
Star Frontiers 2016:
Zebulon Sunset
Combat Rules:
Ranged Weapons,
Melee and Vehicles

Star Frontiers

The **Star Frontiers** role-playing game was originally published in 1982 by TSR Hobbies, Inc. of Lake Geneva, WI. The game was written by the TSR Staff and edited by Steve Winter with cover art by Larry Elmore. It was distributed with a basic game and an expanded RPG game called Alpha Dawn.

Designed by Douglas Niles and published in 1983 by TSR, **Knight Hawks** was a supplement to the Star Frontiers game. It provided a board game to conduct starship combat as well as supplemental role-playing rules.

Zebulon's Guide to Frontier Space, Vol. 1 was first published in March 1986 by TSR, Inc. and was edited by Kim Eastland. This was meant to be the first of several books to update the Star Frontiers game, but ended up being the last officially published supplement.

Star Frontiers 2000: Is a Star Frontiers Community Project developed by Andy Campbell, Craig Cavalieri, Roy Crisman, Tim Carrier, Albin Johnson, Brad McMillan, Timothy Norris, Layne Saltern, Troy Terrell, Clark Valentine, Vandi Williams and others that was released January 10, 2001. It is a fan-created effort to convert the Zebulon rules to more of an Alpha Dawn hybrid system.

Star Frontiers

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Introduction

This booklet is intended to update the Star Frontiers 2000 project by providing the Alpha Dawn combat rules along with a comprehensive inclusion of various optional rules for ranged weapon, melee and vehicle combat that were published in the Dragon, Ares, Polyhedron, Star Frontiersman and Frontier Explorer magazines. It also attempts to translate some of the rules of Zebulon's Guide, such as those for Area Effect Weapons, into the Alpha Dawn system.

Any sections that expand upon the Alpha Dawn combat system will be listed as optional.

Joseph Paul Cabadas

March __ , 2017

Cover art from the Basic Game.

Section I. General Combat Rules

In a perfect world, nobody would fight.

People wouldn't die of blaster wounds, creatures wouldn't attack even if provoked accidentally, and robots would never be programmed with the ability to seek out intruders and shoot to kill. Fortunately for the fun of the players, STAR FRONTIERS isn't such a perfect world.

These combat rules are based on the system presented in the original Alpha Dawn game. They have been supplemented with information with information from *Zebulon's Guide to the Frontier* and other TSR magazine and fan-created articles.

This booklet is separated into thirteen sections including:

- General Combat Rules
- Ranged Combat
- Grenades and Thrown Weapons
- Melee Weapons
- Combat with Animals, Robots and Remote Weapons
- Defenses
- Character Damage and Healing
- Vehicles and Vehicle Combat
- Flying Movement and Combat
- Tanks a Lot: Expanded Vehicle Combat
- Water Craft and Other Transportation
- Area Effect Weapons
- Critical Rolls: Optional Ablative Damage Rules

Illustration from Zebulon's Guide to the Frontier, Vol. 1, remastered.

Some weapons, such as a knife, could be both a melee weapon and a thrown weapon. The Weapons Charts are an essential tool for conducting combat.

The Combat Turn

When the players find themselves in a combat situation, the referee starts keeping track of time in combat rounds, or turns. Each turn is approximately six seconds long, thus there are ten such turns in a minute.

During his turn, a player's character can try to do anything that could normally be accomplished within six seconds of heart-racing adrenalin-pumping time.

Examples include running, firing at an opponent, reloading a weapon, take careful aim to improve your chances of success, dive for cover, or even multiple actions like dodging and attacking or attacking with multiple weapons.

Don't forget, just because your referee is incrementing time in the form of six-second combat turns, that doesn't mean you can't attempt non-combative actions, such as swinging on a rope or leaping a pit, or even working on hacking a security system while your teammates keep the security bots busy.

How Many Actions Per Turn[1]

Some equipment in Star Frontiers can be easily activated by a character within seconds, such as jaw-tension mechanisms. But this may give a character an unreasonable number of actions in a turn.

Referees should keep several factors in mind when dealing with these items.

Since a turn is only six seconds long, if a character tries to move, fire a weapon, activate a helmet weapon, and survey all the action around him, something is going to suffer.

Remind players that combat, surprise, fear, and so forth confuses players. It is not a simple case of listing all you want to do in six seconds.

Use your best judgment in these cases while remembering that a half dozen action per turn is just too much for anybody.

Combat Sequence

The sequence of events in combat is outlined in the Combat Sequence Table.

This is the basic form of combat, and situations may arise which violate the normal flow, depending on referee fiat.

However, in fairness to the players, referees should only deviate from this sequence when vital to the story or when situations demand a change.

Combat Sequence Table

1.	Check to see if characters are surprised.
2.	Roll for initiative. Throughout this section, the side that gets initiative will be called side A and the side without initiative will be called side B.
3.	Declare what each character will do. Side B declares first, so Side A can decide what to do in relation to the anticipated moves of Side B.
4.	Side B moves. Characters on side A may be able to shoot at opponents who move through their field of fire.
5.	Side A moves. Characters on side B who did not move may be able to shoot at opponents who move through their field of fire.
6.	Side A resolves any wrestling attempts, remaining weapon fire, grenade tosses and melee. Wrestling attempts are resolved before other types of attacks.
7.	Side B resolves any remaining attacks.

Surprise

If there is a chance characters will be surprised by an attack, the referee should let characters make Intuition checks.

The referee must decide which characters get to make checks. For example, only the last character in a marching line has a chance to notice a sneak attack from behind.

If a character fails the check, he does not suspect anything and will be surprised.

When a character or group is surprised, it automatically loses initiative for the first turn of combat and can do nothing that turn except move and take cover.

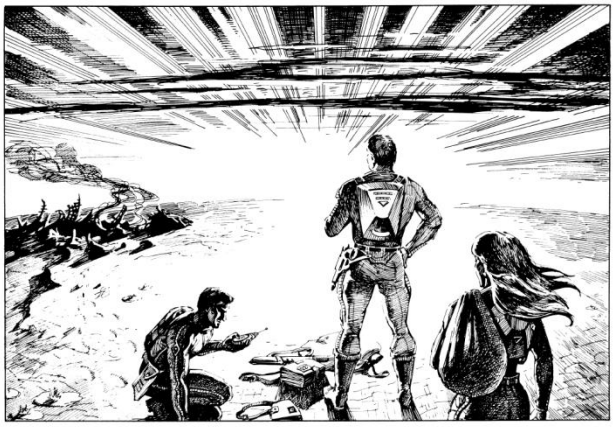
If a character passes the check, he notices something unusual: footsteps behind him, a gun barrel poking around a corner, or anything else appropriate to the situation. The player must decide how to react to this information. If he makes a bad choice, he may still be surprised.

For example, a group of adventurers is driving down a dirt road with tall grass on both sides. Suddenly, a flock of flying lizards takes off ahead of the vehicle and flies away.

The characters decide the animals were frightened by their Explorer and continue driving. Within moments, a group of rebels hidden in the fields opens fire on the ATV.

[1] This section comes from the remastered version of “Zebulon’s Guide to the Frontier, Vol. 1” on page 59.

Spotting Distance/Visibility



Dawn on Volturnus.

When characters have an encounter, one factor that will affect whether they can be surprised is how far they can see. A character standing on flat, level ground can see a man-sized object up to 1 kilometer away, but cannot see any details about the object.

A character can see details at a distance of about 0.5 km. Binoculars, magnigoggles and telescopic sights will multiply these distances by three. Weather conditions such as fog, rain, blowing dust or heat shimmers can reduce these distances to half or less.

A character can see farther if he climbs to a higher elevation, but the distance at which he can see detail does not change with elevation.

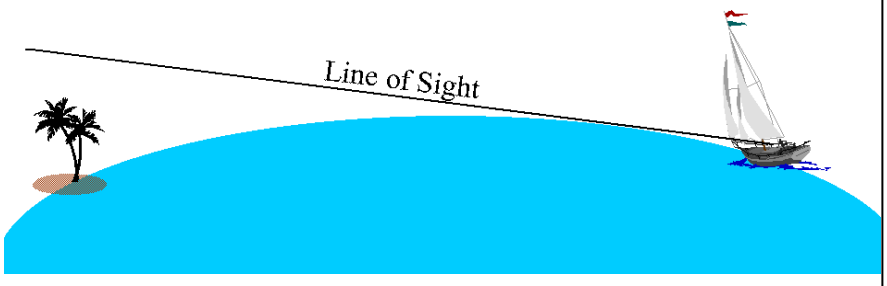
For example, on Earth the surface curves out of sight at about a distance of 5 kilometers (3.1 miles) but the Human eye can discern objects much farther away.

At night, if a character is standing on a mountain, an observation tower or flying in an aircraft, he can see bright lights hundreds of kilometers away. A character with perfect vision can even see a candle flame flickering up to 48 kilometers in the distance.[2]

A character can see tall buildings, mountains and flying aircraft much farther away than low lying hills or flat islands. On planets with terrestrial atmospheres, refraction also comes into play where an object further away from the horizon can be visible.

The effects of refraction vary considerably due to a number of factors including temperature and weather effects. Conditions can change considerably when traveling over water: because of the high heat capacity of water. This means that on two different days with the same temperatures at the eye and the water surface (and, consequently, the same dip), the distance to the horizon can be very different.[3]

Planetary conditions such as forests, tall grasses, intervening hills and valleys and such will also impact how far a character will be able to spot an object. The referee will need to keep this in mind. Dust storms, rain, snow, heat shimmers, smoke, haze and other atmospheric conditions will also play a role.



An example of how refraction affects the line of sight. A 9 meter tall tree can be seen from the boat at a distance of about 10 kilometers. Illustration from http://www.dublerfamily.com/Activity3.html

[2] Wolchover, Natalie. “How Far Can the Human Eye See?” livescience.com, May 7, 2017 02:00pm ET.
[3] “Distance to the Horizon,” http://aty.sdsu.edu/~aty/explain/atmos_refr/horizon.html.

Initiative

One player on each side rolls 1d10 and adds the highest Initiative modifier on his side to the result.

The side with the highest total has initiative and is side A this turn. If the results are tied, the side with the highest modifier has initiative.

If there are more than two teams in a fight, simply add more sides (C, D, etc.) to the sequence as they are needed. The side with the lowest initiative roll always moves first, with the other sides following in order. If only a few characters are involved in a fight, the referee can treat each character as a separate team and have everyone roll their own initiative.

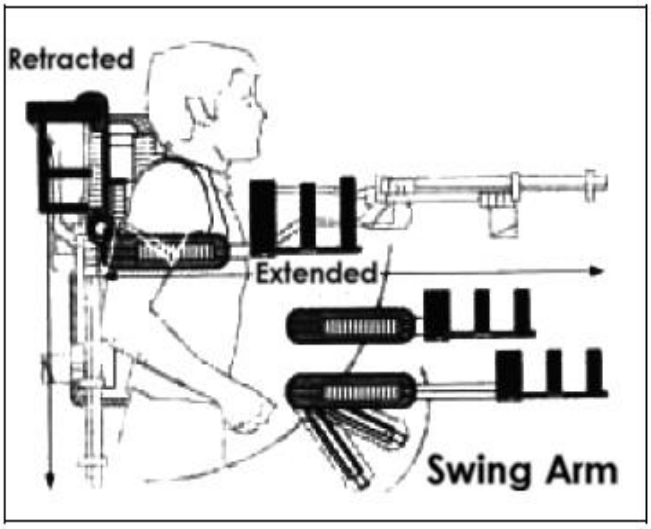
Holstered and Slung Weapons

If a character's weapon is in a holster or slung over his shoulder, the character must subtract 3 from his Initiative modifier when rolling for initiative.

Longer than normal weapons, larger ammunition magazines, or if a character is encumbered by carrying too much weight may subtract 1 or more points from the character's initiative modifier.

If the character is rolling initiative for a group, the modifier applies to the entire group.

If the group is mixed (some characters holding their weapons, some not), then any Initiative Modifier reduction for the group is at the referee's discretion.[4]



The Swing Arm is a robotic device that eliminates the negative initiative modifier for a holstered or slung weapon. From Zebulon's Guide.

Declaration

All characters must decide what they will do at the start of each turn, and declare their intentions before the first move. The referee declares for the characters' non-player character (NPC) opponents.

Side B must declare first, allowing side A to react to side B's moves.

Declarations should be as realistic and specific as possible. For example, instead of saying, "I will throw a grenade," the player should say, "I will throw a doze grenade at the Yazirian, and then duck back behind the rock wall."

If applicable, characters must declare how many shots they will fire, what power settings they will use, whether they will fire a burst, the type of grenade thrown or warhead used on a missile and any other weapon variables that will affect the situation. (See Rate Of Fire, Variable Power Settings, Bursts or other appropriate sections).

If opposing sides in a fight cannot see each other, the referee may ask for declarations before the roll for initiative. This forces players to act without knowing what their opponents will do.

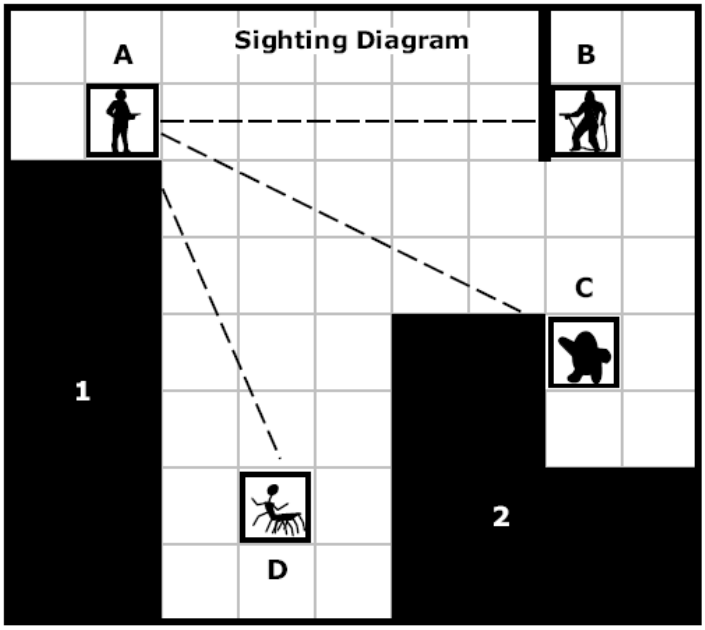
[4] Zebulon's Guide, remastered, p. 5.

Sighting

If the opponents cannot see each other the referee may ask for declarations before the initiative. This forces players to act without knowing what their opponents will do.[5]

A character must be able to see his target in order to shoot or throw a grenade at it. A character can see his target if a straight line from the center of his square to the center of his target's square is not blocked by a building, a cliff or some other obstacle.

If the character is in a position where he can lean around the obstacle to shoot, it does not block his sight. Refer to the following diagram for an understanding of sighting and visibility.



The Human at A can see the Yazirian behind the low wall at B. If the Yazirian crouches behind the low wall, he will be completely hidden from the Human.

The Human cannot see the Dralasite at C because it is hidden by the corner of building 2.

If the Dralasite was leaning around the corner, the Human could see it. The Vrusk at D is blocked from the Human's view by the corner of building 1. If the Human leans around the corner, he can see the Vrusk.

Movement

All movement, whether running, dodging, flying, or in vehicles, is confined to simple modifiers. These modifiers apply to both the target and the attacker; that is, if both the attacker and the target are moving at walking speed, they receive a +0% modifier. But if both are running, the total movement modifier would be -20%,[6]

Moving through Fields of Fire: Characters on side B move first. If a character moves through an opponent's field of fire, the opponent may be able to shoot at him as he moves.

Everything in front of a character is in his field of fire; see Opportunity Shots.

Side A moves after side B.

If a character from side A moves through an opponent's field of fire, and the opponent did not move this turn, the opponent may be able to shoot as the character moves.

Melee Distance: If a character started the turn within 2 meters of an opponent who declared he would attack in melee, the character cannot move. If both characters declare they will attack in melee, the character on side B gets to move into his opponent's square.

Exceptions to this rule would include the Humma's special ability to charge (see Melee).[7]

Dodging: Dodging is a special type of movement. Instead of running straight across an opponent's field

[5] Zebulon's Guide, remastered, p. 5.
[6] Modified text from Zebulon's Guide, remastered, p. 8.
[7] Zebulon's Guide, remastered, p. 5.

of fire, a dodging character ducks, weaves and zigzags through a dangerous area. Dodging makes a character harder to hit, but also slows him down;

Characters who dodge move at one-half their running speed but are considered a fast-moving target on the Ranged Weapon Hit Procedure Table.[8]

Advantage/Disadvantage Modifiers[9]

The advantage modifier is for any condition that is either advantageous or disadvantageous to the attacker.

If the attacker is in a better position than the defender (above or behind him, for example), or if the defender is disadvantaged (encumbered, surprised, stunned, drugged, etc.), the attack gains a +5 to +10 percent bonus for each distinct advantage he has.

Likewise, if the attacker is disadvantaged (in a poor combat condition, surrounded by attackers, encumbered, or groggy himself) or if the defender is at an advantage, then the attacker has a -5 to -10 percent penalty for each distinct disadvantage he has. Advantages and disadvantages are announced by the referee before the dice roll.

Advantage Modifiers	**%**
Defender surrounded	+5
Defender encumbered	+10
Behind or above a defender	+20
Defender surprised	+20
Defender stunned/drugged	+20
Disadvantage Modifiers	**%**
Character surrounded	-5
Character encumbered	-10
Behind or below an attacker	-20
Surprised by an attacker	-20
Character stunned/drugged cannot attack or defend	N/A

Automatic Hits

There are two kinds of automatic hits. The first is an attack that cannot miss. An example of this is a character who holds a gun next to a canister of compressed air and pulls the trigger; there is no way the character can miss the canister. The referee must use his common sense to decide when a shot cannot miss.

The second type of automatic hit happens when a player rolls 01 through 05 on his roll to hit; a shot always hits on these rolls, no matter what the character's modified chance to hit is. Again, referees should be careful to prevent their players from abusing this rule and use common sense to judge these situations. Any roll to hit of 01-02 knocks a character unconscious.

Referees should be careful to prevent their players from abusing the automatic hit rule. For example, it would be ludicrous if it is no harder to shoot an insect at extreme range than it is to shoot a Sathar at extreme range. Some shots are just impossible to make. The referee must use his common sense to judge these situations.

In Melee Combat. Automatic hits include hitting a character who cannot defend himself (one who is being held by another character or is stunned). Anyone attacking a defenseless character gets a +20 percent modifier if the victim is conscious. (Also see “Hitting a Pinned Opponent”).

Any roll to hit of 01-02 knocks a character unconscious.

If the victim is unconscious, the attacker can automatically hit, scoring the maximum amount of damage with a weapon. Players still need to roll, however, because a result of 96-00 on a d100 is an automatic miss.

Exceptions for Area Effect Weapons. Missiles, rockets and cannon rounds normally have safety features built into them where they need to travel a minimal distance before they are armed and do damage. This prevents the attacker from being caught within the blast radius.

[8] Zebulon’s Guide, remastered, p. 5.
[9] Modified from the rules in Zebulon’s Guide, p. 8; many of these modifiers are also listed in the Melee Combat section of the Alpha Dawn rules.

So, even if a character succeeds with an automatic hit, the target may receive insignificant damage (like an artillery shell bouncing off a warbot).[10]

Maximum Damage Option. In addition to knocking out a character, a roll of 01 or 02 also causes the maximum amount of damage to a target. For example, a laser pistol set for 10 SEUs will normally cause 10d10 points of damage but with an automatic hit, it scores 100 points of damage to the target.[11]

Automatic Misses

Any shot will miss on a d100 roll of 96-00, no matter what the character's chance to hit is. This rule applies even to shots the referee has decided cannot miss; the player must roll the dice anyway.

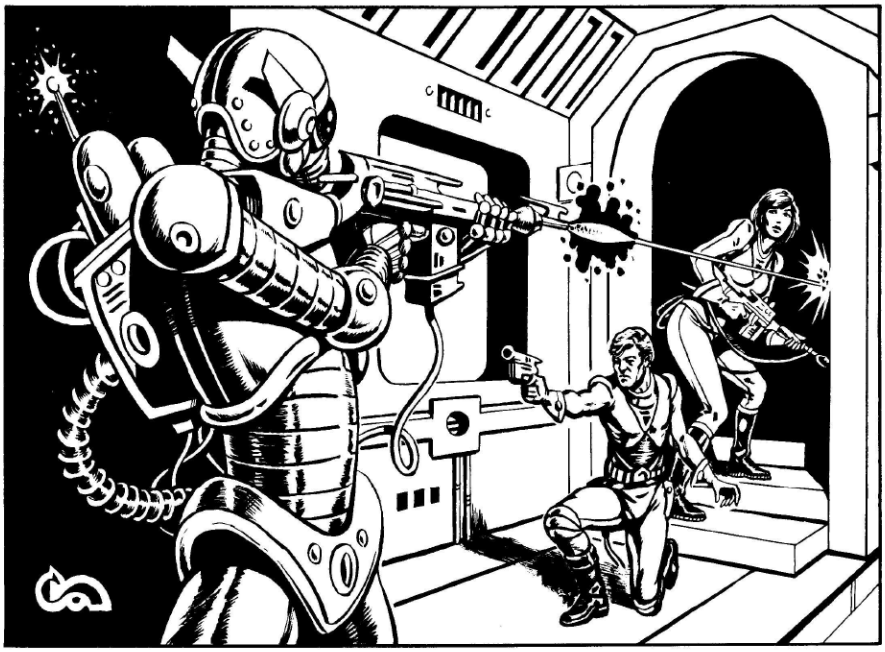
Ranged Combat. When using a ranged weapon, the roll of 96-00 means weapon has malfunctioned and failed to fire.

Melee Combat. Any melee attack will miss on a d100 roll of 96-00, no matter what the character's chance to hit is. This rule applies even to attacks the referee has decided cannot miss. For example, if a character is trying to stab a held opponent, his weapon may have slipped from his hand or struck something on or under an opponent's clothing that deflected the blow.

Area Effect Weapons.With area effect weapons, an automatic miss can mean anything from a missile warhead fails to detonate (a dud), an artillery round going wildly off course and striking friendly units, or a bomb being "hung-up" on a bomb rack, which could then fall off at the wrong time/wrong place.

Critical Rolls

An alternative method for handling automatic hits and automatic misses will be dealt in **Section XI. Critical Rolls: Optional Ablative Damage Rules**.



Two humans dodge fire from a security robot. Illustration from the module "The Dramune Run."

[10] This is a house rule.
[11] Based on Zebulon's Guide, remasterd, p. 7.

Structural Damage

Examples of the amount of damage caused by ranged, area effect, and melee weapons when they are used against doors, walls or other structures is shown on the Structural Damage Table below.

The structural points of various doors, walls and vehicles is shown on the adjacent Structural Damage Capacity table. This is typically the amount of damage to break through a door, blast a hole in a wall, etc. rather than completely destroying an object.

Structural Damage Table

Weapon	Structural Damage
Projectile weapon (includes automatic pistols, rifles and machine guns)	5 points/shot
Gyrojet (includes pistols and rifles)	10 points/shot
Needler rifle/pistol	no damage
Laser (includes pistols and rifles)	5 points/SEU
Rafflur	¼ damage
Maser	no damage
Bolt	½ damage
Fragmentation grenade (if placed instead of thrown)	15 points 30 points
Micromissile	1d10+4/shot
High Explosive Warhead	½ damage to normal damage
Standard Explosive Warhead	normal damage
Force Axe	1d10+2
Bombs/Artillery Shells	normal damage
Vibroknife	1d4
Javelin or Spear	1d3
Knife	1 point
Sword	1d4 points

***Note**: These are examples of the types of damage that these weapons can cause against normal structures. However, materials that are less dense may take more damage. A structure made from a reinforced or armored material may take less damage or none at all depending upon the referee's discretion.*

Structural Damage Capacity

25+d10	
Heavy Door	Interior Wall
Sign Post	
50+2d10	
Fortified Door	Exterior Wall
Light Vehicle	
100+d100	
Safe	Fortified Wall
Heavy Vehicle	
200+2d100	
Vault	Armored Wall
Armored Vehicle	

A Zuraqqor technician holding an unidentifed beam weapon. Source: Star Frontiersman magazine, issue 18.

Section II. Ranged Combat

Any weapon that can be used to attack someone from a distance is a ranged weapon. In *STAR FRONTIERS* games, ranged weapons include lasers, gyrojets, needle guns, automatic rifles and pistols, needlers, micromissiles, and grenades.

Primitive ranged weapons such as bows and arrows, javelines, spears and knives also can be used.

Ranged Combat Procedure

When attempting to aim or hurl a weapon at an opponent or target, use the checklist to the right to determine your actual chance to successfully hit.

Skill Modifiers

Characters get a bonus on their chance to hit if they have been trained to use their weapon. Characters learn weapon skills by spending experience points for them (see SKILLS).

Skills for beam, gyrojet, projectile and thrown weapons must be learned separately. A character gains a +10% bonus on his chance to hit for each level of skill he has with the weapon he is using.

For example, a character with level 3 beam weapon skill and level 1 P.G.S. weapon skill gets +30% to hit with beam weapons (lasers, sonic disruptors, etc.) and +10%to hit with gyrojet rifles and pistols. A character does not need a weapon skill to use a weapon.

For more information about **Automatic Hits** and **Automatic Misses**, see Section I. General Combat Rules, pages 12 and 13.

Note: Under “Burst Fire” in the Ranged Weapon Hit Procedure Chart the modifier is +20% if using the Alpha Dawn combat rules or +0% if the referee uses the Zebulon conversion system.

Range

If the attacker and his target are at different heights, the range is found by comparing the horizontal distance between them and the difference between their heights. The shorter of these two distances is divided by 2 and added to the other. Their sum is the distance to the target.

Example: A Star Law marksman on the ground is trying to shoot a sniper that is on the roof of a building.

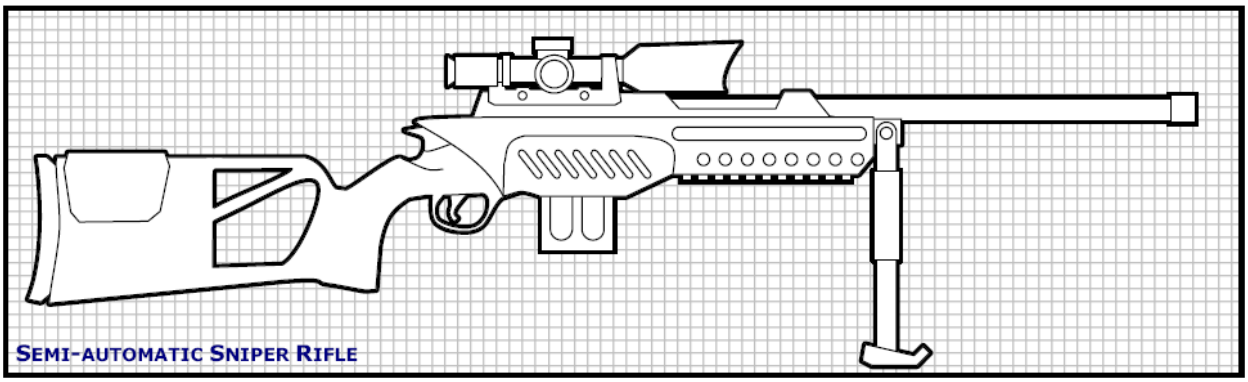
	Ranged Weapon Hit Procedure Table	%
1.	**Basic Chance** to hit equals one half of the firing character’s Dexterity, rounded up. This should already be figured on your character sheet as your RW score.	**½ DEX**
2.	**Skill** adjustments. Add 10% for each level of skill the character has with that weapon.	**+10**
	Per skill level	
3.	**Range** adjustments. This can be reduced by using a telescopic sight.	**+0**
	Point Blank	**-10**
	Short	**-20**
	Medium	**-40**
	Long	**-80**
	Extreme	
4.	**Movement** adjustments (all movement modifiers except “stationary” can be applied to both the target and the attacker):	**+10**
	Stationary (target only)	**+0**
	Walking	**-10**
	Running	**-20**
	Dodging	
	If the target is a running animal, use these animal modifiers.	**-10**
	Medium	**-20**
	Fast	**-30**
	Very Fast	
	If the target (not the attacker) is a moving vehicle, subtract 10.	**-10**
	Target is moving vehicle	
	If the attacker is riding in a vehicle, subtract 10. If the vehicle is moving faster than 150 meters per turn, subtract 20.	**-10** **-20**
	Attacker in Slow Vehicle	
	Attacker in Fast Vehicle	
5.	**Aiming**. Add 15 if attacker is standing still and aiming carefully.	
	Careful Aim	**+15**
6.	**Burst Fire.** Add 20 if firing a burst.	
	Firing a burst of 10 bullets	**+20 (+0)**
7.	**Cover**. Subtract cover modifiers	
	Soft Cover	**-10**
	Hard Cover	**-20**
8.	**Target Size.** Apply target size modifier	
	Tiny	**-10**
	Small	**-5**
	Medium	**+0**
	Large	**+5**
	Giant	**+10**
9.	**Wounds.** Subtract 10 if attacker’s Stamina is reduced to half or less.	
	Attacker Wounded	**-10**
10.	**Prone.** Subtract 5 if target is lying prone.	
	Target prone	**-5**
11.	**Wrong Hand.** Subtract 10 if attacker is	

The marksman is 20 meters from the base of the building, and the building is 50 meters tall.

