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INTRODUCTION

In preparation for the upcoming FFE release of the **Marc Miller's Traveller** Imperium Games releases on CD-ROM, Marc Miller asked if I would begin drafting a consolidated set of errata (much like other legacy **Traveller** errata projects). This document represents those efforts, after consolidating the various T4 errata documents available on the internet as a start. In addition, I've applied some formatting in places to make the document cleaner. If you've got additions, contact me at don.mckinney@gmail.com.

Imperium Games itself released a single page of errata, titled "T4 FAQ & Errata". After the first printing of the T4 Rulebook was released, there was actually a competition held on the Traveller Mailing List to collect errata by David Smart. His errata collection included the following information, which is copied here to remember the work of its contributors: "The following pages contain errata and suggested fixes compiled from postings to the Traveller Mailing List on the internet. Contributors were Joe Walsh, Glenn Crawford, Bruce Johnson, Bill Rutherford, David Blustein, Jerome Darmont, Kenneth Bearden, Michael Barry, Mark Urbin, Joseph Heck, Thomas Biskup, Guy Garnett, and David Smart." Some submissions have been dropped from this collection because they were commentaries rather than errata. Special thanks to Tom Rux and Matt Stevens for their assistance with this compilation.

This errata will eventually provide corrections and elaborations for the entire Imperium Games **Traveller** rules line. Currently included errata covers: **Marc Miller's Traveller** (1000), **Starships** (1100), **Central Supply Catalog** (1200), **First Survey** (1410), **Emperor's Arsenal** (1500), **Pocket Empires** (1600), **Psionic Institutes** (1710), **Fire, Fusion & Steel** (1720), **Emperor's Vehicles** (1730), and **Milieu 0 Campaign** (2002). As I find errata for *Aliens Archive* (1300), *Milieu 0* (1400), *Game Screen* (1510), *Anomalies* (1700), *Naval Architect's Manual* (1740), *Imperial Squadrons* (1750), *Missions of State* (1770), *Long Way Home* (3001), *Gateway!* (3002), and *Annililik Run* (3003), I will add them to this collection. Of the missing product numbers, *Aliens Volume 1* (2003) was never released, but does appear on FFE's T4 CDROM. The other three known Imperium Games products, *Nobles* (1760), *Marc Miller's Traveller* (2001, which was to have been a revised core rulebook), and *The Vilani Hypothesis* (3004), were never released.

UPDATES

The latest changes to this document are always marked in **blue** for easy identification.
This section details updates to this document.
- v0.01, 12/23/11: first consolidated T4 errata document.

EXPLANATIONS

The errata are broken down into four categories: corrections, omissions, clarifications, or additions.
Correction: Could be a typo, could conflict with another rule or publication, but the original item is wrong.
Omission: Perhaps it was an editing problem, but something was just left out of the published material. Corrected omissions generally turn into additions.
Clarification: This is an explanation of something that was difficult to understand, or has confused many players or referees.
Addition: Not in the original material, but it really helps if you use it with the existing material. Worse, the existing material may be dependent on something which was left out.

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MARC MILLER'S TRAVELLER (1000, 1996)

Pages 8-9, History of the Universe (correction): Some of the dates given for periods of history overlap deliberately, but others are very incorrect. The correct sequence should be:

Grandfather (300,000 BC)
The Vilani Era (4700 BC to 2300 AD)
The Terran Confederation (2100 to 2300 AD)
The Rule of Man (2300 to 2750 AD)
The Long Night (2750 AD to 4550 AD)
The Aslan Border Wars (3400 to 4900 AD)
The Third Imperium (4521 to 5637 AD)
The Vargr Campaigns (4731 to 4900 AD)
The Barracks Emperors (5100 to 5121 AD)
The Solomani Expansion (5122 AD to 5600 AD)
The Rebellion (5636 AD)

Page 16 and 26, Titles and Noble Ranks (clarification): Despite their appearance on the tables, Ranks G and H are not available for player characters. Characters who start with a Social Standing of 12, select the Noble career and gain 5 advances in Social Standing do not become Emperor.

Page 16, Acquiring Skills, second paragraph (correction and clairification): The first sentence appears to contradict the second. The paragraph should read:

The first time a skill is acquired, list it on the character sheet with a "1" beside the skill's name. A skill can be acquired more than once; list a "2" beside the skill the second time it is acquired, a "3", for the third, and so on. (Example: Computer-1, Vac Suit-2, Ground Vehicle-3, etc.)

Page 19, Preferential Enrollment (clarification): Preferential Enrollment does not apply to Commando School.

Pages 20 – 34, Pursuing a Career (clarification): Previous Traveller editions used the word *career* generically for any choice made, and the word *service* was reserved either for military careers or the "term of service". This section badly confuses the usage of these words, causing some confusion. In similar fashion, *commission* was used for military services, and *position* for other careers. Not using the word *position* in T4 has added additional confusion. Additionally, commissioned/position ranks are often listed as "01, 02, 03, etc" rather than the correct "O1, O2, O3, etc".

Page 20, Commando School, left column, Perseverance (correction): Since Commando School is only one year, washing out results in no aging and no Academic Skill, and the character spends the next four years as an Army or Marine officer.

Page 20, Flight School, left column, Perseverance (correction): Since Flight School is only one year, washing out results in no aging and no Academic Skill, and the character spends the next four years as a Navy officer.

Page 20, Medical School, right column, second paragraph (correction): This should read, "…adds +4 to his Education…"

Page 21, Preferential Enlistment (clarification): Preferential Enlistment does not apply to the Nobles or Psionicist careers.

Page 21, Draft (clarification): The draft allows access to the Agent, Army, Marines, Navy and Scout careers (from the page 26 errata below), rather than only military careers.

Page 21, Commissions/Position (clarification and addition): This paragraph should read as follows:

Commissions/Position: Each career has a commission/position number. In order to be given a commission/position, the character must roll the stated number or below. DMs may apply to the roll. If the commission/position is achieved, the character receives Rank O1 in the career. A character may attempt to acquire a commission/position once per term of service until successful, but a draftee may not attempt to acquire a commission in the first term of service. Commissions/positions are not available to Entertainers, Rogues, Scholars, or Scouts.

Page 21, Promotions (correction and clarification): Each career has a promotion number and DMs affecting that promotion throw. If a promotion is achieved, the character advances to the next higher rank in the career. A character is eligible for one promotion per term of service. A character may attempt to be promoted in the same term of service that a commission/position is received and in each subsequent term of service. Promotions are not available to Entertainers, Rogues, Scholars, or Scouts.

Page 22, Aging (clarification and addition): As written, success on the Aging roll means losing a point in an attribute. You could flip the target to change this: "Roll 2D versus a target equal to the tens digit of the character's age plus one. If the roll is equal to or greater than that target number, no attribute loss occurs." In this case, the target number for the checks in the example is 6+, and only fails for Dexterity, reducing that attribute from 9 to 8.

Page 24, Mustering Out Benefits, left column, first paragraph (correction): These rules are written for a rank structure of 1 through 6, and do not work for the new 1 through 10 ranks, and also do not differentiate between Non-Commissioned and Commissioned ranks for those careers which have them. Apply the following changes:

"Additionally, a character who has received Commissioned ranks 1 through 3 (Noble ranks B or C) in the service receives one extra roll. A character who has received Commissioned ranks 4 or 5 (Noble ranks D or E) receives two extra rolls. A character who has commissioned rank 6+ (Noble rank F) receives three extra rolls, and in addition may apply a DM of +1 to die rolls on the Benefits Table."

Page 24, Benefit Descriptions, Retirement Pay (clarification): The table referenced is the Retirement Pay Table, on page 26.

Page 24, Benefit Descriptions, Starships (clarification): For starships, there are four types of ships available, counting the yacht (for noble and entertainer) and lab ship (for scholar). Use the USP from page 101 or page 104.

Page 24, Benefit Descriptions (omission): Some possible mustering out benefits were left out of this section:

The "Forensics Kit" benefit for Agents includes a fingerprint kit and simple ballistics and chemical analyzers, etc; items that would allow Agent characters to perform basic forensic tasks.

The "Science Instrument" benefit for Scholars will vary, but should include an appropriate type of scanner and a basic kit which provided needed materials to conduct basic scientific experiments.

Page 25, Alexander Lascelles Jamison, Fourth Term (correction): The example mistakenly uses navy ranks rather than merchant ranks. Second term should have "2nd Officer" for rank, third term should have "1st Officer" for rank, fourth term should have "Captain" for rank, and fifth term "Senior Captain".

The example is also written for aging rules from a previous edition, not using the rules on page 22. At age 35, Jamison needs to roll against the four attributes with a target of 3–; given the rolls listed, he would lose a point of Strength, and also need to roll for his Intelligence.

Page 26, Draft Table (correction): The Draft Table is incorrect; substitute the following table in its place:

DRAFT TABLE

Roll	Service
1	Agent
2	Army
3	Army
4	Marines
5	Navy
6	Scouts

Entertainers, Merchants, Nobles, Rogues and Scholars are deliberately omitted from the Draft Table.

Page 27, Military Academy (correction): The Perseverance description should read "DM +2 if Int 9+".

Page 27, Commando School, Flunked Out (correction): This should read, "+0 to age. No roll on Academic Skills."

Page 27, Commando School, Academic Skills (clarification): A character successfully completing Commando school ages one year, rolls twice on the Commando Academic Skills Table, and then rolls for the next three years on either the Army or Marine Tables.

Page 28, Naval Academy (correction): The Flunked Out description should read, "Enlistment in Navy as enlistee", and the Graduation description should read "Automatic enlistment in Navy as Rank O1".

Page 28, Flight School, Admission (correction): This should read, "DM +1 if Dex 9+," not "Dex 9–".

Page 28, Flight School, Flunked Out (correction): This should read, "+0 to age. No roll on Academic Skills."

Page 28, Flight School, Academic Skills (clarification): A character successfully completing flight school ages one year, rolls twice on the Flight Academic Skills Table, and then rolls for the next three years on the Navy Tables as normal.

Page 28, Medical School, Benefit (omission): The additional benefit of +4 to Education was accidentally dropped.

Pages 29 – 34, Terminology (clarification): For the non-military careers of Merchants and Nobles, substitute Position roll for Commission roll. Entertainers, Rogues, Scholars and Scouts do not have either Commission or Position rolls.

Pages 29 – 34, Skill Clusters (clarification): Throughout this section, skill clusters are not shown in bold; such an adjustment does make the charts easier to use.

Pages 29 – 34, Skill Eligibility (clarification): The phrase "1 skill per term per Commission" means that the character receives one additional skill that term if they succeed in becoming commissioned. The phrase "1 skill per term per Promotion" means the character receives one additional skill that term if they succeed in gaining a Promotion.

Pages 29 – 34, Mustering Out Tables (clarification): The DMs for the tables are on page 24. Note the errata above for page 24 dealing with ranks.

Page 29, Army Table, Career Skills (correction): Roll 6 for Career should read "Artillery," rather than "Field Artillery."

Page 31, Merchant, Mustering Out Tables, Benefits Table (correction): Roll 6 for Benefits should read "High Passage" rather than "Low Passage."

Page 33, Noble (clarification): Career Rank corresponds to noble rank (determined from Social Standing) once Commission is achieved. Commission for a Noble gives a minimum rank of B (Knight/Lady).

Page 33, Noble, Social Skills (correction): The selection "6. +1 Soc" should instead be "6. Charisma". The sole method for increasing Social Standing for Nobles is through Commission and then Promotion.

Page 34, Scholar, Benefits Table (correction): This table is incorrect, and should be replaced as follows:

Roll	Benefits Table
1	Low Passage
2	Mid Passage
3	High Passage
4	+1 Soc
5	Weapon
6	Lab Ship
7	—

Page 37, Skills, Maximum Skill Levels (clarification): There is no maximum skill level, nor is there a maximum number of skills a character can have.

Pages 37 and 49, Level-0 Skill Use and Default Skills (clarification): Level 0 is not unskilled; level 0 designates a person with some level of instruction or experience, sufficient to avoid the penalties that an unskilled person would face.

