-breed errand boy, was playing with a hoop on the parade ground. Frank called him over.

"Senhor Lieutenant?" the boy said. "Shine your boots?"

"No," said Frank. "Clean this place up. I want that work bench cleared, and all the stuff around it."

"What should I do with it, Senhor?"

"I don't care." said Frank. "Just get rid of it." He tossed the boy a dime. "Do a good job. I'll be at the stables." Frank turned and walked out across the parade ground.

Frank spent several hours at the stables, selecting a new mount. He finally settled on a sorrel stallion, barrel-chested and a bit heavy in the girth. Exercise would take care of that.

He saddled the horse and rode through the south gate. Amongst the sacaton grass, he gave the stallion its head, and enjoyed the sure feel of the muscles beneath him. Then, in front of him, he saw a mop of raven hair bobbing in the sun. He reined the horse in.

It was Alchito running through the fields. The boy saw him at the same time. "*Oye*, Senhor Lieutenant!" he cried. "Look at it!" And behind the boy, Frank's box-kite rose from the grass.

It rose and kept rising and higher till it hung in front of the sun, a black silhouette dancing in the air. Frank stared up at it. Kept staring until his eyes filled with tears. The sun was very bright.

* * *

After the flash, an afterimage, like a negative resting in the eyes. Frank winked away tears. He felt odd, disoriented.

Barnes was looking directly at Ellie. "My dear, please excuse an old man's prattling. Did the flash frighten you?"

She was sobbing quietly.

"Ellie?" Gently, Frank shook her shoulder. "Ellie, what's wrong?"

"Oh God!" she gasped. "It was so awful, so cold. Did you have to kill me, Frank? Did you have to?" she looked up, and seemed surprised, somehow, to see him. "Leave me alone. Just leave me alone a minute." She pushed him away weakly.

Barnes let the trigger bulb slip from his fingers, and stepped hesitantly toward the couple. "Please, young lady," he said. "This is most distressing. Perhaps some smelling salts?"

"Ellie, get a hold of yourself," Frank interrupted. "I don't know what you're talking about — you had some kind of dream, or something!" He turned to Barnes. "Do you have any idea what she's talking about?"

The photographer bit his lip, glanced involuntarily at the camera. "Perhaps it was the flash. A certain type of epileptic, I've heard, is sensitive to flashing lights."

Ellie began to pull the cotton print dress from her body, careless of ripping out the buttons.

"Frank, let's get out of here," she said.

Frank stood in confusion. "Do you want me to call a doctor?"

She shook her head. "Just get me out of here. Now, please."

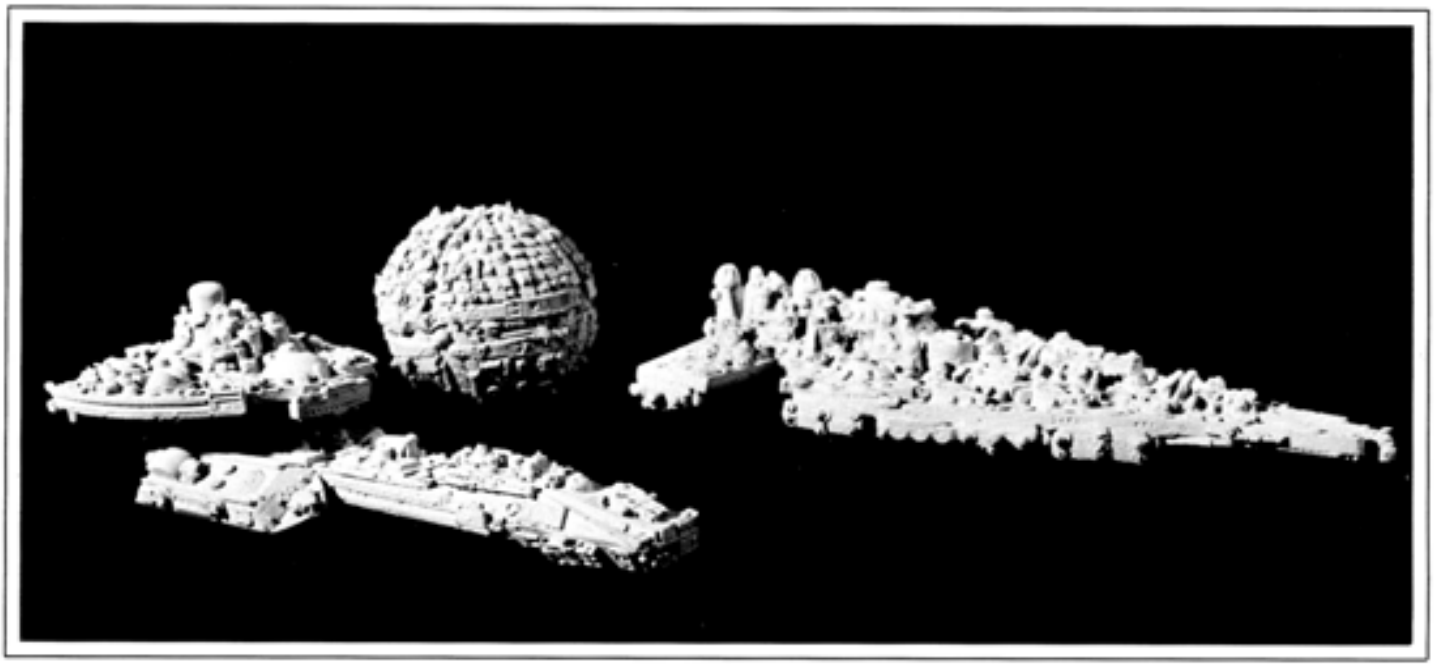
In five minutes they were gone. The uniform and dress were piled on the dressing room floors. Slowly, methodically, J. Kenneth Barnes forced himself to pick them up, hang them back on the racks. He prided himself on being methodical, even at such a propitious moment.