The shorter distance is 20 meters, and half of that is 10 meters. The range to the target is 50 + 10 = 60 meters.

Telescopic Sights. Telescopic sights, called "scopes," are small telescopes that magnify distant targets, making them easier to aim at. Using a scope lets the attacker use the range modifier for the next closer range; for example, extreme range becomes long range.

Telescopic sights cannot be used at point blank or short range. A character using a scope can fire only one shot per turn. (See the description in the Equipment section for more information.)



A Human-styled sniper rifle with a telescopic scope. Illustration from Star Frontiersman magazine, issue 4.

Careful Aim

A character can get a +15% bonus on his chance to hit if he does not move during the turn and takes only one shot. The character must steady his weapon on some kind of solid surface. If he is shot or hit in melee during the turn, the character loses the bonus. This bonus does not apply to bursts or thrown weapons.

Sniper Rifles. Sniper rifles are weapons with an extremely long range. Two of the most common types of sniper rifles on the Frontier fire projectiles or laser beams. Their targeting scopes often include electronic range determination and targeting guidance, which halves the penalties associated with range. They have folding bipod struts that can be extended in order to steady the aim of the shooter.

Characters who are in the Enforcer Profession (Military PSA) may multiply their weapons skill level times the damaged rolled, but only if the shooter takes two turns doing nothing but aiming at the target.

Example, Harry has a Dexterity score of 50, is an Enforcer (Military PSA) with a level 3 in Beam Weapons. He fires at a target with a laser sniper rifle. The target has soft cover and is at 800 meters, which is long range.

To-Hit: 25 (1/2 DEX) + 30 (level 3) -20 (Long range with scope) +15 (Aiming) -10 (Soft Cover) = 40%

Damage Example: Harry set his rifle to 10 SEU so the damage will be 10d10 x 3 (level). Harry rolls a 51. Multiply that result by 3, 51 x3 = 153 points of damage.[12]

[12] Moore, Larry. “Laser Sniper Rifle,” Star Frontiersman magazine, issue 8, p. 50.

Cover Example Table	
Hard Cover Examples	
■	Brick, stone or metal wall
■	Metal vehicle
■	Large tree trunk
■	Hills, sand dunes, rocks
Soft Cover Examples	
■	Plastic curtain
■	Darkness
■	Smoke or fog
■	Tall grass

Cover

A character has cover if more than half of his body is hidden by a wall, a rock, a clump of bushes or anything else that can protect him from enemy fire or hide him from his opponent's sight.

There are two types of cover: hard and soft. Hard cover will stop or deflect bullets and energy beams. Soft cover hides the character from the enemy, but will not stop enemy fire. Examples of hard and soft cover are listed below.

Sometimes the referee must decide whether cover is hard or soft. For example, a wooden wall that is made of heavy logs is hard cover, but a wooden wall made of thin planks is soft cover.

Darkness does not affect an attack if the attacker is using an infrared or light amplification device. Infrared devices allow the user to see through smoke, haze and fog as well.

Rates of Fire

Some weapons can be fired more than once during a turn. This is different from a burst, which is considered one shot.

Characters must declare how many shots they will fire at the start of the turn.

The attacker must roll to hit separately for each shot.

Examples of some of the common weapons and their maximum rates of fire are shown on the table to the right. Rates of fire for all weapons are shown on the Weapon Tables.

On the Weapons Charts, rates of fire are abbreviated as ROF.

Examples of Weapon Rates of Fire (ROF)	(shots per turn)
Automatic Pistol	3 single shots or 1 burst
Automatic Rifle	3 single shots or 1 burst
Electrostunner	1
Gyrojet Pistol	3
Gyrojet Rifle	3
Laser Pistol	2 (1 if energy setting is changed)
Laser Rifle	2 (1 if energy setting is changed)

Bursts

Automatic pistols and rifles, machine guns and some energy weapons (such as the laser auto rifle from Star Frontiersman magazine issue 7) can fire a burst of 10 rounds/pulses as one shot. A burst can be aimed at up to five adjacent characters in an area up to 10 meters wide, or at just one character. According to the Alpha Dawn combat rules, a character firing a burst gets a +20% bonus to hit.

Optional: While firing a burst covers a greater area, it also severely throws off the attacker's aim. Therefore the two factors cancel each other out with a combat modifier of 0.[13]

Only one die roll is needed to hit all the characters aimed at. If the burst is aimed at one character it causes 5d10 points of damage. If it is aimed at more than one character, it causes 5d10 points of damage plus 1d10 for each additional target. These points are divided as evenly as possible among all the targets.

Any leftover points of damage are lost.

Example: A character fires a burst from an automatic rifle at a group of five pirates charging toward him. All five are hit, so the player rolls 9d10 for damage. The result is 49 points of damage.

[13] The Alpha Dawn rulebook gives a +20

These are divided evenly among the pirates, resulting in 9 points of damage to each. The extra 4 points are lost.

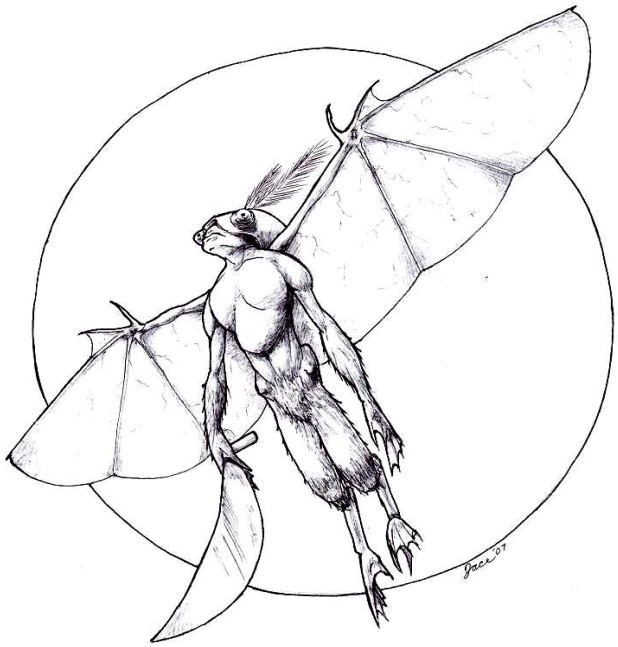
Target Size

Size modifiers apply mostly to animals, but the referee can allow bonuses or penalties for other targets if he wants.

All of the character races are medium sized. The animal size ratings are described in detail in the section on Creating Creatures.

For game purposes. creatures are divided into five different size groups -- tiny, small, medium, large and giant.

- **TINY** creatures weigh less than 5 kilograms. They can be up to 25 centimeters long. The target size modifier is -10%.
- **SMALL** creatures weigh from 5 to 20 kilograms and may be 25 centimeters to 1 meter long. The target size modifier is -5%.
- **MEDIUM** creatures weigh from 20 to 200 kilograms and are 1 and 3 meters long. The target size modifier is 0%
- **LARGE** creatures weigh from 200 to 1,500 kilograms and are between 2 and 5 meters long. The target size modifier is +5%.
- **GIANT** creatures weigh more than 1,500 kilograms and are more than 5 meters long. The target size modifier is +10%.



A Yinni is a tiny intelligent creature that is 25cm tall, with a wingspan of 50 cm, and weighs about 2.2kg. A player firing at one would get a -10% penalty. Illustration from Star Frontiersman magazine, issue 4.

Prone Targets

A character who is lying on the ground is harder to hit than someone who is standing up, so 5% is subtracted from the chance to hit a prone character.

This combines with the soft cover modifier, but not with the hard cover modifier. For example, anyone shooting at a target that is lying prone in tall grass has a -15 modifier to hit. Anyone shooting at a target that is laying prone behind a heavy log has a -20 modifier to hit.

Wounds and Anesthetics

If a character's Stamina has been reduced to one-half or less of his uninjured score, all of the character's attacks have a -10% penalty and the character can fire only one shot per turn. Anesthetic drugs, which reduce pain, will cancel this modifier. One dose of anesthetic lasts five hours.

Optional: There are no modifiers for being wounded. The adrenaline boost from being in a fight counters the character's pain.[14]

[14] Zebulon's Guide, remastered, p. 8.

Firing with the Wrong Hand/Two Weapons

Except for the Vrusk, every “Core Four” player-character race (Humans, Yazarians and Dralasites) have "handedness" – this is either their right or left hand (or paw or pseudopod) is stronger and more coordinated, and is used more often.

If a character shoots a pistol with his weaker hand for any reason, the shot has a -10% modifier.

Vrusk are ambidextrous and can use either hand with no penalty.

Using two weapons at once may seem very heroic to some character, but it still garnishes a negative combat modifier (-10% penalty) in addition to the negative modifier (-10%) for using the wrong hand with one of the weapons if the character is not ambidextrous.

These weapons can be fired at different targets, if the targets are adjacent to each other.

Note that regardless of the number of pseudopods a Dralasite forms, it cannot fire more than two weapons at one time.

Brains only multitask so well.

A Human woman "gun-fu" expert fires two pistols while dodging an assault. Illustration from the Alpha Dawn, remastered rules, p. 82.

Opportunity Shots

Characters can fire opportunity shots while their opponents are moving, if the opponent moves through the attacker's field of fire. Anything in front of a character is in his field of fire.

A character can fire an opportunity shot at a running or dodging target if the target moves at least 5 meters while in the attacker's sight. A character can fire an opportunity shot at a walking target if the target moves at least 2 meters while in the attacker's sight.

Characters cannot fire opportunity shots at targets that are not moving.

A character that declared he would fire two shots during the turn can fire only one opportunity shot. A character that declared he would fire three shots during the turn can fire one or two opportunity shots. A character that declared he would fire one shot, and all characters with weapons that have a rate of fire of 1, cannot fire opportunity shots.

Characters can only fire an opportunity shot when a target is moving through the attacker’s field of fire.

A character that declared he would fire two shots during the turn can fire only one opportunity shot; if they are firing three rounds, they can make two opportunity shots.

Those firing once cannot make an opportunity shot.

Area Fire

Characters who are firing more than one shot during the turn can aim at an area instead of an opponent.

This area can be no more than 5 meters wide. If an opponent moves through the area, the aiming character can fire opportunity shots at him. This tactic is useful if opponents are hidden at the start of the turn.

Shooting at Targets in Crowds

If a character fires a gun at someone who is standing in a crowd, the target is treated as if it had soft cover (-10 to hit). If the shot misses, there is a 25% chance it will hit someone else. The referee decides who the shot hits. This rule also applies to shots at targets that are in melee and attempts to shoot past someone who is partially obscuring a target.

Energy Settings[15]

Certain ranged weapons have energy settings -- the amount of energy used (and damage caused) can be set by the character.

At the beginning of the combat sequence, when a character must declare his intentions, the setting of his weapon must also be declared. The maximum damage is then considered to be the amount listed multiplied by the setting.

For example, a player running a Star Lawman using a Ke-1500 laser long pistol declares his setting to be 8 SEU. The Ke-1500 can cause 1d10+2 points of damage per SEU used. At a setting of 8 SEU, it will cause 8d10 + 16 points of damage.

The energy setting for a weapon can be changed only at the beginning of a turn and the rate of fire for that turn cannot exceed a single shot. More information on variable power settings is included in the descriptions of laser weapons in the Equipment section.

Ammunition and Reloading

Players must keep track of their character's ammunition. Weapons that require powerpacks can be operated from powerclips or from power beltpacks or backpacks. Beltpacks and powerpacks can power other equipment besides weapons, however, so players must keep accurate records on their power supply.

A character can reload a weapon with a fresh clip or attach it to a different powerpack in one turn if he does not run or dodge. A weapon cannot be fired on the turn it is reloaded.

[15] Modified from the rules in Zebulon's Guide, p. 8.

Heavy Weapons

Heavy lasers, sonic devastators, recoilless rifles, grenade mortars and rocket launchers are heavy weapons. When a character fires a heavy weapon, he must subtract 1 from his skill level with that type of weapon. A character with no training for that weapon has a -10 percent penalty.

Example:: A character has level 3 skill with gyrojet weapons and no other weapon skills. He only receives gets a +20 bonus when firing a grenade mortar or rocket launcher, but has a -10 modifier when firing a heavy laser, sonic devastator or recoilless rifle.

Recoilless Rifles, Rockets and Missiles

Recoilless rifles, rocket launchers and missiles are considered heavy weapons, they are also area effect weapons. When a character fires a heavy weapon, he must subtract 1 from his skill level with that type of weapon. A character with no training for that weapon has a -10 percent penalty. Even a character with a missile skill receives the -10 percent penalty.

Remember to subtract 1 level from a character's skill level when firing heavy weapons such as recoilless rifles, rocket launchers, and missiles.

This impacts even characters with a missile skill.

The warheads on these weapons do a varying severity of damage according to the distance an object is from them when they explode.

Even if one of these weapons does not score a direct hit, it most likely will explode somewhere. A referee may need to determine if anything or anyone is in the affected area. In some cases this isn't important.

For example, a rocket that misses a flying aircraft could be considered a complete miss. The effects bomb that misses a fleeing car in the open desert could likewise be ignored. But if the area is populated or has other important structures or items nearby, then such a miss could still have devastating consequences.

An automatic miss means that any detonation is too far away to do any damage to the target or anything else of importance. Otherwise, the attacker must roll 1d10 and consult the Ranged/Dropped Weapon Miss Chart. (This is based on the classic Alpha Dawn Grenade Bounce Chart.)

The referee should determine the distance the missile (or rocket, recoilless rifle shell or bomb) overshot or undershot its target. This gap could be anywhere from 20 to 50 percent of its flight/fall distance. Then check the immediate and secondary blast areas for inadvertent damage.

Saab Dynamics' M4 recoilless rifle. Source: Aviation Week, Oct. 13, 2014, http://aviationweek.com/defense/saab-adds-capabilities-new-recoilless-rifle

Section III. Grenades and Thrown Weapons

Grenades and other thrown weapons such as knives, axes, spears, etc. are treated as ranged weapons when determining hits and misses. A character's chance to hit his target with a grenade equals one-half of his Dexterity score plus ten times his Thrown Weapons skill level.

The only other ranged weapon modifiers that apply to thrown weapons are range, movement, wrong hand and wound modifiers. Other modifiers should be ignored.

Grenade rifles and mortars are not thrown weapons. They are ranged weapons.

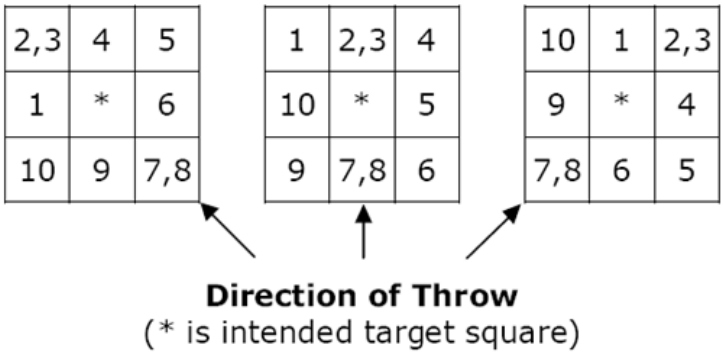
Grenades

A grenade is both a thrown weapon and an area effect weapon. It can be set to explode in one of two ways, either on contact or with its built-in timer. A character tossing a grenade must declare at the beginning of the turn which method he is using.

If it is set to explode on contact, it has no chance to bounce around. If it is set on a timer, or it does not make a direct hit, the referee must use the Grenade Bounce Table.[16]

Grenade Bounces. When a grenade misses its target, it still goes off somewhere. The player should roll 1d10 and check the Grenade Bounce Diagram to see which direction the grenade rolls. The distance the grenade bounces depends on how far it was thrown. The table below shows how far grenades will bounce if they are thrown from different ranges:

Grenade Bounce Table	
Range	**Bounce**
Short	5 meters
Medium	10 meters
Long	15 meters
Extreme	20 meters



Grenade Effects and Blast Radius. Grenades affect areas 6 meters in diameter. Every living creature in the area is affected, but damage is rolled separately for each. This means a grenade can seriously injure one character and have very little effect on others.

Example: A fragmentation grenade explodes and catches three characters in its blast radius. The grenade causes 8d10 points of damage to each character. The first rolls 40 points, the second rolls 63 points and the third rolls only 17 points.

Doze Grenades. Very large creatures cannot be knocked out with only one doze grenade. The number of doze grenades needed to knock out a creature is equal to its current Stamina divided by 50, rounded down (but never less than one). For example, an animal with a Stamina of 120 could be knocked out with two doze grenades. If its Stamina was reduced to 90 by wounds, it could be knocked out with one doze grenade.

Poison Gas and Other Grenades: Similar to dose grenades, poison gas and other grenades (tangler, solid, etc.) will not necessarily affect huge creatures. For example, a poison grenades may not contain enough gas to affect the huge creature's respiratory system. The number of gas grenades needed to

[16] Zebulon's Guide, remastered, p. 11.

A Yazarian equipped with a disc grenade bandolier. It allows the Yazarian +1 IM bonus when using disk grenades (or zamras) due to its fast-use design. It costs 20 Credits. By Tom Verreault, source: starfrontiers.us.

possibly affect a creature is equal to its current Stamina when the grenade his, divided by 50, rounded down (but never less than one.[17]

Refer to the equipment section for the effects of each grenade.

Modifiers

Thrown weapons must be learned separately from other skills. A character gains a +10% bonus on his chance to hit for each level of skill he has with the thrown weapon he is using.

The only other ranged weapon modifiers that apply to thrown weapons are range, movement, wrong hand and wound modifiers. Other modifiers should be ignored.

No Careful Aim. Characters cannot receive a bonus for "careful aim;" it does not apply to thrown weapons.

Rate of Fire. The rate of fire is typically one grenade or other thrown weapon except if the character is throwing something small, such as the sonic marble grenade; up to three such marble grenades can be thrown once per turn.[18]

For more information about **Automatic Hits** and **Automatic Misses**, see Section I. General Combat Rules, pages 12 and 13.

Examples of Thrown Weapons

Some examples of other thrown weapons include the axe, knife, spear, zamra and yazarian disc-grenades. This category also covers some powered weapons including the sonic hammer. Sonic knives cannot be thrown.

Axe. Actually a tool, the axe can be used as either a thrown or melee weapon. If used as a thrown weapon, all the usual ranged weapon modifiers apply. Inertia screens and skeinsuits will halve the damage from an axe.

Knife. This category covers any knife that is big enough to fight with in a melee. If thrown, the usual ranged combat modifiers apply. Inertia screens and skeinsuits will absorb half of the damage caused by a knife.

Spear. Any pole with a knife-like blade on the end is a spear including bayonets and pikes; however, only spears that have been made to be balanced can be effectively used as a thrown weapon. Inertia screens and skeinsuits halve the damage from a spear.

Zamra. This is a traditional Yazarian weapon. Most are metallic discs that are 10 centimeters in diameter with a sharp edge. Yazarians can hurl them at opponents. Some are made of softer material and are meant to be ceremonial or used for nonlethal throwing-and-catching contests but can still cause damage.[19]

[17] Based on Zebulon's Guide, remastered, p. 11.
[18] Zebulon's Guide, remastered, p. 10.
[19] Tracy, William. "The Zamra: Weapon of the Yazarians," Ares Magazine, issue 17, p. 41.

Yazarian Disc-Grenades. The Yazirian disc-grenade is a smallish discus (15cm in diameter) with a curved outer lip. It's able to be thrown with a rapid motion flick of the wrist, hurling it forward to ride on the air. It's made of a lightweight plastic shell with an inner core consisting of gunpowder and fragments of steel and phosphors. It uses the thrower's Thrown Weapons skill, but can be used to throw around corners and bounce off certain solid surfaces in order to get it to where the thrower desires. In the right hands, it can get around defensive barriers.[20]

Sonic Hammer. Produced by WR Industries, the sonic hammer has a blunt side used to wallop opponents. This side also releases a sonic discharge that causes 4d10 points of sonic damage to unprotected opponents. The opposite end has four prongs that will do 3d10 points of damage plus a character's punching score (PS) in melee combat. When thrown, roll a 1d10. If the result is 8+ then the end of the hammer that the attacker desires to use will strike the target. Otherwise, on a result of 1-7, the other end will hit. Characters with a Thrown Weapons skill can add their skill level to modify the result of the die roll.[21]

[20] Logan, Bill. "Yazarian Disc-Grenades," Star Frontiersman Magazine, issue 5, p. 19.
[21] Moore, Larry. "Sonic Hammer," Star Frontiersman Magazine, issue 13, p. 7.

Section IV. Melee Combat

Fighting hand-to-hand or with non-ranged weapons is called melee. Characters must be within 2 meters of each other to engage in melee.

Archaic melee weapons such as swords, axes, and knives are still used quite commonly throughout the Frontier, despite the more deadly weapons like blasters. Some societies even consider it a badge of honor to be highly skilled in such a traditional form of combat.

Basic Chance to Hit

Players can use either one-half of their Strength or one-half of their Dexterity, whichever is higher, as their basic chance to hit in melee. A player need not use the same ability all the time.

For more information about **Automatic Hits** and **Automatic Misses**, see Section I. General Combat Rules, pages 12 and 13.

Number of Attacks

A character gets one bare-hand attack for each arm-leg pair he has.

Hand-to-hand combat.

Humans, Vrusk, Yazirians, Ifshnit, Osakar, and Sathars always get to make two attacks.

Because of their weakened forearms, Humma make only one attack unless charging.

A Dralasite can attack twice if it has four or five limbs, three times if it has six or seven, etc.

Mechanons may have varying types and numbers of attacks depending on their structure and programing. Any character using a weapon in melee makes only one attack per turn.

	Melee Weapon Hit Procedure Table	%
1.	**Basic Chance** to hit equals one half of the character's Dexterity or Strength (whichever is greater), rounded up. This should already be figured on your character sheet as the MW score.	**½ DEX or ½ STR**
2.	**Skill adjustments**. Add 10% for each level of skill the character has with a weapon.	
	Per skill level	**+10**
3.	**Weapon Modifier.** If using a melee weapon, add the weapon modifier from the weapons table.	**Varies**
	Weapon Modifier	
4.	**Helpless.** If the defender isn't able to defend himself because he's unaware of the attacker or because he's stunned, the attacker gets a bonus of +20 to hit.	
	Attacking from behind	**+20**
	Attacking a stunned foe	**+20**
5.	**Battle Rage**. If the attacker is a Yazarian and he is in a battle raging state, ad +20.	
	Attacker Battle Raged	**+20**
6.	**Defender Encumbered.** If the target is currently carrying more than half of his carrying capacity, add 10.	
	Target encumbered	**+10**
7.	**Attacker Encumbered**. If the attacker is currently carrying more than half of his carrying capacity, subtract 10.	
	Attacker encumbered	**-10**
8.	**Wounds.** If the attacker's current Stamina is reduced to half or less, subtract 10 due to injuries.	
	Attacker wounded	**-10**
9.	**Defending.** Subtract 15 if the target is actively defending himself instead of attacking during his turn.	
	Target defending	**-15**
10.	**Apply Damage.** If a melee attack is successful, roll for damage. Apply the punching score to non-powered melee weapons. The effects of armor or screens is then considered. No other modifier.	
	Roll for damage	**+0**

Melee Skills

Melee relies heavily on a character's martial arts and melee weapons skills, they are explained in the character skills section. Any character who has no skill levels in melee weapons or martial arts uses their MW score and suffers a -10 percent penalty. [22]

[22] Zebulon's Guide, remastered, p. 12.

Special Abilities

Battle Rage. Yazirians have the special ability to work themselves into a fighting fury, gaining a +20 modifier on their chance to hit in melee. A Yazirian must roll a number less than or equal to its battle rage score on d100 to enter battle rage. A Yazirian can try to enter battle rage once per combat.

Charge Spring. Humma can spring great distances. This gives them a form of charge bonus in combat. Unlike the other races, which must be within two meters to engage in melee, a Humma can spring up to 25 meters horizontally and, if it lands within two meters of an opponent, make a free melee attack against the opponent. [23]

Damage

The amount of damage a character inflicts with his bare hands (or claws or pseudopods) depends on the character's Strength score. Simply take one-tenth of the character's Strength, rounded down, and that gives you the damage he does when punching. This damage is constant unless the character's Strength improves.This damage is constant.

Punching. The character's punching score should have been determined during character creation but the Punching Score Table is repeated below for ease of use.

PUNCHING SCORE TABLE					
STR	01-20	21-40	41-60	61-80	81-00
PS	+1	+2	+3	+4	+5

Knockouts. As in ranged combat, any roll to hit of 01-02 knocks a character unconscious. In addition, an opponent is knocked out if he was hit with a blunt weapon (including bare hands) and the number that was rolled ended with a 0.

For example, a character is attacking with a club. He can hit his opponent with a roll of 35 or less. A roll of 01-2, 10, 20 or 30 will knock the opponent unconscious. A character that is knocked out will stay unconscious for d100 turns.

Stunning. A stunned character cannot attack, move or defend himself for as long as he is stunned. Anyone who attacks him gets a +20 modifier to hit.

Melee Weapons

Many different weapons can be used in melee. The most common ones are described on the Melee Weapons Table in the Characters equipment section. Some of these armaments can also be used as Thrown Weapons.

The referee can use these as guides if characters use other items as weapons. The "Damage" column shows how many points of damage the weapon causes. The attacker's normal punching damage is added to the amount rolled.

Remember to add a character's Punching Score (PS) to the damage caused by non-powered melee weapons including clubs, nightsticks, brass knuckles, swords, etc. However, characters using modern melee weapons such as shock gloves, sonic knives, sonic swords or stunsticks just roll for damage.

However, characters using shock gloves, sonic knives, sonic swords or stunsticks just roll damage, and do not add their punching score. The numbers under "Modifier" are added to or subtracted from the attacker's chance to hit.

Weapon Modifiers. After each melee weapon on the Weapons table is the "Melee Modifier," which alters a character's to-hit number.

[23] Zebulon's Guide, remastered, p. 12.

Advanced Melee Weapons

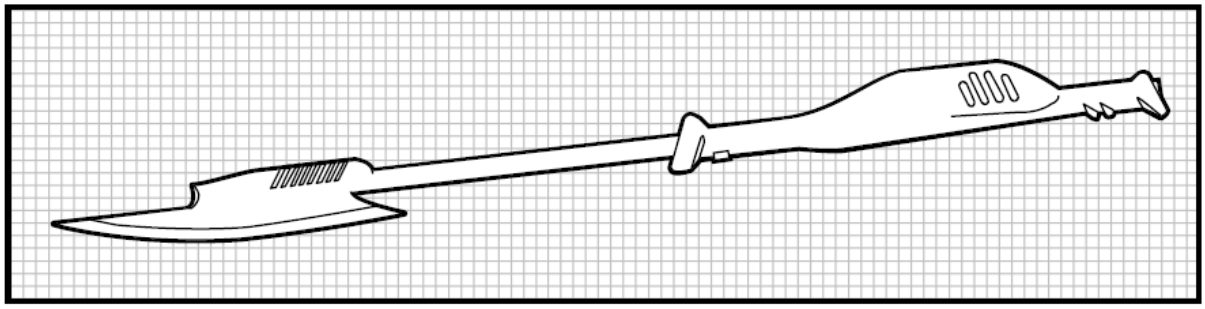
In the Star Frontiers universe, some melee weapons are powered as noted earlier these include electronic swords, shock gloves, sonic knives and swords, stunsticks and vibroknifes. Zebulon's Guide added the force axe while there are other fan-created weapons such as the blast axe, blasthammer, defense rod, sonic hammer, variable sword, and electric and sonic whips.

Remember, the punching score is not added to the damage caused by these weapons.

Many of these melee weapons use either a powerclip or can hook into a beltpack or backpack for power or, as in the case of the defense rod, may also need a fuel charge to use their full effect. Some, such as the blast axe, which can shoot a short ranged laser beam, also double as a limited ranged weapon.

Adjusting the power setting, if one is needed, or replacing a power source takes one turn. For example, the electric sword is a light-weight metal rod that contains a battery in the handle and can either be set to deliver shock or stun damage.

If a weapon becomes depowered, many can be used like a non-powered melee weapon where a character would add his PS number to the damage rolled. Exceptions include sonic knives and sonic swords that have handles, but not physical blades.