Default skills are those skills in which all characters are considered to possess Level 0 skill. Drop mention of default skills being "skills listed in italics on the skill list," as that idea was removed from the final draft. Default skills are labeled "Default" in the Skill Descriptions on pages 39 through 47.

Page 38, Default Skills List (correction): This list should include:

Skill Name	Related Cha.
Administration	Soc or Edu
Law	Edu

Page 39, Academic, left column (correction): Academic is missing the "Cluster" identification on the right side of the column.

Page 40, Criminology, right column (correction): Criminology is missing the "Cluster" identification on the right side of the column.

Page 43, Forensics, second paragraph (correction): The paragraph should read, "Crude forensic instruments become available at TL 4; equipment from higher TLs is more reliable…"

Page 43, Ground Craft, first paragraph (correction): The last sentence (which starts with, "A malfunction…") should be removed.

Page 44, Instruction, third paragraph (correction): The paragraph should read, "A character use Instruction to convey to other characters other skills he knows. The referee…". Later in the paragraph, the discussion of success should be changed to read, "Success means that the student gains the skill at Level 0 (if it was not possessed previously or is not a Default skill), or gains one level in the skill (if already possessed or is a Default skill), to a maximum of one less than the level of skill possessed by the character with the Instruction skill." Note that the level of Instruction skill possessed does not affect the level of skill taught, it is a modifier to the success of the teaching.

Page 45, Long Blade, left column (correction): Long Blade should be noted as (Blade Combat Cascade, Default), not (Blade Combat Cascade, Cluster).

Page 45, Melee Combat, left column (correction): Melee Combat is missing the "(Default)" identifier.

Page 45, Navigation, left column (correction): Navigation should be noted as (Exploration Cluster, Default), not (Exploration Cluster).

Page 46, Psionicology, second paragraph, first sentence (correction): The details of mental powers of psionic individuals appears in Chapter 11, not Chapter 9.

Page 46, Psionicology, third paragraph, last sentence (omission): Note that there are no rules in Chapter 11 which allow the psionicology skill to be used to resist psionic attacks.

Page 46, Stealth (correction): The last sentence should be modified to read, "Unfortunately, stealth alone will not work…". To get past electronic systems or robots, characters may be required to use other skills or checks to identify dangers, and then stealth.

Page 50, Universal Task Format (addition): A format for tasks was presented in later books and is provided here:

Task phrase. (Duration)
Task statement, (Characteristic + Skill) ± Modifiers < Difficulty (nD).
Special condition (qualifier for special condition)
    Explanatory text

The task phrase gives a brief summary of the task, with a suggested Duration for each attempt.

The target number for the task is the sum of the characteristic, skill and any modifiers given. The characteristic may not always be the default one given in the rulebook. "± Modifiers" indicates that a number of modifiers are given in the explanatory text.

The difficulty will be one of the standard text names from the **Traveller** rule book, followed by the number of dice to roll. Where more than one skill may be used, each is listed on a separate line and may have a different difficulty level for the task.

An example task might be as follows:

To detect a gas giant at one parsec distance (12 hours).
(Intelligence + Survey) < Difficult (2.5D)
(Intelligence + Sensors) < Formidable (3D)
(Education + Astrogation) < Staggering (4D)
Uncertain (1D)

An attempt that uses Survey is a Difficult task; Sensors makes it Formidable, while Astrogation is Staggering. The task takes about 12 hours and there is some chance of uncertainty in the result.

Most failed tasks can be attempted again unless the explanatory text (or common sense) indicates otherwise. The text usually gives a detailed description of the task and the effects of success or failure.

Page 50, Task Difficulties (correction and clarification): Errata for the task system was published in later books which changed the die rolls for Staggering and Impossible tasks to 4D and 5D respectively.

Page 50, Harder Than It Looks Tasks (addition): If the number of whole dice being rolled is greater than the character's skill level (plus Jack-of-All-Trades level), increase the difficulty of the task by two levels.

Page 56, Ranged Attacks, Determining Range, left column, fourth paragraph (correction): The listed example should read as follows:

For instance, a body pistol has an effective range of 1 (Contact), so it can be used for aimed fire with a difficulty modifier of +1. An assault rifle, on the other hand, has an effective range of 3 (Medium), so it gives a difficulty modifier of +3 when used for aimed fire.

Note that while this example mentions an assault rifle, assault rifles are not on the weapons list on page 80.

Page 56, Autofire, second paragraph (omission): This paragraphs mentions that one of the benefits of autofire is that a character has a chance of hitting a target more than once in a single action; however, no rule in this section explains or defines this benefit.

Page 56, Autofire, fifth paragraph (clarification): While this paragraph notes that "Five rounds of ammo are used up per figure attacked…" on page 75, the ACR fires a three-round burst, and the submachinegun fires a four-round burst. For all weapons with an auto mode, five rounds are standard, unless otherwise stated. Where specifically stated, use the burst for that specific weapon.

Page 57, Resolving Wounds, right column, first paragraph (clarification): Cutlass and mesh armor are not mentioned in the Equipment chapter. Other than that, the example is correct in demonstrating the basics of weapon vs. armor.

Page 57, Resolving Wounds, The Effect of Wounds, fourth paragraph (correction): The fourth sentence should read, "Once a characteristic…".

Page 57, Resolving Wounds, The Effect of Wounds, fifth paragraph (correction): The first sentence should read, "Unconscious characters… recover consciousness after ten minutes (100 combat rounds)".

Page 58, Serious Wounds (correction): The definition of serious wounds was left out. The first sentence should read, "If two characteristics are reduced to zero, the character is seriously wounded."

Page 59, Combat Loads (omission): Resulting penalties for carrying over the weights given are not described, particularly in combat situations.

Page 61, Combat Range Table (clarification): The correct range name for range number 5 is "V. Long."

Page 65, Personal Electronics, Comm (omission): Despite the mention of Comm Boosters here, they do not appear in the Exploratory Gear section.

Page 67, Exploration Gear, Backpack (clarification): The description should read, "…items in it are not readily accessible (requiring at least one full round to get at them)."

Page 69, Exploration Gear, Suit, Vacuum (omission): The Vac suit description notes that the suit has a "regional range radio"; "regional" is defined in the *Game Screen* Master Range Table as a range of 500km.

Page 70, Medical Gear, Slow Drug, fifth paragraph (correction): The first sentence should read, "An antidote is available for slow drug."

Page 73, Medical Gear, Medkit (clarification): The description of the medkit mentions (second paragraph) "stimulants, sedatives, antibiotics, metabolic enhancers, and (as a last resort) metabolic reducers…" This does not include the other drugs and antidotes described in the Medical Gear section, but is a general reference to medications used for first aid purposes.

Page 73, Combat Gear, first paragraph (correction): The third sentence should read, "On the other hand, both are expensive, and the latter is really needed to carry the former at any rate of speed."

Page 74, Combat Gear, Pistol, Laser (clarification): The mass of a TL 12 laser pistol is 5 kg, of which 3 kg represents the power pack, and 2 kg represents the pistol itself.

Page 74, Combat Gear, Pistol, Magnum Revolver (correction): The Magnum Revolver should be TL 10 because it is an advanced model, but the damage rating should be 3.

Page 74, Combat Gear, Pistol, cP003 (correction): The correct name is cP003; change references to "Pc-03" to cP003. The pistol is a TL 11 item with a cost of Cr750.

Page 74-75, Combat Gear, Rifle, Bullpup (correction): This weapon is described as both an autofire weapon on page 74 and a single-shot weapon on page 75. It should be considered a TL 9 semi-automatic rifle, not an autofire weapon.

Page 75, Combat Gear, Rifle, cR898/cR898 Advanced Combat (correction): This weapon should be correctly labeled the "cR776/cR898 Advanced Combat" rifle.

Page 76, Armors, Reflec (omission): No cost is given for Reflec armor.

Page 76, Armors, Helmet (omission): No cost is given for Helmet.

Page 76, Armors, Diplo Armor (omission): The cost of Diplo armor is Cr500 (from *Central Supply Catalog*).

Page 78, Equipment Table, Exploration Gear (correction): Several items are incorrect on the table:
Rebreather replacement cartridges have a negligible mass and cost Cr20.
Sursats mass 50 kg for storage purposes.
Survey Shields mass 1 ton for storage purposes.

Page 78, Equipment Table, Medical Gear (omission): All prices for Fast Drug, Medical Drug, Slow Drug, Medical Slow Drug and Truth Drug were dropped from the table.

Page 80, Weapon Table, Body Pistol (correction): Shots for the Body Pistol should be 5, not 1.

Page 80, Weapon Table (clarification): The details behind this table are not well explained. For example, does the Mass column represent loaded or unloaded weapons? Either way, the numbers for the Laser Pistol are difficult to explain, but the numbers for the Laser Rifle seem reasonable.

Page 80, Weapon Table (omission): The example on page 56 uses an assault rifle, but assault rifles are not on the weapon list on page 80.

Page 80, Armor Table (omission): The table for Armors was dropped.

Page 84, Surface Vehicles, Grav Vehicles (omission): The descriptions for the Rolen *Politesse*, Iliant *Lion S* and Mylin *Ranger* Grav Cars all mention communications with ranges, which is not how Comm devices are identified in this edition.

Page 84, Air Raft (correction): The cost of an Air Raft should be Cr 60,000, not Cr600,000.

Pages 89 through 113, Chapter 8, Spacecraft (correction and clarification): For a variety of reasons, the system published with **Marc Miller's Traveller** is inadequate. A revised version of the QSDS system (qsds15e.pdf) was developed and maintained by Guy Garnett, along with a related document of hull designs (bighulls.pdf) for use by ship designers. All spacecraft designs appearing in the original release are questionable and should be redesigned with the most updated version of QSDS, version 1.5e. That document should be considered a complete replacement for much of the Spacecraft chapter (excepting Starship Economics).

Page 113, Crew Salaries (omission): There is no entry for Stewards in the table.

Page 115, Astrogation Skill and Interplanetary/Interstellar Travel (omission): Despite the definition of the Astrogation skill (page 39), there seems to be no actual use of the skill in the Space Travel rules.

Page 115, Stowaways (correction and clarification): Reactions of 6− will result in spacing—why would the Captain space someone he likes.

Page 117, Space Combat, Step 5: Sensor Action (clarification): QSDS does not use masked or stealthed hulls. The SSDS system (used in *Starships*) does make use of this feature.

Page 120, Sandcasters Table (correction): The ranges given on this table are incorrect. They should read, "Very Short, Short, Medium, Long."

Page 120, Sensor Locks and Detection (clarification): In general, sensors with a rating of 0 aren't useful in combat, although they serve well in rendezvous and docking, and to detect ships even if they don't give a firing solution. However, since the sensors exist, even if they're not very powerful, there's a small chance. If it's ever important, treat sensors with a rating of 0 just like those with a 1, except they may only be used against targets at Very Short range.

Note, however, that jammers with a rating of 0 do not exist. A 0 jamming rating means "no jammer"; a 0 sensor rating means "not enough range to be useful".

Page 123, Psionic Strength, Psionic Strength Ratings (clarification): Ratings of 13+ cannot be achieved by any character, before or after age 18, except, perhaps, for a very lucky Psionicist during character generation.

Page 124, Telepathy, Abilities (clarification): Shield should be the first ability under Telepathy, because other abilities (such as *life detection* and *assault*) are affected by Shield.

Page 124, Telepathy, Assault ability (clarification): A victim of the assault ability need not be wary. The first sentence should read, "With this power, a telepath may inflict pain upon a victim."

Page 125, Awareness, Regeneration (correction): The intended range (not rage) of this ability is self.

Page 126, Psi Drugs, Special (correction): The description should read, "The rarest of psi drugs, …"

Page 128, Psionicist (clarification): Despite the Enlisted ranks appearing in the Table of Ranks, the ranks should be treated as O1-O10, and all Psionicists are automatically commissioned.

Page 130, World Creation, Technological Level (omission): The Technological Level Tables were omitted from the book.