He found a bag that young Mr. Ash had left behind — it contained a brightly-colored child's kite. Apparently, Ash had stepped on it in his haste, for all the struts were broken.

He put the package behind the counter.

At last he could attend to the camera. His hands shook a little as he unlocked the film carrier and slid it from the camera. He knew the new formula was close; it had to be. And that young lady had given the strongest reaction yet. He turned out the studio lights and hurried back to the darkroom.

The first images to come out on the glass plate were the dark shadows of the buzzards. J. Kenneth Barnes, photographer, philosopher, and experimental alchemist, smiled. ^



by Kim Eastland

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One of the oldest and finest starship lines on the market is Superior's Starfleet line. With a selection of 75 different ship types, the line is designed around five "star empires" based on the human, insect, avian, aquatic, and mammalian races. The prices range from $4.00 for ten fighters to the huge super ships (too large to show here) for $17.50. Most of the ships are one-piece castings, and the only one that requires extensive assembly is the Star Fortress, which sells for $22.00. This line is designed for use in miniature games or as collector's pieces.
Suggested retail price: Jaguar: $8.75, Morning Star: $8.25, and Mantis: $7.75.

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STAR TREK® 1/3900 Scale Starships figure line. (Clockwise from left) U.S.S. Reliant, U.S.S. Enterprise (new version), Klingon Battlecruiser D-7, Romulan Bird of Prey.

For all would-be starship captains out there FASA Corp. has recently released eight different vessels. Some vessels are single figures (like the Romulan Bird), but most are multi-pieced (the other three shown are 3-piece miniatures.) Each blister pack comes with a single ship, and a 2-piece plastic stand that helps when using the figure in stellar miniature combat games. The other ships in the line are: U.S.S. Enterprise (old version), the Regula I Space Station, Larson Class Destroyer, and a Klingon Heavy Cruiser D-10.
Suggested retail price: $3.50 each.

LEE'S GUIDE™ to Interstellar Adventure, Vol.1

Design: Gregory P. Lee. Gamelords, Ltd., 1983. $5.95 booklet.

It's a sad thing that many of the "approved for TRAVELLER® game" booklets and modules have not been up to snuff. Happily, such is not true of Gamelords' LEE'S GUIDE™, Volume 1.

LEE'S GUIDE details ten worlds in TRAVELLER game statistics; the worlds are not named, though various worlds matching the given descriptions in GDW's Spinward Marches and Solomani Rim sectors are given for most of the planets described. Each world is well described, and numerous adventuring scenarios are presented for TRAVELLER game parties to amuse or abuse themselves with. Some of the adventures are suitable for short, one or two evening game sessions; others, particularly *Back From The Ashes* and *Troubled Waters*, are excellent for long-term campaign play. One scenario, *War Zone*, would make a good setting for a STRIKER™ game campaign for relatively low tech level forces.

The type style is uncomfortable to read, but that is a minor point. LEE'S GUIDE makes an excellent addition to a TRAVELLER game referee's library, and referees of other SF role-playing games might be well advised to pick this booklet up and adapt the situations to their own game campaigns. I highly recommend it.

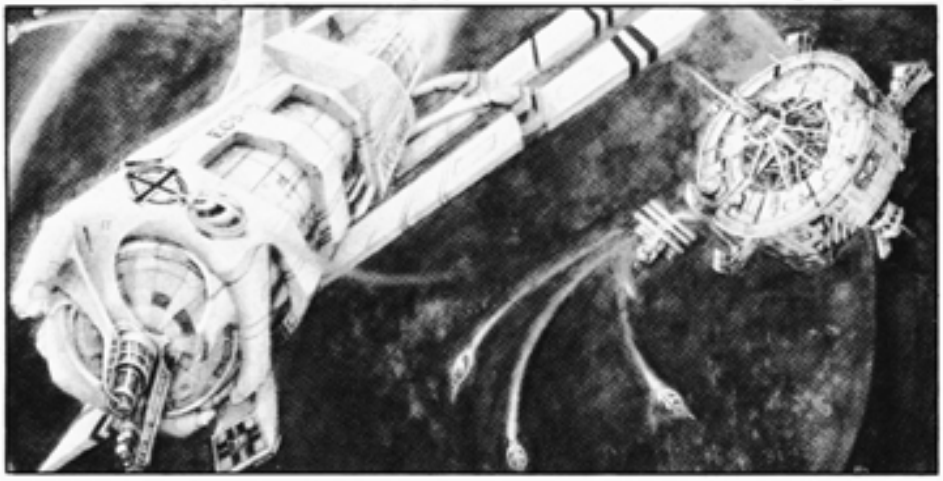
Reviewed by Roger E. Moore

THE COMPANY WAR™ Game

Design: James Griffin and Bill Fawcett, with assistance from C.J. Cherryh. Mayfair Games Inc., 1983. $17 boxed.

THE COMPANY WAR game is a spaceship combat game licensed from C.J. Cherryh's novel *Downbelow Station*. I must admit I approached the game with serious doubts. The last several licensed games I've bought had only passing resemblance to the books they were based upon. Although it does not portray all the different levels of the original novel, THE COMPANY WAR game is a good recreation of the conflict between the military forces involved in the war Cherryh describes. The presentation of the merchant families is weaker, but plays well.