A Blast axe is a combination short polearm and light electro-laser. It can be used as a melee weapon or fires an electro-beam that causes 4d10 points of damage. Source: Star Frontiersman magazine.

Special Actions

Besides simply hitting an opponent, characters can try to pin him to the ground, take away his weapon or defend themselves from an attack.

Wrestling. A character can try to grab an opponent and pin him down by twisting his arm, throwing a headlock, etc. Wrestling is resolved after movement but before other attacks. The attacker cannot use a weapon when wrestling. If the attack succeeds, the character can maintain his hold automatically each turn, and automatically inflict points of damage equal to his punching score each turn. However, a 98-00 means the hold slipped. A character can release a hold whenever he wants.

The character who was pinned cannot do anything except try to break out of the hold. To do this he must wrestle his opponent; a successful roll means the character; has twisted free, but has not grabbed his opponent.

A character or creature can only wrestle opponents that are the same size or smaller than itself. Only one wrestling attempt can be made per turn.

Hitting a Pinned Opponent. A character who is being held can be hit by up to two other characters automatically each turn.

Disarming. A character who tries to force his opponent to drop a weapon must make a strike roll to hit with a -20 modifier. If the attack succeeds, the opponent drops the weapon but does not take any

damage. Either character can try to pick up the weapon; doing so requires a d100 roll that is equal to or less than the character's Dexterity score.

Defending. A character who does not attack can defend himself. The player simply declares that he is defending himself, and anyone trying to hit, grapple or disarm him automatically has a -15 modifier on his chance to hit.

Number of Attackers. A character can be attacked by up to three opponents at once, if the opponents are the same size as the character. If the attackers are larger or smaller than their opponents, the referee must decide how many of them can attack at once.

Guns in Melee. A character who is involved in melee can shoot a pistol at an opponent that is in melee with him, but cannot shoot at anyone that is not involved in the melee. Long pistols or short rifles may be fired in melee, but there is a -20 percent modifier. Rifles also can be fired in melee, but there is a -30 percent penalty modifier to hit.

The referee should check to see if any misses hit someone else (see Shooting in Crowds).

Martial Arts. A character with martial arts skills is a better fighter in melee than an unskilled character and adds 10 percent per level to his basic chance to hit with his bare hands in melee. The skill also increases the damage caused by a successful bare-hands attack, adding one point of damage per level.

Martial Arts skill also gives the character three sub-skills: tumbling (how to take a fall), defensive throws and nerve combat. Tumbling reduces damage from falling by -1 point of damage per skill level.

Defensive throwing lets the character inflict damage when breaking out of a hold. When a character with Martial Arts skill breaks out of a hold, he automatically knocks his opponent down, causing damage equal to his punching score.

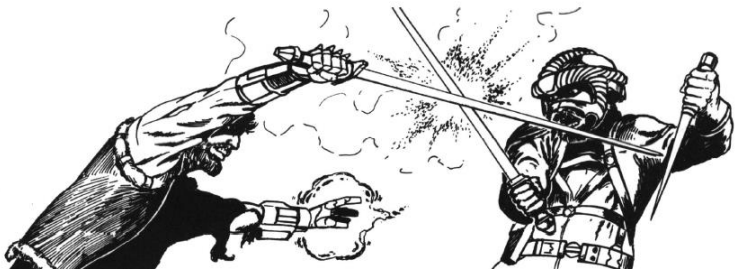
Nerve combat increases the character's chance to knock out his opponent. The opponent must be one of the four major races. The attacker gains a +1 percent chance to knock out the opponent per skill level on each attack. Thus, a character with 4th level skill in Martial Arts and a Dexterity score of 40 would knock his opponent unconscious on a roll of 01-06, 10, 20, 30, 40, 50 or 60.

Weightless Combat. Whenever a character in freefall attacks with a ranged weapon or in melee, he must make a Reaction Speed check. If he fails the check, the character has lost his balance and is spinning out of control. A spinning character can do nothing until he regains control.

To regain control, the character must pass a Reaction Speed check. The character can make a check at the end of every turn, starting the turn after he loses control. If he passes the check, he has regained control and can move and attack on the next turn.

Characters who are wearing magnetic or Velcro-soled boots and characters who are firing beam weapons never lose control.

Characters with the Weightless Combat skill are only required to make a check to maintain control if they roll 98-00 or miss in melee combat. In ranged combat, characters with any level Weightless Combat skill are allowed to use their full weapon skill level, as opposed to half level. In melee combat, characters with the Weightless Combat skill are allowed to use the Weightless Combat skill level and half (round down) of their Melee or Martial Arts (if applicable) level up to the level of Weightless combat.



Section V. Combat with Animals, Remote Weapons, Robots

Fighting Animals

Combat with animals usually will start with ranged combat. If an animal has a special ability that lets it attack from a distance, it follows normal ranged combat rules. If the animal is still alive when it reaches melee distance, the normal melee rules are used.

The various normal animals encountered on alien worlds may include herbivores, carnivores, and omnivores, but the referee is free to create other creatures.

Attack number. All animals are given an attack number, which is their basic chance to hit in melee or ranged combat.

Two Dralasites dodge an attack by a queequeg.

How an Animal Attacks. The referee should decide how the creature attacks, what its chance to hit is and how much damage it causes. If the creature has an unusual attack, the referee must decide its effects. In general, carnivores attack to kill, herbivores attack to protect themselves and omnivores attack for both reasons.

Most creatures can attack only one target, so the amount of damage a creature causes should be a combination of all its attacks.

Unusual Attacks. These include poison, acid, shooting darts and electric shocks. If an attack shoots something it has a range. The referee should record what their effects and limitations are.

Defenses. Any defenses should fit the creature's type and purpose. They may be designed to escape or discourage attackers or protect the creature from damage, and are often adapted to the terrain the creature lives in. Some examples are bounding away from attackers, natural camouflage, a thick hide or a protective shell.

Animal Movement. How fast a creature travels and how it moves is a very important part of combat. Creatures are specially adapted for maximum speed in their native terrain and are not affected by terrain movement modifiers. There are five categories of movement for animals: very slow, slow, medium, fast and very fast.

Player characters fit in the slow category.

- **Very Slow.** Movement is 15 meters/turn or less. The average very slow speed is 10 meters/turn.
- **Slow**. Movement is 16 to 45 meters/turn. The average slow speed is 30 meters/turn.
- **Medium.** Movement is 16 to 75 meters/turn. The average medium speed is 60 meters/turn.
- **Fast.** Movement is 76 to 105 meters/turn. The average fast speed is 90 meters/turn.
- **Very Fast.** Movement is more than 105 meters/turn. The average fast speed is 120 meters/turn.

How It moves. The referee should decide how the creature travels and whether it has any special way to move. A creature might have wings, fins, a prehensile tail or many legs, allowing it to fly, swim, swing through trees or burrow into the ground.

The referee also should note any limits on a creature's movement. For example, some creatures might spend their entire lives in one spot, waiting for their prey to come to them.

Special Abilities. Some creatures have special abilities or adaptations to the terrain. Some examples of special abilities are glowing in the dark, spinning webs, making honey, building crude bridges or homes, changing color or shape, etc. Special adaptations include fur to keep warm in winter, fins to keep cool in the desert, etc.

Creature Encounters

When player characters enter areas keyed on the referee's map that contain beings or plants that are likely to respond to their presence, there will be an encounter. The results of this encounter will depend upon what is encountered and the referee's discretion.[24]

When players are traveling through large areas of unexplored wilderness terrain – on a world that has flora and fauna, the referee should check for random animal encounters once each day and night by rolling a single ten-sided die. A roll of 1 or 0 indicates an encounter.

Animal Surprise Modifiers for Intuition Check	
Creature is in its natural environment	-5
Creature is out of its natural environment	+10
Creature's size is tiny	-10
Creature's size is small	-5
Creature's size is medium	0
Creature's size is large	+10
Creature's size is giant	+15
Creature stalks its prey	-5
Creature lies in weight for prey	-10
Creature is a herd/flock animal in a herd	+15

If the adventurers are on the move and covering a certain distance during the time period when the encounter occurs, an appropriate die roll should be cast to determine what time this happens at. The exact location and terrain can be decided on by the referee.

As noted in Section I, there is a chance that the creature(s) may surprise the characters, requiring an Intuition check. This check would be modified by the terrain and the creature's natural camouflage abilities (if any). For example, a predator stalking a character will know how to move stealthily, but a giant, dinosaur-like herbivore with the bulk to defend itself, may serenely munch on its food, ignoring the characters unless they approach too close or cause a disturbance.

It is important for a referee to play toe roles of creatures encountered in such a way to challenge the ingenuity of the players.

Creature Reactions

A creature's reaction to a character depends on the animal's temperament and what the character does. The creature may be naturally timid, curious or aggressive; it may be hungry, or it might have just eaten. A character can affect the creature's reaction by ignoring it, coaxing it with food, or frightening it with fire, loud noises or flashes of light.

Characters fight a quickdeath on Volturnus.

[24] Ward, James M. and Gary Jaquet, Gamma World, 2nd printing; (TSR Games), August 1978, p. 21

The referee must use his judgment in these cases, but several things to consider including:

Intelligence. Intelligent creatures will not be frightened by a burning torch, clanging frying pans, etc. Creatures with low intelligence, however, might be easily startled or frightened away by these actions.

Experience. A creature is less likely to be afraid of something it has seen before, unless the previous experience was very painful or frightening.

Size. Large creatures often are harder to frighten then small ones. (Also see **Target Size** on page 12).

Type. Carnivores tend to be more aggressive and harder to frighten than herbivores, which tend to be timid. Omnivores tend to be curious.

Temperament. If a creature is naturally aggressive, it may attack creatures much larger than itself with very little fear. Timid creatures try to avoid fighting whenever they can.

Is the creature a loner or a pack/herd/flocking animal? Is the animal hungry, thirsty or sleepy?

Motivation. Any creature that fights has a reason for fighting. Even naturally shy and weak creatures may fight savagely to defend their lair, their territory or their young. Those that are cornered or wounded, sensing that they must fight or die, often fight ferociously and without fear.

Some creatures are not territorial. Others have a large territory, or it changes with the seasons, or its territorial area is only its den or nest. Does it mark or patrol its territory?

Animal Reaction Modifiers Table

Creature is a herbivore

- **Normally timid/skittish**
- **Has strong defenses?**
- **Much smalle/largerr than characters/vehicles?**
- **Characters invading its territory?**
- **Herd animals with bulls or dominant females that defend territory/young**

Creature is a carnivore

- **Predatory/meat eater**
- **Is fed?**
- **Is hungry?**
- **Likes to stalk prey or lie in wait?**
- **Character wounded or disabled?**
- **Character near den/young?**
- **Character doing something to make loud noise, etc. to scare creature away?**

Creature is an omnivore

- **Normally curious**
- **Is fed?**
- **Is hungry?**
- **Character wounded or disabled?**
- **Character near den/young?**

How does a creature defend its territory? These factors could include:

- Only defends against its own kind?
- Defense against one sex only?
- Excludes one type of species or all intruders?
- Only one sex defends the territory?
- When attacking intruders, the creature is content to drive them away?
- Or when it attacks intruders, it will try to kill them?
- Will it will defend its territory until dead?[25]

Other Factors. A referee has to keep in mind a few other factors when determining how a creature will react including:

- A character is alone. This will make carnivores and omnivores even more curious and willing to attack. Herbivores may be more bold too.
- A character is in a group. There can be safety in numbers.
- A character is injured. Carnivores and omnivores will be more willing to go after an injured character – even if the character is in a group. Herbivores may ignore or even trample an injured creature.
- Day/Night factors: creatures more prevalent in the daytime may be sleeping at night and vice versa. The presence of a campfire may keep creatures away, but the presence of food in open or

[25] ExileInParadise. "Social Combat on the Frontier," http://www.starfrontiers.us/node/9592, March 5, 2017, 7:21 p.m.

easy to reach containers will attract some animals such as rodents or even bear-like omnivores.
- Wilderness versus cultivated areas: Creatures in a wilderness will be more bold in their environments but more skittish in regions that have been "civilized."
- Creatures' previous experiences with hunting/weapons/robots and vehicles.
- Characters are riding in a vehicle; the vehicle is much larger or smaller than the creature. While an animal like a Volturnus roller might stampede an explorer that gets too close to the herd, a sand shark would probably ignore a character riding on a hover cycle.

Creature Encounter Reaction Table

Attack	Aggressive Response	Neutral	Timid Response	Flees
Carnivore/Omnivore attacks without warning after lying in wait/silently stalking	Carnivores/Omnivores may stalk characters. If they get close enough, they may attack. May bark/bay/hiss ahead of time.	Carnivores may languish at a spot at a distance. Possibly feeding on a recent kill. Omnivores amble along, possibly coming close with curiosity but no apparent aggression.	Carnivores might be visible at a distance, either walking a parallel track or moving away from characters. Omnivores may make a brief appearance before moving into shelter.	Carnivore may be visible at a distance but will slink away, even leaving a kill behind. Omnivores hide in den
Herbivores: Bulls charge, females kick/scratch/paw/bite, herd animals stampede toward characters	Herbivores: Put on a defense display by hissing, snorting, pawing dirt, etc. Bulls or females may charge at characters from a distance before pulling back.	Herbivores stay put, grazing in the open, but keep a wary eye on characters.	Herbivores visible at a distance. Will keep distance or move away from characters.	Herbivores move/run off soon after spotting characters.

Average Creatures

Average values and ranges for each of the standard creature types are listed below. The referee can use these tables when he needs a new creature quickly.

The scores can be used as they are listed, or modified to produce creatures with above or below average statistics. Special Attacks, Defenses and Abilities are left to the imagination of the referee.

Creature's Ability Scores. Only three of the scores are usually needed for creatures: Stamina, Reaction Speed and the Initiative modifier. When selecting ability scores, the referee should be sure they fit the purpose of the creature.

Intelligent alien creatures should be treated as nonplayer characters. The referee should assign scores for all eight of their abilities and for any special abilities.

A fire locust from Alcazzar.

Herbivores. Normally timid, herbivores will protect themselves if they are attacked. They usually are adapted to avoid or repel attackers. Some, like bulls, may even counter attack. Herbivores are more likely to have weapons like quills, repulsive odors or horns.

Average Herbivore Table					
Type	Tiny	Small	Medium	Large	Giant
Weight	1-5 kg	5-20 kg	20-200 kg	200-1500 kg	1500 kg+
Size	1-25 cm	24cm-1m	1-3m	2-5m	5m+
Number	1-100	1-20	10-100	1-20	1-10
Move	Medium 60 m	Fast 90 m	Very Fast 120m	Fast 90 m	Slow 30m
IM/RS	+8/75	+7/65	+6/55	+5/45	+4/35
Stamina	1-10	5-20	20-100	50-100	100-300
Attack	30	35	40	45	50
Damage	1d2	1d5	1-2d10	1-3d10	2-6d10

Carnivores. Consuming any type of meat, carnivores usually prefer only one kind, such as fish or insects. They almost always have effective natural weapons, such as claws, fangs or poisons. These natural weapons make them more dangerous than most herbivores.

Average Carnivores					
Type	Tiny	Small	Medium	Large	Giant
Weight	1-5 kg	5-20 kg	20-200 kg	200-1500 kg	1500 kg+
Size	1-25 cm	24cm-1m	1-3m	2-5m	5m+
Number	1-50	1-20	1-10	1-5	1-2
Move	Fast 90 m	Fast 90 m	Medium 60m	Medium 60m	Medium 60m
IM/RS	+7/65	+6/60	+6/55	+5/50	+5/45
Stamina	1-10	10-20	20-100	75-200	100-400
Attack	55	65	75	65	55
Damage	1d5	1d10	1-3d10	2-5d10	3-10d10

Omivores. These creatures may or may not be dangerous, but they usually are curious. Many have natural weapons, but these are often less effective than the carnivores' and are used mostly for catching small prey and discouraging predators.

Average Omnivores					
Type	Tiny	Small	Medium	Large	Giant
Weight	1-5 kg	5-20 kg	20-200 kg	200-1500 kg	1500 kg+
Size	1-25 cm	24cm-1m	1-3m	2-5m	5m+
Number	1-20	1-10	1-5	1-5	1-3
Move	Medium 60m	Medium 60m	slow 30m	slow 30m	slow 30m
IM/RS	+7/70	+6/60	+5/50	+5/45	+4/40
Stamina	1-10	5-20	20-100	50-150	150-300
Attack	45	50	55	65	65
Damage	1d5	1d10	1-2d10	1-5d10	2-8d10

Remote Weapons Systems

Besides the possibility of combating other characters, animals and robots, another hazard on the Frontier are remote weapon systems (RWS). These devices are usually controlled by computers using Robot Management programs.

The module “Bugs in the System” offered one such automated weapons turret that the characters needed to overcome. It ws equipped with two laser rifles and a grenade launcher and had 120 structure points.

Another example of a remote weapons system is the Sentry Gun, an automated heavy-weapons platform that is often used for perimeter defense.[26] Once the unit is placed into position, it may be specifically set to monitor targets in infrared or optical, depending on the profile of the target. In particular, targets with thermal or visual profiles, respectively.

To prevent the possibility of casualties by means of “friendly fire,” Sentry Gun’s control unit can be equipped to identify specific Identification – Friend or Foe (IFF) transponders. When a target enters its sensor range, the Sentry Gun will trigger IFF detection, through a coded, radio signal. If the Sentry Gun’s reads are positive, the target will be free to pass; otherwise, the weapon will open fire.

Chance to Hit. An automated remote gun have a basic chance to hit of 30%, plus 10 x the program's level.

Initiative Modifier. A remote weapon system’s IM is its level plus three.

Used by an Operator. A character can also operate a remote weapon system using a computer interface. Generally the base chance to hit is 30% plus 10% for each computer level (or the Security Systems: Activate and Operate subskill).

Features: All RWS systems require a power source, a computer link or a control module, and ammunition for its gun.

Damaging and Destroying A Remote Weapons System

Assume a remote weapons system, such as the sentry gun, has 5 structure points for every kilogram it weighs. They can be mounted with power screens, one coat of spray armor, or skeinsuit-like armored plates.

As with characters, an RWS can only have one energy screen up at any one time.

Whenever a RWS is hit by gunfire, an exploding grenade or a demolition charge, the attacking character must roll 2d10 on the Remote Weapons System Damage Table.

The number of dice of damage caused by the attack is added to the result. This number is modified by the type of RWS. A separate roll is made for each successful attack.

Spray Armor. If the RWS is protected by a coat of spray armor, weapons fire must first burn through its 25 points of protection *before* a player can roll on the damage table.

Remote Weapons System Damage Table

# Dice Damage + 2d10 Roll	Special damage
2-19	No effect
20-21	Turret mechanism damaged, -1 IM, -10% to hit
22-23	Sensor damage, -10% to hit
24-25	Ammunition reloader damaged/power cord struck
26-27	Controller casing cracked, -20% to hit, -2 IM
28-29	Controller Casing broken, gun disabled
30+	Explosion: Battery/ammunition magazine hit (cannot be repaired)

Modifiers	
Target is a sentry gun	0
Target is in a fortified turret	-2

[26] Jackson, Madin. “Sentry Guns,” Star Frontiersman Magazine, issue 5, pp. 17-18.

Explanation of RWS Damage

No Effect. No extra damage was done to the remote weapon system.

Turret mechanism damaged. The RWS receives a -1 point penalty on its initiative rolls while its attack number is reduced by -10%. This effect is cumulative. If the gun's IM or to-hit number is reduced to zero then it cannot fire until repaired.

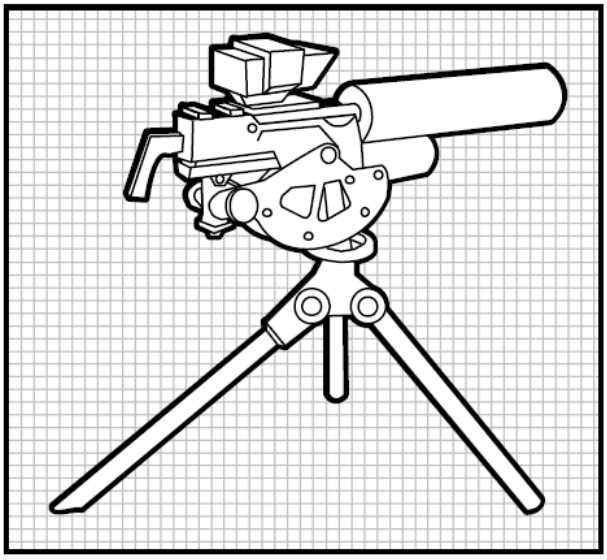
Sensor damage. The weapon system's sensors have been damaged and its attack number is reduced by -10%. This effect is cumulative. If the gun's to-hit number is reduced to zero then it cannot fire until repaired.

Ammunition Reloader Damaged/Power Cord Struck. It the gun turret has an energy weapon, then a power cord was severed. If it relies on ammunition, such as a machine gun, then the reloading mechanism was damaged. It cannot fire. If a RWS has more than one weapon, one of its systems was knocked out of commission. This effect is cumulative. Once all ammo reloaders or power cords are damaged, the unit will not work until repaired.

Controller Casing Cracked. Damage has occurred to the control system. The RWS now has a -20$ penalty and its Initiative Modifier is reduced by 2 points. This effect is cumulative. If the gun's IM or to-hit number is reduced to zero then it cannot fire until repaired.

Controller Casing Broken, Gun Disabled. The casing to the control unit has been breached and the circuitry was heavily damaged. The gun system will no longer work until it receives a major repair, including replacement parts, which may or may not be available.

Explosion. The ammunition magazine was hit, setting off the rounds or the power battery was hit, causing an explosion which will have a blast similar to a fragmentation grenade. If the ammo magazine was empty and/or the unit does not have an internal battery, the hit has complete wrecked the RWS where it is no longer repairable.



This is an example of a remote weapons system called a sentry gun. Weighing 25 kilograms, it can be assembled in 10 turns and can mount one heavy weapon, such as a machine gun, heavy laser or a grenade launcher. Source: Star Frontiersman, issue 5, p. 17.

Robot Combat

Robot Level	To-Hit	Initiative Modifier
1	*40%*	*+4*
2	*50%*	*+5*
3	*60%*	*+6*
4	*70%*	*+7*
5	*80%*	*+8*
6	*90%*	*+9*
7	*100%*	*+10*
8	*110%*	*+11*

As with vehicles and characters, there is a limit to the number of weapons that a robot can handle. Most robots (except the "tin can" style) that have a pair of standard or anthropomorphic limbs can pick up and use normal weapons without penalty.

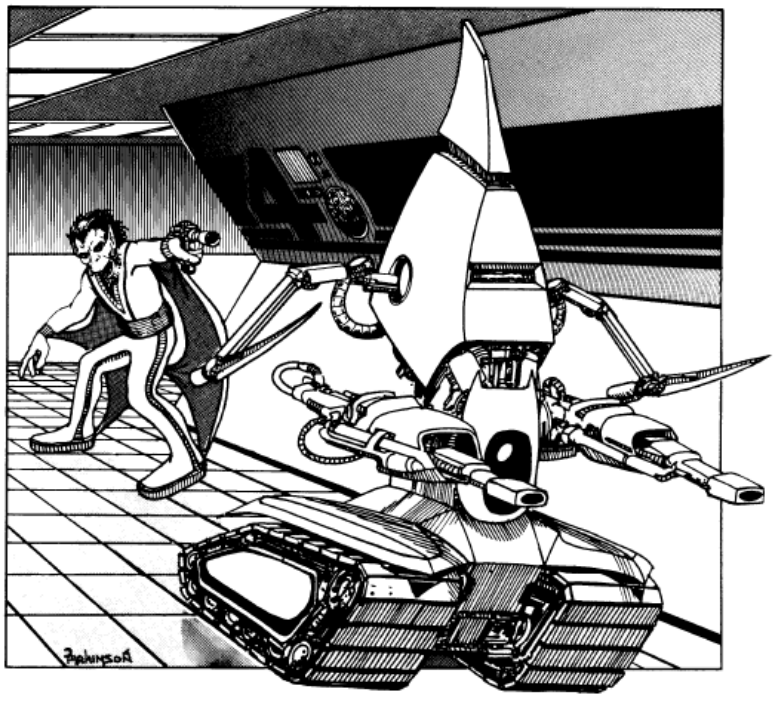
These weapons include grenades, man-portable heavy weapons such as the Ke-5000 (the Alpha Dawn heavy laser) and Ke-6000 (the Zebulon version of the heavy laser that causes slightly more damage per SEU used), a Rafflur M-10, a recoilless rifle, a machine gun, etc. They do get a penalty for firing two weapons.

Chance to Hit. As per the Alpha Dawn rules, a robot's basic chance to hit is 30 percent plus 10 times the robot's level (30% + RL x 10). This is the number used in both ranged and melee combat.

Initiative Modifier. A robot's initiative modifier (IM) is its level plus three (IM = RL + 3). Other modifiers apply as usual.

Robot Melee Attacks. A robot gets one melee attack for every pair of limbs it has. When the robot attacks without a weapon, standard and anthropomorphic limbs cause 2d10 points of damage; heavy-duty limbs cause 6d10 points of damage. If the robot uses a melee weapon, it causes whatever damage is normal.

Robot Ranged Attacks. A robot using a ranged weapon is treated exactly like a character and is subject to all the ranged combat modifiers. However, a robot cannot attack unless it has a restrain, self-defense or attack/defense program.



A Yazarian prepares to fire at a PGC combat robot aboard the Starship Omicron.

Computer Controlled Robots. A computer using a Robot Management program can remotely control the robot's weapon systems. It will have a base chance to hit of 30 percent plus 10 times the program's level (30% + 10 x Prog Level). The initiative modifier is the computer's level plus three.

The controlling computer can override a robot's normal mission parameters.

For example, it could cause maintenance robots that normally are robotic vacuum cleaners to move to block characters or flail their robotic limbs (if so equipped) to cause melee damage.

The robot must be equipped with computer link to be remotely controlled. If the connection is broken somehow – such as jamming the appropriate radio frequency – the robot returns to operating normally.

Character Remote Controlling a Robot. A character can also remote control a robot using a Hand Controller (see "Mutiny on the Eleanor Moraes") or through a computer (see "Dark Side of the Moon"). The remote controlled robot will have a base chance to hit of 30 percent plus 10 times the operator's computer skill (Access & Operate).

The robot being controlled must be equipped with a device (radio receiver/transmitter) that will allow it to be remotely operated. If the connection is broken somehow – such as jamming the appropriate radio frequency – the robot returns to operating normally.

Stealth Technology. Some robots are designed to be practically invisible to most protection equipment. This is over and above using a holographic projector or a sonic ("hush") screen. A stealth robot is practically invisible to most detection devices (70 percent success rate).

Because of its camouflage abilities, casual observers will probably miss seeing it at a distance (an 80 percent chance) even while it is moving. Note, the type of terrain will affect the distance. For example, an observer should be able to see a stealth robot sitting in an open field of low cut grass, in broad daylight at 100-500 meters without a penalty.

Characters trying to target a stealth robot at medium to extreme ranges suffer an additional -10 percent penalty.

Stealth Drawbacks. Once the unit has taken more than 50 percent structural damage, it loses its stealthy abilities until repaired. Repairs are 10 times the normal cost if the owner wants to retain its stealth characteristics. Applying spray armor to a robot destroys its stealth characteristics.

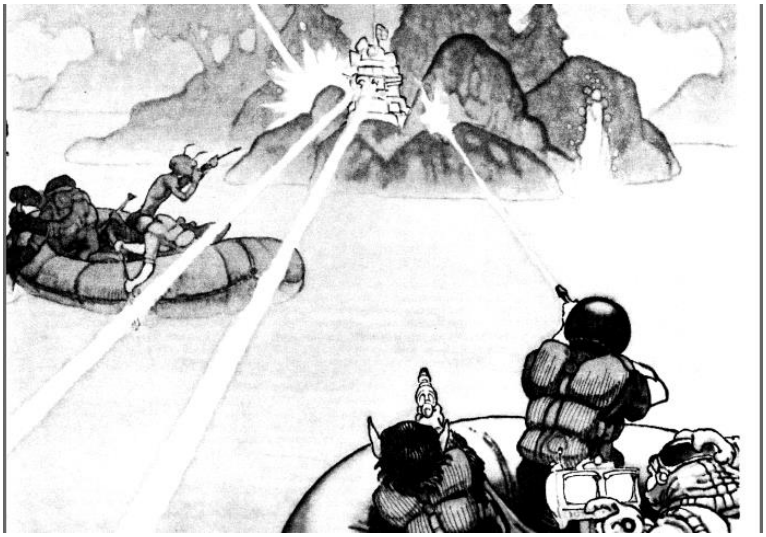
Silent Kill. A stealth robot can use a "silent kill" attack for ranged or melee combat with a basic chance to hit at 20 percent plus 5 times the robot's level (20% + RL x 5). If successful, the robot will cause an extra 1d10 worth of damage to a target while its attack will go unnoticed or unheard by other adversaries in the area.