Page 132, Atmosphere (correction): The D, E and F atmospheres were left out in this section. The explanations are:

Dense, high atmospheres cannot support life at sea level or below because the pressure is too great, but the atmosphere is breathable at higher altitudes.

Thin, low atmospheres are unbreathable at most altitudes except the very lowest ones, as in depressions or deep valleys, because the thin atmosphere settles to the lowest levels of the terrain.

Ellipsoid atmospheres are an indication that the world surface is ellipsoidal, but the atmosphere remains spherical. As a result, surface atmospheric pressure ranges from very high at the middle to very low at the ends. Breathable bands may exist at some point within the range of pressure.

Page 132 and 135, Trade Classifications (correction): The trade classifications for Fluid Oceans and Low Population were left out in this section (but are included on the Trade Classification Table on page 170).

Fluid Ocean worlds have an atmosphere of A or higher and a hydrographic percentage of 1 or higher. These worlds have oceans of a liquid other than water, e.g., ammonia or methane. Atmosphere A+, Hydrographic 1+.

High population worlds have a population of 9 or greater (rather than A or greater, from page 132).

Low Population worlds have a population of 3 or less. Population 3−.

Page 133, Systems Content Table, Naval Base (correction): The note should read, "Do not roll if starport C, D, E or X."

Page 133, Atmosphere Table (correction): The missing atmosphere entries are:

Digit	Description
7	Standard, Tainted.
D	Dense, high.
E	Thin, low.
F	Ellipsoidal.

Page 135, Government Table (correction): The descriptions for governments E and F were dropped from the table.

E   Religious Autocracy. Government by a single religious leader having absolute power over the citizenry.

F   Totalitarian Oligarchy. Government by an all-powerful minority which maintains absolute control through widespread coercion and oppression.

Page 135, World Generation Checklist (correction): The formula given for Hydrographics is incorrect; the correct formula as given on page 130 is 2D−7+Atmosphere, not 2D−7+Size. Step 7 should read, "Note trade classifications (page 170) based on Universal World Profile." While pages 132 or 135 were intended, the table on page 170 is correct and includes all the classifications.

Page 137, Encounters (clarification): Due to font issues, the three main sections of this chapter are not clear. They are: Routine Encounters, then Animals, then Aliens.

Page 138, Patron (clarification): The Patron section should have been labeled "Patron Encounters."

Page 138, Adventure (clarification): The Adventure section should have been labeled "Adventure Encounters."

Page 138, Referee's Responsibility, Checklist (omission): The encounter checklist was dropped from the book.

Page 141, Creating Encounter Tables, Hits (clarification): In the example, "an animal listed on the Animal Size and Weaponry Table as taking 2D hits…" should read "2D/2D hits" instead.

In the second paragraph, the guideline for weapon damage maximum was not intended to apply to humans or aliens.

A further problem exists with the damage maximum, as a 400 kg animal can be knocked out with a big game rifle (6D damage against wounds of 6D/3D), but a 12 kg animal would not be (1D maximum wounds against wounds of 2D/2D).

Page 141, Creating Encounter Tables, Wounds (clarification): The simplification for pre-rolling animal damage does not work when interacting with humans wearing armor. The correct procedure would be for the referee to roll the proper number of dice when the animal hits.

Page 141, Creating Encounter Tables, Weaponry (omission): The determination of how target numbers for animal attacks are calculated was dropped from this section.

Page 142, Creating Encounter Tables, Animal Characteristics (correction): In the explanations of A7 and F7, the roll should be 7+, not 7−.

Page 142, Animal Definitions, Herbivores, Filters (correction): Filters should inflict automatic wounds of 1D per 50 kg or less of animal mass.

Page 143, Events, Animals, Rutting Season (correction): The description should read as follows:

Rutting Season: A large, normally harmless herbivore mistakes the party's ATV for a rival and charges. The driver must make an Average Ground Craft roll each combat round to avoid a collision. If a collision occurs, the driver must make a second Average Ground Craft roll or the ATV will be damaged and rendered immobile until repaired.

Page 145, Animal Characteristics, Formatting (correction): The description of "*if possible*" should read, "an animal will attack if it possibly can."

Page 145, Aliens, last sentence (correction): The last sentence of this section should read, "**Traveller**'s aliens serve to gently remind that the tempo of the rest of the galaxy beats with the synchronous rhythm of inhuman hearts"

Page 145 to 147, Aliens in the Imperium, Major Races (omission): The description of the Vilani was dropped.

Page 146-147, Vargr (correction): The word "resemblance" was not hyphenated when split between pages.

Page 147, Zhodani, third paragraph (correction): The period closing this paragraph was dropped.

Page 147, Minor Races (clarification): The description of minor races is incorrect. Minor races can achieve star flight independently, using sublight methods. Minor races are those which never independently develop Jump Drive.

Page 148, Rye-Ben (clarification): The racial description incorrectly gives their height in feet. Rye-ben stand between 1.2 and 1.4 meters tall. Note that by the numbers given, Rye-Ben are eight times as dense as normal humans, which would make them as dense as rock.

Page 149, Patron Encounter tables (clarification): To match the descriptions on page 138, the Random Encounter Matrix should be labeled "Patron Encounter Matrix", "Patron Encounter Matrix One" should be labeled "Patron List One" and "Patron Encounter Matrix Two" should be labeled "Patron List Two". Note that the Patron Lists would have been more useable had they each been presented in a single column (like the Random Encounter List on page 150).

The "Patron Encounter Matrix DMs" apply to the die rolls for selecting the encounter, based on which list is used.

Page 152, Animal Characteristics table, Carnivore, To Attack (correction): The notation of "surprised" for Pouncers, Trappers and Siren should be "surprise".

Page 159, Character Experience, Skill Improvement, first paragraph (correction): To make the chances consistent with skills with lower ratings, this first paragraph should read:

Skills of rating 7 or higher improve only if the 1D roll is a six, and a second roll is made and added to *five*, for a total equal to or greater than the current skill rating.

Page 159, Character Experience, Skill Improvement, sixth paragraph, last sentence (correction): This sentence should read, "The player would have one of his original three experience points remaining to test another skill."

Page 165, Trade and Commerce, Cargo Identification (correction): In the first example, the cargo identification should read, "D-8 Lo Ni Po Ba."

Page 165, Trade and Commerce, Determining Cargo Identification, second paragraph (correction): This paragraph should read, "For example, a Cr7,000 cargo from Pennell…"

Page 165, Trade Classifications, Non-Agricultural (correction): The word "unable.to" should be "unable to".

Page 166, Computing Costs of Goods, Starport Effects (correction): The spacing has jumbled the cost modifiers. The modifiers should properly read as follows:'

If starport type A, −Cr1,000.
If starport type C, +Cr1,000.
If starport type D, +Cr2,000.
If starport type E, +Cr3,000.
If starport type X, +Cr5,000.

Page 166, Computing Selling Price, Bribery (correction): The second sentence should read, "Each two levels of Bribery add DM +1 and costs a kickback of 7% of the final price."

Page 167, Types of Interstellar Trade Goods (clarification): Other than the specific details and effects mentioned for Performances, there are no specific game effects for carrying the various cargos under these rules.

Page 169, Noting Cargo Identity, Example (correction): The cargo from Rethe should correctly be identified as "E-8 De Hi Na Po Cr6,800."

Page 170, Brokers (clarification): While formatted badly, the table does correctly indicate availability of Brokers by quality and starport. What is not mentioned is the cost of a Broker; a broker receives 5 percent of the final market price for each level of skill possessed.

Page 171, Market Price Table (correction): There are some problems with this table; the correct table appears below.

MARKET PRICE TABLE

Source Code	—	Ag	As	Ba	De	Fl	Hi	Ic	In	Lo	Na	Ni	Po	Ri	Va	Wa
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Ag	—	+1	+1	—	+1	—	+1	—	+1	+1	+1	—	—	+1	—	—
As	—	—	+1	—	—	—	—	—	+1	—	+1	—	—	+1	+1	—
Ba	—	+1	—	—	—	—	—	—	+1	—	—	—	—	—	—	—
De	—	—	—	—	+1	—	—	—	—	—	+1	—	—	—	—	—
Fl	—	—	—	—	—	+1	—	—	+1	—	—	—	—	—	—	—
Hi	—	—	—	—	—	—	+1	—	—	+1	—	—	—	+1	—	—
Ic	—	—	—	—	—	—	—	—	+1	—	—	—	—	—	—	—
In	—	+1	+1	—	+1	+1	+1	—	+1	—	—	+1	+1	+1	+1	+1
Lo	—	—	—	—	—	—	—	—	+1	—	—	—	—	+1	—	—
Na	—	—	+1	—	+1	—	—	—	—	—	—	—	—	—	+1	—
Ni	—	—	—	—	—	—	—	—	+1	—	—	−1	—	—	—	—
Po	—	—	—	—	—	—	—	—	—	—	—	—	−1	—	—	—
Ri	—	+1	—	—	+1	—	+1	—	+1	—	+1	—	—	+1	—	—
Va	—	—	+1	—	—	—	—	—	+1	—	—	—	—	—	+1	—
Wa	—	—	—	—	—	—	—	—	+1	—	—	—	—	+1	—	+1

Page 172, Exit Visa, Standards and Assumptions, Current Date: 001 (correction): The current date for this adventure is 300-1105, as described.

Page 172, Exit Visa, Ship's Locker (clarification): The contents as listed do not match the equipment in Chapter 6. The referee will need to make adjustments for play.

Page 172, Exit Visa, Free-Trader Beowulf (clarification): The Free-Trader design on page 102 is intended to match this ship. Referees may need to make adjustments for the starship rules (QSDS or SSDS) they are using.

Page 174, Exit Visa, The First Encounter, Meeting Officials (correction): The first sentence should read, "Once per day, the group will randomly encounter an official who has the potential to assist them, whether the group splits up or remains together."

Page 177, Exit Visa, The Officials, 29. Supervisor in the Passport Office (correction): The supervisor can be bribed for Cr150.

Page 179, Rubicon Cross, The Setup, right column, last paragraph (correction): The first sentence should read, "There are no specific locations for this scenario."

Page 182, Core Subsector (correction): Trannis (0606) and Lishilli (0607) should be noted as Low Population worlds. This information on Core was replaced with the release of Core Sector in *Milieu 0*.

Page 189, Index, Spacecraft (correction): The subtopic labeled "subsideies" should read, "subsidies."

STARSHIPS (1100, 1996)

The *Starships* book included a different design system for starships, SSDS. This system, developed by David Golden, has a revised version available (ssds.pdf). All spacecraft designs appearing in Starships should be reevaluated based on the revised version of SSDS. That document should be considered a complete replacement for Chapter 3 of this book.

CENTRAL SUPPLY CATALOG (1200, 1996)

Overall (clarification): The equipment in this book, and the vehicle design system appearing therein, are not compatible with *Fire, Fusion & Steel* second edition.

Page 37, Personal Mobility table (correction): In the Personal Mobility section, the mass and cost for the following items is missing:

Climbing Shoes-9	0.5kg	Cr100
Hiking Boots-9	0.9kg	Cr200
Parachute-10	10kg	Cr300
Parawing-10	8kg	Cr700
Rocket Pack-7	40kg	KCr15
Skis-3	8kg	Cr250
Skis-9	4kg	Cr400

Page 38, Commercial Goods table (omission): In the Commercial Goods section, the entire table of item, mass, price, and relevant skills is missing. So, those items which do not have this information contained in their descriptions are lacking. The following offer no mass or price information:

Calculator-8	0.1kg	Cr20	
Disquise Kit-9	3kg	Cr800	
Flashtray-10	0.5kg	Cr100	
Personal HUD	1kg	Cr4000	
Reference Comp-11	1kg	Cr4000	
Structurecomp	as for vehicle armor		
Bugs-12	0.1kg	Cr2000	(one bug dispenser, 2 relays/recorder/burst transmitter, 1 multichannel receiver)
Stress Detector-11	0.2kg	Cr600	(smaller, more expensive versions are available, as are larger ones with better capabilities, as for most equipment).