The game can be played with two, three, or four players. The two-player game has one controlling the Mazianni fleet, pirates who formerly belonged to the Earth Company, and the Union fleet which doesn't recognize the sovereignty



of Earth. The Mazianni want to destroy the Union's ships and capture their space stations; the Union is on the defensive but can occasionally mass enough ships to knock out parts of the Mazianni fleet. Though there are nearly three times as many Union ships as Mazianni, the Mazianni ships are better.

The three and four-player games add Earth Company and Union merchant ships to the action; these get victory points for carrying and delivering cargo to the space stations. As this occurs in a combat zone, it takes a skillful player to win, the emphasis being upon negotiation and avoiding fights. In eight multiplayer games, the merchant player won only once.

The movement system is unusual in that a player is never sure how many ships he'll be allowed to move each turn; a die is rolled to determine the number of ships that can move. Movement is limited only when a ship encounters an enemy ship and must stop. Union players can then slow or trap Mazianni ships using their weaker "dart ships," which is just as well as these craft are basically useless in the strategic game. Since ships can move between some forty jump points, such encounters are common, and much of the Union's strategy involves trapping portions of the Mazianni fleet. This is often difficult as the Mazianni receive a bonus on the die roll that determines which side moves first. Despite the die rolls involved, THE COMPANY WAR game is less dicey than some of Mayfair's earlier games, and definitely rewards planning and skill over luck.

The combat in the strategic game is not very realistic. Although it conforms to the extensive background notes that C.J. Cherryh wrote for the game, it also allows a lucky player to destroy a massive carrier with two very small ships. A tactical game is added, which is like a simplified STAR FLEET BATTLES™ game and is fun to play. Unfortunately, if you add the tactical combat into the game it can take four or five hours to complete a two-player game which rarely takes more than ninety minutes using the strategic rules; a single battle will take about twenty minutes to play out. In the four-player game, this almost always leaves one player with nothing to do.

One technical problem is that the "rider" ships that come with the carriers are powerful enough that their use in the tactical game will favor the Mazianni player. Still, this isn't a drastic change, and otherwise the two-player game seems well balanced.

The rules are clear and fairly easy to read. The basic (strategic) game rules are in a separate booklet for easy reference. Included with the game is a starmap showing the correct location of the major stellar systems in C.J. Cherryh's DOWNBELOW universe, and a long

background article mentioned earlier that gives detailed technical information on the game and her novel as well. Not surprisingly, the article is very well written and extremely interesting in its own right.

The game map is the jigsaw puzzle type that Mayfair has begun using. There are some problems in distinguishing between those space stations loyal to Earth and those loyal to the Union, as the difference in type face between them is very slight. The counters are easy to read, though five were back-printed with the wrong numbers and you have to correct them with a pen; otherwise some ships are better damaged than when repaired.

THE COMPANY WAR game definitely rewards planning and skill over luck.

Despite the problems, if you like science-fiction games or C.J. Cherryh's novels, you will enjoy this game. It could also serve as the basis for a miniatures campaign with some work, and the starmap could be adapted into a science-fiction role-playing game. THE COMPANY WAR game is easy to understand and challenging.

Reviewed by Ryan Carroll

The TO CHALLENGE TOMORROW™ Game

Design: David F. Nalle. Ragnarok Enterprises, 1983. $7.95

The TO CHALLENGE TOMORROW game is one of the new generation role-playing games to come out this year. The concept behind TCT and others like it, is to produce a generic set of basic rules which govern character creation, combat mechanics, and skill systems that can be used with "Locale Packets" to create historic, mythic, or fictious campaigns. Locale Packets provide the details of a particular area or group of people (e.g. Ancient Rome, Celtic Britain, Medieval Japan, Jack Vance's Tschai, etc.), while the basic rules keep all characters from these various locales compatible with one another.

The popularity of this concept has been proven by the multitude of generic RPGs hitting the market currently. The reason for their popularity is well-grounded. Now the GM doesn't have to worry about converting characters from one game system to another when players want to enjoy the tea in Imperial Japan or fight the sands of Arabia, travel through space to Foster's MIDWORLD. All the GM has to do is pick up the appropriate cheaper-priced Locale Packet and play.

Considering then that TCT is the basic rules to a generic RPG and not a Locale Packet (I've heard that there are several in the works currently), the $7 price tag is, at first glance, a pretty reasonable amount. Upon closer inspection, TCT is a bargain!

For your money, TCT consists of three 5½" × 8½" booklets, 20-36 pages in length, printed in very small type. The artwork is incredible; it ranges from excellent to shoddy, but the best thing about it is that it's kept to a minimum. The whole package comes in a zip-loc baggy (I doubt that it's used for freshness).

The first booklet covers the general rules for character creation, skills and training, combat mechanics, and equipment lists (including one of the most comprehensive lists of firearms I've come across).

Characters are created by a series of die rolls and point allocations. The player has 20+1d10 points to distribute between four categories of three skills each. The four categories and their appropriate skills are: Physical (Size, Constitution, Strength), Active (Reaction, Dexterity, Agility), Mental (Psychic Ability, Rationality, Education), and Social (Appearance, Charisma, Social Status). In addition to the individual point allotments given, the character is given 15+1d10 points to use in any of the characteristics as the player sees fit.