The robot also has a base 5 percent chance to instantly kill an unsuspecting target plus 5 percent per the robot's level (5% + RL x 5). If the robot uses explosive devices such as rockets, missiles, grenades, etc. it will automatically negate the robot's silent kill ability, though it still has a "first shot" attempt to slay an opponent caught unawares.

Robot Armor and Defense Screens

Robots can be outfitted with the same types of defensive screens and "suits" as characters. In the case of defensive "suits," this is actually a type of armor or albedo paint. The same prohibitions regarding these defense devices – not being able to wear two (or more) different defense suits or use two (or more) different defense screens at the same time – applies to robots like it does to player characters.

Spray Armor: The spray armor found in Zebulon's Guide can also be added to most robots – though this would be difficult if not impossible for many cyborg or android models. Spray armor provides 25 points of protection per layer applied. Any weapons fire that strikes the robot would have to penetrate these added points before



Characters defend themselves from a robot ambush. From: "Mutiny on the Eleanor Moraes."

the robot's structure takes damage.

Each layer of spray armor trims a robot's speed by 15 kilometers per hour (25 meters per turn) per layer for ground and hover robots and by 40 kph (67 meters per turn) per layer for rotor and rocket-powered robots. Note: warbots can have one layer of spray armor without suffering a movement penalty.

Secure Compartments. Some robots – level 3 and above – may have specially-designed, secure compartments for their roboprog circuitry. Reduce the effects by half for any effects from a "brain casing cracked" or "brain casing broken" result on the Robot Damage Table.

Optional: Damaging a Robot[27]

Whenever a robot is hit by gunfire, an exploding grenade or demolition charge, the attacking character must roll 2d10 on the Robot Damage Table. The number of dice of damage caused by the attack is added to the result. This number is modified by the type of robot. A separate roll is made for each successful attack.

Explanation of Robot Damage

No Effect. No extra damage was done to the robot.

Body damage. The robot has a -5% penalt to hit with weapons due to internal damage.

Leg damage. -5 meters/turn on movement (unless robot has alternate movement system, such as rocket movement.)

Arm damage. Attacker can choose the damaged arm or tentacle; the robot has -9% penalty to hit with any weapon held in that arm.

Arm joint damage. Attacker can choose the damaged arm or tentacle; the robot has a -14% penalty to hit with a weapon in that arm, -2 damage for melee attacks.

Arm joints damage. Attacker can choose the damaged arm or tentacle. No weapons may be fired from that arm, no melee attacks.

Robot Damage Table

# Dice Damage + 2d10 Roll	Special damage
2-15	No effect
16-17	Body damage
18	Leg damage
19	Arm damage
20	Arm joint damage
21	Arm joints damage
22	Brain casing damage
23	Leg broken
24	Body cracked
25	Arm Broken
26	Arm joint broken
27	Brain casing cracked
28	Movement center damaged
29	Arm joints broken
30	Body and Brain casing cracked
31	Brain casing broken
32+	Explosion (cannot be repaired)

Modifiers	%
Robot is a microbot	+10
Robot has an ultralight/superlight body	+5
Robot has a light body	+2
Robot has a standard body	0
Robot has an anthropomorphic body	0
Robot has a standard-reinforced body	-1
Robot is a security robot	-1
Robot is a combat robot	-2
Robot has a heavy-duty body	-3
Robot is a warbot	-4
Robot has a heavy-duty reinforced body	-4
Robot has a super duty body	-5

Brain casing damage. There is a 50% chance of robot being stunned for d100 turns (even if A-S implant is installed). When it can operate, it has a -5% penalty to hit with all weapons. Furthermore, there is a

[27] Pamental, Jason and David Packard. "A Shot in the arm: A special damage system for Star Frontiers games," Star Frontiersman, issue 23, pp. 63-68. Originally printed in Dragon Magazine, issue 124, August 1987

20% chance of a malfunction.

Leg broken. Attacker can choose the leg broken. The robot's ground movement is decreased by 10 meters/turn on movement. Otherwise movement is decreased by 5 meters/turn if the robot is using alternate movement system because it has been hit.

Body cracked. The robot has a -10% penalty to hit with all weapons. Movement is decreased by 5 meters/turn. There is a 20% chance of a malfunction.

Arm broken. No weapon can be fired from the arm, -5% to chances to repair it. The attacker can chose which arm or tentacle is broken.

Arm joint broken. Same as arm broken, but a -25% to chances to repair it. The attacker can chose which arm or tentacle is affected.

Brain casing cracked. The robot is stunned for dl00 +20 turns. There is a 50% chance of it being deactivated. When it reboots, the robot has a -10% penalty to hit with all weapons, a 35% chance of a malfunction. A roboticist has a -30% penalty when trying to repair the damage.

Movement center damaged. The robot cannot move, -30% to chances to repair it.

Arm joints broken No weapons can be fired from the arm, -20% to chances to repair it.

Body and brain casing cracked. The same effects as body cracked and brain casing cracked combined. All damage and penalties are cumulative.

Brain casing broken. Automatically deactivated, -20 to hit with all weapons, -20 meters/turn on movement, 55% chance of malfunction, -50% to chances to repair.

Explosion. The powerplant has been hit. Microbots explode with a force of 1d10 points, damaging everyone and everything within a 2 meter radius. Ultralight, Super Light and Light Body robots explode with a force of 3d10 points, with a 2 meter radius.

- Robots with a type 1 parabattery explodes with a force of 5d10 points, with a 5 meter blast radius.
- Robots with a type 2 parabattery explodes with a force of 7d10 with a 10 meter blast radius.
- Robots with a type 3 parabattery explodes with a force of 10d10 with a 10 meter blast radius
- Robots with a type 4 parabattery explodes with a force of 15d10 with a 15 meter blast radius

Characters can make a Reaction Speed check to avoid damage.

Robot Weapons

Helmet Weapons. Except for some anthropomorphic cybots and androids, robots do not wear helmets. However, they can mount some of the helmet weapons found in Zebulon's guide such as the minigrenade launcher or helmet rafflurs on their heads. As with characters, if a robot has a minigrenade launcher mounted, it cannot have helmet rafflurs added and vice versa.

Built-in Weapons. All robots, including androids, might have built-in weapons, some of which may be concealed until they are used. Hand and arm mounted weapons cannot be used if the robot is holding another weapon in its manipulator arms (unless the robot has more than one pair of arms and the weapons are mounted in the secondary pair).

Built-in weapons can be used – without a firing penalty – in addition to any that the robot uses with its manipulator arms. A microbot might be built around a one-shot "holdout" pistol or carry a grenade or an explosive. Super-light, ultra-light, light, standard, standard-reinforced robots can only have up to two built-in and/or concealed pistol-size or melee weapons.

Anthropomorphic robots and androids may have up to four built-in and/or concealed pistol-size or melee weapons (or up to six if an extra set of limbs have been installed). These weapons are often mounted in the hands and/or forearms.

Standard and standard reinforced bodied robots can have up to six built-in weapons (which is equal to the maximum number of manipulator limbs that could be added to such a unit). If the weapons are rifle size or larger, then the weapon replaces a limb but it will have servos so it can swivel around.

Heavy-duty, heavy-duty reinforced and super heavy-duty robots can have eight built-in and/or concealed weapons. These include pistol to rifle to man-portable weapons but not vehicle weapons.

Warbots with heavy-duty bodies can have two small turrets or one medium turret, but they cannot mount vehicle weapons.

Surface mounted weapons are on swivel mounts and have firing arcs – front (F), front and right (F-R), front and left (F-L), front hemisphere (FH), right side (RS), left side (LS), rear (Rr), rear and right side (Rr-RS), rear and left side (Rr-LS) or rear hemisphere (RrH). Even a surface-mounted rifle or grenade launcher will take up the space for one limb.

Warbots with heavy-duty reinforced bodies have 8 hardpoints available for mounting man-portable and vehicle weapons. The weapons can be internally or externally mounted. The warbot can have two turrets – two small, one small and one medium, or two medium turrets. (For an explanation about “hardponts” and vehicle-sized weapons, please go to **Section X. Tanks a Lot: Expanded Vehicle Combat**.

Surface mounted weapons are on swivel mounts that have firing arcs. Small weapons take up the space for one limb; medium weapons take up the space for two extra limbs; and large weapons take up the space for three extra limbs.

Warbots with super-duty bodies have 18 hardpoints available for internal or external man-portable or vehicle weapons. It can have up to four turrets – four small turrets or one medium and two small turrets or two medium turrets or one large and one small turret. Surface mounted weapons are on swivel mounts with firing arcs. Small weapons take up the space for one limb; medium weapons take up the space for two extra limbs; and large weapons take up the space for three extra limbs.

Turrets: Capable of rotating 360 degrees, a top-mounted turret allows the robot to face one direction yet engage an oppenent that is not in the firing arcs of its other weapons. The robot could fire its turret weapons at a second or even third target. Top mounted turrets cannot fire at objects more than 90 degrees above them.

A vertically mounted (side) turret can fire at straight up and straight and straight down, but only 90 degrees in the other direction.

Turrets have motorized components that permit them to rotate and move. Although more expensive than a surface mount, they are popular on warbots.

Since warbots are designed to accept turrets, adding them does not increase the robot’s body cost or weight; the turret still has weight and a cost, however. Turrets added to other models will add 20 percent to their body cost and weight in addition to the cost and weight of the turret.

Internal Turrets: This type of turret is concealed inside the robot’s body until it is needed. Once activated and deployed, it can fire in a full 360 degree arc.

Thus, a warbot could be camouflaged to look like another heavy-duty robot and catch characters unawares until it fires – or until a roboticist successfully uses his identification skill.

For more information about robots, see the story “Robots Rules of Order Revised,” Frontier Explorer Magazine, Issue 17, Summer 2016.

A warbot tank with four legs and a turret mounting a heavy vehicle weapon.

Section VI. Avoidance and Defenses

Avoidance Rolls

Characters can avoid or reduce the effects of some weapons by leaping or twisting away from the attack, or by resisting its effects.

When a character is attacked with one of the weapons listed on the Avoidance Roll Table he gets to make an avoidance roll on d100. If the result is equal to 0; less than the indicated ability score, the character has avoided or resisted the attack.

Avoidance Roll Table

Weapon	Avoidance Roll	Result
Electrostunner	Current STA	No effect
Sonic Stunner	Current STA	No effect
Stunstick	Current STA	No effect
Anesthetic needles	Current STA	No effect
Doze grenade	Current STA	No effect
Tangler grenade	RS	No effect
Fragmentation grenade	RS	½ damage
Incendiary grenade	RS	½ damage

A character who passes an avoidance check against a fragmentation, incendiary or tangier grenade must move 3 meters to get out of the blast area. If the character has nowhere to move to, he cannot try to avoid the blast. A character can try to avoid only one grenade per turn.

Armor

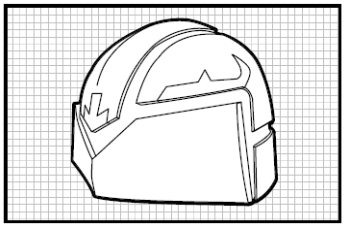
The types of defensive armor are available in STAR FRONTIERS game include helmets, defensive suits, power screens, powered armor, plus shields and archaic armors. Only one suit and one screen can be worn at the same time. There is also a piece of equipment, such as an anti-shock (A-S) implant that helps protect against electrical-based attacks.

Each suit or screen protects the wearer from one type of weapon. The effects of these suits and screens are summarized below. (They are described in more detail in the **Equipment** section.)

Helmets

Helmets come in many shapes and sizes to fit all races. Most are made with modular sections that can be removed to add microphones, goggles, etc. The items in this section can be added to helmets. There are eight ports on a helmet; only one item can be attached to a port. (Please see the **Equipment** section for more information.)

If using the ablative damage rules, helmets play a key role in protecting a character's head.



Universal Combat Helmet.

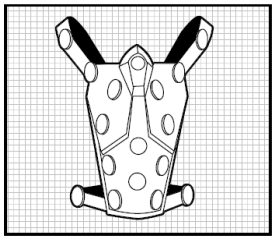
Defensive Suits

Star Frontiers offers characters a variety of different defensive suits that protect against different kinds of weapons. Skeinsuits are probably the most popular for planetary explorations while albedo suits are often used for defending space ships as most projectile weapons have the potential of punching a hole through the hull. A brief description of each suit follows, but more information is in the **Equipment** section. The types of suits include: albedo, skeinsuit, dead suit, duraweave (light and heavy), flak armor, grid suit, insuit, Kevlar Suit (light, medium, and reinforced flak), maser mesh, polyplate (partial and full), shocksuit, sythvelope, security skeinsuits, stealthskin, and the tactical vest.

Albedo Suit. An albedo suit can absorb up to 100 points of laser damage. When it is hit by a laser, the damage is subtracted from the suit's total of 100 points. The suit is destroyed and does not protect the wearer after it has absorbed 100 points of damage.

Skeinsuit. Skeinsuits absorb one-half of the damage caused by projectile and gyrojet weapons, fragmentation grenades; explosives and melee weapons. The suit is destroyed when it has absorbed 50 points of damage.

Dead Suit. A dead suit is a black one-piece synthetic garment that resembles a wet suit. It masks the heat emissions of the character wearing it, thus preventing any IR devices or heat scanners from detecting the wearer.



A detangler harness.

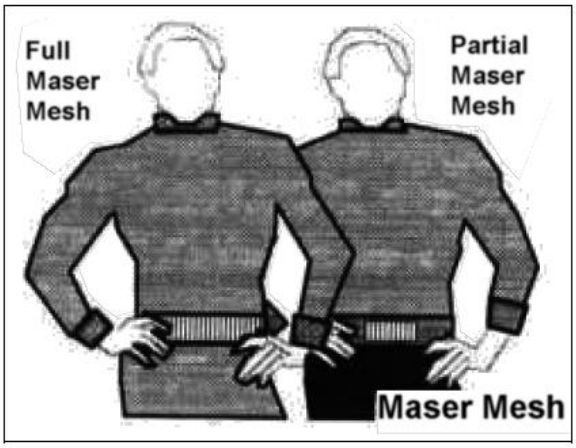
Detangler Harness. In the turn directly following a character being entangled in a tangler grenade's threads, the harness will release a reservoir of Solvaway liquid in an aerosol-like fashion. It has a 75% chance to successfully dissolve the character's bonds, releasing him in the next turn. The Detangler Harness can be worn over conventional protective suits and vests along with being used with screens.[28]

Duraweave. Lighter and more flexible than Kevlar, duraweave reduces the damage by projectile and gyrojet weapons by half. The light suit offers 15 points of defense while the heavy suit offers 25. It is nearly indistinguishable from normal fabric.[29]

Flak Armor. Made of hardened plasti-steel armored pieces, flak armor is more effective against projectiles and explosives than a skeinsuit. It absorbs 3/4ths of all inertia damage, up to 60 points, while the wearer only takes ¼th of the damage. A reflective coating can be added (at an additional 500 Credit cost) that will act as an albedo suit, absorbing 100 points of laser damage. It may be relayered as needed.[30]

Gridsuit. The gridsuit is probably the most unusual, sought after, and expensive of defensive suits. Like skeinsuits, it comes in both military and civilian styles. The suit has a nullifying absorption field circuit that absorbs and dissipates large amounts of energy. The suit can absorb up to 30 points of energy damage per turn from lasers, rafflurs, masers, bolt weapons, and electrical attacks before it allows damage to pass through to the wearer.

If attacks cause more than 30 points of damage in a turn, the excess damage is inflicted upon the wearer. The suit absorbs damage in this fashion every turn. It is destroyed after 100 points of damage are received from projectile or gyrojet weapons.



Kevlar Suit. The primitive forebears of the advanced ballistic fibers used in skeinsuits, Kevlar suits are still found in use on small or low-tech Frontier colonies, among criminals and pirates, and members of militant cults. It will reduce damage from projectile and gyrojet weapons by half and will reduce all other inertial damage by one-fourth. The light suit offers 10 points of defense; the medium suit offers 20 points; and the reinforced flak suit provides 30 points of defense.[31]

Maser Mesh. Maser mesh is used to protect against maser attacks. It resembles chainmail and can be purchased in different sizes.

Full maser mesh, which almost touches the ground, is heavy and a bit cumbersome. While is completely

[28] "New Equipment: Detangler Harness," Star Frontiersman, Issue 6, p. 27.
[29] Campbell, Andy. "Variant Armor Types in Star Frontiers," Star Frontiersman, issue 22, p. 51.
[30] "Flak Armor," Star Frontiersman, issue 9, p. 24.
[31] Campbell, Andy. "Variant Armor Types in Star Frontiers," Star Frontiersman, issue 22, p. 51.

nullifies the effect of maser fire, it is also easily picked up by scanners and radar.

Partial maser mesh, similar in size to a long shirt, is lighter and harder to trace than full mesh, but only absorbs half the damage from masers.

A character wearing maser mesh is vulnerable to electrical attacks and receives an additional 50% damage from them. Maser mesh does not adapt well to unusual Dralasites shapes.

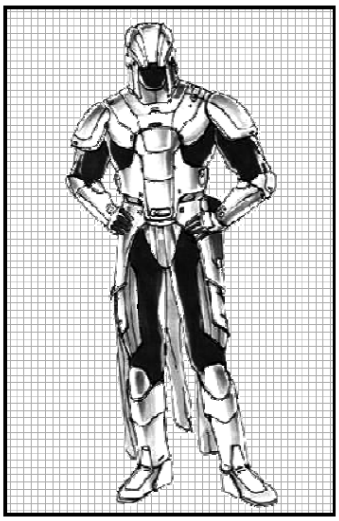
Polyplate Armor, Partial. This armor covers all vital areas with hardened polymer plates, formed and molded to the body. The armor is fitted to the character that wears it, but may be altered in a shop or by a character with a repair machinery skill.

Acting like a combination albedo suit and skeinsuit, partial polyplate absorbs half damage from all beam and physical attacks while the other half gets through to the wearer. Once the suit has absorbed 100 points of damage it stops protecting the wearer.

Because of the restricting nature of the plates, characters wearing partial polyplate Armor have a -5 penalty applied to all Dexterity and Reaction Speed checks.

Polyplate Armor, Full. Like its less protective brother, full polyplate armor is a hardened polymer carapace designed to protect a combatant from harm. Characters protected by this armor take only one-fourth (round down) the damage that should otherwise be applied to them, if that damage comes from a beam weapon or physical/inertial source. The armor absorbs the remaining three-fourths of damage.

The armor can take 250 points of damage before it stops protecting the wearer. Much more restrictive, characters wearing fully polyplate armor have a -10 penalty applied to all Dexterity and Reaction Speed checks.



Full Polyplate Armor.

Shipsuit. Used by spacers, a shipsuit consists of a layer of shock-absorbent gel between two layers of skeinweave integrated into a lightweight exoskeleton. Both the gel layer and the exoskeleton compensate for the effects of high-gee acceleration, allowing for normal manual dexterity and movement under thrust while helping to negate the adverse effects of acceleration.

The layers of skeinweave protect as a military skeinsuit (absorbing one-half of any inertia damage, while the character takes the other half, up to 50 points of damage) and protects the wearer from physical damage, while the built-in exoskeleton provides no additional benefit other than allowing normal movement under thrust.

In the event of decompression, an inflatable hood of clear skeinweave can be pulled up from the back of the suit collar, over the head and back down to the front and sides of the collar, where it can be zipped securely into place. A tank of compressed air at the rear of the suit provides up to ten hours of breathable oxygen. The suit also has a 50 SEU beltpack and uses 1 SEU/turn of operation.[32]

Shocksuit, defensive. This defense suit offers protection against electric shocks delivered by stunsticks, electrostunners, shock gloves, electric swords, etc. It will even fully protect a character from the effects of an electrical discharge warhead. If the character is forced to make a Stamina check from an electrical-based stun attack (any attack that lists A-S/Gauss as a defense), that energy gets harmlessly dissipated. Each time the suit protects the wearer, it takes one point of damage. After it takes 10 points of damage it is rendered useless.

Shocksuit, offensive. This acts similar to the defensive shocksuit, but it also is powered by a 20 SEU powerclip allowing the wearer to release a corona of electrical energy around him. Any living being

[32] Signs, William. “It’ll Ride Up With Wear: Additional Suits for Star Frontiers,” Star Frontiersman, issue 9, p. 23.

touching the character at this time will need to make a Stamina check or fall unconscious unless they are protected by an anti-shock implant, gauss screen or another shocksuit.[33]

Synthvelope. A sythvelope suit is a synthetic one-piece envelope that absorbs the damage from proton beam weapons (rafflurs). For each point of damage absorbed, the suit receives one point of damage. When it has accumulated at least 100 points of damage, the suit becomes useless.

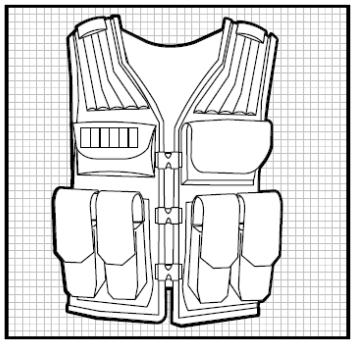
Security Skeinsuit. Designed for function over form, security skeinsuits are not camouflaged ike a military suit, nor are they designed to conceal their existence, such as a civilian suit. They protect against ballistic and melee attacks, with half of the damage affects the wearer while the suit absorbs the other half. The suit continues to help the wearer until it has absorbed 25 points of such inertial damage, then is too ripped up/damaged to continue protecting its wearers.

Stealthskin. Sometimes direct protection against physical or energy damage isn't as important as just avoiding detection. The best defense for an attack is simply not to be attacked.Stealthskins are made of a special fiber that makes no noise when it rubs together.

When wearing a Stealthskin, the character is permitted to use the Stealth and Concealment subskills of the Environmentalist skill as if he were a Level 1 Environmentalist. If the character already has the Environmentalist skill, he can make amazing use of this fabric and gets a bonus of +10% to both of these skills.

If a character sustains more than 25 points of personal damage, or is encumbered with gear (carrying more than half his STA score in kilograms) the Stealthskin no longer provides these bonuses. [34]

Tactical Vest. This vest is designed to hold eight ammunition magazines, helping the character distribute the weight and improving their carrying capacity by 4 kilograms. For example, a character could carry four grenades, two variable timers and one kilogram of Tornadium D-19 with easy.



A tactical vest.

It also has several straps designed to hang off the bottom of the vest, to act as rigging onto which pistol-sized weapon holsters can be attached. The back of the vest includes five SEU PowerClips in a network of heavy-duty canvas rigging, all wired together with integrated power routing and buffering to form the equivalent of a standard 100-SEU Power Backpack.

Built of an extremely durable ballistic material, if worn alone the tactical vest acts as a 25 point skeinsuit, but its effects are not cumulative with a skeinsuit. If worn over another skeinsuit, both of the protective layers will take the same damage. For example: a character is shot for 34 points of damage. He takes only 17 points, and both his skeinsuit and his tactical vest take 17.

If worn over an albedo suit, it nullifies the protective nature of that suit.

Archaic Inertia Armors[35]

Leather Armor

Archaic armors are completely outclassed by the high-tech weaponry common on the Frontier. Usually the only situations where such armors might be encountered would be ceremonial occasions (worn by royal guardsmen for a state parade) or in entertainment facilities (worn by actors, historical reenactors, etc.).

However, archaic armor have been encountered on various low-tech planets such as Volturnus and Starmist by explorers. In survival situations, a few simpler types

[33] Moore, Larry. "Shocksuit," Star Frontiersman magazine, issue 7, p. 28.
[34] Originally published in Star Frontiersman magazine, issue 1, p. 2.
[35] Campbell, Andy. "Variant Armor Types in Star Frontiers," Star Frontiersman, issue 22, pp. 51-52.

can be fashioned by trained Environmental specialists.

Effects. Archaic armors will reduce damage from melee and archaic missile weapons by half and trim all other inertial damage by one-forth. The types available include fur hids/light leather, studded leather, chain/scale/ring mail, brigandine/splint/platemail, and full plate.


Full Plate Armor

Costs. The price in parentheses represents the cost on Frontier worlds to buy these armors from specialty craftsmen; they are not widely available, must be specially ordered by the buyer and are priced accordingly.

Furs, Hides and Light Leather Armor. Type: Archaic Inertia. Points of Defense: 5. Mass: 5 kilograms. Cost: 20-50 Credits. Note: Hide, leather or plant fiber armor may be made by Environmentalists using the "Making Tools / Weapons" subskill if the right materials (wood, leather, etc.) can be found.

Leather and Studded Leather. Type: Archaic Inertia. Points of Defense: 10. Mass: 8 kilograms. Cost: (25-100 Credits).

Chain, Scale and Ring Mail. Type: Archaic Inertia. Points of Defense: 15. Mass: 15 kilograms. Cost: (200-600 Credits).

Brigandine, Splint and Platemail. Type: Archaic Inertia. Points of Defense: 20. Mass: 20 kilograms. Cost: (500-1,000 Credits).

Full Plate Armor. Type: Archaic Inertia. Points of Defense: 25. Mass: 25 kilograms. Cost: (2,000+ Credits).

Riot and Archaic Shields[36]

Unless one is using the ablative damage rules, Star Frontiers does not use a hit location system, but there are two ways in which shield use can be represented in game play including in passive defense and active defense.

Passive Defense. If played as a passive defense, a shield is treated as "cover" if the shield-bearer is attacked. Depending on what the shield is made of, the cover modifier will either be for "hard cover" (-20) or "soft cover" (-10).

The cover modifier is only applied if the defender is aware of the attack and actively using the shield for defense. If the target is aware of the attack and defending itself, then the cover modifier is applied to all incoming attacks except those from behind.

Even if the shield cannot stop a bullet, for instance, it obscures the shooter's view of the target which may cause a miss. If the attacker misses the to hit roll by an amount that would have hit the target without the shield's modifier, then roll damage as normal and apply that damage to the shield itself.

Example: An attacker needs a 60 or less to hit an enemy with a shot from his gyrojet pistol, 40 after applying the "hard cover" -20% modifier for the defender's riot shield. The attacker rolls a 54, which would have hit if the shield had not been used. This means the shot was caught by the shield and it will take damage. The attacker rolls 2d10 and gets a 20 damage result. 1/2 of 20 points yields 10 points of damage to the shield; since the riot shield only has 10 points hit points, it is shattered and useless.

Active Defense. If shields are treated as an active defense, they are used by characters to block attacks directly and can only be used to defend against melee or archaic missile weapons. The shield will only absorb damage if used to successfully block an attack.

A block is successful if the defender rolls below half of his Reaction Speed score. If the shield user is fired

[36] Campbell, Andy. "Variant Armor Types in Star Frontiers," Star Frontiersman, issue 22, pp. 51-52.

upon by missile weapons, the shield will block an attack only if the user rolls under one-tenth of his Reaction Speed score (if successful, the user is able to anticipate the general area of the incoming fire or is simply lucky).

Note that if a shield is used to block an attack by a melee weapon which causes damage by electricity (such as a stunstick or electric sword) a block will have no effect, as the electrical damage will pass right through the shield into the defender.

Costs. If the price is in parentheses this represents the cost on Frontier worlds to buy shields from specialty craftsmen; they are not widely available, must be specially ordered by the buyer and are priced accordingly.

Riot Shield. Type: Inertia. Points of Defense: 10. Cover Type: Hard. Mass: 2.5 kilograms. Cost: 50 Credits. Effects: Reduces damage from melee, projectile and gyrojet weapons by half.

Shield (soft). Type: Archaic Inertia. Points of Defense: 5. Cover Type: Soft. Mass: 2.5 kilograms. Cost: (20-50 Credits). Effects: Reduces damage from melee and archaic missile weapons by one-forth. Soft shields may be made by a character who has the "Making Tools/Weapons" environmental subskill if the right materials (wood, leather, etc.) can be found.

Shield (hard). Type: Archaic Inertia. Points of Defense: 10. Cover Type: Hard. Mass: 5 kilograms. Cost: (50-100 Credits). Effects: Reduces damage from melee and archaic missile weapons by half; reduces all other inertia damage by one-fourth.

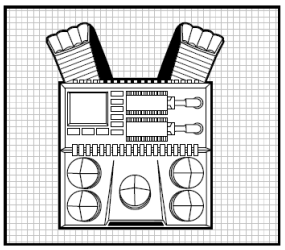
Power Screens

As with defensive suits, numerous powered defense screens/energy fields are available to protect the wearer against lasers, inertia weapons, masers, rafflurs, sonic weapons, etc. Other energy fields, such as the halo screen, might be used to hide a character from an attacker.