FIRST SURVEY (1410, 1996)

It is unclear how the data appearing in this book was generated. It does not match previous canon details, or the history given in the *Milieu 0* book. The attached First Survey Data document was released to correct these issues; however the Gushemege data may not fit with *The Long Way Home.* Referees may wish to use CORE, Sunbane or DGP datasets and roll canon back to produce comparable data.

EMPEROR'S ARSENAL (1500, 1997)

The items in this book were not designed using FF&S2, but using the T4 conversion of *Guns, Guns Guns*, 3rd ed written by Greg Porter and published by BTRC. Further, references in the book to high tech items produced by the Vilani or First Imperium, or the Rule of Man or Second Imperium, are incorrect. Canonically, the highest technology achieved by the Vilani should be TL 11, and the highest TL produced by the Rule of Man should be TL 12.

POCKET EMPIRES (1600, 1997)

Page 6, left column, second paragraph (correction): Marien should be Morien, to match usage elsewhere in the story, and the family tree diagram on page 14.

Page 12, Examples, World Details (omission): The details for the worlds of the Empire of Seven Stars, and the Cararialta family worlds, were left out. While they do use the Core sector data presented in other books, they are included here as well:

EMPIRE OF THE SEVEN STARS

Loc	Name	UWP	Remarks	PBG	Stellar Data
2635	Arvlaa Gam	E889377-3	LoPop	704	M3 V
2636	Vled	C998200-8	LoPop	914	K7 V
2736	Gaaen Luum	C324366-9	LoPop	513	K2 V

2836	Khuir	B478ABB-9	Ind HiPop	204	M3 V
2837	Igla	B414555-D	Ni Ic	904	M2 V M9 D
2934	Dishe	A778000-A	Ba	015	K9 V
2935	Amuur Keiir	C472100-7	LoPop	113	A1 V
2936	Saregon	A584522-C	Ag Ni	314	M3 V M6 D
2937	Uurigger	C4347BB-8		403	M1 III M9 V
2938	Shakiiga	C867844-9	Ri	310	K4 V
3034	Iishaanka	B554877-A	HiPop	603	K3 V M3 D
3037	Lashupii	E665100-4	LoPop	722	M3 V
3137	Iimdii	C493000-7	Ba	003	M1 V

CARARIALTA EMPIRE

Loc	Name	UWP	Remarks	PBG	Stellar Data
0537	Lia	E654755-6	Ag	502	F4 V
0635	Anemzaa	B642422-7	Po LoPop	702	M7 V
0637	Vlimas	C796000-5	Ba	003	M4 III
0734	Laari	C797355-4	LoPop	100	M3 V M3 D
0735	Aapas Mi	E584366-2	LoPop	304	M1 V
0737	Shash	C898522-6	Ag Ni	923	G1 V M3 D
0835	Laaze	D348000-4	Ba	003	M6 V
0933	Kis	B88A300-9	Wa LoPop	311	K2 IV
1034	Gur	D533688-4	Na Ni Po	600	M4 V M9 D
1035	Madalagaa	B581233-8	LoPop	103	G2 V M1 V

Page 14, Cararialta Family Tree (correction): The diagram on page 14 does not match the text. The diagram has the parents in the bottom left, with children above and even sideways, and not in descending order of age.

In some Cararialta examples, Anfinwen is refered to as "he". This should be "she".

Page 18, Partner Table (omission): The Partner Table was dropped.

PARTNER TABLE

1D	Social Rank	Homeworld
1	Soc +1	Same World
2	Soc +0	Same World
3	Soc +0	Neighbor World
4	Soc −1	Neighbor World
5	Soc −2	Another Pocket Empire
6	Soc −1D	The Imperium

Page 18, right column, second paragraph, example (clarification): Ignore the text where it says Ysta is the daughter of Merilla and Saranth. Merilla and Saranth are brother and sister so shouldn't be having any kids. In fact, Saranth is married to Ianya and so these are Ysta's parents.

Page 27, Determining the Stake, third paragraph (clarification): The text makes it unclear, but the total number of unit Size points can be allocated as a point of Attack, OR Defense, OR Transport, OR Jump.

Page 29, Self Determination, NPC Worlds (correction): Using a random 2D-2 for NPC worlds creates many worlds in disarray. A more reliable method is to use the formula:

Self Determination = (Unity Characteristic + Government Pluralism value + Law Level) ÷ 3

Page 32 and 104, Alien Race Table (omission): The Alien Race Table was dropped.

ALIEN RACE TABLE

Roll	Race Type
2-9	Minor human race.
10-11	Minor alien race.
12+	Major alien race.

Pages 35-36, Generating the Economic Extension, Resources (clarification): As a world improves its Trade Classification and Tech Level, the world's Resources should be adjusted accordingly. For example, once a world is populated, it loses the Ba classification, and should gain 1D-1 Resources.

Page 36, Generating the Economic Extension, Culture, right column, first paragraph (correction): A Barren world (Barren worlds have no population) with Infrastructure or Culture, represents the remnants of a previous civilization (perhaps roads, usable buildings, monuments, art, etc). As a Barren world always has 0 population, delete the line "however, if the world truly has no population, Culture is always 0, of course".

Pages 37-38, Planetary Demand (correction and clarification): The rules in this entire section, along with the sidebars (but keep the note on Rounding), should be replaced as follows:

Planetary Demand

To establish Planetary Demand, first establish the world's Base Demand. On a low population world of Pop 0-3, this will equal the population code. The population is likely a resource exploitation unit; for example, a mining or farming community. On worlds with Pop 4+, the Base Demand will equal the world's Resources level. On worlds where Infrastructure is greater than Resources, Base Demand will equal the world's Infrastructure level.

To establish Total Demand, cross reference Base Demand with a 2D roll on the Total Demand table (page 105), using the DMs listed on the table for Population and Culture.

Planetary Demand = Total Demand.

Pages 38 and 40, Resources Trade (correction and clarification): The rules in this entire section (similar to the Planetary Demand section) should be replaced. Additionally, Infrastructure Maintenance costs have been moved here as the circumstances are usually mitigated by Resource Trade. Replace as follows:

Resource Trade

Resource Trade assists with raising the GWP of any planet where there is a surplus or deficit of resources. In both cases, the world GWP will increase due to the extra economic activity over and above the world's total demand.

To establish the level of resource trade, first check for high levels of Infrastructure reducing available Resources. Then establish the volume of Imports and Exports.

If Infrastructure Exceeds Resources

When both the world's Infrastructure and Total Demand exceed the world's Resource level, Infrastructure maintenance costs impact strongly on Resources Available.

The amount of Resources needed to support the excess Infrastructure in this circumstance depends on Total Demand.

Reduction in Resources = Total Demand − Resources

Resources available = Resources − Reduction in Resources (Resources available cannot be less than 0)

Volume of Imports and Exports

The level of Resource Trade is established by:

Imports/Exports = Resources available − Total Demand

Where a positive result denotes Exports and a negative result shows Imports. If negative, drop the minus sign. For example, Resources 6 − Total Demand 8 = −2, or Imports of 2 Resources.

We now know the level of Total Demand and the level of Imports or Exports present, both of which are used in establishing the world's Base GWP.

Consequences to Infrastructure from Low Imports

Where high Infrastructure has increased the need for more Imports, and those Import needs are not met, then reduce Infrastructure to reflect the consequent reduction in Infrastructure maintenance.

Infrastructure loss = Unfulfilled Import RUs × 0.1

Pages 40 and 42, Base Gross World Product (correction and clarification): This entire section has been replaced as the Benefit table is intended to reflect the impact on GWP, not the volume of Imports or Exports in Resource Trade. Replace as follows:

Base Gross World Product

The Base Gross World Product (GWP) is a measure of the wealth-generating economic activity occurring on a world. For the purposes of these rules, assume the factors consist only of Resources (raw materials) and the required Labor, Technology and Infrastructure to gather those Resources and process them. The impact of interstellar trade and interstellar demand are then considered to modify the base GWP.

GWP is figured in Resource Units (RU), an abstracted valuation used within the structure of these rules. The formula is:

Base GWP = (RE × LF × I) ÷ (C + 1)

RE = TL × 0.1 × (Total Demand + Import/Export benefit)
Import/Export benefit = Import or Export level × Resource Trade Benefit table multiplier
LF = Labor base from the Labor Base table × Population multiplier
I = Infrastructure
C = Culture

Resources Exploited (RE) is a representation of the world's resource use, including benefits gained from imports and exports. Multiplied by the Tech Level × 0.1 to reflect technologies increasingly efficient use of those resources.

Import/Export benefits exclude profits lost in trade and transportation and will fluctuate from year to year. The Import/Export benefits are established by rolling 2D on the Resource Trade Benefit table and multiplying your Imports or Exports by the appropriate Resource Trade Benefit.

Labor Factor (LF) uses the score on the Labor Base table, multiplied by the Population multiplier found in the Economic Extension. This reflects the portion of the population engaged in actual resource exploitation (Primary Industry).

Page 43, Taxation Level, Discretionary Tax (clarification and addition): Governments adjust Taxes with a view to Popularity. In general if Popularity is high, the population's tolerance to higher taxes is high and the Government will tax and spend more. This trend is reversed if Popularity is low. Of course this is very a broad generalization.

To set initial Discretionary Taxes, following these steps. It generates a Popularity within the range of 8-13.

1. To establish Popularity, assume Discretionary Tax = 0%.
2. Set Discretionary Tax Rate = **Popularity − (7 + 1D)**. Note that Discretionary Tax can be positive or negative, adding to or reducing normal tax take.
3. Adjust Popularity (from step 1): **Popularity − (Discretionary Tax Rate × 100)**

Players can of course adjust Discretionary Taxes at any time, but this ensures the Sector Population is largely content with their lot.

Page 46, Military Expenses and Maintenance Costs, Examples (correction and clarification): After stating on page 45 that Military Expenses = M×A×G, the A and G multipliers are left out of future examples.

The Sylea example given on page 46 also fails to multiply its 5% of GWP Military Maintenance (M) figure by 1.10 (A) and 1.00 (G). It should be 2124.8 × 1.0 × 1.35 = 2868.48 RU Military Expenses.

The Khuir example given on page 46 wrongly states that Khuir's Military Expenses are 519 RU when it should say that this is the Military Maintenance or M part of the equation. This figure of 519 should then be multiplied by the Administration (A) value of 1.10 and the Government value of 1.00. This gives 519 × 1.10 × 1.00 = 570.9 RU Military Expenses, which in the example leaves Khuir with total expenditure 627.7 + 570.9 = 1198.6, leaving the government with a surplus of 2,038.1 − 1198.6 = 839.5 RU.

Page 54, Population, Population Change Procedure, Population Change Factor (correction and clarification): The Labor +1 modifier creates a very inconsistent growth rate. Change the formula to:

Population Change Factor = (1D + R + I + T) ÷ (L + PM)

R = Native Resources (excludes imports or exports).
I = Infrastructure.
T = Tech Level.
L = Labor digit.
PM = Population Multiplier digit.

Page 59, Maintaining Control, Natural Drift of Self Determination (clarification and correction): The equation as published guarantees rises to the Self Determination score. Change the 10 year calculation to:

Change = 2D + L − S

S = Current Self-Determination level.
L = Average Law Level over the last 10 years.

Pages 58-59, Maintaining Control, Changing Law Level (addition): As published, there are no rules for a ruler to change the Law Level.

Law Level can be changed by one level each year without consequence. If changed by two or three levels in a single year, lose one or two Popularity points, respectively. Changes to Law Level cannot be greater than three levels in a single year.