After all of the Primary Characteristics are created, the player uses various formulas to determine the character's Secondary Characteristics. These include Hand Attack Rating, Missile Attack Rating, Hand Defense Rating, Missile Defense Rating, Attack Force Rating, Movement, Activity Points, Hit Points, Fatigue Points, and Training Points. The secondary attributes are used the most in play, but the character will also be required to "save" against various primary characteristics in some cases.

Attack and defense ratings act as base modifiers in combat situations. The attack force is a strength bonus for extra damage in hand attacks. Movement is the amount of distance, in feet, that a character can move in each 6-second combat round. Activity points are used to govern what actions can be taken by the character during a combat turn and how long it will take to complete multi-turn activities. Movement, firing, aiming, performing skill functions, etc., all expend APs. Hit points represent how much damage a character can take. Fatigue points are the amount of energy the character has to expend before becoming exhausted. Fatigue points are spent whenever anything is attempted by the character, from mental exercise to physical exertion. Training points are used for buying skills.

Skills are given very short descriptions in the text and then dropped totally. They figure in prominently during play, but very few guidelines are given in the actual rules. As far as complications during the game, I had no problems with the skills. I did think that such skills as *Assembly*, which governs building and constructing with all forms of materials, and *Husbandry*, governing the care and herding of all domestic animals, were rather general. But these and the others found in the skills section could be broken down as a GM sees fit with each part costing a number of TP as assigned by the GM. Given the number of pages devoted to skills, TCT does a good job of covering a wide spectrum.

Unfortunately, training points are used as "Gifts from the Gods" similar to experience points in other games, a premise that I heartily disagree with. Training should come from the devotion of time and money (more of the latter

than the former) to practice and study. However, even the time factor could be decreased to zero with the more advanced cultures. No doubt there will be learning processes discovered that can be transmitted through the subconscious, such as the "learning tapes" from the Space Opera fiction of the 50s. Motivations for adventure should come through character foibles or circumstance, not through artificial means. This is a fault of many games, not just TCT.

The mechanics of combat in TCT are simple, but provide the necessary amount of realism to generate accurate results. Basically, the player determines the character's aiming location (be it the leg, arm, chest, abdomen, or head), expends APs to fire or swing which modifies the appropriate attack rating, and rolls the percentile dice, adding this total together and further modifying it by skill levels and circumstances dictated by the GM. The final sum is modified by the defender's defense rating and skill levels, plus any benefits due to armor or concealment. The end product is found on the hit location chart to see where, if any place, the hit was made. Damage is determined by rolling appropriate dice, by weapon type or calibre and the effects of the damage resolved.

Hit locations can only sustain a certain percentage of the character's overall hit points and exceeding this percentage will lead to compiling serious injuries. These "bonus" injuries run the gauntlet from unconsciousness to instant death (there is even a chance of "internal organ damage, resulting in a slow and sloppy death").

Combats are quick and deadly. Beginning GMs and those not familiar with this system would be well advised to practice by running a few combats prior to play, or they may find themselves with all kinds of NPCs, but not too many player characters. Superior numbers make a difference, but superior weaponry will almost assure victory. A TCT GM should make sure that NPCs have one or the other, but never both.

The second booklet, *Worlds of Adventure*, describes in very broad guidelines, ten specific time periods of Earth, from A.D. 1400 to A.D. 3000. There are also guidelines for operating a time-travel and paratemporal campaign, though even these are glossed over. If the designer, Dave Nalle, intended these to be the end of the matter as far as Locale Packets, I would say that TCT is a flop. However, these are only meant to get the GM started on creating a Locale Packet of his own.

They are to be used only as examples of items to consider when developing a campaign. They cover such topics as: Historical background, major personalities, equipment and skill modifications, and possible areas of adventure. A fully complete Locale Packet should have a variety of information on the period of time, details on political organizations, and expanded character backgrounds. The final sections of *Worlds of Adventure* include rules for creating vehicles and starships and resolving combat between them. I found it pretty disappointing overall, but hopefully the future Locale Packets will expand on these rules also, making them more detailed, as they are extremely abstract; leaving a lot of room for interpretation.

The third booklet, *Adventures*, gives the beginning GM and players four different scenarios from four different time periods (two are historical and two are science future). The GM should look these over very carefully as they are good examples of "role player" scenarios, as opposed to "hack-n-slash" adventures. The situations are unusual, though the players are in for a treat (provided they like mental games as much as they like combat ones).

The adventures are not, however, without faults. The maps are the biggest problem as some have no scale given and none have any means of regulating movement (hexes or squares). The maps for *Anarchy at Lugano* are so atrocious that they are unreadable (they appear to be maps from a very old atlas, too jumbled with italic lettering or topographic markings to be usable). I had to consult a library's world atlas instead.

The other problem is really only a pet peeve of mine. The characters described in the adventures are of two types: "living" and "flat." Some NPCs are given motives or personalities; these also have corresponding attributes given, but the majority are too generally grouped to be considered anything more than clones.

An example comes from *Anarchy at Lugano* (an interesting situation that, in my opinion, suffered the most problems). The "Local Anarchists and Other Characters" are all given the same characteristics. This, in itself, would be no problem if everyone in the scenario were bent on destruction, but they aren't. The GM is required to do some character generation prior to play which shouldn't be necessary (I didn't expect to see in-depth character studies of all 10,000 Lugano residents, but I did expect more diversity than one set of common attributes). The other scenarios suffer the same fate, though to a lesser degree.