A brief description of each power screen follows, but more information is in the **Equipment** section. The types of suits include: albedo, inertia, displacement, halo, gauss, light shift, shimmer, simp, sonic, etc.

Defensive screens remain up until they run out of power or are knocked down by weapons such as electrical discharge warheads.

Albedo Screen. Like an albedo suit, the screen protects the wearer from laser beams. Absorbing a laser beam uses a number of SEU equal to 1/5 the number of damage points caused by the beam, rounded up. For example, absorbing a beam that caused 11 damage points would consumes 3 SEUs.



A displacement screen generator.

Inertia Screen. Inertia screens protect the wearer from half of the inertia damage he receives in any one attack like skeinsuits do. The screen uses 2 SEU every time it is hit.

Displacement Screen. This is a type of light shift screen (LSS) that bends light away from the wearer, making it appear to be up to a meter away from his actual position. As onlookers move, the position of the displaced person shifts even more. The screen uses 1 SEU per turn. Any time the wearer is successfully hit, there is a 50% chance that the attack will actually miss. [37]

Gauss Screen. A gauss screen absorbs all the damage caused by electrostunners, shock gloves, stunsticks and other electrical attacks. It uses 2 SEU every time it is hit.

Holo Screen. Projecting a 3-dimensinal image around its wearer, the halo screen can be used to portray the holographic information of beings (such as an adult male Yazarian in civilian clothes) or things (such

[37] "New Equipment: Displacement Field," Star Frontiersman, Issue 6, p. 27.

as a camoflague background). This information is contained on a holo disc could.

The holo screen is only 80% effective. On a roll of 81-00 an onlooker will notice something is wrong. The holo image is limited to roughly the same size and shape as the wearer.

Light Shift Screen. A light shift screen (LSS) sets up a light-bending shell around the individual or unit using it. The effects of the shell differ for each type of screen, but energy consumption and penetration are the same for all LSSs. LSSs use SEUs at different rates in different types of lighting.

A *Type I LSS* bends all light away from the shell, thus creating a totally black area. This LSS types is usually used at night or by a character masking his identity.

A *Type II LSS* shifts the wearer's image away from his actual location to a distance of one to three meters in a fixed direction.

The *Type III LSS* unit is a variation on the type II but instead of shifting a single image of the wearer it creates up to five images (at the wearer's option), all exactly the same. Type III LSSs always create the images in a side-by-side line, with up to three meters between each image.

Type II and III LSSs are often used by a character to draw fire away from themselves and confuse the enemy.

A character dodges the fire of flying cybodragons. Source: Captive Planet.

Shimmer Screen. This type of screen is available after the Second Sathar War for public purchase. This specialized, power-hungry shield protects a character from all types of damage for short periods of time. The screen shifts between albedo, gauss, inertia, sonic, and simp defenses.

There is a small chance that a hit penetrates the shield during the instant it shifts from one defensive type to the next. Any hit roll of 01-05 ignores the shimmer shield's effect. Although this screen offers the best protection, no weapons can be fired out of the shield when it is activated. It uses 5 SEU per minute of operation and each hit drains 5 SEU.[38]

Simp Screen. Similar to an albedo screen, a simp screen even emits a silvery aura but it protects against rafflur fire instead of laser damage. For every 6 points (or fraction of 6 points) absorbed, 1 SEU is drained from the power source.

For example, absorbing 21 points of damage drains 4 SEU. Any weapon can be fired out of a simp screen. As long as the power holds out, the wearer receives no damage from a rafflur weapon.

Sonic Screen. Sonic screens act as sound barriers, absorbing all sound that hits the screen. They absorb all damage from sonic stunners and disruptors. Absorbing a hit uses 2 SEU, and the screen itself uses 1 SEU every minute it is on.

[38] Moore, Larry. "Non-Civilian Duty Vehicles," Star Frontiersman, issue 15, p. 28. The shimmer screen appears here as a power-hungry, vehicle defense screen. It probably could be downsized to protect a person.

Other Suits/Equipment

Asbestos Suit. This is a fireproof garment – it is not really made from asbestos but advanced materials – that that covers the entire body, including the head and extremities. It is often used by firefighters but protects against incendiary weapons, though a character would also need a breathing mask and googles. It weighs 3 kilograms and costs 500 Credits. [39]

Chillsuit. This outfit protects the wearer from conditions of extreme cold. It consists of a close-fitting suit of thin, insulating material that completely covers the wearer's head and body. It comes with dome-like goggles and a special heat-retaining filter for breathing. It can be worn under defensive suits and does not interfere with defensive screens. It uses energy depending upon the power setting which also determines the level of protection.[40]

Breathing Mask. This is a mask with a small oxygen tank to protect characters in thin or poisonous atmospheres. (Dralasites receive a environmental like bag suit, while the "mask" is a bag-like apparatus for a Vrusk's abdomen. The Vrusk "breathing mask" also permits them to swim, which is a fairly uncommon practice among these insect-like beings. Wearing the mask for long periods of time is uncomfortable for those who have not received extensive training in their use. Effects: a 1 point penalty to the character's Initiative Modifier (-1 IM), and -5 to Dexterity and Reaction Speed checks.[41]

Inssuit. This is a protective garment typically worn by ship engineers, fighter pilots or others who work in radioactive environments to protect them from radiation. It includes a respirator unit, protective headcovering/goggles. Some spacesuits, powered armor or other gear can be bought with an inssuit lining.[42]

Environmental Suit. Designed to protect its wearer from the weather and other conditions on habitable planets. Covering the entire body, it is made of lightweight, quilted cloth and comes with a built-in gas mask, goggles, and a small heating and cooling system. It will keep the suit cooled to a comfortable temperature on hot planets and warm on cold planets.

The suit protects the wearer from tainted atmospheres (including gas grenades), airborne irritants, and dust- and sandstorms. It may be worn under defensive suits and is compatible with all defensive screens, but it offers no other protection from attacks. It uses 1 SEU per day if the heating/cooling system is used.[43]

Wearing the breathing apparatus over a long time causes discomfort to those who have not received extensive training in its use. Effects: a 1 point penalty to the character's Initiative Modifier (-1 IM), and -5 to Dexterity and Reaction Speed checks.[44]

Environmental Suit

[39] Williams, Skip. "Sage Advice," Dragon Magazine, July 1988, p. 68..
[40] Morris, Graeme. Bugs in the System, TSR, Inc., 1985, p. Pullout Sheet VI.
[41] The module "Mutiny on the Eleanor Moraes" features a breathing mask as does the module "Dark Side of the Moon." In the "Eleanor Moraes" adventure, referees are to stress how uncomfortable the masks are to wear, but doesn't provide any provisions on how this should effect characters, so the negative IM and DEX/RS modifiers are a house rule.
[42] Adapted from Knight Hawks, p. 63, also mentioned in "Bugs in the System," p. __.
[43] Cook, David "Zeb." "For a Fistful of Credits," Dragon Magazine, issue 112, p. 88.
[44] The module "Mutiny on the Eleanor Moraes" features a breathing mask that is part of the equipment for the environmental suit. See note for breathing mask.

Exoskeletons

The only mention of exoskeletons in the Alpha Dawn rules is in the Equipment section. These rules state that exoskeletons are "specially fitted to the character that will wear it, and cannot be worn by anyone else." Although a character wearing such an outfit can move "twice as fast as a normal character, can jump 5 meters straight up (in 1g), gains a bonus of +20 to hit in melee and does +10 points of damage in melee."

Although weighing only five kilograms, though it is a mechanical and metal frame worn on the outside of a character's body and uses 1 SEU per minute while in operation, which is far less power efficient than a robot.

What follows are some house rules for handling exoskeletons which are based on discussions on the starfrontiers.us website by numerous contributors but especially by the user known as w00t!

Usage. To properly know how to use an exoskeleton, a character should have the skill (or subskill) Machinery: Operate, which is a Technician (TechEx) skill. Otherwise, unskilled characters have a --30% penalty when performing any tricky maneuvers. When attacking in melee, the character suffers a -15% penalty.

Fastening/Unfastening. The time it takes to put on an exoskeleton (fastening) or taking one off (unfastening) depends upon the type a character is using. Unskilled characters must make a Dexterity check to see if they can shave off a turn or two to get in or out of the contraption. Skilled characters – a Technician or TechEx with the machinery: operate skill – can reduce the time by 1 turn per level they possess.

Types of Exoskeletons

Characters can purchase up to five basic exoskeletons including the custom-fit; low-cost, nonpowered exoskeleton, adjustable powered, labor, and explorer/enforcer rigs. These models form the basis for the Frontier's powered armor outfits. Referees may add other types of exoskeletons with different capabilities as they see fit, such as a medical exoskeleton that can be used instead of bionics.

Custom-Fit Exoskeleton. This rig is custom-made for the wearer and cannot be worn by someone else of the same race without modifications by a TechEx. Getting in or out of the outfit takes 1d10 + 10 turns.

When wearing the exoskeleton, a character receives the following benefits:

- All movement rates are doubled, including walking, running, climbing, jumping, and swimming. (Yes, these devices are waterproof),
- Jumping five meters straight up (in a 1G environment) without a running start,
- Gains a bonus of +20 to hit in melee and does an extra +1d10 points of damage in melee.
- Can lift an extra 40 kilograms without being encumbered.

An exoskeleton provides no protection to the wearer, but it can be worn along with a power screen and defensive suit. Another benefit, because it is so lightweight and slim, a character wearing a custom-fit exoskeleton can easily get in and out of vehicles without needing to modify the vehicle's door openings or seats. Cost:

A medical prosthetic-style exoskeleton to help paralyzed people walk. Source: http://wonderfulengineering.com

3,500 Credits. Weight: 5 kilograms. Power: 20 SEU battery, though it can be plugged into a 50 SEU Beltpack or 100 SEU Backpack (sold separately). Power Useage: 2 SEU per hour.

Raytheon's XOS exoskeleton prototype. Source: http://defenceforumindia.com

Low-Cost, Nonpowered Exoskeleton. Also called the "LoCo Exo," this model is a mostly mechanical exoskeleton that allows the user to overcome many of the negative effects of higher gravity worlds (those with more than 1 G gravity). Specifically, when a character wears one of these exoskeletons, he will not suffer a decrease in normal carrying capacity, can leap and vault normally and safely jump the same distance as a character in a standard 1 G environment. However, it will not eliminate any additional damage taken in a fall (+2 points per 0.1 increase in gravity).

When used in a 1 G environment, it would allow a character to carry 5 extra kilograms without being encumbered. For every tenth of a gravity less than 1 G, a character can carry an extra 2 kilograms above and beyond the level stated in the Alpha Dawn rules under "Movement: Gravity, Weight and Mass."

When worn, the unit does not count against a character's carrying capacity.

The low-cost exoskeleton is adjustable, but it can only be used by someone of the same racial type – i.e. a Vrusk can only wear an outfit made for a Vrusk, a Yazarian must wear a Yazarian model, not one for a Human or a Dralasite, etc.

Initially getting in or out of s LoCo Exo takes 1d10+5 turns. A character can speed up the time it takes to "suit up" by expending experience points. For each experience point used, the character can trim 1 turn off of the time it takes to put on or take off the exoskeleton; the maximum reduction is 15 turns so then it would take a highly experienced user only 1d10 turns.

The outfit provides no protection to the wearer, but it can be worn along with a power screen and defensive suit. Like the custom-fit models, the Loco Exo is slim enough where a character can operate most vehicles without needing to modify any door openings or seats. Cost: 300 Credits. Weight: 10 kilograms. Power: N/A.

Adjustable Powered Exoskeleton. This type of powered exoskeleton sacrifices strength for decreasing the amount of time it takes to put on and take off while being adjustable so it will fit others of the same race. Slightly heavier than the custom-fit models, it is a blend of robotics and bionic technology. Its mechanical/metal frame has miniature motors at each joint to follow the wearer's movements while amplifying strength.

Initially getting in or out of an exoskeleton takes 1d5+5 turns. A character can speed up the time it takes to "suit up" by expending experience points. For each experience point used, the character can trim 1 turn off of the time it takes to put on or take off the exoskeleton; the maximum reduction is 5 turns so then it would take a highly experienced user only 1d5 turns.

A character in this type of exoskeleton can move twice as fast as normal (in including walking, running, climbing, jumping, and swimming), can jump five meters straight up in a 1G environment, gains a bonus of +5 to hit in melee and does an extra +1d5 points of damage in melee. An exoskeleton provides no protection to the wearer, but it can be worn along with a power screen and defensive suit.

The wearer can lift an extra 15 kilograms without being encumbered. Another benefit, because it is so lightweight and slim, a character wearing a custom-fit exoskeleton can easily operate vehicles without needing to modify any door openings or seats. Cost: 1,500 Credits. Weight: 8 kilograms. Power: 20 SEU battery, though it can be plugged into a 50 SEU Beltpack or 100 SEU Backpack (sold separately). Power Useage: 2 SEU per hour.

Labor Rig. This this exoskeleton is used for pure strength. It is bulkier and heavier than the standard models, hence a reduction in reaction speed. Commonly used for lifting, pushing and carrying heavy loads, the labor rig is typically used in warehouses or on planets with high gravity. It provides a +25 bonus to Strength (STR) but cuts Reaction Speed (RS) by -15 RS. The wearer can lift up to 250 kilograms without being encumbered or up to a maximum of 1,500 kilograms.

While this may appear to be an ideal suit for mounting heavy weapons, wearers suffer a -20 percent modifier to hit while using ranged or melee weapons because it is not made for combat. But, a successful melee strike will cause 4d10 points of damage!

It takes a character 1d5+5 turns to suit up or properly exit the rig.

Humans, Yazarians and Dralasites can use the same type of labor exoskeleton, but Vrusk need their own purpose built unit (no extra cost). The rig does not provide any additional to a character but they can wear defense suits. Defense screens will not work with this type of exoskeleton unless it is purposely mounted on it (with a 10 percent extra charge).

Because of its size and bulk, a character cannot wear a labor rig and use or even ride in many vehicles (cycles, cars, etc.), but they could be carried in a ground, hover or air transport and other larger craft. Cost: 2,000 Credits. Weight: 80 kilograms. Power: 100 SEU Backpack . Power Usage: 4 SEU per hour (6 SEU per hour if lifting more than 250 kg).

Explorer/Enforcer Rig. The EE Rig, also called the poor man's powered armor, is a robust exoskeleton designed for speed, melee power but not necessarily for a lot of extra carrying capacity. Basically a scaled down robot for a character, it is made to mount all sorts of equipment and is compatible with a defense field. In its stripped-down form, it will not provide any additional protection but a character could wear a defensive suit.

A character in an EE Rig can move twice as fast as normal (including walking, running, climbing, jumping, and swimming), receives a +1 Initiative Modifier, can jump five meters straight up in a 1 G environment, gains a +20 to hit modifier in melee and does an extra +10 points of punching score (PS) damage in melee combat. It comes with many pockets and attachments to hold additional powerclips and equipment. The wearer can lift an extra 15 kilograms without being encumbered.

This rig can be paired with partial and full polyplate armor (see the Alpha Dawn remastered rules under Optional Equipment). If so, a character cannot wear any other defensive suit and the polyplate armor is actually plates that are mounted over the exoskeleton.

Other equipment can be mounted to the EE Rig such as a toxirad gauge, chronocom, trace-tags, etc. for an additional 10 percent installation charge. For an additional 5 percent charge, such equipment can also be made to be removed and used by a character when they are not wearing the outfit. Characters can double their normal carrying capacity (unencumbered and encumbered).

It takes a character 1d10+10 turns to suit up or properly exit the rig; a character can spend experience points to reduce this time (1 XP to reduce 1 turn to a maximum reduction of 8 turns). Humans, Yazarians and Dralasites can use the same type of labor exoskeleton, but Vrusk need their own purpose built unit (no extra cost).

Because of its size and bulk, a character cannot wear an EE Rig and operate or even ride in many vehicles (cycles, cars, etc.), but they could be carried in an explorer or ground, hover or air transport and other larger craft. Cost: 3,500 Credits. Weight: 25 kilograms. Power: 100 SEU Backpack (sold separately). Power Usage: 4 SEU per hour.

Powered Armor Combat

In addition to the Enforcer/Explorer Rig, several powered armors suits are available ranging from the powered skeinsuit and flak suits along with the CLIFF polyplate armors, which are advanced exoskeleton-based armors to even larger units such as the WarTech HARPER Suit, and the ultimate in Frontier technology is the Planetary Assault Battle Suit (PABS).

These suits are basically one-person tanks and offer different degrees of protection. They are made to be used by creatures of a specific race though Humans, Yazarians and Dralasites can use compatible armors. Vrusk models tend to cost 10 percent more than armors for other races while models for Ifshit, Osakar, Humma and the Satharoid races (Sathar and Ssessu) have other capabilities.

While most exoskeletons are basically of a “wear and use” design – meaning a character does not need special training to operate them – someone wanting to use powered armor and its built-in weapons and systems will need the Zebulon’s Guide skill: Weapons: Powered Assault Armor. This can be considered an Enforcer or Espionage professional skill though for those strictly using the Alpha Dawn skill system can consider it to fall under the Weapons PSA. The success rate is 100% and is based on a character’s Dexerity.

Deployment from Space. Soldiers in powered armor are usually landed by shuttles or dropped to a planet from orbit by assault transports. These shuttles can carry 100 soldiers, either in powered armor or other defensive suits.

Troop transports can carry numerous one-man reentry capsules for orbital drops by powered-armor troops. Prior to an orbital drop, powered-armor soldiers are encased in individual capsules which have parachutes and retrorockets. As the capsule enters the atmosphere, the layers burn away, protecting the soldier inside.

The Planetary Assault Battle Suit (PABS) that graced the cover of Zebulon's Guide to the Frontier.

With the combined use of the parachutes, retrorockets, and (if so equipped) the powered armor’s boot jets, the capsule is able to make a safe and gradual descent. As the ablative layers of the capsule break off, they show up as numerous blips on radar, thus making it difficult to track descending capsules.

To further this end, dummy capsules, exploding capsules, magnetic decoys, ion-window devices, white-noise broadcasters, and radar jammers are also launched from orbiting ships. Together, these elements produce thousands of images on radar when there are in actuality only a few hundred manned capsules being dropped. Consequently, the drop is probably the safest part of the mission.

A 2% chance exists for any dropped soldier to become a casualty in the actual drop; casualties during the drop are almost invariably fatalities. Powered-armor drop capsules are not for sale to the general public. They are considered high-security military hardware.

Battle Suit Combat[45]

Ranged and melee fighting in powered armor is a combination of normal character and vehicle combat. Characters in the armored suits often receive a number of benefits when it comes to hitting other targets, strength boosts for carrying objects, and especially being protected against a number of weapons.

Some armors only partially protect the pilot from damage while others will shield a character from damage except in the cases when the armor is penetrated by a critical hit or when it has lost its outer protective structure.

Another type of armor, the Articulated Combat Vehicles or ARCVs, are vehicles and will be covered under vehicle rules.

Targeting Systems

Many powered armor outfits have targeting systems that provide the pilot with a bonus to-hit when using ranged weapons.

Character Protection

	Powered Armor Combat Table
1.	**Armor Penetration.** Check if the weapon penetrated the armor. If so, consult the Internal Damage Table for additional effects. Character damage may also happen.
2.	**Power Screens.** See if a defensive power screen stops any or all of the damage against a particular weapon type.
3.	**Armor Damage**. Check if damage to the armor occurs. Add the number of dice of damage caused by the weapon to a 2d10 die roll on the Internal Damage Table.
4.	**Puncture Sealing.** If the character is operating in a hostile environment, check to see if any hits have compromised the pilot's life support.
5.	**Apply Results of Damage**. Except for a parabattery or ammunition explosion, any other damage results will affect the armor the next turn.
6.	**Damage to Character.** Roll for normal damage to the character, reducing the damage by half.

The main property of battle armor is the protection it provides. The degree of protection depends upon the type of armor. For example, the Planetary Assault Battle Suit (PABS) provides a degree of projection similar to spacesuit armor and completely protects and itself from some attacks while with other weapons it provides only partial projection.

Armor Penetration

Power Screens. Any number of defensive screens can be mounted on powered armor. If one is activated, see if it stops any or all of the damage first before checking to see if the armor is damaged.

Only one energy screen can be activated at one time and it must have a power source to operate. A screen that allows only half damage through (such as an inertia screen) would means only one-fourth the total damage affects the character.

Powered Skeinsuit, Powered Flak and CLIFF Polyplate Armors. These powered suits act like their unpowered counterparts – a portion of the damage does penetrate and causes injury to the pilot. The suit's internal systems can also take damage. Roll on the Damage to Powered Armor Table. **Optional:** Once these suits have taken six successful internal hits (i.e. a "no effect" result on the Internal Damage Table does not count), these armors are rendered inoperable.[46]

[45] This battle armor combat system is based upon articles in the *Dragon* and *Star Frontiersman* magazines. Specifically, stories by David Dennis in Dragon's January 1988 issue and by Chris Harper in *Star Frontiersman*, issue 14. Though their rules are similar, they were not 100 percent compatible.

[46] This is a house rule to make the powered skeinsuit, powered flak and CLIFF armors more compatible with the HARPER suit.

WarTech HARPER Suit. This suit has 400 external armor points. Once this outer shell has been eliminated, the suit takes internal damage and the pilot takes half damage. If an attacker rolls 01-02, the suit takes additional damage on the battle suit damage table regardless of how many armor points it has. (As with other combat rules, the referee will need to make sure this rule is not abused. A character wielding a knife or a whip is highly unlikely to cause any major damage to the suit.)

Weapons that only do 1d10 damage will not affect the HARPER suit in a combat situation. Once the armor has taken six successful internal hits (i.e. a "no effect" result on the Internal Damage Table does not count), it is rendered immobilized and useless.

Planetary Assault Battle Suit (PABS). The main property of battle armor is the protection it provides. The degree of protection for a number of weapon types is listed on the Powered Armor Protection Table, though like the HARPER Suit an attacker's roll of 01-02 almost always penetrates. (Again, the referee will need to keep this automatic armor penetration rule from being abused.)[47]

The percentages listed there work on the same principal as spacesuit armor. If a character is hit by a weapon, look on the chart for the proper percentage and roll percentile dice. If the number is less than or equal to the listed percentage, the weapon fails to penetrate the armor. If the weapon penetrates the armor. The character will only take half damage.

Optional: Once the PABS has taken 600 points it no longer provides any protection and is considered pretty much destroyed. The suit's internal structure can be hit up to ten times before it is immobilized and rendered useless.[48]

Planetary Assault Battle Suit Protection Table

Weapon Type	Protection	Weapon Type	Protection
Axe, knife, etc.	100%	Gyrojet	55%
Electrostunner	100%	Lasers	50%
Gas Grenades, bombs, etc.	100%	Explosive Mine	50%
Needlers	100%	Fragmentation Grenade	45%
Flamethrower	90%	ECM Rifle/ED Warhead	45%
Spear or sword	85%	Recoilless Rifle	40%
Stunstick	85%	Rocket Launcher	35%
Bullets	70%	Guided Missile	30%
Shock Gloves	70%	Cannon	30%
Electric Sword	65%	Bomb	20%
Bolt, Maser Weapons	60%	Howitzer	15%
Sonics	60%	Tangler Grenades/Warheads	0%

Automatic Puncture Sealing. Similar to spacesuits, many powered armors have self-contained life support systems so characters can operate in hostile environments ranging from the vacuum of space to arctic or even extreme heat conditions. They will have an inner liner of self-sealing material that will automatically close a puncture that is 3 centimeters or less in diameter. If the puncture is larger than 3 cm across, there is a 25% chance for each additional cm that the suit will be unable to plug the hole.

For example, there is a 50% chance a suit will not automatically seal a 5 cm hole. A suit can never automatically repair a hole that is 7 cm or more in diameter; such punctures require a patch. The roll to determine if a hole seals itself is made as soon as the suit is punctured. If it is successful, the hole is

[47] In order to make the HARPER and PABS armors more compatible, having the PABS armor penetrated on a roll of 01-02 is a house rule and not part of Dennis' original description.
[48] This is a house rule so the PABS statistics more closely conform to the other armors listed here.

patched immediately.[49]

See the Section XIII. Space Action and consult the “Puncture Diameter Chart” on page __ for examples of how large a hole certain weapons make. Note, since powered armors are considerably better than spacesuits, they have a better chance to seal holes.

Armor Damage

Once the armor has been penetrated the, suit receives critical damage on the Internal Damage Table. The pilot also receives damage. Hits are cumulative. The suit’s internal structure has been successfully hit up to a certain number of times (consult the armor type) the armor will be rendered immobile.

Cumulative Damage. Any damage sustained by the suit is cumulative. This, if speed is reduced by half twice in a row, the overall speed falls to one-quarter normal.

Repairs. Technicians (or Techex) may repair any damage to powered armor by using the repair machinery skill.

Explanation of Results

No Effect. No appreciable internal damage resulted from the attack.

Suit Systems. Roll a 2d10 on the Systems Damage Table to see what components are affected.

Torso Structure. The suit’s chassis is damaged. All movement rates are cut by 20 meters per turn. All actions suffer a -10% modifier. If so equipped, there is a 20% chance that the suit’s cargo area is damaged. Choose item or items to be destroyed. If in space, the contents were jettisoned. The pilot compartment is not affected.

Weapon. A weapon is knocked offline until repaired. Choose randomly.

Arm Structure. The suit exoskeleton is damaged. All actions using the arm (chose randomly) including aiming suffer a -20% penalty.

Leg Structure: The suit exoskeleton is damaged. All movement is reduced by 20 meters per turn. All actions involving legs suffer a -20 penalty.

Internal Damage Table	
# Dice Damage + 2d10 Roll	**Effect**
2-19	No Effect
20-22	Suit Systems
23-24	Torso Structure
25	Weapon
26	Arm Structure
27	Leg Structure
28	Arm Amplifier Motor
29	Leg Amplifier Motor
30-31	Parabattery Damage
32+	Ammo/Parabattery Explodes

Modifiers	**%**
Powered Flak Armor	-1
CLIFF Full Polyplate Suit	-2
WarTech HARPER Suit	-2
Planetary Assault Battle Suit	-3

Amplifier Motor Arm. The motor that powers the arm (chose randomly) is destroyed. The arm cannot move. Any weapons mounted to it suffer a -40% penalty to-hit.

Parabattery Damaged. One of the parabatteries is damaged, half of all stored SEUs are lost.

Ammo/Parabattery Explodes. The ammo for a random weapon is hit and explodes. The remaining rounds do their normal damage to the suit’s structure points. If the suit uses only beam weapons or there

[49] This is another house rule to take into account that many of the power armors – both the Dragon magazine version and those from Star Frontiersman magazine – have life support systems so pilots can operate in hostile environments.

is no ammo left the parabattery explodes and does 1d10 per SEU to the suit's remaining structure points. The pilot takes half-damage.

Systems Damage Results

Note: If a powered armor suit is not equipped with a system, or it has already been destroyed/disabled, then reroll for a new result.

Medical. Any automatic medical system no longer functions.

Targeting. The targeting system is destroyed. Pilot has a -20% penalty to all attacks; cannot use guided missile lock on; can only fire 1 missile/rocket at a time.

Communications. The communications system is destroyed. If the suit has more than one – i.e. a chronocom and a radiophone – chose one randomly. Reroll if all communications systems are already destroyed.

Systems Damage Table	
2d10 Die Roll	**System Type Affected**
2-4	Medical
5-8	Targeting
9-10	Communications
11-12	Computer
13-14	Life Support
15-16	Vision
17-18	Defense Screen
19-20	Special System

Computer. The suit's computer, if so equipped, is damaged and will not function. The pilot loses any benefits that this system would have controlled including targeting. (See the "Targeting" damage result for effects).

Life Support. The air supply and air filter, heating and cooling ceases to function. After 1d10 minutes the character will start to take 1d10 points of damage a turn. If the pilot is operating in a breathable atmosphere, he can open vents to the outside air, but this means he will be affected by gas weapons (doze, poison, etc.) or other airborne contaminants such as radiation.

Vision. Any enhanced vision systems – magnigoggles, infrared or ultraviolet scannners, etc. – are damaged and cease to function.

Defense Screens. One of the defense screen emitters is destroyed and will not operate. Chose randomly if the suit has more than one screen.

Special System. Powered suits can be equipped with any number of specialized equipment. For example, some have a freeze field that will automatically engage to save the life of a pilot's whose stamina has dropped below 0, or an external power light, jump boots, etc. One of these systems has been destroyed (chose randomly).

Powered Armors

Four common exoskeleton-based armors include the powered skeinsuit, powered flak suit, CLIFF polyplate armors, and WarTech's HARPER Suit. Because of many of its unique qualities, the Planetary Assault Battle Suit is treated separately. These powered armors can be equipped with numerous options, so the descriptions listed are for the base models only.