Page 62, Playing Politics, In Play, Changing Government Type (addition): While there are guidelines on page 24 (Assuming Control of a Government) and page 30 (Pocket Empires Government Types), there are no rules for changing the player's Government type, either the Capital, or the Pocket Empire. The following tasks are provided:

To change World Government type.
(Popularity/2) + DMs < Formidable (3D)
Apply the difference between Self Determination and the intended Government Pluralism as a DM to the task.
Spectacular Success: As success, with +2 to Popularity and if applicable, +2 to relations with other worlds.
Success: Government type change succeeds.
Failure: Popularity decreases by the difference between Self Determination and Government Pluralism.
Spectacular Failure: The World splits into geographic regions and is now Balkanized (Government code 7) into D6+1 states, the largest of which has the same Government code as the world UWP. Generate individual stats for each state.

To change Pocket Empire Government type.
(Prestige) + DMs < Formidable (3D)
Spectacular Success: As success, with +1 to Popularity on all Worlds and +2 to relations with other worlds.
Success: Government type change succeeds.
Failure: Prestige decreases by 1.
Spectacular Failure: The Pocket Empire splits into d6+1 Empires, balkanizing the HiPop worlds if necessary to achieve d6+1 splits.

Page 72, Unilateral Meta-Tasks, To Settle an Uninhabited World (addition): Add to Success, "Ba (Barren) worlds lose their Ba code and add 1D-1 to their Resources".

Page 76, Bilateral Meta-Tasks, To Improve Relationship Code (clarification and correction): An examination of the published task shows that the better a relationship level is, the easier it is to improve it further. Additionally, each world is treated in isolation and previous attempts to influence the target world and its neighbors does not influence the results. Finally, the Improve Relationship Code task needs a target number which does not reinforce its own success.

DMs:
Marriage ties (page 76)
Prestige adjustment (page 76)
Receptivity of Target World to advances (Relationship level with Target World − Target World Popularity)
Sum of previous Unilateral Offensive tasks by the PE against all worlds within jump-2 of the Target World (see note below on Tally Unilateral Offensive Tasks).

Tally Unilateral Offensive Tasks
Keep a tally of Unilateral Offensive Tasks against each world by source. Reduce this total by one for each year "left alone". War counts as a Unilateral action for that year.

To Improve Relationship code.
Average Relationship with all worlds within jump-2 of Target World + DMs < Chosen Difficulty
Chosen Difficulty: +1 level is Difficult (2D), +2 levels is Formidable (3D), +3 levels is Staggering (4D). (Maximum of +3 levels per turn).

Spectacular Success: Increase by one more level than targeted.
Success: Increase by target level.
Failure: No change.
Spectacular Failure: −1 Relationship level.

Page 78, right column, third paragraph, Initial Relationship Score (clarification and correction): The text is confusing, and the rules are split over two pages (Pocket Empire Relationship Chart on page 74, First Contact on page 77-78). For clarification, use the following rules for determining Initial Relationship scores:

1. Establish each world's character and the average character score.
2. Establish worlds of interest. All worlds within jump-2 of 'Home' and all worlds within reach of a second jump-2 (reachable within two jumps). Repeat for any HiPop worlds within jump-4 of 'Home'.
3. Establish relationship level. (2D - Difference between the two Worlds' average World character)
4. Worlds more than jump-2 apart should adjust their Relationship Score 4 points towards and not past, "4 No Established Relationship." (This creates far less relationships over jump-2 away and more of a blank canvas for the budding pocket empire to expand into.) Worlds more than jump-4 apart are all at "4 No relationship established".
5. Resolve a Unilateral task for each pair of systems at war, perhaps creating "Captive Governments".
6. Delete all relationship scores for any systems that are now "Captive Governments". Their relationships are now dictated by their dominant world.
7. Where a world or pocket empire is subject to more than one War, Subversion or Political Attack (levels 1-3) relationship, the worlds doing the "ganging up" improve their joint relationship level due to having a common enemy, by +3, +2 or +1 respectively. Start with War (+3) and adjust only relationship levels higher than the level currently being examined.

Pages 81-82, Describing Military Units (clarification): The text makes it unclear, but the total number of unit Size points can be allocated as a point of Attack, OR Defense, OR Transport, OR Jump.

Page 101, Tables, Pocket Empires Turn Checklist (clarification and correction): The turn checklist lacks detail and page references for the tasks involved. Additionally, it has been re-ordered to place income generating at the end of turn and then each new turn starts with a known surplus to spend.

For Turn 0, setting up the game, initially start at step 9, **Gross World Product for each World**.

Subsequently (turn 1 onwards), follow this turn sequence:

1. **Spend Surplus Budget** (generally spent as you work through the turn).
   A. Purchase military units.
   B. Meta-task investments.
   C. Planetary development.
2. **Plot Actions** (only relevant in multiplayer games, ignore for solo games).
   A. Plot military actions.
   B. Plot political actions.
3. **Random Pocket Empire Events** (page 79).
   A. An event occurs on 11+ (2D). Refer to the Pocket Empire Event table (page 110).
4. **Political Events** (page 65, Chapter 7 — Expanding the Empire).
   Resolve for Empires in descending order of Prestige.
   A. Unilateral Meta-tasks (page 72)
-     1. Survey world first stage. Determine UWP.
       2. Survey world second stage. Determine EE.
       3. Settle uninhabited world.
       4. Military offensive (abstracted, used instead of step 5, Military Activity).
       5. Subversion offensive.
       6. Spying offensive.
       7. Media offensive.
       8. Trade offensive.
       9. Corporate offensive.
          (page 69, descriptive fluff; page 71 meta-task DMs for the task; page 73, the Corporate Offensive task)

          10. Technology offensive.
          11. Political offensive.
          12. Religious offensive.
          13. Aid offensive.
          14. Blockade offensive.
    B. Bilateral Meta-tasks (page 76).
        1. Improve relationship.
        2. Form marriage alliance.
        3. Merge two worlds or pocket empires.

5. Military Activity (page 81, Chapter 8 — War).
Resolve for Empires in descending order of Prestige.

6. Random World Events (page 63).
For every world in the pocket empire, on an 11+ (2D) refer to World Event table (page 109).

7. Internal Pocket Empire meta-tasks (annual).
    A. Infrastructure improvement (page 47).
    B. Starport improvement (page 50).
    C. Technology improvement (page 51).
    D. Population increases (page 54).
       (Pop Change Factor = (1D + R + I + T) ÷ (Labor + Pop multiple)) (pages 107-108, Chapter 5 tables)
    E. Assign lieutenants (page 58).
    F. Marriage arrangements (page 59).
    G. Assign peace-keeping forces (page 59).
    H. Self-determination manipulation (page 59).
    J. Change Government type (errata for page 62, above).

8. Domestic Situation.
    A. Recalculate each world's Popularity (page 55) (only if world characteristics have changed).
        1. Check Domestic Situation table (1D + Popularity + Peace Keepers).
          (page 56, Chapter 6 tables; page 59, Peace Keepers; page 30. Min/Max Prestige = 0 to 15)
        2. Resolve any domestic problems.

9. Update Characteristics.
    A. New military units are available in their construction systems.
    B. Adjusted world stats are now effective (Pop, TL, Infrastructure, Government type, Law Level, etc.).
    C. Recalculate pocket empire characteristics (page 29).
        1. Total pocket empire population code (page 29).
        2. PE worlds code (page 30, Chapter 3 tables "Size Code").
        3. PE military power code (page 30, Chapter 3 tables "Size Code").
        4. PE economic power (page 30, Chapter 3 tables "GEP Code").
        5. PE Prestige = (Avg Popularity of member worlds + Pop + Worlds + Military + Economic) ÷ 5 (page 30)
    D. 10 Year Tasks
        1. Culture drift (page 52)
        2. Self Determination drift (page 59)
          (Change = 2D + Law Level − current Self-determination) (Chapter 6 tables)

10. GWP for each World
Apply any costs or benefits incurred in the turn so far
(PE & World random events and Meta tasks, plus the Domestic Situation table)

11. Tax each World
    A. Calculate basic tax rate (page 43, Chapter 4 tables "Base Tax Rate")
    B. Calculate social tax rate (page 43, (Law Level + Culture) ÷ 100))
    C. Set discretionary tax and establish tax rate (page 43, Basic + Social + Discretionary = Tax Rate)
    D. Calculate each world's tax take (page 45, (Tax Rate × GWP))

12. Budget Surplus / Deficit for each World
    A. Establish civilian expenses (page 45)
    B. Establish military expenses (page 45, Maintenance × Admin Factor (page 46) × Government Type mod (Chapter 4 tables "Governmental Expense"))
    C. Determine surplus or deficit.
    D. Transfer surplus RUs to the pocket empire treasury.

Page 108, Chapter 5 Tables, Planetary Development, Infrastructure Atmosphere Modifier (clarification and correction): Developing Infrastructure on a trace or vacuum world poses the same issues; change Code 0 Modifier to +6. Developing in a corrosive atmosphere should be more costly than in an insidious atmosphere; change Code C Modifier to +10.

Page 109, Chapter 6 Tables, Controlling the Empire, World Event Table (clarification and correction): The existing result for event 6, Major space accident, gives a modifier of 0, which will cause GWP to drop to 0 for the year. Change the result to: Interstellar *Demand* Modifier (to GWP) *drops to 0.8* next turn, −1 Popularity.

PSIONIC INSITUTES (1710, 1997)

Page 22, Description and Costs of Special Abilities (omission): While Lightning Calculator appears on the list for selecting abilities, it was left out of the descriptions.

Lightning Calculator: Not a true psionic ability, lightning calculator is the ability to perform complex mathematical calculations with lightning fast ability. A character with this ability can approach the speed of lower grade computers in terms of mathematical calculations. This ability therefore gives the character an advantage in any situation where such calculations may be helpful. Treat as a +1 DM on any skill rolls that the Referee believes this ability would give the character an edge, such as Astrogation, Computer programming, etc. This person can also function as a Rating 0 computer as a result of these abilities.

Cost: Free, so long as character is conscious.

FIRE, FUSION & STEEL (1720, 1997)

To clarify the equations found in the book, Stuart C. Squibb released two documents which cleaned them up. These are the "FF&S Equations" and "FF&S Energy Weapon Equations" documents.

Overall, Equation Formats (correction and clarification): Between book design and printing, the multiplication signs ("×") were replaced with "↔". If those symbols are treated as if they were multiplication signs, the formulas should work fine, except where noted below.

Page 11, Asteroid Hulls, Example (correction and clarification): The example uses an incorrect value for material toughness, 1.2, instead of the correct value of 1.71. The corrected example should read as follows:

Example: Let's create the hull for a 100,000Td monitor—a large, non-jump warship intended to defend critical points in the system. We need a 1,400,000m^3 asteroid, which costs us MCr1.4 to tow into the inner system. We'll use a metallic asteroid, just like the hundreds of others in the belt, to hide from invaders. We want to be able to pull 6Gs, the structural factor is 7,360, and the toughness for metallic bodies is 1.71, so we have to leave at least 77,474m^3. However, we want this to be fairly well armored, so we'll leave half of the asteroid. That's 700,000m^3 times Cr100/m^3, or MCr70 for the tunneling. The surface area is 60,521m2. 1/3 of the material left acts as armor, or 233,333m^3. Divide that by the surface area, and our average armor thickness is 3.85m. That equates to an armor factor of 658.

Page 11, Drives, first paragraph (correction): The paragraph contradicts Table 163: Advanced Thrusters (page 105), which lists the TL for reactionless thruster plates as TL 11. So the next to last sentence should start with, "Beginning at TL 11..."

Page 11, Equation 1, Standard Thrust Requirements (correction): The formula should correctly read,

$$Thrust = Accel \times Volume_{ship} \times 10 \ kN$$

Page 12, Drives, Realistic Thrust, delta-V formula (correction): The delta-V formula should be:

$$\Delta_v = \ln(\frac{M_{total}}{M_{total} - M_{fuel}}) \times \frac{3600}{Cons_{fuel} \times Density_{fuel}}$$

M_{total} is the total mass of the vehicle (fuel and everything else), M_{fuel} is the mass of the fuel, $Cons_{fuel}$ is fuel consumption in m^3/kN/hour, and $Density_{fuel}$ is fuel density in t/m^3.

Note that this formula disagrees with the one in the "FF&S Equations" document.