Overall, TCT might seem to have a lot going against it. The editing could have been more complete. The adventures omit important information, like scales of maps and totally useless map reproductions. Some sections are glossed over excessively. However, the work involved in "repairing" the game is not excessive nor complicated.

On the other hand, TCT is very flexible (inherent by nature). It can be used in any situation provided a Locale Packet is made for that situation. The game is simple but open-ended, allowing countless character diversifications with no one player being stuck with a useless character. And most of all, the TO CHALLENGE TOMORROW game is enjoyable to play.

Overall I would give the effort an "8" (on a scale of 1-poor to 10-divine inspiration). It is best suited to those who are looking for a simple, realistic, and quick RPG system that can expand to the limits of the imagination. It will be a tough act to follow. ▲

Reviewed by Jerry Epperson

by Michael J. Lowrey

Elephant Song

Barry Longyear, Berkley Books, $2.50 (paperback)

Elephant Song is the story of how the members of O'Hara's Greater Shows ("the first of the interstellar circuses") and the crew of the starship *City of Baraboo*, stranded on an alien planet by an insane rival, form the society which is referred to as "Circus World." From the crash of the ship to the death of the last "bull" (elephant), Longyear chronicles the struggle of a highly specialized subculture to form a new, more complete society while remaining true to their precious traditions.

The narrative centers around four generations of "bullhands": Bullhook Willy and his daughter Little Will, who are with the *Baraboo* when it crashes, and Little Will's son Johnjay and his curiously begotten daughter Girl. At the same time, one of the great pleasures of the book (and its companion volumes *City of Baraboo* and *Circus World*) is the kaleidoscopically-varied picture of a people and a way of life. The book shows how these people and their lifestyles are affected by constantly changing audiences, acts and performers. Despite all, they stay very much the same, from barkers and clowns to roustabouts and fortune tellers. They remain clannish and tradition-oriented, yet feel a painful isolation from "normal" lifestyles dictated by the nature of their profession.

Longyear has spent years of research and study talking with circus folk, and has even spent some time in the real city of Baraboo, Wisconsin. He shows circus people as they are and how they would be, developing in ways which, admirable though they may be, leave them unsuited for the mundane existence in which they have no interest and no place. His is a loving but unsentimentalized vision of an endangered way of life which is still vital to its practitioners.

This is a moving work. From the opening scene where Bullhook Willy risks his life to save the bulls, to the scene where Johnjay fights a physical and psychic battle to claim his daughter, Longyear creates people with whom we identify

and care about. These admirable people perform the extraordinary (building homes, growing crops) with the same unbreakable spirit with which they handle the everyday (communicating with telepathic snakes, flinging themselves about in dangerous aerial acrobatics). They captivate the reader.

Whether or not you've ever looked wistfully at the lives of circus performers, you will understand how a new and beloved world is built on the pride expressed in their three-fourths cynical, one-fourth heartfelt motto: "Life with a circus is just one long uninterrupted dee-light!"

New America

Poul Anderson, Tor Books, $2.95 (paperback)

New America is a collection of short stories (with one essay) which has been done a disservice by being packaged as if it were a novel. Conventional wisdom in the publishing field has it that short story collections are well-nigh unsaleable (indeed, this is one of several such packages recently). *New America* consists of four stories about the same character and people; two other stories (including the award-winning "The Queen of Air and Darkness") are set in the era of Anderson's future history. The essay is a non-fictional discussion of interstellar travel.

The heart of the book lies in the first four stories. They tell of how a group of colonist/refugees adapt to a new planet, as shown primarily through the eyes of Daniel Coffin, a member of the first generation born on the planet Rustum. In spite of the misleading and inaccurate cover blurb, these stories are unconcerned with how the Constitutionalists came to arrive on Rustum (although he does try to show how a free-market society can provide for the common welfare, if resources are almost unlimited and leaders are all infinitely wise and altruistic). Each story deals with a "people problem" facing the colonists; each also reminds you that, whatever his idealogy, Poul Anderson truly knows something about the human heart.

The essay and the other two stories are also excellent. "Home," in particular, provides what might be considered an anthropological equivalent to Tom Godwin's "The Cold Equations." It depicts human suffering made necessary by laws of intercultural relations as grimly unbendable as those of physics.

Taken *in toto*, this is a very good collection which deserves repackaging in a more straightforward manner. ^

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by Christopher John

Brainstorm

Producer/Director ..... Douglas Trumbull
Screenplay ..... Robert Stitzel
& Philip Frank Messina
Music ..... James Horner
Photography ..... Richard Yoricich, A.S.C.

Michael Brace ..... Christopher Walken
Karen Brace ..... Natalie Wood
Lillian Reynolds ..... Louise Fletcher
Alex Terson ..... Cliff Robertson
Gordy Forbes ..... Jordon Christopher

There has not been much in the way of watchable science fiction this year. Maybe that is what makes *Brainstorm* seem so good. Probably not, though. There is little one can find in this splendid film to keep it from the title "Best SF Picture of the Year" in this year, or in most of the ones recently gone by, for that matter.

Brainstorm is a quiet picture; it has no villain except human fears. There are no gun fights, no high-powered chases or helicopter duels, yet the tension almost never lets up. In the tradition of Hitchcock's great spy thrillers, *Brainstorm* takes a small group of normal, everyday people, and introduces a secret into their midst, one which soon involves them with factors out of their depth. In Hitchcock's films, those factors might be murderers, enemy agents, or the police. In *Brainstorm* they are the strangling grip of a paranoid government and the face of God.