Powered Skeinsuit.[50] A type of powered armor used by soldiers on the battlefield. It consists of a military skeinsuit, an explorer/enforcer exoskeleton, an albedo screen, a helmet with a built-in chronocom, a tank of compressed air good for 10 hours of breathable air, a Level 3 (28 function point) computer, and a type 4 parabattery (4,000 SEU) to power all of the suit's systems and beam weapons, which is usually a laser rifle or a heavy laser that is often set at 20 SEU.

The powered skeinsuit also has the strength for the user to carry up to four heavy projectile weapons — usually shoulder-mounted rocket launchers — for fire-support roles.

- **Movement**. A character can move at double his species' normal rate for walking, running,

[50] Signs, William. "It'll Ride Up With Wear: Additional Suits for Star Frontiers," Star Frontiersman, issue 9, p. 23.

climbing, jumping and vaulting. The pilot can jump five meters straight up (in a 1 G environment). Exception, because of its bulk, a character cannot swim in this armor. Unless it is equipped with ballast tanks and some form of alternative movement, the character must walk on the bottom of streams, rivers, lakes, sea beds, etc.
- **Benefits.** The pilot receives a +20% modifier to hit in melee, does +10 points of damage.
- **Drawbacks**: The wearer has a -10 percent modifier for all Dexterity and Reaction Speed checks.
- **Protection**: the armor will absorb half of all inertia (ballistic/melee) damage, while the character takes the other half. Once it takes 50 points of damage, the armor will no longer protect the wearer. The albedo screen will protect against laser damage.

The powered skeinsuit uses 5 SEU per hour. Weight: 250 kilograms (the weight doesn't affect the wearer when the suit is powered up).

Powered Flak Armor. [51] A significant improvement over the powered skeinsuit armor, this suit combines the benefits of flak armor with an explorer/enforcer exoskeleton, a shimmer screen, a helmet with a built-in chronocom, a tank of compressed air good for 10 hours of breathable air, a Level 3 (28 function point) computer, and a type 4 parabattery (4,000 SEU) to power all of the suit's systems plus a beam weapon, which is usually a laser rifle or a heavy laser, the selected weapon being set at 20 SEU.

Powered flak armor also has the strength for the user to carry up to four heavy projectile weapons — usually shoulder-mounted rocket launchers — for fire-support roles.

- **Movement**. A character can move at double his species' normal rate for walking, running, climbing, jumping and vaulting. The pilot can jump five meters straight up (in a 1 G environment). Exception, because of its bulk, a character cannot swim in this armor. Unless it is equipped with ballast tanks and some form of alternative movement, the character must walk on the bottom of streams, rivers, lakes, sea beds, etc.
- **Benefits.** The pilot receives a +20% modifier to hit in melee, does +10 points of damage.
- **Drawbacks**: The wearer has a -10 percent modifier for all Dexterity and Reaction Speed checks.
- **Protection.** Powered flak armor is more effective against projectiles and explosives than a skeinsuit. It absorbs 3/4 damage of all inertia damage, up to 60 points, while the pilot only receives ¼th damage. It will absorb 60 points of inertia damage before needing replacement. A reflective coating can be added (at an additional 500 Credit cost) that will act as an albedo suit, absorbing 100 points of laser damage. It may be relayered as needed.
- **Shimmer Screen.** This specialized, power-hungry shield protects a character from all types of damage for short periods of time. The screen shifts between albedo, gauss, inertia, sonic, and simp defenses. There is a small chance that a hit penetrates the shield during the instant it shifts from one defensive type to the next. Any hit roll of 01-05 ignores the shimmer shield's effect. Although this screen offers the best protection, no weapons can be fired out of the shield when it is activated. The screen uses 5 SEU per minute of operation and each hit drains 5 SEU.

The powered flak armor uses 5 SEU per hour. Weight: 250 kilograms (the weight doesn't affect the wearer when the suit is powered up).

A Yazarian warrior in CLIFF Partial Polyplate Armor.

[51] This is a house-created armor which is based on the Powered Skeinsuit Armor created by William Signs for Star Frontiersman Magazine, issue 93.

CLIFF Partial Polyplate Powered Armor. [52] The Combat, Light Infantry Forward Fighter (CLIFF) armor provides the protection of partial polyplate with the power of an explorer/enforcer exoskeleton. The wearer can lift an extra 15 kilograms without being encumbered

- **Movement**. The pilot move twice as fast his species' normal rate for walking, running, climbing, jumping and vaulting. The pilot can make a 5 meter vertical jump in 1 G. However, like the powered skeinsuit and flak armors, the unit is too heavy for a character to swim.
- **Benefits**. The wearer can, receives a +20% modifier to hit in melee, does +10 points of damage and moves at twice his/her normal speed.
- **Drawbacks**: The wearer has a -5 percent modifier for all Dexterity and Reaction Speed checks.
- **Protection**: The armor will absorb half of all damage from beam and physical attacks. Once it takes 100 points of damage, the armor will no longer protect the wearer.
- **Optional**: If equipped with a HUD Targeting System, the user receives a +10% modifier for all ranged attacks. Other gear can also be purchased and added (remember there is a 10% installation fee).
- **Optional**: Can be outfitted with enhanced servos and motors, which eliminates the DEX and RS penalties for an extra 50% cost.

A woman wears Combat, Light Infantry, Forward Fighter (CLIFF) Full Polyplate Powered Armor. Source: Star Frontiersman, issue 14; artwork by Scarecrow.

Unlike the powered skeinsuit and flak armors, CLIFF armors do not come standard with a life-support system. It is powered by a 100 SEU backpack and the exoskeleton consumes 4 SEU per hour, giving it 25 hours of continuous use.

CLIFF Full Polyplate Powered Armor. [53] This powered armor provides the protection of full polyplate with the power of an exoskeleton. The wearer can lift an extra 15 kilograms without being encumbered.

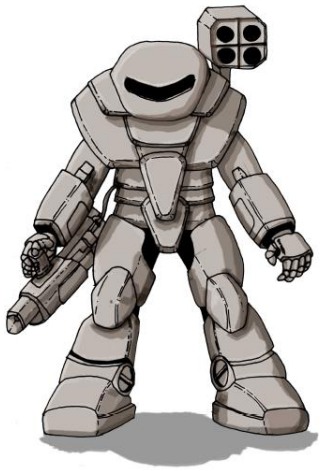
- **Movement**. The pilot move twice as fast his species' normal rate for walking, running, climbing, jumping and vaulting. The pilot can make a 5 meter vertical jump in 1 G. However, like the powered skeinsuit and flak armors, the unit is too heavy for a character to swim.
- **Benefits.** The wearer can make a 5 meter vertical jump in 1 G, receives a +20% modifier to hit in melee, does +10 points of damage and moves at twice his/her normal speed.
- **Drawbacks**: The wearer has a -10 percent modifier for all Dexterity and Reaction Speed checks.
- **Protection**: The armor will absorb three-fourths of all damage from beam and physical attacks. Once it takes 250 points of damage, the armor will no longer protect the wearer.
- **Optional**: If equipped with a HUD Targeting System, the user receives a +10% modifier for all ranged attacks. Other gear can also be purchased (remember there is a 10% installation fee).

[52] Cliff, Brian. "Power Armor," Star Frontiersman, issue 14, p. 40. Note, the costs given here are different than what is in the magazine to take into account that the armor would use the EE Rig exoskeleton.
[53] Cliff, Brian. "Power Armor," Star Frontiersman, issue 14, p. 40. Note, the costs given here are different than what is in the magazine to take into account that the armor would use the EE Rig exoskeleton.

- **Optional**: Can be outfitted with enhanced servos and motors, which eliminates the DEX and RS penalties for an extra 50% cost.

Unlike the powered skeinsuit and flak armors, CLIFF armors do not come standard with a life-support system. It is powered by a 250 SEU powerpack and the exoskeleton consumes 5 SEU per hour, giving it 50 hours of continuous use

WarTech HARPER Suit.[54] Developed by WarTech during the Second Sathar War, the Heavy Assault Reconnaissance Patrol Enforcement and Raid (HARPER) Suit proved to be cheaper to build than tanks as well as more portable. This powered armor suit has a heavy-duty exoskeleton chassis covered with a special polyplate armor that is four times as thick as that found on a normal polyplate combat suit.



Sealed from the outside environment like a space suit, the battle suit employs communications, advanced targeting computers, life support for 50 hours, defense screens and medical support including a freeze field, 6 doses of Biocort and 1 Staydose .

Many combinations of standard and heavy weapons can be mounted to the suit's four hard points. A character can wear a "soft" defense suit while inside the Harper Suit (i.e. a skeinsuit, albedo suit, etc.) but it will not provide any extra protection. It will help the character if he is forced to exit the powered armor.

- **Movement**. Standard model – Top speed: 125 meters/turn (75 kph), Cruise speed: 50 meters/turn (30 kph), Accel./Deccel.: 40/30 meters per turn. Vrusk model – Top speed: 175 meters/turn (105 kph), Cruise speed: 80 meters/turn (50 kph), Accel./Deccel.: 60/40 meters per turn. The pilot can run at top speed for a number of minutes equal to his STA/10. He can maintain cruise speed for a number of minutes equal to his STA/5. The character can walk for his STA/5 in hours.
- **Leaping**. A pilot can leap in the battle suit. The distance is 1/3 the distance traveled per turn. The player must make a reaction speed check to avoid a roll on the vehicle control table.
- **Jumping**. The battle suit can jump vertically 5 meters. A battle suit can jump down 10 meters with no effect. Falling from a height uses the AD rules for falling.
- **Maneuver Checks.** Characters must make a maneuver check with their adjusted Dexterity score. If they fail, the battle suit will fall down, causing 1d10 damage. The player must then roll below his modified Dexerity to stand up.
- **Benefits**. 360-degree vision. While in the battle suit, the pilot can punch, kick, or wrestle an enemy. The character's melee or martial art skills apply with their modified Dexterity score. Re-calculate their chance to hit using the modified DEX score. Punching and kicking damage is 2d10 +20.
- **Drawbacks**. Due to its bulk, a battle suit will not fit through most doorways and some floors will not support its weight.
- **Ranged Combat.** With the targeting computer the pilot can use his normal projectile or beam weapon skill while in the suit. Direct fire weapons such as lasers and machine guns can be aimed by using the targeting computer. The pilot must remain stationary for one turn, except the enemy can be moving and still be aimed at, and receives a +15 bonus. Virtually any weapon can be mounted to the Harper battle suit (see description for more information).
- **Weapons:** Small arms or large weapons can be mounted on the HARPER. The suits have 4 hard points to mount weapons: one on each shoulder and one on each forearm. It can mount all manner of man-portable heavy weapons (not weapons that take up 2 hardpoints or more). Some special weapons packages, such as an automatic recoilless rifle, guided missile pack, and "stinger" gyrojet pack are available for purchase.
- **Cargo.** There is an airtight, vacuum-safe cargo area on the back of battle suit that can hold up to

[54] Harper, Chris. "Powered Battle Suits," Star Frontiersman, Issue 9, pp. 16-22.

25kilograms. It is airtight and safe in the vacuum.

- **Protection**. The battle suit has 400 structure points. Once this has been eliminated, the suit takes internal damage and the pilot takes damage. On a roll of 01-02, the suit takes additional damage on the battle suit damage table regardless of how much armor stamina it has. Weapons that only do 1d10 damage will not affect the suit in a combat situation.
- **Critical Damage.** Once the armor has been penetrated the, suit receives critical damage on the Battlesuit Damage Table. The pilot also receives damage. Hits are cumulative. The suit structure can be hit up to 6 times before the suit is immobile.

Example: Terl's HARPER suit armor is down to 20 points. He gets hit with 6d10 damage. A 10, 9, 4, 3, 2, 2 are rolled. The highest numbers are added up first. The 10, 9, and 4 are enough to penetrate the armor. Whereas, the 3, 2, and 2 are left. Therefore, 3 dice penetrate. The attacker gets 3+3D10 on the battle suit damage table. She rolls a 10, 5, 3 + the dice makes 21. So, the torso structure is hit.

A HARPER suit is powered by a type I parabattery (500 SEU). The suit uses 10 SEUs per hour to operate. A separate 500 SEU battery is used to operate other systems. A third parabattery or SEU pack can be added to the cargo compartment for emergency power backup.

Planetary Assault Battle Suits

Certain rich and powerful mega-corporations and planetary governments for planetary raids, anti-armor strikes, search-and-destroy missions, and for other missions across the Frontier. These suits were first mentioned in Zebulon's Guide to the Frontier, but rules for them were not issued until the January 1988 issue of *Dragon Magazine*.[55]

A Planetary Assault Battle Suit (PABS) is the ultimate powered armor available in the Frontier and is much more like a one-person tank than a powered suit. It was designed especially for use by the UPF Landfleet and Spacefleet Marines during the Second Sathar War.

Sealed like a spacesuit, the PABS allows the pilot to operate in hostile environments, including the vacuum of space, for indefinite amounts of time. Its life support system will provide air, water, and liquid nutrition for up to 10 GST days (200 hours). If not depleted by combat, its power system with three type I parabatteries can keep the suit operating at full capacity for 3,000 kilometers or 1,000 GST hours.

Suit Design. The standard UPF assault model includes:

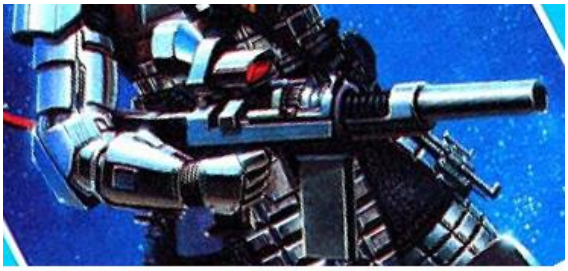
- Two rocket launchers on the right forearm with 8 rockets,
- One grenade mortar on the back with 8 grenade mortar shells,
- One flamethrower on the left forearm with 10 shots.
- Two guided missile packs, one on each shoulder, with six missiles each (12 total),
- One hand-held heavy laser with 300 SEU of power or one hand-held ECM rifle.

ECM Rifle. This weapon shoots a beam of magnetic energy. Its main function is to disrupt robots and computers, though it may affect living beings by causing disorders in the iron content of the creature's blood and by jamming the creature's neural synapses.

To find the chance of jamming a computer or robot, multiply the number of SEU used by five for a base percentage chance of success. From this base, subtract the level of the computer or robot multiplied by four; this will yield the chance of a malfunction. When a malfunction occurs, roll on the malfunctions table (page 15) for the results.

[55] Dennis, David. "Armored and Dangerous: The power of powered armor in the Star Frontiers game," Dragon Magazine, January 1988, pp. 70-73. This story serves as the basis for the powered armor rules, though they have been modified in order to equate to the fan-created suits.

To cause damage to living targets, an expenditure of two SEU is necessary. When firing at vehicles or armor, treat the number of SEU used as the number of dice of damage done when using the damage table. Even if 15 SEU are fired at an armored soldier, the attack still does 5d10 to the wearer, but it is a 15-dice attack for the damage table.



ECM Rifle

Statistics for the ECM Rifle. Cost: 8,000 Credits. Mass: 15 kilograms. Damage: 5d10 or jam. SEU Usage: 2-20. Rate: 2. Defense: Gauss. Range: PB 0-10, Short 11-30, Medium 31-100, Long 101-150, Extreme 151-300.

Guided Missile Pack. Each missile pack contains six missiles. The PABS pilot may fire all the missiles at once (or any number he chooses) and command them to divide themselves between as many targets as were launched that turn. In addition, the pilot may dispatch different numbers of missiles to different targets.

For example, the pilot sees one civilian, one skimmer, and one enemy powered-armor soldier. The soldier launches eight missiles, aiming one at the civilian, three at the skimmer, and four at the enemy suit. All missiles must roll separately to hit, but receive a 30% bonus to hit because each missile is guided.

Statistics for the Guided Missile Pack. Cost: 1,200 Credits. Mass: 10 kilograms. Damage: 6d10/missile. Blast Radius: 4/6 meters. Rate: 1-6. Defense: Inertia. Range: PB 0-10, Short 11-50, Medium 51-150, Long 151-300, Extreme 301-500.

Firing Limitations. The PABS pilot may fire all weapons he possesses in the same turn except those on the gun arm. Here, the wearer must choose between the handheld weapon and the weapons built into that arm.

Ground Movement. Treat the PABS movement similar to a robot or a vehicle. Its typical movement rates are:

- Cruise/Walking Speed: 10 meters/turn
- Turn speed: 90 meters/turn
- Top speed: 150 meters/turn
- Acceleration: 70 meters/turn
- Deceleration: 50 meters/turn

All of the vehicle movement options (except skid turns) can be made by a PABS. Consider it to have a bump number of:

Flight Capability. Some PABS models are made to fly. On the ground, these models have top speed of 190 meters/ turn and a minimum ground acceleration of 80 meters/turn. Flying suits accelerate, decelerate, change altitude, and make turns just like a jetcopter. However, flying suits may perform nap-of-the-earth flying with no movement penalties.

Jumping. The PABS can make vertical jumps of 200 meters in height. Jet-assisted jumps may be made to 400 meters, but only 10 jet-assisted jumps may be made before the suit runs out of fuel.

Horizontal jumps of 180 meters, with a 40-meter peak at the height of the arc, may also be made. The rate of movement in powered armor depends upon the type of armor purchased.

Power. The amount of SEU stored in the weapons and the miscellaneous powerpacks must be decided upon. Add up the total SEU carried in each powerpack and divide this number by 10, rounding up.

This is the number of points that must be paid. The monetary cost is 5 Credits for every SEU carried. Powerpacks may be recharged at the same places as power backpacks (at no more than a 50-point expenditure).

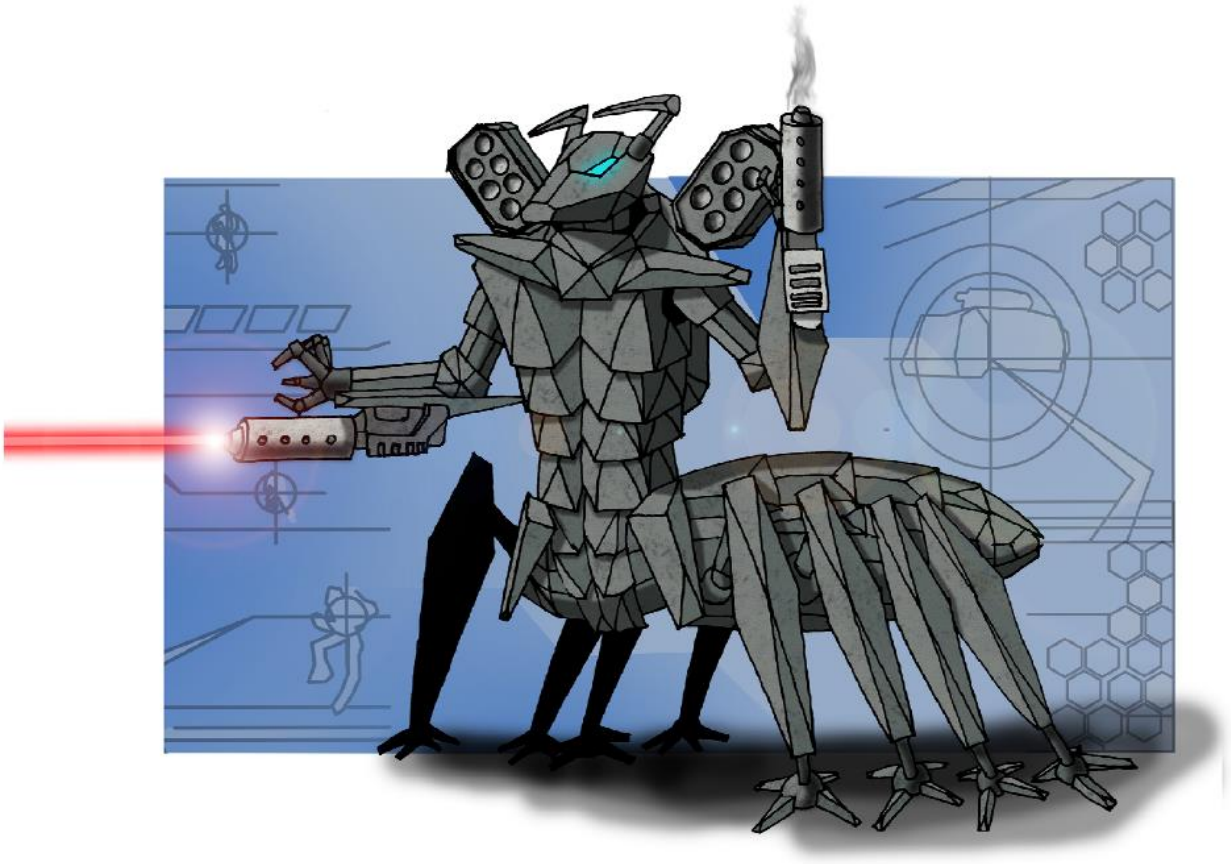
Protection. The PABS provides 100% protection against electrostunner, normal melee, and needler attacks. It is shielded against Electromagnetic Discharge attacks and is flame resistant (90% protection against flamethrowers and incendiary devices). See the Planetary Assault Battle Suit Protection Table on page __ for more information.

Strength and Stamina Boosted. Besides providing protection, a PABS boosts the wearer's Strength and Stamina. A person wearing a fully functional suit of armor has triple his normal Stamina. This benefit comes from lack of fatigue, lack of effort expended when wounded, decreased penetration by weapons, and many other factors.

Even more benefits are received from the increased strength the armor gives. An armored character is able to lift one metric ton (1,000 kilograms) over his head, carry 200 kilograms at encumbered movement, and carry 120 kilograms unencumbered.

PABS Targeting Systems. The pilot wearing a PABS receives a 20% bonus to hit when using ranged weapons. If the character uses a missile pack or other heavy weapon, this bonus is trimmed to only 10% (because characters get a -10% penalty for using heavy weapons.

Melee Benefits. The suit's strength adds an additional 35 points to damage done in melee combat. For purposes of hitting in melee combat, such that half of the attacker's Strength is the chance to hit, give the wearer a base 100% chance to hit.



An illustration of a Vrusk in battle armor from Star Frontiersman Magazine, Issue 9, p. 15.

Section VII. Character Damage and Healing

Whenever a character is hit in ranged combat or melee, the character suffers damage. The amount of damage caused depends on the type of attack. The Ranged Weapons and Melee Weapons tables show how much damage each weapon causes. It can be found in the equipment area of the Characters section.

As noted earlier, under **Wounds and Anesthetics** on page 18, if a character's Stamina has been reduced to one-half or less of his uninjured score, all of the character's attacks have a -10% penalty and the character can fire only one shot per turn. Anesthetic drugs, which reduce pain, will cancel this modifier. One dose of anesthetic lasts five hours.

Option: Zebulon's guide amended the rule on a character receiving a penalty for having less than half of their Stamina because of an adrenalin rush. But, a referee could decide that rule only applies to a particular combat encounter. If a character's Stamina is still below half during another, subsequent encounter, than the -10 percent penalty would apply.

Death at Zero Stamina. When damage reduces a character's Stamina score to zero or below, the character is dead. Defensive suits and screens can protect characters from injuries, but a freeze field or staydose injection will preserve a dead character's body so it can be revived at a medical complex.

Notes on Stamina and Damage

When a character's Stamina score is reduced below half, all if his attacks have a -10% penalty. He can only fire one shot a turn.

Whenever the roll to hit in combat is 01-02, the target is immediately knocked unconscious for d100 turns.

If a character suffers burn damage that affects more than half of his Stamina score, he is incapacitated until treated.

If a character's Stamina score is reduced to zero or below, he is dead.

When the Stamina score is reduced below 30, the only way to resuscitate a character is with a body-jump box.

Irrecoverably Dead. At -31 Stamina points, a character is normally considered irrecoverably dead. This can be due to the result of extensive damage to the brain, central nervous system, and/or internal organs.[56] At this point, the only resuscitation technology that may work to revive the character is a body-jump box. However, the referee may still rule that even at this point, the damage/decay to a character's body is just too extensive for this procedure to work.

Shock and Unconsciousness

Whenever the roll to hit in combat is 01-02, the target is immediately knocked unconscious for d100 turns. Stimdose can awaken the character sooner.

Burns

Acids, fire and extreme heat cause burns, which are very painful. If a character suffers damage from burns that is more than half his Stamina score, the character is completely incapacitated and unable to do anything until treated at a hospital.

Wounds caused by normal Frontier lasers are not burns.

Healing

Natural. Wounds heal naturally at a rate of 1 point for every 20 hours the wounded character spends resting. Resting means doing nothing more strenuous than taking short walks.

[56] Sings-With-Spirits, "Healing and Medical Kits (House Rule)," http://starfrontiers.wikia.com/wiki/Healing_and_Medical_Kits_(House_Rule), Feb. 20, 2016.

A hospital can heal up to 20 Stamina points per day, at a cost of 1 Credit per Stamina point healed, plus 50 Cr per day.

Biocort. Biocortizone is a healing drug. An injection of biocort heals 10 points of damage immediately, when it is given by a medic. (Biocort has no effect if given by a non-medic.) Only one dose of biocort can be given in a 20-hour period; additional doses have no effect unless given during surgery.

Field Surgery. A medic can perform minor or major surgery on a wounded character to heal more than 10 points of damage. Surgery is described in detail under SKILLS: Medical.

Stimdose. Stimdose is a stimulant. If given by a medic to an unconscious character, the character will wake up immediately. A stimdose will restore 10 Stamina points if the points were lost to poison, disease or infection. These 10 points are restored even if the character is unconscious.

If the character's Stamina has been reduced to -10 or less, however, the stimdose will not save him, because only one dose can be given effectively in a, 20-hour period. The stimdose will not restore Stamina points unless the poison, disease or infection has been neutralized or cured with the proper drug, or has worn off.

Medical Procedures

See the Library of Skills document for more information about each procedure.

Characters who do not have the prerequisite skill needed to use items in the medkit can still attempt a medical procedure but have a -30 percent modifier. If a patient is treated in a hospital or sick bay all Success Rates are increased 20 percent. If the patient is an animal or an unfamiliar alien, all Success Rates are reduced by 20 percent (a -20% modifier). These two modifiers are cumulative, so the chance to perform major surgery on an unfamiliar alien at a hospital is the skill's normal success rate, although the time required for X-rays or exploratory surgery would be longer for an unknown alien.

Animals can only be treated by Medical Treatment: Veterinary, but the activities and alien creatures' modifiers still apply.

Note that when a character has a disease, infection, infestation, poison, or radiation introduced into his system, damage does not begin to occur until the turn following the introduction. All other forms of damage (weapons damage, fire, falling, etc.) occur instantly, in the same turn they are introduced to the character.

A character whose Stamina has been reduced to 0 or less is dead, but he can be revived if his Stamina has not gone below -30. The body can be preserved with drugs or a freeze field, and revived at a hospital.

Diagnosis. A character with this skill can attempt to diagnose a patient's ailment by using a medscanner or Medic-CAS combined with his skill. The diagnosis outlines the patient's general symptoms and classifies the ailment for treatment as a disease, a poison, an infection, an infestation, radiation poisoning, or a wound, the latter of which falls into one of four categories: requiring first aid, minor medical attention, major medical attention, and surgery.

Once there is a general diagnosis, the character can use his skill to gain specifics. If he passes the skill check, the character knows exactly what the ailment is. With this information, the character can use one of the other medical skills to treat it (if he possesses that skill).

First Aid. Also called Medical Treatment: Wounds I, this skill is the equivalent of knowing first aid and nursing. It is the only medical treatment skill that does not require Medical Diagnosis as a prerequisite and is generally available to the public. Included in the skill is knowledge of how to clean wounds, change bandages, resuscitate a victim and perform some minor healing.

Medical Treatment: Minor Medical Attention. Also called Wounds II by Zebulon's Guide, this treatment allows the medical character to heal up to 20 points of damage in addition to the 10 points healed by First Aid (Wounds I).

Field Surgery. Field surgery can save a character whose Stamina was not reduced below -30 if a staydose was used to preserve the character; surgery will not help a dead character.

Major Medical Treatment. Also called Wounds III, this skill can heal any amount of damage to a character. For every 10 points of damage (or fraction of 10 points) healed, a dose of biocort is used. Whenever Major Medical Treatment is used, two doses of anesthetic are also required. The only limit to the amount of damage that can be healed is the patient's original Stamina, the supply of biocort, anesthetic and time.

Major Surgery. Also called "Wounds IV," this skill is the equivalent of surgery and is absolutely necessary for the treatment of broken bones, massive lacerations, ruptured organs, tumor removals, amputations, etc. All of this is left to the referee's discretion and these occurrences should be rare, but when they do happen the character must receive surgery or die.