Page 15, Sickbay (clarification): Guy Garnett (one of the designers) offered the following commentary about sickbays and low berths.

A "sickbay" is one of several different types of medical facility. They are lumped together for convenience (3 dtons, and cost 0.8MCr). The sickbay supports a staff of two, at least one of whom would normally be a Medic-3 or better (doctor, surgeon, or medical specialist) to get the full benefit of the facility. The designer determines the exact purpose of the sickbay (outpatient care, medical specialty treatment center, critical care, surgery, nurse's station, etc.) when it is designed and installed. Some facilities may have multiple installations, so that (for example) you could equip a hospital

ship with an emergency room, surgery, pharmacy, trauma unit, critical care unit, radiology department, medical lab, and so on.

My thinking about low berths and sickbays is that low berths already have the required equipment, drugs, and other supplies for reviving the occupant as safely as possible—thus, the presence of a sickbay won't affect the low berth survival roll, since there's nothing the sickbay can supply that's not already available. However if a sickbay is present, someone who has failed their revival roll could be transferred there, and sickbay care may help the patient recover from the results of a failed roll (since the sickbay is probably qualifies as a TL-11 or better medical facility). This is unlikely to be practical, except in the case of a Naval frozen watch.

A sickbay, like the other labs and shops, provides specialized equipment, tools, information, and other needed supplies to exercise certain skills. For tasks where the availability of this stuff makes a difference, there should be some type of reduction in the difficulty of a task, based on the availability of this equipment. The "game effects" listed for each type of facility gives the referee some guidelines on what this might be. The presence of the facility won't help tasks that aren't affected by the availability of appropriate equipment.

Page 16, Fuel, Drop Tanks (clarification): Add the following note to the section on drop tanks:

In the Third Imperium, jump drives capable of using drop tanks are not developed until around 1090 and can only be manufactured on TL-15 worlds. However, drop tanks can be manufactured on most worlds capable of building hulls.

Page 36, Equation 22: Single Shot Recoil (correction): This equation as printed is illegible. The corrected equation should be:

$$Mod_{rss} = (\frac{0.15 \times \sqrt{E_{muzzle}}}{Mass_{loaded}} + Mod_{energy}) \times Mod_{recoil}$$

Page 36, Gauss Weapons, Mass (correction): The equation for ammo mass is incorrect. The correct equation should be:

$$Mass_{ammo} = \frac{\pi \times Cal^3}{50}$$

Page 40, Equation 34: Single Shot Recoil (correction): This equation as printed is illegible. The corrected equation should be:

$$Mod_{rss} = (\frac{0.15 \times \sqrt{E_{muzzle}}}{Mass_{loaded}} + Mod_{energy}) \times \frac{Mod_{recoil}}{2}$$

Page 41, Equation 37: Explosive Warhead Burst Radius (correction): In the equation, $Mod_{brwhtype}$ should be $Mod_{brwtype}$, to match Table 76 (page 93).

Page 42, Equation 43: Chaff Burst Radius (correction): In the equation, $Mod_{illumtl}$ should be $Mod_{chafftl}$.

Page 42, right column, Volume (correction and clarification): The given warhead volume equation only works for a 2cm warhead. A better equation is given below. The caliber of warhead is in cm.

$$Vol_{warhead} = (\frac{Cal}{100})^3 \times 5$$

Most heavy weapon warheads are 5 calibers in length due to instability in flight of any rifling spin stabilized round above 6 calibers in length (the shorter the barrel the worse the instability). The suggested equation uses a square base and thus should be considered a storage volume. FSDS type rounds are considerably longer, but a large portion of the length is buried in the powder casing.

Page 43, Equation 44: Rifle Grenade Range (correction and omission): The equation as printed is illegible and incorrect. The equation should read:

$$R_{rg} = \frac{D}{Mass_{grenade}} \times Mod_{gtech}$$

Additionally, the value of *D* is not defined; *D* is the **Traveller** damage value of the rifle or carbine firing the grenade.

Page 43, Nuclear-Pumped X-Ray Lasers (correction): The two paragraphs are incorrect and should read:

See Tables 93 and 94 for short- and long-range detonation lasers. Short-range detonation lasers have a maximum range of 15,000km. Long-range detonation lasers have a range of 30,000km at TL-16 or less and a range of 60,000km at TL-17 or above.

Page 43, Equation 45: CPR Gun Propellant Mass (correction): In the equation, Len_{barrek} should actually be Len_{barrel}, and represents the barrel length of the CPR gun.

Page 45, Equation 51: MD Muzzle Energy (correction): The equation as printed is incorrect. The correct equation should read:

$$E_{muzzle} = \frac{Mass_{warhead} \times V_{muzzle}^2}{2,000,000}$$

Note that this formula disagrees with the one in the "FF&S Equations" document.

Page 46, Equation 55: MD Direct Fire Range (correction): The equation as printed is illegible and should read:

$$R_{dshort} = 5 \times \frac{V_{muzzle}}{20} + Cal + 20$$

Page 47, Equation 61: Single-Shot Recoil (correction): The equation as printed is illegible and should read:

$$Mod_{rss} = \frac{150 \times \sqrt{E_{muzzle}}}{Mass_{loaded}} \times Mod_{recoil}$$

Page 48, Equation 63: Battlefield Missile Thrust and Equation 64: Spacecraft Missile Thrust (correction and clarification): Battlefield missiles or rockets with a flight time of more than a minute should be designed as a two-stage missile. First stage (main charge) is designed with equation 63, with burn time being time to achieve maximum velocity. Second stage (sustainer charge) is designed with equation 64. Determine sustaining acceleration using Table 119 (see below).

Equation 63 should now be the equation below. Vel_{max} is the maximum velocity in kilometers per hour. $Time_{burn}$ is the amount of time acceleration can be sustained.

$$T_{req} = \frac{Mass_{avg} \times Vel_{max} \times 60^2}{1000 \times Time_{burn}}$$

Equation 64 should now be the equation below. Acc_{design} is in m/s^2.

$$T_{req} = Mass_{avg} \times Acc_{design}$$

Page 49, Spacecraft Missiles, Rating, Fuel in G-Hours, delta-V formula (correction): The delta-V formula should be:

$$\Delta_v = \ln(\frac{M_{total}}{M_{total} - M_{fuel}}) \times \frac{3600}{Cons_{fuel} \times Density_{fuel}}$$

M_{total} is the total mass of the vehicle (fuel and everything else), M_{fuel} is the mass of the fuel, $Cons_{fuel}$ is fuel consumption in m^3/kN/hour, and $Density_{fuel}$ is fuel density in t/m^3.

Note that this formula disagrees with the one in the "FF&S Equations" document.

Page 50, Lasers, Calculate Performance, Calculate Damage Value, Intensity (correction): Replace the paragraph on Intensity with the following:

Intensity: Intensity is equal to discharge energy for ranges up to effective range. For ranges greater than the effective range, intensity is calculated using the following equation:

$$Intensity = \frac{E_{discharge}}{\left(\frac{Range_{actual}}{Range_{effective}}\right)^2}$$

Page 50, Lasers, Calculate Performance, Calculate Damage Value, Damage Value (correction): The equation is incorrect, and should read:

$$D = 3.6 \times \sqrt{Intensity}$$

Note that this formula disagrees with the one in the "FF&S Energy Weapon Equations" document.

Page 50, Lasers, Supply Energy Requirements, Choose Rate Of Fire (correction): The second sentence should read, "Rates higher than one shot every 20 seconds require extra cooling and ventilation to avoid damage to the focal array."

Page 52, Particle Accelerators, Calculate Performance, Calculate Damage Value, Intensity (correction): Replace the paragraph on Intensity with the following:

Intensity: Intensity is equal to discharge energy for ranges up to effective range. For ranges greater than the effective range, intensity is calculated using the following equation:

$$Intensity = \frac{E_{disch\ arg\ e}}{\left(\dfrac{Range}{Range_{effective}}\right)^2}$$

Page 52, Particle Accelerators, Calculate Performance, Calculate Damage Value, Damage (correction): The equation is incorrect, and should read:

$$Damage = 7.1 \times \sqrt{Intensity} \times Mod_{damage}$$

Note that Mod_{damage} is the value calculated above (see Calculate Tunnel Characteristics, Damage Modifier).
Note that this formula disagrees with the one in the "FF&S Energy Weapon Equations" document.

Page 54, Circular PAWs, Calculate Performance, Calculate Damage Value, Intensity (correction): Replace the paragraph on Intensity with the following:

Intensity: Intensity is equal to discharge energy for ranges up to effective range. For ranges greater than the effective range, intensity is calculated using the following equation:

$$Intensity = \frac{E_{disch\ arg\ e}}{\left(\dfrac{Range}{Range_{effective}}\right)^2}$$

Page 54, Circular PAWs, Calculate Performance, Calculate Damage Value, Damage (correction): The equation is incorrect, and should read:

$$Damage = 7.1 \times \sqrt{Intensity} \times Mod_{damage}$$

Note that Mod_{damage} is the value calculated above (see Calculate Tunnel Characteristics, Damage Modifier).
Note that this formula disagrees with the one in the "FF&S Energy Weapon Equations" document.

Page 55, Meson Guns, Calculate Performance, Calculate Damage Value, Damage (correction): The equation is incorrect, and should read:

$$Damage = 7.1 \times \sqrt{Intensity}$$

Note that this formula disagrees with the one in the "FF&S Energy Weapon Equations" document.

Page 65, Hulls and Streamlining, Step 6. Stealth (correction and addition): Replace the existing step 6 with the following:

At TLs 8-9, only one level of stealth may be applied, and this application has no effect against TL10+ sensors. At TLs 10-11, only two levels of stealth may be applied. At TL12+, ships may have up to three levels of stealth. Regardless of armor thickness, stealthy hulls have a minimum cost. For convenience the effects of stealth are summarized below (rounded off slightly for convenience).

Level	Minimum TL	Component volume multiplier	Component area multiplier	Armor cost multiplier	Minimum Cost (MCr/m^2)	Signature Modifier
1	8	1.1	1.25	5	0.05	−0.5
2	10	1.2	1.56	25	0.025	−1.0
3	12	1.3	1.95	125	0.125	−1.5

The *component volume multiplier* is used for the volume of all surface-area-using components (except drives and radiators), such as weapons, sensors, etc. The *component area multiplier* used for the surface area of all surface-area-using components. The additional volume and area represent waste volume and area required to make components stealthy and do not affect any other characteristics of the component such as mass, price, etc.

Page 65, Hulls and Streamlining, Step 7. Hull Coatings (correction): The discount for "bare metal" hulls of MCr 0.01 per m^3 is incorrect; the correct discount is Cr 50 per m^2.

Pages 71-72, Controls (omission): Table 185: Control Systems was dropped from the book; see the errata for page 108 below.

Page 72, Workstations (clarification): At or above TL 9, crewstations and workstations require a computer or they act as TL 8 workstations.

Pages 72-74, Sensors (clarification, correction and addition): See instead the "Definitive Sensor Rules" document by Bruce Alan Macintosh. In particular, active sensors no longer use twice the range factor, but instead use a modified detection chart. The range factors given in the examples should be increased by 6.

Sensor Options: *Folding Arrays:* ignore the "double the volume." Instead, folding arrays multiply the cost by 1.2 and reduce the required surface area to 10% of normal. Note that the spacecraft cannot evade while the folding array is deployed. At TL10+, PEMS arrays can operate while folded, at a penalty of -1 to sensitivity.

Passive Sensors: *Resolution:* Resolution is in meters. To calculate resolution at any other distance, use the following formula, where R is the resolution given in the table and D is the distance in km.

$$\text{Re}\,solution \quad = R \times \frac{D}{50,000\ km}$$

Active sensors: delete "twice" in "twice the range factor".

Vehicle Active Sensors: (See new table below.)

Note that TL6-7 active sensors are missing and will be added later. The only TL6-7 passive sensors available are those in the "Portable Visible and Infrared Light Sensors" table. Rules for specialized TL-6 and 7 trackers will be added later (but will only rarely be used, since there are no TL-6 or 7 beam weapons to require fire control.)