The film starts with the perfecting of a revolutionary invention: a recording machine which, when linked with brain wave sensors and fifth-generation computer technology, can read and record every physical, emotional and intellectual sensation as it is experienced or remembered by an individual. Those sensations are then available for playback, to be re-experienced in their totality by any other person.

Such a device would create total communication, an event which would thoroughly and permanently alter our understanding of the world in which we live. It would have enormous potential for good, just as, like so many of mankind's breakthroughs, it would have an equivalent capacity to harm us.

"Most of us," explained producer/director Douglas Trumbull, "experience life as a slow, evolutionary process, becoming so content with this pattern of reality that we seldom acknowledge that what we are aware of is no more than a small fragment of what we are experiencing.

"Yet every so often," he continued, "something happens which is revolutionary, a dramatic breakthrough or event which is beyond our control and completely changes our perceptions of ourselves and of the world around us. Such transitions are going to become more and more frequent in this technological age, and it seems to me that 'speculative fiction' such as *Brainstorm* helps us to recognize and prepare for these new experiences. They happen whether we like it or not — and all we can do is brace ourselves, work hard as hell to make them enhance rather than diminish our lives, and hope for the best."

Brainstorm is so realistic, it is so hard to spot the fiction in it. Most of the scientific equipment used in the film is already available; no one has come along to integrate it as the team in the film does. The film's "breakthrough" was inspired by advancements in several different fields: cybernetics (man-machine communication), artificial intelligence (computers capable of independent and creative thinking), superconductivity (for ultra-fast information processing), holography and advanced computer imaging (the use of lasers to store and recreate images of objects in three dimensions), and various new areas of medical investigation, including neuropsychology, neurochemistry and psychobiology.

This is what makes *Brainstorm* a good science-fiction film. What makes it a good film is something else. Most of the credit can be laid at Doug Trumbull's feet. Trumbull did not seize on a great idea and milk it; he looked at the possible device and then extrapolated his film from not only what *might* happen, but probably would happen, with respect to our government, the people who did the inventing, and so forth.

He also made the decision to shoot the film in both Panavision and Super Panavision, the first film ever made this way. Super Panavision is a 70mm widescreen film process that provides unequaled brilliance of color and image clarity. Used in the film for the visual effects sequences, the process made them appear amazingly vivid, more so than the "real" scenes. It was a clever trick — one that worked.

In fact, everything in the film works. A lot of speculation was stirred over Natalie Wood's death, which took place before filming had been completed; but it seems to have made little difference. Ms. Wood's last film can be ranked as one of her best. Louise Fletcher has finally netted a role worthy of her talents — her performance is flawless, as is Cliff Robertson's.

The point is made; *Brainstorm* is

In a psychotic dream produced by a "Brainstorm" tape, a young boy (Jason Lively) believes his scientist father (Christopher Walken) is trying to kill him, in MGM's movie *Brainstorm*.

excellent. For those who want special effects, this film has them. For those who want a decent plot, with a sensitive, dramatic love story, *Brainstorm* has them, along with good acting and excellent direction. And it has the first decent science-fiction story line in a long time.

For those looking for nothing more than the same old spaceships and monsters, well, this one probably isn't for you — but then again, you've got all the movies you need this year. *Brainstorm* is for the rest of us.

Testament

Producer	Jonathan Berstein/ Lynne Littman
Director	Lynne Littman
Music	James Horner
Photography	Steven Poster
Screenplay	John Sacret Young
Carol	Jane Alexander
Tom	William Devane
Brad	Ross Harris
Mary Liz	Roxana Zal
Scottie	Lukas Hass

Testament, Paramount Picture's latest release, is a film about the aftermath of nuclear war. It makes no political statement; it doesn't tell us who won the war, or even with whom the war was. We see no soldiers, no national guardsmen . . . only shattered families trying to pull themselves together after a devastating disaster.

Testament is what is known as a "woman's picture." It does not concern itself with hostility, retaliation, or revenge. As the director explains, "Men just couldn't think about it in the same terms that women would. A woman's reaction is 'this just cannot happen,' but men seem to get involved in how the defense plans would work, the logistics of nuclear war. On the other hand, women leap instinctively, shouting 'STOP!' It seems to be a primal connection — from the Greek tragedies on through history."

Testament is more than a balancing film between male and female viewpoints. It is a straightforward, well-researched, speculative documentary on the effects of nuclear war. It does not preach, nor is it top-heavy with facts. The film starts innocently, showing us the pecking order and structure of the Wetherly family. Dad is making a man out of his oldest son, daughter is struggling with the feelings within her, the youngest is getting lost in his fantasies and Mom tries to cope, stuck between them all. Then one afternoon, the sky suddenly lights up and the world comes to an end.

"A woman's reaction is 'this just cannot happen,' but men seem to get involved in the logistics of nuclear war."

Jane Alexander and Lukas Hass, as mother and son, face an uncertain future in Paramount Pictures' *Testament*.

Garbled civil defense instructions are given in the local church, people bicker over the half-facts they've heard over the years, there are reports of looting, and people leave town. The local ham operator tries to find out what happened. Adults and children start dying.

There are no animals seen in *Testament*, as if they have all deserted the world, fleeing the madness they sense coming in some elemental manner. There is nothing happy that is not strained; the daily order of survival becomes almost primitive. Graveyards and back yards become filled with the dead, and as the body piles grow deeper, they are finally burned by hollow-eyed, nameless people who simply empty the trucks of bodies and toss them onto open field fires.