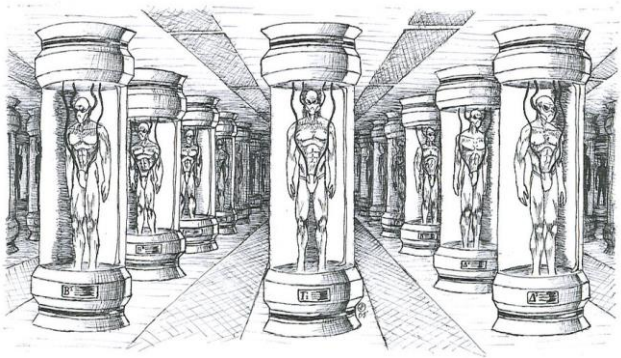
Intensive Healing. Intensive healing may only be done at sophisticated hospitals. The referee should decide if a hospital is able to do intensive healing. Intensive healing will allow the character to heal 40 Stamina points a day. The cost is three times the number of points healed per day plus 500 Cr. Healing 85 Stamina points would take three days and cost 755 Credits. [57]

Other Treatments. Along with wounds, medical personnel also may need to deal with diseases, infections, infestations, poisonings, and radiation sickness. Under the Zebulon system (and Zebulon Sunset house rules), a character should have the appropriate skills to be able to successfully deal with these conditions.

Special Procedures

Cloning. This process is very rare, performed at only the most advanced hospitals. When a character is to be cloned, tissue samples are taken of various parts of the character.s body. These may be held for any length of time. From these samples, a new body may be grown when requested. Growing a clone takes 500 days and costs 1,000,000 Credits.

Physically, the clone will be identical in appearance to character from which the tissue samples were taken, save for scars and other uninherited physical traits. The clone will have average scores in Strength, Stamina, Reaction Speed, and Dexterity. It will have no Intuition, Logic, Personality, Leadership, or Special Abilities.



A cloning chamber. Source: Jeremy Pea (Malcadon) for Mutant Future, http://malcadon.deviantart.com/art/Cloning-Chamber-84418433, © 2008-2017 Malcadon.

A clone may be supplied with these abilities through an experiential matrix (giving the clone the scores recorded in the Matrix, see below). If a matrix is fed into a clone different from the person from whom the matrix was taken, the Strength, Dexterity, Reaction Speed, Personality, and Leadership scores are reduced by 20 points. No score may be reduced below a level of six in this case. Clones and cloning are illegal on some worlds. [58]

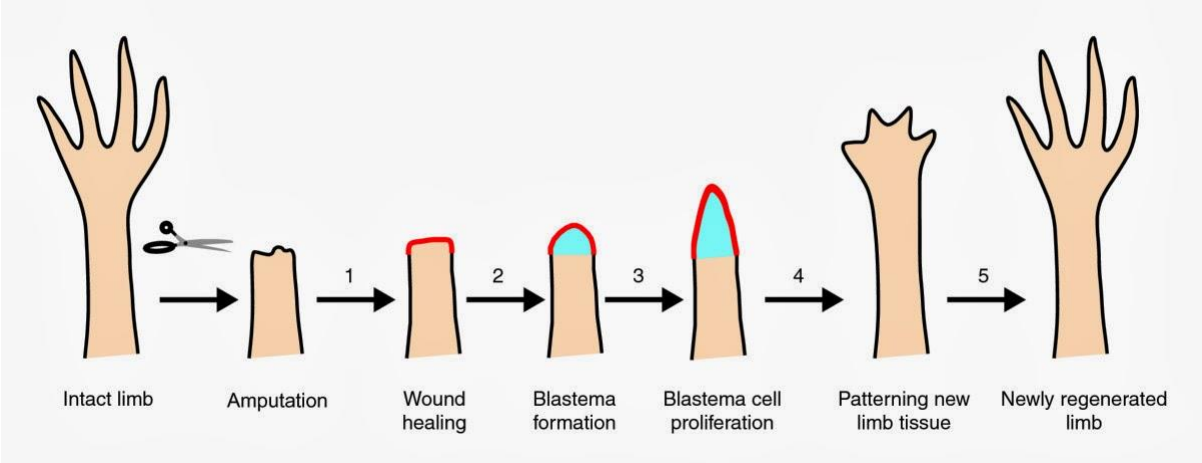
Experiential Matrix Analysis. Living characters may undergo an experiential matrix analysis. This process will record all memories and experiences of the character up to the time of the analysis into a special computer storage.

[57] Cook, David. "For a Fistful of Credits: Extra equipment for the Star Frontiers game," Dragon Magazine, August 1990, pp. 89-91.
[58] Cook, David. "For a Fistful of Credits: Extra equipment for the Star Frontiers game," Dragon Magazine, August 1990, pp. 89-91.

The process is mainly used to transfer memories to a clone, and may only be done at an advanced hospital. This process is dangerous as it involves severe strain on the character; there is a 20% chance that the following abilities will be permanently reduced whenever an analysis is made: Stamina, Logic, Intuition, Reaction Speed, Personality, and Leadership.

One check is made for each ability. If an ability is to be reduced, the character will lose 10-50 points in that ability. All abilities (except Stamina) may not be lowered to less than six points. If the Stamina ability is reduced to zero or below, the character is permanently dead.

The referee should record the reduced Ability Scores of the character analyzed and keep this information for later use. Reduced abilities may only be increased by use of experience points. The analysis takes one week and costs 50,000 Credits. [59]



An example of salamander limb regeneration. Source: http://imgarcade.com/1/regeneration/

Regeneration. This process allows lost arms, legs, fingers, and toes to be regrown by the use of special medical stimulation procedures.

It may only be done at the most advanced hospitals. The patient, obviously, must be alive (or in a freeze field) when brought to the hospital. Regeneration takes 30 days for a finger or toe (costing 50,000 Credits) or 90 days for a complete arm or leg (costing 200,000 Credits).

How the character lost the limb in the first place is left entirely up to the referee. If the referee does not want to deal with this, the game problem of limb loss and regeneration may be ignored. Since Dralasites do not have any specific limbs, they do not need regeneration. [60]

Medical Kits

Frontier medtechs, doctors and even ordinary citizens have access to a number of medical kits. Besides the Standard Medkit, other kits include first aid packs, a first responder's kit, and a doctor's kit. [61]

Medkit, Standard. A standard medkit has specialized equipment the medic needs to perform his or her job. It weighs 10 kg and can be carried as a backpack. It contains: Local Anesthetic, 10 hypo doses to relieve pain; Plastiflesh, 5 cans of spray which closes up wounds and heals burns; Omnimycin, 10 hypo doses to control infections; Acid neutralizer, 1 bottle of liquid to neutralize acids; Antiseptic, 5 cans of

[59] Cook, David. "For a Fistful of Credits: Extra equipment for the Star Frontiers game," Dragon Magazine, August 1990, pp. 89-91.
[60] Cook, David. "For a Fistful of Credits: Extra equipment for the Star Frontiers game," Dragon Magazine, August 1990, pp. 89-91.
[61] Donovan, Chris. "Healing and Medical Kits (House Rule)," http://starfrontiers.wikia.com/wiki/Healing_and_Medical_Kits_(House_Rule).

spray to clean and disinfect a skin area; Microforceps, adjustable, used to remove shrapnel and bullet fragments from wounds; and Medscanner, an electrical instrument used to diagnose ailments.

A hypospray.

Other equipment includes: Spray hypo, asyringe used to give shots without a needle; Biocort, 20 hypo doses to stimulate very fast healing; Telol, 10 hypo doses of truth serum; Stimdose, 10 hypo doses to revive unconscious individuals; Staydose, 10 hypo doses to sustain a dying character for 20 hours; Sonic scalpel, a tool used for cutting plastic, metal or flesh, makes a smooth, bloodless incision up to 5 millimeters deep; Laser scalpel, used to make deep incisions; Electrosurgeon, a small machine that keeps wounds open and controls bleeding during surgery; Autosurgeon, a special device that allows a medic to operate on himself; Antibody plus, 10 hypo doses that increase the body's ability to recover from diseases; and Antitox, 10 hypo doses to neutralize poisons.

First Aid Pack. This is a compact, abbreviated version of a Medkit that is the type found in many homes, carried by hikers. Anyone can purchase it to treat up to 10 minor wounds.

Physically the kit is a small, waterproof case or pouch of negligible weight, approximately 15cm x 10cm x 2cm, containing the following: Spray Bandage (Plastiflesh), 1 can of spray which closes up wounds and heals burns; Antiseptic Spray, 1 can of spray to clean and disinfect a skin area; Spray Hypodermic (Spray Hypo), syringe used to give shots without a needle; 1 dose of Stimdose, to revive unconscious individuals; and 1 dose of Staydose, to sustain a dying person for 20 hours.

The pack also contains an information card with basic instructions on using the kit and baseline conditions for all major races. Most First Aid Packs assume the presence of a Pocket Tool and are sold with one (such as the version in the standard or emergency packs), but some models include a small safety cutter or scissors. Other models include a pair or protective gloves and/or use lower-tech bandaging or medical packets. Cost: 40 Credits. Weight: 5 kilograms.

First Aid Pack, Large. A larger version of the first aid pack that is often found in businesses or other areas where large numbers of people live and work. Larger kits cost an additional 40 Credits and weigh an extra 0.5kilograms per 10 uses. The largest first aid pack would have a maximum of 50 uses total. Refills may be purchased in 10-use blocks for 40 Credits.

First Responder's Kit. This sort of medkit contains all of the supplies of a first aid pack in greater quantity plus a number of items to make treating *Moderate* injuries possible. A first responder's kit is carried by EMTs and combat medics, and requires a character to have at least that level of training to use properly.

Combat medic's kit.

It's purpose is to allow the medic to treat *Minor* injuries and help stabilize more heavily injured characters (presumably for transport to a medical facility). This sort of medkit is designed to treat up to 20 *Minor* injuries and 10 *Moderate* ones.

A complete First Responder's Kit costs 200 Credits, measures 28x25x20 centimeters, and weighs 5 kilograms. Refills for this type of kit cost 150 Credits and weigh 3 kilograms.

Field medical kit.

Complete first responder's kits may be purchased only by characters certified to have at least Medic training. Others may purchase a "basic" version of this kit that lacks controlled medicines for 150 Credits (refills 100 Credits).

Doctor's Kit. This is the sort of kit a field surgeon or civilian doctor carries. It is capable of providing the resources to treat any sort of injury and if not cure the patient, then, at least, maintain their life until a hospital can be reached. It can also give field treatment for poisonings and diseases. Doctor's kits can

treat up to 40 *Minor* injuries, 20 *Moderate* injuries, and 10 *Serious* ones.

A Doctor's Kit costs 500 Credits, is carried in a backpack measuring roughly 28x53x15 centimeters, and weighs 10 kilograms. Purchase is restricted to fully-licensed doctors. Refills are 400 Credits and weigh 5 kilograms.

Medicated Bio Pack. This item is a commercially produced medicated poultice or cataplasm. It also comes with gauze for securing it in place. It can be applied by anyone to speed healing (5 Stamina points for 20 hours of rest with rest being limited activity). However, one pack is only good for 20 hours and must be changed with a fresh pack to maintain the accelerated rate of natural healing. Cost: 10 Credits Weight: n/a.[62]

Medical Drugs

Accelerator Drug. This drug speeds up the body.s actions. Only a medic may administer this successfully. When under the effects of the drug, a character adds +2 to the initiative die roll (in addition to normal bonuses) and can make one extra attack per turn in melee combat.

The effect will last for a number of turns equal to the character.s Stamina score (at the time the drug is taken) divided by 10. Each turn the character is accelerated, the person will lose four Stamina points. Lost points are healed like normal wounds. Cost: 10 Credits/dose. [63]

Athilor Cream. Athilor Cream is and ancient herbal remedy developed by Yazirians before their Star Exodus. It boosts the body's natural healing processes. Typically an injured character will heal at a rate of 1 Stamina point per 20 hour period of rest, but Athilor cream will triple this for a Yazirian (3 Stamina points for 20 hours of rest). This herbal concoction only works on the Yazirian biology. Only one dose may be applied per 20 hour period. The cream does not require medical skill to use. One small jar holds 5 doses. Cost: 40 Credits. Weight: 0.25 kilograms. [64]

Athilor 4 Cream. Developed by SythnCorp, Athilor 4 is a broad spectrum version of the traditional Yazirian remedy. It works on all four species of the "Core Four," doubling the natural healing of any of a character for a 20 hour period of rest. Only one dose may be applied per 20 hour period. The cream does not require medical skill to use. One small jar holds 5 doses. Cost: 25 Credits. Weight: 0.25 Credits. [65]

Anesthetic Drug. This drug works exactly like a doze grenade, except that it must be injected into the target. Anyone may give the injection. Cost: 5 Credits/dose. [66]

Biocort. Biocort can be used to bring a character's Stamina score back above O if his score was not reduced below -9.

Hydro-gel. Hydro-gel was developed by the Eorna and is now produced under license by SynthCorp. At its introduction during the Second Sathar War it was difficult to come by since there were production bottlenecks when the Eorna were producing it on Volturnus.

It comes in a plastic envelope/pouch that must be torn open and liberally applied to the burns of a victim. It will heal 5 Stamina points lost to burns of any form (including laser) for each application but it cannot be applied more than once per day (20 hours). It does not require medical skill to be used.

A packet of Hydro-gel.

[62] Verreault, Tom "The Power of the Poultice," Frontier Explorer, issue 11, p. 10.
[63] Cook, David. "For a Fistful of Credits: Extra equipment for the Star Frontiers game," Dragon Magazine, August 1990, pp. 89-91.
[64] Verreault, Tom. "Medical Supplies in the Minzii Market Place," Frontier Explorer, issue 11, pp. 8-9.
[65] Verreault, Tom. "Medical Supplies in the Minzii Market Place," Frontier Explorer, issue 11, pp. 8-9.
[66] Cook, David. "For a Fistful of Credits: Extra equipment for the Star Frontiers game," Dragon Magazine, August 1990, pp. 89-91.

Cost: 25 Credits, Weight: --. [67]

Medical Tabs. These aspirin-sized tablets are used by explorers to temporarily combat unusual maladies. Examples include the following:

- **Aller-Tab**. One tab blocks the effects of most allergies to alien flora or fauna for twelve full hours.
- **Dehy-Tab**. One tab reduces the impact of heat dehydration on the Humans, Ifshnits, Humma, or Yazirians for twenty-four hours.
- **Elasti-Tab**. One tab prevents the Dralasite body from losing its elasticity or the Vrusk's chitinous body from locking up in freezing weather.
- **Fungi-Tab**. This medicine guards against most alien fungi from growing on or in the user's body for eight hours. [68]

Neutrad. An injection of neutrad is necessary with the Medical Treatment: Radiation skill to stop radiation poisoning. Radiation poisoning can be caused by nuclear battery or plant leakage, being on a spaceship that is struck by a nuclear-armed torpedo, etc.[69]

Salgel. Salgel is an oily blue goo that effectively protects surfaces from all but the worst concentrations of acid. Explorers often coat themselves or any exposed items with it to counteract the corrosive effects of severe acid rain or acidic gas. It can only be removed by a special liquid that accompanies its purchase. [70]

SmartFlesh. Appearing to be a small blob of clear gel, SmartFlesh spreads evenly over a small wound, sealing it better than any bandage. The SmartFlesh keeps the wound dry in any environment, clean and disease free. Enzymes released by the SmartFlesh speed healing, and can be easily removed once healing is complete.

SmartFlesh is self-cleaning, and can reused indefinitely. One application is sufficient to heal up to 10 Stamina points over 10 turns (1 point per turn), and prevent any subsequent infection. However, SmartFlesh will not cure or otherwise affect diseases already present.

It will not restore Stamina lost after application, nor will it restore Stamina points due to non-damaging effects (fatigue, poison, radiation, etc.). A character can have no more than 8 applications of SmartFlesh applied at any one time. Weight: negligible. Cost: 50 Credits per application. [71]

Sporekill. An injection of sporekill is necessary with the Medical Treatment: Infestation skill to stop spore or parasite infestation. Spore infestation is most often caused by alien plant life seeking to spread its spores to a fertile growth medium such as a character's lungs. [72]

SynthPlasma. Originally designed as a universal blood replacement, and still useful as such, SynthPlasma is composed of microorganisms specially designed to mimic blood corpuscles. The microorganisms mimic the user's blood as soon as they enter the bloodstream, functioning perfectly as the user's own blood. Moreover, it was found that SynthPlasma is even more effective than actual blood, being immune to all known diseases, and boosting oxygen production within the user.

A single dose of SynthPlasma gives the user an effective boost as if using Stimdose, Omnimycin, Biocort and Antibody Plus for 8 hours, as well as the normal effects of a blood transfusion. Successive doses of SynthPlasma within 24 hours of the first gain no additional benefit, nor do they extend the 8 hours of initial boosting, though it will offset blood loss.Weight: 1 kilogram/liter (one dose). Cost: 100 Credits per liter.[73]

Staydose. An injection of staydose will bring a deed character back to life, but will slowdown the body's functions so it can survive with fewer Stamina points. Staydose must be given within one minute (10 turns) of death or it will not work.

A staydose injection will keep a character alive for 20 hours. After 20 hours, the body cannot be revived

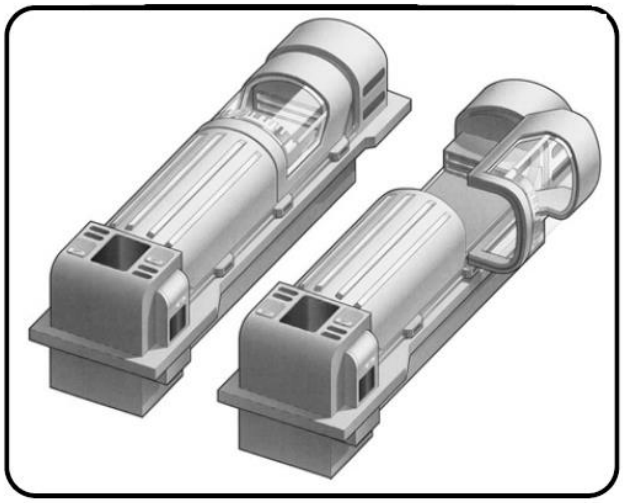
[67] Verreault, Tom. "Medical Supplies in the Minzii Market Place," Frontier Explorer, issue 11, pp. 8-9.
[68] Zebulon's Guide, remastered, p. 94.
[69] Zebulon's Guide, remastered, p. 94.
[70] Zebulon's Guide, remastered, p. 94.
[71] Trussell, Allen. "BioSys Incorporated," Star Frontiersman, issue 15, pp. 73-74.
[72] Zebulon's Guide, remastered, p. 94.
[73] Trussell, Allen. "BioSys Incorporated," Star Frontiersman, issue 15, pp. 73-74.

and further injections will have no effect. Only a medic can administer staydose effectively.

Universal antibody. This antibody helps protect the person from any type of disease. It may only be injected at a hospital. Characters with the universal antibody have a +20% chance to resist any disease (if the chance to resist the disease is 0% (nil), the character is given a 20% chancel. This product is a great boon to galactic tradesmen and explorers of new worlds. Cost: 100 Credits/dose. [74]

Medical Equipment

Autodoc. [75] The Autodoc or "Coffin" is a level 6 autonomous medical robot that can provide most services that a medical professional can provide. The autodoc consists of an airtight capsule, where the character is placed. It is usually made of glass for observation. It also has built-in storage for instruments and storage for drugs and gases used during procedures.



The injured or sick character is placed inside. The autodoc assesses and diagnoses the problem. Then administers the appropriate treatment. The autodoc will sedate the character during treatment. They will be totally unconscious during any procedures.

A character who has not gone below -30 stamina can be placed in the autodoc. They will be stabilized and field surgery will be performed. The auotdoc makes a skill check for each treatment of skill level of 6. It will first do a diagnosis. Then it will determine whether first aid, minor surgery or major surgery is needed to heal the character.

Characters who are poisoned or infected: a skill check of controlling infection then cure disease will be administered. The character will not be released until all Stamina points are restored. A maximum of 20 stamina points per day can be restored.

If the character has sustained a dismemberment of arm, leg, finger, etc. the part can be put into the autodoc for reattachment. Success on this varies.

If any skill checks fail for treatment the autodoc will instantly put the patient in a freeze field. It will not release the freeze field until the patient is brought to an advanced facility for treatment.

Autodocs are species-specific or can be modified with software and instruments for other races. Autodocs can be used singularly or can be run in a succession of several capsules. They were used to good effect in the first Sathar war.

The autodoc will give a complete diagnostic of the character in its care and give the time for treatment and causes etc. It can also provide an autopsy of a dead character. These are provided through voice or by printout. The autodoc will converse with the characters to discuss treatment (provide options, etc.).

The autodocs usually have a constant power source (such as a permanent installation, starship or a large vehicle), although a parabattery or generator can be used. The power usage is 20 SEU per day. The 'doc can be temporarily disconnected from the main power source and moved. Provided another power source is connected within 10 minutes. It is completely sealed and is insulated from adverse weather and the vacuum of space.

[74] Cook, David. "For a Fistful of Credits: Extra equipment for the Star Frontiers game," Dragon Magazine, August 1990, pp. 89-91.
[75] Harper, Chris. "Autodoc," Star Frontiersman, issue 8, p. 49.

The autodoc can withstand 100 points of damage before it will not operate. If the doc has sustained damage the capsule will remain locked. It will take a tech to defeat security or another 30 points to the locking mechanism to get at any patients.

The autodoc can heal up to 500 stamina before it needs an overhaul. This will cost 1,000 credits, and must be done at a major hospital. Cost 50,000 Credits, Extra capsules: 10,000 Credits (can add up to 10 capsules to one doc.), Comes with software for 1 species. Additional species programs and equipment are 5,000 ea. Size: 1.5 meters x 2.5 meters x 1 meter tall, Mass: 200 kg.

Biocontacts. – To activate biocontacts, the wearer must insert them in the eye like a normal contact lens (biocontacts do not function with dralasite eyespots). After 8 hours, the biocontacts have adjusted to the body chemistry of the wearer, and can be worn indefinitely, as the organisms survive off the wearer's tears.

The basic model of biocontacts corrects any vision problems the wearer may have that are attributable to the cornea. More advanced models can enhance vision, adding low-light vision, infrared sight, macroscopic (distance) or microscopic vision and more. Weight: None. Cost: 150 Credits for basic, low-light +200 Cr., infrared +300 Cr., macroscopic/microscopic +300 Cr. for x4 up/down, each additional x1 up/down +100 Cr. more. Other spectra of light (ultraviolet, etc.) can be added to the base cost for 500 Credits per spectra. [76]

Body-Jump Box. Coming in many forms, from huge chambers in city hospitals to the small portable units that are carried into the field, a body-jump box is wired to various nerve points of the victim's body and head. When activated, beta particles are forced through the body.

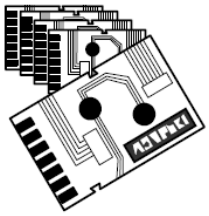
If the skill check is made, the character is "resurrected," though he may have been dead for up to 10 hours. If the skill check is missed, the body could not stand the beta ray bombardment and is completely destroyed.[77]

Freeze Field. A freeze field is a device that places a body in stasis, a sort of suspended animation. The device is fastened directly to the body. Only medics are trained to activate freeze fields correctly.

A freeze field must be activated within two minutes of death, or the body cannot be revived.

Activating the field takes five turns. Each freeze field device contains enough power to operate for 200 hours. If the power runs out, the body cannot be revived. Freeze fields can be removed safely only at hospitals. A hospital charges 200 Credits to remove the field. The character then must pay normal costs to be healed.

MedTrace-Tags.These variants of the Trace-Tag (See Star Frontiersman, issue 3) broadcast information about the person carrying it: heart rate blood pressure, body temperature, blood oxygen level, etc. This data allows a medically-trained individual to make a diagnose attempt from far away – as long as the person carrying the MedTrace-Tag's race, gender, and general health history are known.


Trace-Tags

A tiny circuit board (1.25 by 2 centimeters), the MedTrace-Tag must be worn against the skin (or in some cultures implanted just under the skin on the inside of the forearm). Each Trace-Tag has an identification number that is nearly unique (the random number seed is such that it takes several billion iterations before a duplicate identity number is generated). Cost: 100 Credits. Mass: Negligible.

MedTrace Tag-Tracker. This is a special medical version of the handheld Tag-Tracker. It is used to trac MedTrace-Tags by emitting a high-strength radio frequency (RF) wave that bounces off nearly everything within a 5 kilometer radius. When a Tag-Tracker sends out its signal, the RF energy powers the micro circuitry in any MedTrace-Tags it strikes, similar to the way electromagnetic fields can be induced with electrical transformers.

The MedTrace Tag then provides its identification number details along with biometric data back to the

[76] Trussell, Allen. "BioSys Incorporated," Star Frontiersman, issue 15, pp. 73-74.
[77] Zebulon's Guide, remastered, p. 94.

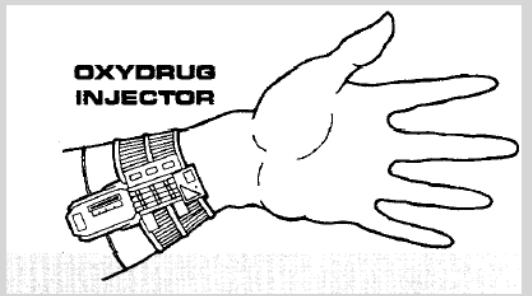
sending unit. The tracker unit can be wirelessly connected to a nearby medscanner (within 10 meters). Cost: 800 Credits.

Nerve Block Nanites. These nanites are injected into the character's body at a hospital facility. They attach to key nerve centers and regulate pain signals. The effect is to cut in half any of the pain penalties for half Stamina.

For example, the melee combat and skill check modifier of -10 is reduced to -5. The encumbrance penalty for the amount of weight carried is reduced from half to one-forth. The movement penalty is reduced from half to one-forth. However, ignoring movement and encumbrance penalties can lead to further injury. For every hour that one or both of these penalties are ignored due to the effects of the nanites, the character must make a current Stamina check to avoid losing 1 STA point.

The nanites have an operational lifespan of 2 years but a booster injection will extend this to another 2 years. Cost: 2,000 Credits for initial injection and 1,000 Credits for a booster injection. [78]

Oxy Drug Injector. This slowly releases oxygen into the bloodstream, supplying all needs for twelve hours. Oxy drug injectors are usually worn on the wrist, feeding the drug directly into the blood.



The injector must be attached at a hospital. Once the injector is attached, the character may refill it with oxy drug as needed. The cost of a refill is noted on the price list. Note that an oxy injector will not protect a character in space; a spacesuit MUST be worn.

Unit Cost: 500 Credits. Mass: --. Oxy drug refills: 30 Credits. [79]

VITAL Scanner (**V**irtual **I**maging and **T**rauma **A**ssist too**L**). This scanner is similar to the standard medical scanner except it is a body comp worn on the arm in the form of a bracer and comes with holographic imaging goggles.

Instead of interpreting data in two dimensions on the medical scanner's readout the imaging goggles present data in 3D with holographic overlay of the patient. This ability provides a bonus to surgery skill check of +15% modifier. Cost: 3,000 Credits. Weight: ??? kilograms. [80]

Wave Field Surgical Tools. Wave field technology was accidently developed by Eversafe Enterprises while working on defensive field technology. When two force fields were projected out of phase and at right angles to each other, this configuration allowed cutting to happen at the intersection of the two fields. This effect became the basis for the wave field scalpel.

A wave field tool permits a surgeon to cut tissue without even opening the skin. A whole suite of wave field tools included wave field forceps, probes, and a suture field. Using wave field tools requires that an assistant to hold a medical scanner or that the surgeon be equipped with a VITAL scanner.

The primary benefit of the wave field tools is that they can eliminate the chance of infection though they do carry a penalty to the surgical skill check of -10 (note that this penalty is more than wiped out by the bonus from using a VITAL Scanner). Cost: 750 Credits. Weight: ?? kilograms. [81]

[78] Verreault, Tom. "Medical Supplies in the Minzii Market Place," Frontier Explorer, issue 11, pp. 8-9.
[79] Cook, David. "For a Fistful of Credits: Extra equipment for the Star Frontiers game," Dragon Magazine, August 1990, pp. 89-91.
[80] Cook, David. "For a Fistful of Credits: Extra equipment for the Star Frontiers game," Dragon Magazine, August 1990, pp. 89-91.
[81] Cook, David. "For a Fistful of Credits: Extra equipment for the Star Frontiers game," Dragon Magazine, August 1990, pp. 89-91.

Bionics and Cybernetics

Note, the following section originates from Chris Donovan, a contributor to Frontier Explorer magazine and the starfrontiers.us website, along with stories by Tom Verreault and Bill Logan from Star Frontiersman magazine, issues 14 and 15 respectively.[82]

The Aleerins, also called the Mechalus, are a race of cybernetic humanoids from TSR's Alternity game. Statistics for them for use in the Star Frontiers game were presented in Star Frontiersman magazine, issue 7.