Jammers: Active sensor jammers are divided into two types, "area jammers" and "deceptive jammers". Area jammers blanket an entire region with electromagnetic interference to reduce sensor sensitivity. All sensors within an active jammer's range and in a 30 degree arc from the jamming ship have their sensitivity reduced by 0.5 for both detection and fire control. Area Jamming enemy sensors is a Staggering (4D) task, reduced one difficulty level for every tech level the jammer exceeds the sensor. Jamming sensors one TL higher is an Impossible (5D) task; sensors more than two TLs higher cannot be area jammed.

Deceptive jammers protect a single ship by attempt to mimic radar/AEMS signals hitting the jammer-equipped ship to disrupt fire control locks (but not detection.) Fire control locks against a ship equipped with a deceptive jammer, by a sensor within that jammer's range, have sensitivity reduced by 0.5. Deceptive jamming is a Formidable task, reduced one difficulty level for every tech level the jammer exceeds the sensor. Jamming sensors one TL higher is an Impossible (5D) task; sensors more than two TLs higher cannot be area jammed.

Passive sensor jammers also operate to prevent fire control locks. (The name is something of a misnomer since they actually do emit radiation.) Fire control locks against a ship equipped with a passive jammer, by a sensor within that jammer's range, have sensitivity reduced by 0.5. Deceptive jamming is an Impossible (5D) task, reduced one difficulty level for every tech level the jammer exceeds the sensor. Passive jammers can only be used against sensors that have been detected by the jamming ship. Sensors of higher TL cannot be jammed.

Detailed rules for active jammers will appear in the next edition of the Definitive Sensor Rules. The next edition will include rules for using passive jammers to blind or deceive enemy sensors (generally only possible for sensors of lower TL than the jammer.)

Decoys: Active sensor decoys and LIDAR decoys are also available. They require 0.1 m^3 per m^2 of the ship's surface per decoy bundle, mass 2 tons per m^3 and cost MCr 5 per m^3. The launcher requires 0.01 m^3 per m^2 of surface area, masses one ton per m^3 and costs MCr 0.1 per m^3. (Separate decoys and launchers are required for active sensors and LIDAR.) They reduce the signature of the deploying ship by 0.5. Decoys of all types are only effective against sensors of equal or lower tech level. Successfully operating decoys is an Impossible (5D) task, reduced one difficulty level for every tech level the jammer exceeds the sensor. TL6-7 decoys cost one tenth as much as normal decoys.

Page 73, Sensor Options, High or Low-Powered Active Sensors (addition): Active sensors may be designed to trade off required input power for size—achieving greater sensitivity in a small package by use of a higher-powered beam, for example. High-power active sensors of a given sensitivity have the price as a normal sensor of the same sensitivity, but the designer may decrease the surface area by any factor between 2 and 5, increasing the power consumption by the same factor. High-power sensors have a volume of 10m^3 per m^2 of area.

Similarly, low-power active sensors decrease the input power by a factor of 2 to 5, increasing the surface area by the same amount. Low-power sensors have a volume of 2.5 m^3 per m^2 of area.

Page 73, Sensor Options, Continuous Sensor Formula (addition): Mathematically inclined users can calculate the area of sensors of arbitrary sensitivity by using the following formula:

$$Area \quad = BaseArea \quad \times 100^{(Sensitivit\ y-13)}$$

The base area is found on the following table:

TL	PEMS Base Area	AEMS Base Area
8	—	50,000
9	—	10,000
10-11	2	5,000
12-13	1	2,500
14-15	0.5	1,000

The minimum diameter and firing range (for PEMS) is taken from the nearest PEMS on Table 198. Sensors may not be constructed with greater or lesser sensitivity than those on Table 198 and Table 201 at a given TL.

Page 74, Exotic Sensors (addition): There are three types of exotic sensors available: Neutrino sensors, Gravitic Sensors, and Neural Activity Scanners.

Neutrino Scanners attempt to detect neutrinos emitted by nuclear power plants. Practical high-efficiency neutrino sensors are made possible by the increasing mastery of nuclear forces at TL12; however, they are generally too short ranged to be useful in starship combat. In addition, they function only as scanners—detecting targets but not providing a precise enough position for fire control. Neutrino scanner volume is given by the following table:

Sensitivity	Volume by TL		Typical Range
	12-13	14-15	
8	10	5	50 km
8.5	50	20	160 km
9	500	200	500 km
9.5	50000.0	20,000	1,600 km

Neutrino scanners mass 2 tons per m^3 and cost MCr 5/m^3. They require0.1 MW per m^3. They require no surface area.

For detection purposes, neutrino signature can be calculated by totaling the power of all nuclear (fusion, fission, and fusion+) power plants on the vehicle and comparing to Table 13. At TL13+, power plants can be constructed with neutrino shielding. Neutrino shielding requires 0.1 m^3 per m^3 of power plant volume, masses 1 ton per m^3, cost MCr 1.0 per m^3 and require 0.01 MW per m^3, and reduces the neutrino signature by 1.0.

Gravitic Scanners detect both static gravitational fields and gravitational radiation. The ability of grav sensors to detect static fields is limited to strong fields or anomalies such as those caused by large mineralogical anomalies, or large astronomical objects. Their ability to detect gravitational radiation, however, gives them some sensitivity to the gravity waves produced by thruster plates and contra-grav propulsion. Like neutrino scanners, they are not accurate enough to provide a fire-control solution, and are somewhat short-ranged. Despite the impressions of certain science-fiction authors, gravitational radiation travels only at the speed of light. Gravitic scanner volume is given by the following table:

Sensitivity	Volume by TL		Typical Range
	12-13	14-15	
7.0	—	0.01	5 km
7.5	0.5	0.05	16 km
8.0	5.0	0.50	50 km
8.5	100.0	5.00	160 km
9.0	5,000.0	100.00	500 km
9.5	500,000.0	2,000.00	1,600 km
10.0	—	200,000.00	5,000 km

Mass is 2 tons per m^3. Price is MCr 8 per m^3. Power required is 0.01 MW per m^3. Antenna area is 0.5 m^2 per m^3.

Gravitic sensors operating on a planetary surface or on a ship with active thruster plates have their sensitivity reduced by 0.5. The gravitic signature of a vehicle may be calculated from the following table:

Thrust (kN)	Signature
1-10	−2.0
10-100	−1.5
100-1,000	−1.0
1,000-10,000	−0.5
10,000-100,000	0.0
100,000-1,000,000	0.5
1,000,000-10,000,000	1.0
10,000,000-100,000,000	1.5
100,000,000-1,000,000,000	2.0

As a rule of thumb, thrust in kN = (G-rating)×(size in Td)×100. Vehicles propelled by contra-grav instead of thruster plates have their signature reduced by 0.5 to a minimum of −2.5. Vehicles with only inertial compensators or artificial gravity provided by gravitics will have their signature reduced by 1.0 to a minimum of −2.5. Vehicles that do not have any gravitic devices (no thruster plates, no antigravity and no inertial compensators or artificial gravity provided by gravitics) will have a signature of −2.5.

Neural Activity Scanners detect and classify life forms based on brain activity. They are extremely short-ranged, expensive, and fragile. At each TL two basic models are available—a lightweight (portable) model and a somewhat larger ranged device.

TL	Range	Power	Vol	MCr
13	0.010	0.004	0.002	0.02
13	0.100	40.000	50.00	20.00
14	0.050	0.005	0.002	0.02
14	0.200	50.000	50.00	20.00
15	0.100	0.006	0.002	0.02
15	0.400	60.000	50.00	20.00

Typical Range in km. Power required in MW. Volume given in m^3. All NAS mass 2 tons per m^3. Antenna area in m^2 = MW×100.

Page 75, Crew, Workstations (clarification): All gunners require workstations. However, if a bridge is needed, only MFD gunners will need bridge workstations.

Page 75, Maneuvering Crew, second paragraph (correction): The equation given for calculating bridge crew for military vessels is incomplete. The correct equation is given below (round fractions up):

$$CMn = 3 \times \log\left(\frac{CM \times Volume}{140}\right)$$

Page 77, Accommodations, Seats (clarification): Seats are not required for crew members; seats are already included in the figures for workstations and crew stations.

Page 84, Tables Index (correction): Change the name of Table 173 to "Rocket Fuels". Table 226: Photoelectric Cells is not listed, but is found on page 112.

Page 85, Table 8: Labs and Workshops (correction): The columns for Power and Price are reversed. The corrected table appears below:

Type	Volume (m^3)	Mass (t)	Power (MW)	Price (MCr)
Electronics Ship	84	40	1.0	0.6
Machine Shop	140	120	1.0	2.0
Laboratory	112	50	0.8	5.0
Sickbay	112	50	0.8	5.0

Page 86, Table 20: Envelope Cost (correction): The cost of (MCr/m^3) is incorrect; the cost should be (Cr/m^3).

Page 88, Table 37: Bullet Length (correction and addition): The table should now read:

Type	Len_{bullet}
Shotgun	0
Pistol or Ball	Caliber
Carbine	2×Caliber
Rifle	3×Caliber
Flechette	3×Caliber
Rifle, high power	4×Caliber
Rifle, SLAP	4×Caliber

Page 88, Table 39: Ammunition Type Modifier (addition): The following entries should be added to the table.

TL	Type	Mod_{atype}
7	Straight (semi-caseless)	0.007
7	Necked (semi-caseless)	0.009

Semi-caseless ammunition uses a metallic cartridge one caliber in length with the remainder of the case made of nitrocellulose, paper, and resin. This is used for the 120mm rounds for the M1A2.

Page 93, Table 83: Chaff TL Modifier (correction): $Mod_{illumtl}$ should be $Mod_{chafftl}$.

Page 97, Table 119: Missile Sustaining Accelerations (addition): The existing Table 119 is unnecessary. Replace with the following:

Speed (km/hr)	Acceleration (m/s^2)
Under 350	$Acc = \dfrac{Speed}{700}$
350 to 3,485	$Acc = \dfrac{Speed - 350}{350} + 0.5$
3,485 to 4,685	$Acc = \dfrac{Speed - 3,485}{120} + 10$
Greater than 4,685	$Acc = \dfrac{Speed - 4,685}{60} + 20$

Page 104, Table 160: Hull Shape Modifiers (correction): The information for a wedge configuration was missing, and the original errata did not work for ratios with alternate length:width:height values:

Configuration	Surface Modifier	Streamlining Cost Modifiers			Dimension Modifiers		
		USL	SL	AF	Length	Width	Height
Short wedge (4:2:1)	1.52	0.5	0.7	1.5	2.316	1.158	0.579
Medium wedge (6:2:1)	1.63	0.5	0.7	1.5	3.036	1.012	0.506
Long wedge (8:2:1)	1.75	0.5	0.7	1.5	3.680	0.918	0.459
Extreme wedge (10:2:1)	1.86	0.5	0.7	1.5	4.270	0.827	0.427

Page 104, Table 161: Streamlined Hull Speed Regime and Table 162: Airframe Hull Speed Regime (correction): Thrust efficiencies between the two tables were reversed, resulting in streamlined going faster for a given thrust than an airframe. The Table 161 efficiencies should be: 0.85, 0.90, 0.95, 1.00, 2.75 and 3.00. The Table 162 efficiencies should be: 1.2, 1.3, 1.4, 1.5, 4.1, and 4.5.