The project appealed to Littman because of both its self-removal from the arena of world politics, and because of the emphasis it places on the relationships between the mother and her children in the central family. "Something happens to your relationship with the world when you have a child," explained the director. "Maybe it was because I did it so late in life, but I think all mothers experience this feeling. In relationship to this film, that feeling boils down to: We're not giving birth to see our children die, particularly in a nuclear attack that could even be accidental in origin."

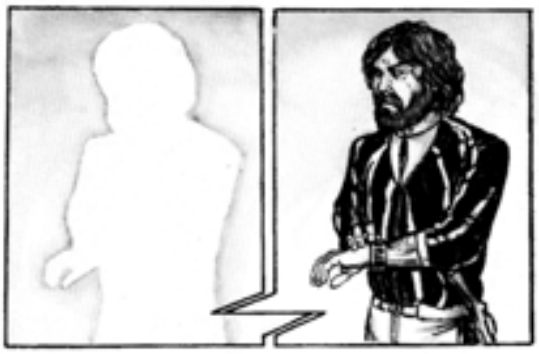
Whatever her reasons for making *Testament*, people who see it will be glad she did. Unlike most of the films being classified as science fiction these days, this one is a deadly serious look at what many feel is a very probable future. Unspectacular, with little in the way of special effects, *Testament* is a frighteningly effective look at what we may soon do to ourselves. By merely presenting the facts of nuclear aftermath as we now understand them it says all it has to about nuclear holocaust.

Littman says that to be enthused about a project, she has to feel it is an important film. But she also feels, "For the film to be worthy, it should somehow change the lives of the people in the audience as well."

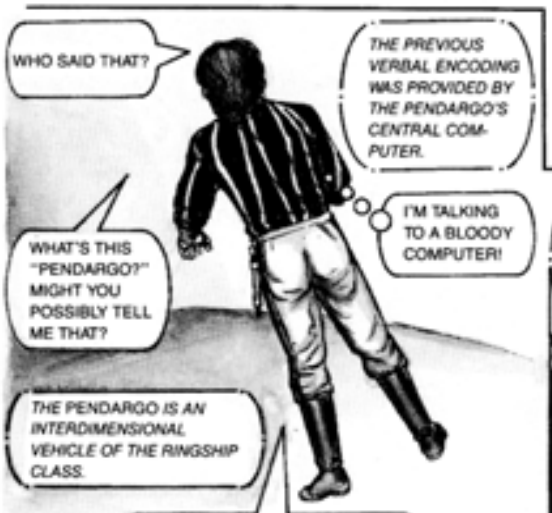
Testament may not change any lives, but it is bound to change the way some people think. Considering the subject matter, every little bit will help. ^

2

CAUGHT BETWEEN THE "PETTY" TRADE RIVALRIES OF SYSTEM ENGULFING MEGA-CORPORATIONS WHILE PRIVATEERING, DRAKE'S CORSAIR CAPTURES AND PLUNDERS AN "ENEMY" MERCHANT VESSEL. AMONG THE NEWLY TAKEN BOOTY, DRAKE UNEXPECTEDLY DISCOVERS THE POWER OF AN ANCIENT RELIC.

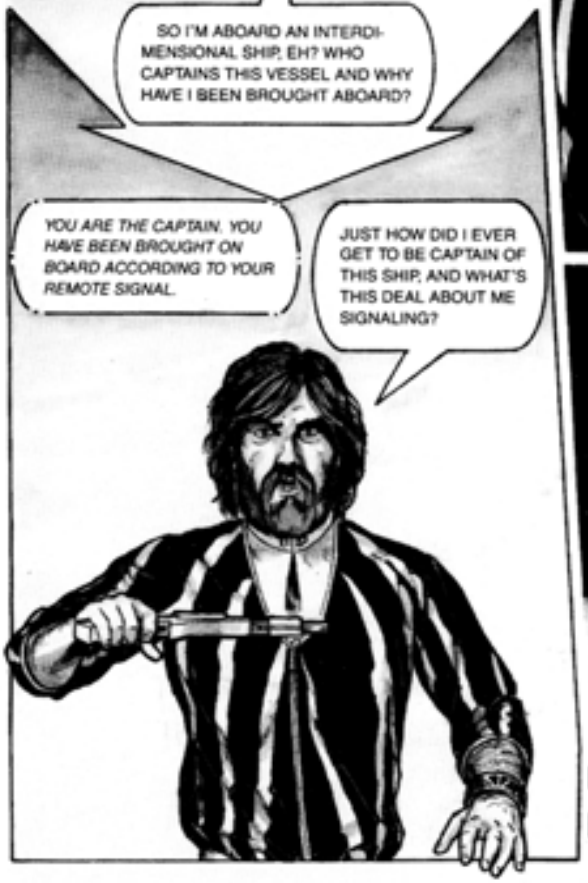


THE QUESTION IS INSTINCTIVE: DRAKE EXPECTS NO ANSWER. HOWEVER, AFTER SEVERAL MINUTES OF ELECTRONIC CONTEMPLATION, THE WORDS, THEIR MEANING AND THEIR MEMORY ARE CORRELATED AND AN ANSWER IS PROVIDED. *YOU ARE CURRENTLY ON BOARD THE RINGSHIP PENDARGO.*



EACH REPLY FROM THE COMPUTER PROMPTS DRAKE TO DELVE FURTHER INTO THE *PENDARGO'S* FUNCTION AND ABILITIES. HE ASKS ONE QUESTION AFTER ANOTHER, EAGER TO UNDERSTAND WHAT IT IS HE HAS STUMBLED UPON.

IN TIME, HE FINDS THAT THE RING MISSING FROM HIS FINGER IS THE VESSEL THAT CONTAINS HIM — A SHIP OF AN ULTRA-SOPHISTICATED NATURE, CAPABLE OF TRAVERSING DIFFERENT CONTINUUMS.

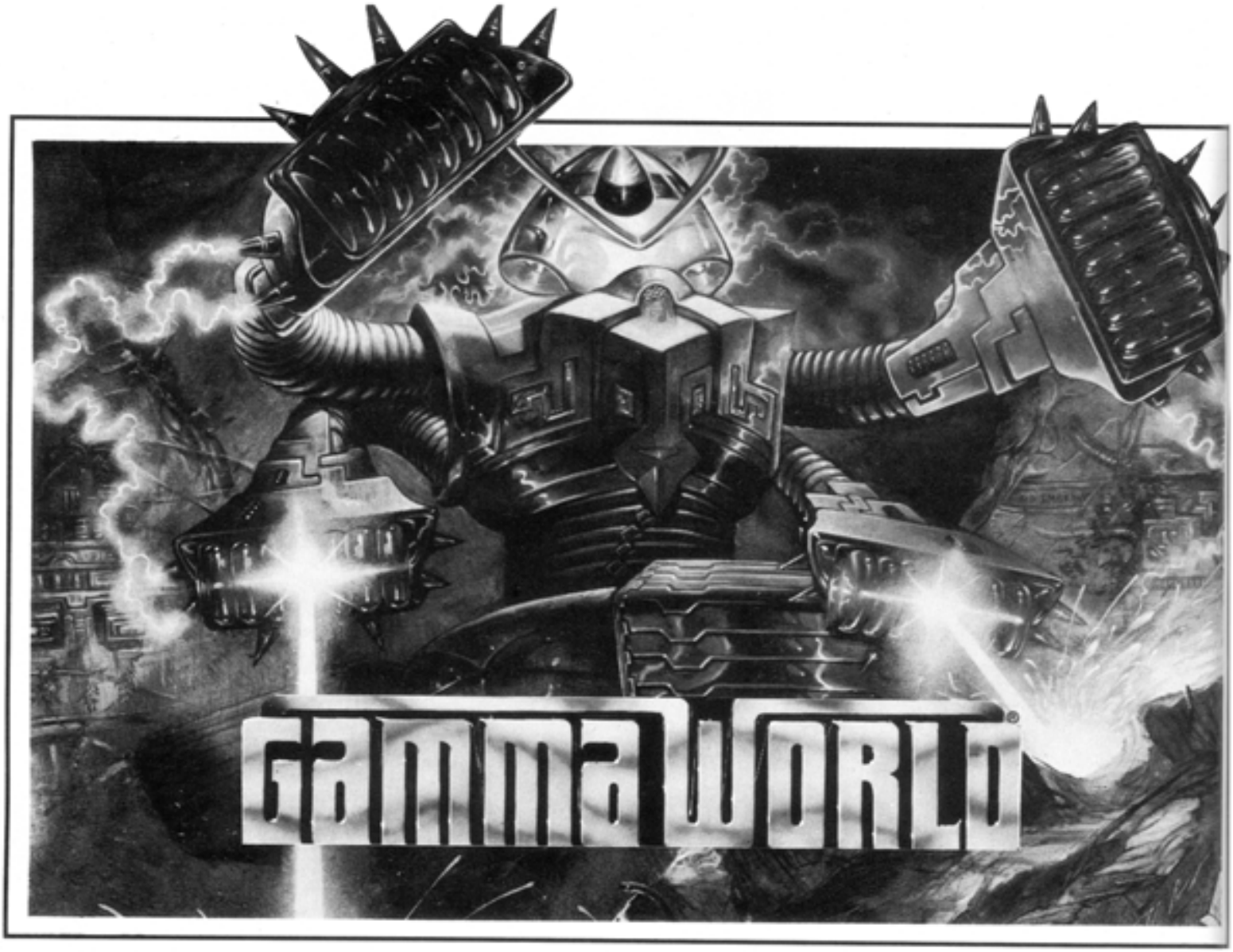


IT DOESN'T TAKE DRAKE LONG TO REALIZE THAT THE RINGSHIP IS HIS WAY OUT, A LIGHT AT THE END OF A LONG, DARK TUNNEL. HE NO LONGER HAS TO DANGLE ON THE STRINGS OF THE ERROX CORPORATION. THEY CAN FIGHT THEIR TRADE WARS WITHOUT HIM. DRAKE IS FREE. DRAKE IS . . .

3

RINGSHIPPER

by Roger Raupp



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BUG-EYED MONSTERS

They Want Our Women!

On silent grav sleds, the alien creatures slide through the forest, readying their lasers and stunners, drooling slightly in anticipation. They choose their first target: a little clapboard house nestled in the woods above town. They attack. The sounds of lasers and stunners are soon met by cries of fear and rage. Wild with lust, they fail to notice when one human makes it to a car and careens away to rouse the citizenry of the small town against the alien threat.

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THE DESIGNER

Greg Costikyan is the designer of nine published games, including THE CREATURE THAT ATE SHEBOYGAN,™ SWORDS AND SORCERY,™ DEATH MAZE,™ RETURN OF THE STAINLESS STEEL RAT,™ and TRAIL BLAZER.™

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