Page 105, Table 166: Liquid Rockets (correction): Replace the current table with the following:

TL	Type	Thrust (kN/m^3)	Price (MCr/m^3)	Fuel (m^3/hr/kN)	Fuel Type
5	Liquid	300	2.00	1.28	LRF
6	Hypergolic Liquid	850	1.83	1.22	Hyp
6	Liquid	500	1.50	1.16	LRF
6	High Density Liquid	650	1.50	0.86	Perox
7	Hypergolic Liquid	930	1.20	1.22	Hyp
7	Liquid	850	0.67	1.19	LRF
7	High Density Liquid	4,080	0.53	0.86	Perox
7	LH Liquid	650	2.00	2.54	HRF
8	Hypergolic Liquid	1,320	1.00	1.14	Hyp
8	Liquid	770	0.83	1.06	LRF
8	High Density Liquid	1,250	1.00	0.80	Perox
8	LH Liquid	730	2.67	2.40	HRF

Page 105, Table 167: Nuclear Rockets (correction): Replace the current table with the following:

TL	Type	Thrust (kNm^3)	Price (MCr/m^3)	Fuel (m^3/hr/kN)	Fuel Type
7	NTR	80	8.00	5.94	LHyd
8	NTR	100	10.00	5.90	LHyd
8	Advanced NTR	120	12,00	4.17	LHyd
8	Exp. Fusion	30	3.50	0.0072	LHyd
9	GCNTR	50	16.67	2.52	LHyd
9	Fusion	90	0.35	0.0035	LHyd
10	AND	1,100	0.80	0.034	D/T water

Exp. Fusion (experimental fusion) is available late TL-8. AND is the Advanced Nuclear Drive, a low-efficiency, high-performance lightweight fusion rocket using tritium-enriched heavy water, for use in missiles. The exhaust (and the whole engine after more than a few seconds of firing) is moderately radioactive; it can only be used in expendable vehicles. Missiles using this drive are "kicked" a few tens of meters away from the launching ship by the launcher or by an explosive charge in the launch canister.

Page 105, Table 168: Exotic Drives (addition): Arcjets are similar to Ion Drives but use a lower density propellant and require more electrical input. Arcjets require a surface of 6m^2 per m^3.

TL	Type	Thrust (kN/m^3)	Mass (t/m^3)	Price (MCr/kN)	Fuel Rate (m^3/hr/kN)	Fuel Type	PowerIn (MW/kN)
7	Arcjet	1.50	5	0.04	3.5	LHyd	20.0
7	Arcjet	2.54	5	0.04	0.5	Liquid Ammonia	10.4

Page 106, Table 171: Thrust Options (correction): The AZH (rocket mode) thrust type should have a fuel consumption of 2.4m^3/kN/hr (an increase of x112 from turbojet mode per m^3 of engine).

Page 106, Table 173: Rocket Fuels (correction and addition): The table name should be "Table 173: Rocket Fuels". The density of HRF should be 0.33. The values for D/T water do not appear on the table; it has a density of 1.167 t/m^3 and a cost of 20,000 Cr per m^3.

Page 107, Table 180: Weapon Stabilization (correction and clarification): The Price heading should be (kCr) rather than (MCr). Correctly stated, Mass is in kg per ton of weapon, and Price is in kCr per ton of weapon.

Page 108, Table 184, Computer Power and Price (correction): The price for TL-11 should be 0.05, not 0.29.

Page 108, Table 185: Control Systems (omission): This table was dropped inadvertently. It should read:

TL	Type	Power (MW)	Price (MCr)	Maximum Airframe
4	Primitive Mechanical	—	0.000007	Simple
5	Basic Mechanical	—	0.000015	Fast Subsonic
6	Enhanced Mechanical	0.000015	0.000022	Supersonic
7	Electronic (FBW)	0.000038	0.000038	Hypersonic
8	Electronic Linked	0.000038	0.000057	Hypersonic
9	Computer Linked	0.000038	0.000075	Hypersonic
10	Dynamic Linked	0.000075	0.000112	Hypersonic
13	Holographic Linked	0.000075	0.000150	Hypersonic
17	Synaptic Linked	0.000075	0.000188	Hypersonic
21	Advanced Synaptic Linked	0.000075	0.000225	Hypersonic

All values per m3 of hull automation: all values are for Standard automation. For Low automation, multiply by 0.95. For High automation, multiply by 1.10.

Page 108, Table 189, Terrain-Following Avionics (correction): The volume for TL-9 should be 0.2 and not 0.02.

Page 109, Table 190: Radio Communicators (correction): The price for 1,000AU should be 150 kCr, not 0.15 kCr.

Page 109, Table 194: Range Factors (correction): The Range Factors should change from a range of 9 to 17 to a range of 3 to 11.

Page 109, Table 195: Detection Probability (correction): Replace the existing table with the following:

Signal	Active Detection Task	Passive Detection Task
<0	(target cannot be detected under any circumstances)	
0.0	Impossible (5D)	Impossible (5D)
0.5	Average (2D)	Staggering (4D)
1.0	(automatic detection)	Average (2D)
1.5	(automatic detection)	Easy (1D)
2.0	(automatic detection)	

Page 109, Table 196: TL8-9 Scanners (correction): Sensor Mass should be 1 ton/m^2, not 1 ton/m^3.

Page 109, Table 197: TL8-9 Trackers (correction): The existing table should be replaced with the following:

			Areas by TL (m^2)		Resolution
Sensitivity	Max Range	Diameter	8	9	at 50,000km
13	50,000	1.5	2.0	1.0	20m
13.5	150,000	5.0	20.0	10.0	5m
14	500,000	15.0	—	100.0	1.5m
14.5	1,500,000	50.0	—	1000.0	0.5m

Sensor Mass should be 1 ton per m^2, not 1 ton per m^3.

Page 110, Table 198: PEMS Arrays (correction): Change the Firing Range column to read as follows:

Sensitivity	Firing Range (km)
12.5	50,000
13.0	160,000
13.5	500,000
14.0	1,600,000
14.5	5,000,000
15.0	16,000,000
15.5	16,000,000
16.0	16,000,000

Mass is 1 ton per m^2, not per m^3. Power is 0.001 MW per m^2, not 0.001 kW per m^2.

Missing Footnote: The "*" indicates "limited by diameter". PEMS 15.5 and 16 may be built with larger than listed diameter; multiply resolution and maximum range by (diameter/300m), to a maximum of x3 for PEMS 15.5 and x10 for PEMS 16.

Page 110, Table 203: LIDAR, (correction): The table should be replaced with the following:

		Area by TL (m^2)				
Sensitivity	Range (km)	8	9	10-11	12-13	14-15
13.5	50,000	0.5	0.2	0.1	0.1	0.05
14.0	200,000	1.6	0.6	0.3	0.2	0.1
14.5	500,000	5.0	2.0	1.0	0.6	0.5
15.0	2,000,000	—	6.6	3.3	2.5	2.0
15.5	5,000,000	—	20.0	12.5	10.0	6.0

Page 110, left bottom of page, Table 204: Converting to FF&S1/QSDS/SSDS (correction and addition): The table was mislabeled, and was replaced when Bruce Alan Macintosh introduced his "Definitive Sensor Rules". The tables below should replace it.

TABLE 204A: PASSIVE SENSOR CONVERSION TABLE

FF&S Range (hexes) or T4 Rating	Sensitivity
0.01-0.1	13.0
1-2	13.5
3-4	14.0
5-6	14.5
7-8	15.0

TABLE 204B: ACTIVE SENSOR CONVERSION TABLE

FF&S Range (hexes) or T4 Rating	Sensitivity
0.01-0.1	11.5
1-7	12.0
8-16	12.5

TABLE 204C: LIDAR SENSOR CONVERSION TABLE

FF&S Range (hexes) or T4 Rating	Sensitivity
1	13.5
2	14.0
4	14.5
6	15.0
8-16	15.5

LIDARs are considered "Trackers", and can only be used for fire control locks or for maintaining contact with previously detected targets.

Page 110, Table 204d: Active Jammer Table (omission): Insert the table with details for Active Jammers.

	Range Area by TL (m^2)				
	8	**9**	**10-11**	**12-13**	**14-15**
11	500	100	50	25	10
12	5,000	1,000	500	250	100
13	50,000	10,000	5,000	2,500	1,000
14	—	100,000	50,000	25,000	10,000
15	—	—	—	—	100,000

Active area jammers have area given by the above table. They have a volume of 5m^3 per m^2, a mass of 2 tons per m^3, and require 5 MW per m^2. They cost MCr 5 per m^2. Active deceptive jammers have one-tenth (1/10) the area given above. They have a volume of 2m^3 per m^2, a mass of 2 tons per m^3, and require 0.1 MW per m^2. They cost MCr 5 per m^2.

Page 110, Table 204e: Passive Jammer Table (omission): Insert the table with details for Passive Jammers.

	Range Area by TL (m^2)				
	8	**9**	**10-11**	**12-13**	**14-15**
13	1	0.5	0.2	0.1	0.1
14	10	5	2	1	0.5
15	100	50	20	10	5
16	100	500	200	100	50

PEMS jammer volume is 2m^3 per m^2 of area. Mass is 2 tons per m^2. They require 0.1 MW per m^2 and cost MCr 5 per m^2.

Page 110, Table 205b: Vehicle Active Sensors (omission): Insert the table for Vehicle Active Sensors.

Sensitivity	Area by TL (m^2)					Typical Range
	8	**9**	**10-11**	**12-13**	**14-15**	
6.5	0.05	0.025	0.01	0.005	0.002	16
7	0.1	0.05	0.025	0.01	0.005	50
8	0.25	0.10	0.05	0.02	0.010	160
8.5	0.5	0.20	0.10	0.05	0.025	500
9	1.0	0.50	0.20	0.10	0.050	1,600

Sensor volume is 1m^3 per m^2 of area at all TLs. Mass is 2 tons per m^3. Power required is 0.05 MW per m^2. Price is MCr 1 per m^2.

Page 111, Table 208: Life Support A, Minimal (correction): The entry for I (Minimal) should read, "0.001", "0.002", "—", and "0.0002".

Page 111, Table 209: Life Support B, Price (correction): The correct price listing is below. Mass should be (t/m^3) and Power (MW/m^3).

TL	Type	Price (MCr/m^3)
5	Oxygen tanks & masks	0.01
8	V-a (Endurance)	0.1
9	V-b (Endurance)	0.2
10	V-c (Endurance)	0.5
10	V-d (Endurance)	1.5

Page 111, Table 212: Food Storage (clarification): The volume required for food is included in the Food Storage volume. For example: A 2.4 m^3 TL-8 refrigerator will store 2 m^3 of food internally; in other words, the food space is included in the 2.4 m^3 volume. This seems both reasonable and consistent with an actual TL-8 refrigerator

Page 111, Table 215: Power Plant Scale Efficiencies (correction): On the fourth row of the table, the Min Volume multiple of x1,000 is incorrect; the multiple should be x10,000.

Page 111, Table 217: Fission Power Plants (correction): To match the text on page 81, the fuel rate should be changed from (m3/MW/hr) to (m3/MW/Yr).

Page 112, Table 222: Fuels (addition): To support fuel cells and other chemical power plants, add LOX to the table data:

Type	Density (t/m^3)	Cost (Cr/m^3)
Liquid O2 (LOX)	1.14	35

Page 112, Table 223: Accumulators (clarification): It is useful to remember from page 58 that one cubic meter of accumulators masses 2 tons and costs MCr0.01.

Page 112, Table 226: Photoelectric Cells (correction): The unlabeled mystery table located just underneath Table 221 is Table 226: Photoelectric Cells. The correct table headers should be: (MW/m^2) (t/m^3) (MCr/m^3) (m^2/m^3).

EMPEROR'S VEHICLES (1730, 1996)

The vehicles appearing in this book were not published with any tech level details. A general tech level range can be inferred based on each vehicle's fuel source: Steam TL 2-4, Battery TL 5-7, Hydrocarbons TL 5-8, Power Cell TL 6-10, Solar TL 7-12, Power Grid TL 9-12, Fusion TL 9-11 (deuterium) or TL 12-16 (liquid hydrogen), Fusion+ TL 10-15 (heavy water).

MILIEU 0 CAMPAIGN (2002, 1996)

This book is really a combination of the original *Milieu 0* (1400) and *First Survey* (1410) books, with some additional material (Chapters 9 – 12). As a result, the book has the same data problems as *First Survey*. The attached First Survey Data document was released to correct these issues, however the Gushemege data may not fit with *The Long Way Home*. Referees may wish to use the CORE, Sunbane or DGP datasets and roll canon back to produce comparable data.