The fields of bionics and cybernetics are closely related, though the goals are different. The Alpha Dawn game touches on cybernetics in a number of ways, ranging from the Sathar's cybernetic creatures, including the cybodragon to the "Night of the Living Dead"-like slavebots. In later modules, cybernetic robots (cybots) are both touched on the "Bugs in the System" and "Warriors of the White Light" modules.

However, the where's and whys of the Frontier's need for cybots is not really addressed. Zebulon's Guide to Frontier Space only mentions the subjects of bionics and cybernetics in the library of skills section where the bionics skill is so "a surgeon with this skill can attach a bionic part to a living organism. The most common uses of bionics are as replacements for lost limbs or organs. The time required to heal from such an operation and learn how to use a bionic limb is weeks, sometimes months (referee's discretion)."

For cybernetics, Zebs adds "This skill is quite advanced and is used when a character has enough experience to start building cyborgs (cybernetic organisms)."

The word bionics originates from "bi," as in "life," and "onics," meaning "electronics." It is the study of mechanical systems that function like living organisms or parts of living organisms. In Star Frontiers it would basically be the medical field of prosthetics. The goal is to replace damaged organs and limbs -- with electronic/mechanical devices that duplicate what was lost due to wounds or diseases. It might include some enhanced capabilities, but that is not the goal.

Cybernetics in the classic sense is the "study of self-governance," and had referred to governance of people. By 1834 the word "cybernétique" was used by André-Marie Ampère, a French physicist and mathematician, to represent the study of government. The term then evolved by the late 1940s into the creation of artificial, self-regulatory devices that did not require outside (i.e. human) intervention between a monitoring device and its controls.

In science fiction, cybernetic beings are more like Robo Cop, the Universal Soldier, or the borg from the Star Trek universe. Instead of replacing damaged tissue with a prosthetic that mimics real life, cybernetics is an effort to "improve on the species" or even replace the species.

The Sathar use this technology to create their attack creatures. The UPF tries to use it in a more benign way to supplement its artificial intelligence technology. But there would be the "Shadow Run" class of people who want cybernetic/bionics to do more nefarious things or just to be "better" than their normal Frontier citizens. They'd view the "blending of the organic and the synthetic" to be an ideal way to cheat the degradation of old age and death.

[82] Donovan, Chris. "The Million Credit Man/Yazarian/Vrusk/etc.: Bionics in the Frontier," http://www.starfrontiers.us/node/9315#comment-45677

Why Bionics?

Although Star Frontiers offers regeneration technology, the cost is prohibitive to all but an elite few who would never lower themselves to having whole sections of themselves replaced with "metal." For example, the cost to regrow a finger or toe is a 30-day process and cost 50,000 Credits.

Bionics is the "budget option" for poorer citizens (relatively speaking, since the cost is still considerable). Also, regeneration does not work for some individuals due to some quirk of their genetics. [83] For purposes of gameplay, the types of bionics and cybernetics covered are those primarily found in Star Frontiersman magazine, issues 14 and 15. Only a few basics will be covered in the combat rules here.

Regeneration Inhibition Syndrome. The first time the referee rules a given character has been injured to the point of requiring replacement of one or more body parts, the player should make a d100 roll. If the roll is an Automatic Miss (96-100), then the character has RIS and cannot benefit from regeneration technology.

Likewise, a character with RIS is excluded from benefitting from whole body cloning technology. Any other result indicates that the character may have missing parts regenerated, providing they can afford it. Players should make note of the fact either way on their character sheet for future reference. [84]

Prosthetics. A prosthetic is a technological replacement of a body part which in the Frontier offers all the functionality – and weaknesses – of a normal part of the character's body.

For instance, a character that loses a hand might have a prosthetic hand implanted. Such replacements hardly constitute a "cybernetic" implant at all, but are included in the scope of this chapter. They are powered by the body's own bioelectric field and are treated as the character's own body parts once installed.

Bionics. These are technological implants or minimal bodily replacement technologies that are light enough to be powered off the body's own bioelectric field. These are often passive technologies (that is, not all are wired into the brain and controlled internally). If they are connected to the brain, they are more complex bionic implants.

A character can have as many bionic replacements or implants as desired, though common sense must prevail (only two ocular implants can be installed, for instance, because a character has only two eyes). Additionally, there are fatiguing effects of having large amounts of implants (see "Dangers of Implants").

Cybernetics. These are potent implants or body part replacements. They have a power requirement and must be given power sources in order to function. A character who has one or more cybernetic augmentation is called a cyborg, and may have to be registered on some worlds. There is a limit to how many cybernetic implants a body can have (see "Dangers of Implants").

Bionic Limitations

There are fundamental limits to what stresses flesh can withstand. While it is within the ability of Frontier science to make a robotic/cybernetic/bionic arm that could lift tons, or legs that could run at 100-plus kilometers per hour, the biological bodies they are attached to would not be able to withstand the stresses placed upon them in the process without significant additional modifications.

Those facts aside, the average Frontier citizen has a deep aversion to the idea of bionic "enhancements", particularly ones with military applications. The image of Sathar cyber-monsters remains strong in the public consciousness, making the idea repugnant.

A character can have as many bionic replacements or cybernetic implants as desired, though common sense must prevail (only two ocular implants can be installed, for instance, because a character has only

[83] Donovan, Chris. "The Million Credit Man/Yazarian/Vrusk/etc."
[84] Donovan, Chris. "The Million Credit Man/Yazarian/Vrusk/etc."

two eyes). Additionally, there are fatiguing effects of having large amounts of implants (see dangers of implants, below).

Dangers of Implants

Although prosthetics have no particular issues, bionics and cybernetics do come with a price.

Bionic Implant Threshold. Powered off the character's own body, bionics only drain a character minimally, though the person would need to consume a bit more food and rest a little bit longer than he otherwise would have had to under identical circumstances.

Bionic Implant Threshold Table	
Race	**Bionic Implant Threshold**
Dralasite	STA/10-1
Human	STA/10
Vrusk	STA/10+1
Yazarian	STA/10

If you have a number of bionic implants equal to or less than 10% of your character's Stamina score, your character need only rest and eat regularly. Vrusks add +1 to this threshold (as their bodies seem more able to receive implants) while Dralasites subtract 1 from this threshold (their amorphous bodies have more trouble interfacing with implants).

Although there is no real game effect, players should role play their character being hungry and tired a bit more than others.

If you exceed 10% of your character's STA score in bionic implants, you must take vitasalt pills daily or else suffer fatigue that results in a -10 penalty to all actions. For every 5 bionic implants more than this, your character must take 1 vitasalt pill.

Vitasalt pills are quite inexpensive, and are the bionic character's best friend. Lacking these pills, your character might be able to get by with caffeine and sugar - but this can cause annoying headaches.

For Example: Gord'n is a Yazirian and has a STA score of 55. He can have up to 6 bionic implants and have no in-game effects. If he has more than 6, however, he must take a vitasalt pill daily. If he has 11 implants, he must take two pills daily. If he has 16 implants (wow!) Then he must take three pills daily.

Bionic Damage Rule. (Optional) It is possible your character's implants can become dislodged, damaged, or somehow malfunction when you take a great deal of bodily damage. Any time your character is reduced to 10 current Stamina or less, the player must make a d100 roll for each implant. On a result of 01-05, that piece of technology is no longer functional, and must be repaired (costing 1d10x100 Credits). The Referee should inform players if he is going to use this rule.

Cybernetic Implant Threshold. Since cybernetic implants rely on power – the biggest danger you can endure is running out of the precious commodity. Depending on the nature of the implants, you may find that you are suddenly immobile or worse. An unpowered cybernetic component simply doesn't function.

Cybernetic Implant Threshold Table	
Race	**Bionic Implant Threshold**
Dralasite	LOG/10-1
Human	LOG/10
Vrusk	LOG/10+1
Yazarian	LOG/10

A character may have a maximum number of cybernetic implants his body can safely sustain equal to his Logic score divided by 10. For example, a character with 45 LOG can have 5 cybernetic implants without worries. This limit relates to how well the brain can manage interfacing with the implants, and how well the character can maintain his humanity (or whatever race he is) while having his bodily tissue slowly replaced by technology.

Just like for bionic implants, Dralasites have a penalty of 1 applied to this threshold due to their amorphous nature and lack of a centralized, immobile brain and nervous system. Vrusk have physiologies that lend themselves to implantation and therefore have a bonus of 1 applied to this threshold.

However, each additional implant carries with it a chance of cyber rejection. Directly following a surgical procedure that results in more than this maximum number, the patient must make a Logic check. If he

succeeds, his body accepts the new cybernetic implant and all is well. If he fails in this roll, the character's mind rejects the implant and it must be removed.

Once a character's mind rejects one cybernetic implant, it will reject all further implant attempts for the rest of that character's life.

For example: The Yazirian Gord'n has a LOG score of 65. He is able to have up to 7 cybernetic implants before he has any fear of dealing with cyber rejection.

Cybernetic Damage Rule. (Optional) Whenever the character is hit with a critical hit by someone, the player must go through each of his cybernetic implants and roll d100.

On a roll of 01-10, that piece of equipment was damaged and needs repaired (costing 1d10x1,000 Credits – if this is greater than the cost of the implant, then it is trashed and needs replaced). It still counts against the number of cybernetic implants your character has, but is not able to function. Depending on the nature of the implant, this may prevent the character from operating normally.

Augmentation can lead a species down a path of enlightenment or can make a race into an abomination of what it once was. Source: Star Frontiersman, issue 14, image by Levi Dansam.

Game Effects

Specific implants are detailed in issues 14 and 15 of Star Frontiersman magazine, including how such devices would affect a character in combat.

Prosthetic, bionic and cybernetic implants are calibrated to the attributes of the patient at the time of implantation. Players should note that the character has a bionic part on their character sheet, along with the current value of the attribute that most closely is impacted by that part – STR, DEX, and RS for arms and legs, INT for eyes and ears, STA for hearts and lungs, etc.

When a character has such an attribute raised more than 10 points above the level it was at the time of implantation, the GM may rule that the part needs upgrading before any more improvements to that score may be made.

Given the abstracted nature of the Star Frontiers damage system, most games won't really need these rules, much like they won't need the regeneration rules. That said, they make for good story-telling options/adventure seeds (the character has to earn the money to get his missing bits back), or simply a cash-sink if you feel your players are too flush. [85]

[85] Donovan, Chris. "The Million Credit Man/Yazarian/Vrusk/etc."

Section VIII. Vehicles and Vehicle Combat

In the equipment area of the Characters section, there are statistics for several classifications of vehicle (air, ground, hover, etc.) When operating these vehicles, certain rules apply.

Vehicle operations include starting, driving, and using a vehicle to do anything it was designed to do normally. A skill check may be necessary only when a character needs to bypass a locked ignition to start the vehicle.

Obviously, if the vehicle is damaged or out of fuel, it will not start until it is repaired or refueled.

A character usually will have no trouble starting the vehicle, but only gets one chance to operate it during an encounter if he is unfamiliar with it. If the character has driven this type of machine before, he can start and drive it automatically.

The normal operation of a vehicle does not include stunts or hazardous maneuvers. So these rules cover that. Vehicular equipment in Zebulon's Guide to Frontier Space or those found in articles in Dragon, Star Frontiersman or Frontier Explorer magazines increases the chances of successfully performing hazardous actions.

Alien vehicles or those that have been greatly modified may pose a challenge to characters. The referee may decide to require a skill check in order for a character to use it.[86]

Ground Vehicle Movement

Speeds. Vehicle speeds are given in meters per turn (meters/turn). To find out how many map spaces a vehicle moves in one turn, divide its speed in meters/turn by the size of a square on the game map. For example, a skimmer traveling at 50 meters/turn on a map with 5-meter squares will move 10 squares per turn.

See the Speed Conversion Table for converting speeds from meters/turn to kilometers/hour and miles/hour.

Speed Conversion Table

Meters/turn	KPH	MPH
5	3	2
10	6	4
20	12	8
30	18	11
40	24	15
50	30	19
60	36	23
70	42	26
80	48	30
90	54	34
100	60	38
125	75	47
150	90	56
175	105	66
200	120	75
250	150	94
300	180	112
350	210	131

Acceleration. A driver can increase the speed of his vehicle at the start of every game turn. To do this, the player decides how much faster he wants to move, and adds this number of meters/turn to his current speed.

There is a limit to how much a vehicle's speed can be increased in one turn.

This limit is the vehicle's acceleration rate. The Vehicle Data Table shows acceleration rates for all the ground vehicles in meters/turn.

Example: A hover car has a top speed of 150 kilometers per hour (kph) which translates into 250 meters per turn (m/t). During its last move, the skimmer was traveling at 40 m/t or 24 kph. Its acceleration rate is 80 meters/turn.

At the beginning of its next move, the driver of the skimmer can increase its speed to 120 meters/turn (40 + 80 =120).

Deceleration. A driver can slow down his vehicle at the start of each game turn. To do this, he subtracts the amount he is decelerating from his current speed; the result is his speed for this turn. If the result is 0, the vehicle has stopped and it does not move this turn. The amount a vehicle can slow down in one turn is limited by its deceleration rate (also see **Emergency Stopping**). Deceleration rates for ground vehicles are shown on the Vehicle Data Table.

[86] Zebulon's Guide, remastered, p. 31.

Emergency Stopping. A vehicle can come to a complete stop from any speed in one turn by making an emergency stop. The vehicle must move at one-half of its starting speed. At the end of the turn its speed is 0. The driver must make a Reaction Speed check to keep the vehicle under control during an emergency stop. If he fails the check, he loses control; see **Crashes**.

Maximum Speed. No matter what its acceleration is, a vehicle cannot move faster than its maximum speed. Maximum speeds are listed on the Vehicle Data Table.

Backing Up. A vehicle can drive backward at up to 50 meters/turn. A vehicle that is moving forward must come to a complete stop before moving in reverse. A vehicle's acceleration rate in reverse is one-half its normal acceleration.

Turn Speed. The Vehicle Data Table shows turn speeds for the ground vehicles. A vehicle can turn 45 degrees to the right or left in every 5-meter square it enters if its speed in meters/turn is equal to or less than its turn speed.

Turn Speed Table	
Vehicle Traveling	**Distance Between Turns**
At Turn Speed or less	5 meters
Greater than Turn Speed	10 meters

If the vehicle is traveling faster than its turn speed, it must move straight at least 10 meters after making a 45 degree turn before it can turn again. This information is summarized on the table below. See the diagram for examples.

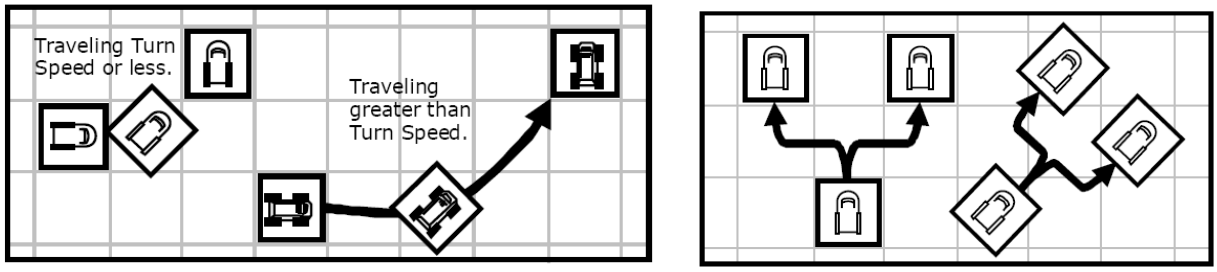
Straight movement from the previous turn can be counted toward these requirements. A driver can turn a vehicle more sharply than indicated above, but risks losing control or crashing; see Short Corners.

Special Maneuvers

Besides driving straight and turning corners, vehicles, can perform special maneuvers. These include slips, pivots, skid turns, bumps and stunts.

Slips. Slipping is similar to "changing lanes"; it allows a vehicle to swerve to the right or left without changing its direction of travel. Any type of vehicle can slip. A slipping vehicle moves 10 meters ahead and 5 meters to either side. This counts as only 10 meters of movement.

A vehicle cannot turn while slipping. A vehicle can slip once for every 10 meters it moves.



Above left, a diagram of a vehicle turning at turn speed versus traveling faster.

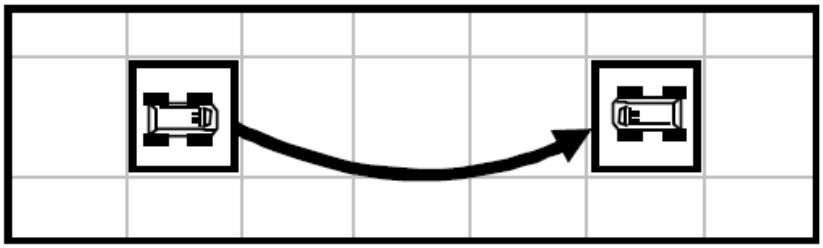
Above right, an example of a vehicle performing a slipping maneuver.

Pivot. A pivot is a turn of up to 360 degrees performed in one spot. Only hover vehicles and Explorers can pivot. A vehicle must be stationary at the beginning of the turn to pivot.

The pivoting vehicle stays in the same square, and the driver can rotate it so it points in any direction.

Skid Turns. A skid turn is done by slamming on the brakes while turning so the vehicle skids around 180 degrees. Only ground cars ground cycles and Explorers can perform skid turns.

The vehicle must be traveling from 60 to 80 meters/turn. It actually will move only 20 meters during the turn, and have a speed of 0 at the start of the next turn.



An explorer is shown performing a skid turn.

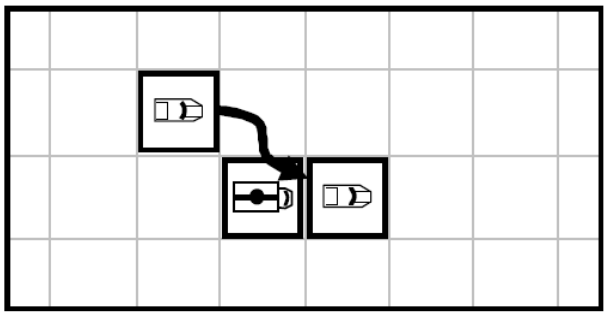
The driver of the vehicle rolls percentile dice. If the result is less than or equal to his Reaction Speed, the driver performs the skid turn safely.

If the result is higher than the driver's Reaction Speed, the vehicle will point in a random direction when it stops skidding. When this happens, move the vehicle as if it had kidded successfully. Now roll 1d10 and turn the vehicle 45 degrees clockwise a number of times equal to the number rolled.

Bumping. A driver can try to make another vehicle crash by bumping it. In order to bump, the driver or his team must have initiative for the turn. The driver must slip directly in front of the other vehicle.

Both drivers then make Reaction Speed checks. The driver who performed the slip makes a normal check, but the driver whose vehicle was bumped has a modifier of - 15. If either driver fails the check, he loses control of his vehicle (see **Crashes**).

Also see **Optional: Expanded Bumping Maneuvers** for more information.



The driver of a ground car attempts to perform a bumping maneuver on a transport.

Stunts. Drivers can perform other stunts, such as jumping their vehicles over bridges, at the referee's discretion. Things to consider when setting up a stunt are the type of vehicle being used, the amount of open space the vehicle has to work with, and the vehicle's condition and cargo.

Short Corners. A driver can try to turn his vehicle tighter than its speed allows, but risks losing control of the vehicle and crashing. A driver shortens a corner if he tries to turn 5 meters before he should.

Vehicle/Robot Bumping Table

Vehicle/Robot Type	Bump Number
Hovercycle Light Body Robots	1
Ground Cycle, Standard Robots	2
Standard Reinforced Robots	3
Hovercar	4
Ground car, Heavy-Duty Robots	5
Hover Transport	6
Ground Transport, Heavy-Duty Reinforced Robots	7
Warbots with Heavy-Duty and H-D Reinforced Bodies	8
APC (hover)	9
APC (ground); Super-Duty Robots	10
Hovertank, Warbots with Super-Duty Bodies	12
Explorer	13
Tank	14
Battlewagon	16

For example, a ground cycle has a turning speed of 100 meters/turn. If the cycle is traveling 150 meters/turn, it must travel straight 10 meters after making a turn before it can turn again. If the driver tries to make the second 45 degree turn after traveling straight only 5 meters, he is shortening the corner by 5 meters.

Whenever a driver shortens a corner, the player must roll d100. If the result is less than or equal to the driver's Reaction Speed, the driver makes the turn safely. If the result is higher than the driver's Reaction Speed, the driver loses control during the turn (see Crashes).

Optional: Expanded Bumping Maneuvers

The article "Here Comes the Cavalry! Conventional warfare in the STAR FRONTIERS® game," by Matt Bandy appeared in the April 1987 issue of Dragon Magazine. Bandy offered some expanded rules on bumping maneuvers and vehicle combat that have been incorporated here.

Some examples of bumping in vehicle combat under the Star Frontiers Alpha Dawn rules seem pretty unlikely, such as a hovercycle running an explorer off the road. Robots might also be involved in bumping attacks too, in particular are those with heavy-duty, heavy-duty reinforced and super-duty bodies.

The Vehicle/Robot Bumping Table provides a bump number for various vehicle and robot types, which can be used to resolve such attacks.

When a bumping situation occurs, the referee finds the difference between the two vehicles. Bump Numbers and multiplies that number by five. The result is added to the modified reaction speed (RS) score of the driver of the higher-valued vehicle, and then subtracted from that of the driver of the lower-valued vehicle.

A percentile-die roll is made for each driver to resolve the success or failure of the bump. Rolls of 01-05 always indicate success, just as rolls of 96-00 always indicate failure.

For example, a hovercycle is trying to run a ground car off the road. A quick look at the Vehicle Bumping Table shows the difference between the two vehicle's Bump Numbers to be four. The hovercycle driver's score of 63 minus 20 (4 x 5 = 20) is 43, and the ground car driver's score of 81 plus 20 (for being the driver of the higher-valued vehicle) and minus 30 (for being the vehicle bumped) is 71.

The hovercycle driver makes a 1d100 roll of 26, meaning he maintained control of his vehicle. The ground car driver is not so fortunate: a roll of 95 indicates loss of control. The referee now consults the ***Control Table*** *in the Alpha Dawn expanded rules (page 31) and continues play.*

When a driver loses control of his vehicle, standard procedures governing this situation apply. The exceptions to this rule are the tank (ground) and the battlewagon.

Due to their low centers of gravity and width, these two vehicles do not roll over. Treat a result of either "roll" or "roll and burn" as a spin.

Crashes

Sometimes the driver loses control or is forced into crashing. These rules cover such events.

Losing Control. When a driver loses control of his vehicle, the player must roll d100 and check the Control Table to see what happens to his vehicle. The die roll is modified by adding the vehicle's speed in meters/turn to the result.

Vehicle Control Table	
Roll	**Loss of Vehicle Control Result**
02-79	Reduce Speed 20 meters/turn
80-139	Reduce Speed 50 meters/turn
140-199	Skid
200-259	Spin
260-349	Roll
350-450	Roll and Burn

Explanation of Results

Reduce Speed. The vehicle immediately reduces its speed by the indicated amount. If this is more than half of the vehicle's current speed, the vehicle slows down to one-half its current speed. The vehicle finishes the move at this new speed.

Skid. The vehicle is skidding out of control. Divide its speed in meters per turn by 10, rounding fractions up. Move the vehicle this number of meters in the direction it was moving before it went out of control. If the vehicle skids into a building or other obstacle, treat it as a collision (see Collisions).

Otherwise, the vehicle continues moving from its new position.

Spin. The vehicle is skidding out of control and spinning. Divide its remaining movement by two.

Move it that many meters in the direction it was traveling before it started skidding. Now roll 1d10 and turn the vehicle 45 degrees clockwise a number of times equal to the number on the die.

On the next turn the vehicle will skid to a stop. Move it one-half of its speed in the direction it was traveling before it went out of control and roll 1d10 again to determine how much it spins.

Roll. The vehicle is rolling out of control. Treat this the same as a spin, but do not roll 1d10 to determine the vehicle's facing. Instead, each passenger in the vehicle suffers 1 d10 points of damage. When the vehicle stops rolling, roll 1d10; if the result is 1, 2 or 3, the vehicle is right-side-up. Otherwise it is on its side or top. The vehicle will run again in 1d10 turns if it was traveling at its turn speed or less.

Roll and Burn. This is the same as a roll, but the vehicle is burning also. Each passenger suffers an additional 1d10 damage from the fire at the start of each turn he is in the vehicle.

A character can get out of the vehicle in one turn if it has stopped rolling. If a character tries to get out of the vehicle while it is rolling, he must make a Reaction Speed check. If he passes the check, he has escaped from the vehicle. If he fails the check, he has not gotten away from the vehicle and he suffers an additional 1d10 damage immediately.

Collisions

If a moving vehicle hits a building, rock, other vehicle or obstacle of any type, it has had a collision. The vehicle stops moving immediately.

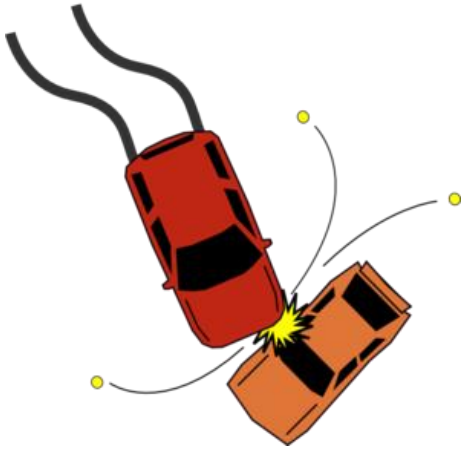
Damage to Vehicles. If the vehicle was traveling faster than its turn speed, it will not run again without extensive repairs. If the vehicle was traveling at its turn speed or slower, it can be driven again after 1 d10 turns. However, its acceleration and turn speed are reduced by 20 meters/turn.

Injury to Passengers. When a vehicle crashes, divide its speed in meters/turn by 20, rounding fractions down. The result is the number of d10 that are rolled to determine how many points of damage each character takes. Add 2 points to each die result if the character was riding a ground or hover cycle, and subtract 2 from each die if the character was riding in an Explorer (no die roll can be modified below 0). This information is summarized on the Damage to Passengers Table.

Vehicle Collision: Damage to Passengers Table

Collision Details	Damage
Per 20 meters/turn of vehicle's speed	1d10
Riding on ground cycle or hover cycle	+2/d10
Riding in Explorer	-2/d10

Armor. Skeinsuits and inertia screens will absorb half of the damage a character suffers in a crash. Crashing Through Obstacles. If characters try to drive through a barricade or obstacle, the referee must use his discretion to decide how badly the vehicle is damaged, whether it keeps running, and whether the passengers are hurt. A vehicle may be able to smash through obstacles that are less solid than concrete posts or parked vehicles.



Collisions with Pedestrians. What a moving vehicle hits a pedestrian, the pedestrian suffers 2d10 points of damage for each 20 meters per turn the vehicle was traveling. The referee might allow the driver or the pedestrian (or both) to attempt to avoid the collision with a Reaction Speed check if not surprised.[87]

Vehicle Combat

This next section covers only personal weapons fired from or at vehicles. Vehicle-mounted weapons are covered in the **Tanks a Lot** section.

Firing From Vehicles. A character who fires a weapon from a moving vehicle has a -10 modifier to hit. If the vehicle is moving faster than 150 meters/turn, the modifier is -20.

Shooting At Passengers. A character can shoot at a passenger inside a vehicle. There is a -20 modifier because the passenger has hard cover, and a -10 modifier if the vehicle is moving. Needlers can injure passengers only if the vehicle's windows or top are open.

Firing At Vehicles. If a character fires a weapon at a moving vehicle, he has a -10 modifier to hit. This modifier does not apply if the vehicle is moving directly toward or directly away from the firing character.

Needlers and gas grenades have no effect on vehicles.

Damaging Vehicles. Whenever a vehicle is hit by gunfire, an exploding grenade or a thrown explosive, the attacking character must roll 2d10 on the Vehicle Damage Table. The number of dice of damage caused by the attack is added to the result. This number is modified by the type of vehicle. A separate roll is made for each successful attack.

Vehicle Damage Table

# Dice Damage + 2d10 Roll	Damage to Vehicles
2-19	No effect
20	Turn Speed -15
21	Acceleration -20
22	Top Speed -30
23	Steering Jammed Straight
24	Steering Jammed Left
25	Steering Jammed Right
26	Speed -20 per Turn
27	Spin
28	Vehicle Burning
29	Roll
30+	Roll and Burn

Modifiers	
Target is ground or hover cycle	+2
Target is Explorer	-2

Damage to a Non-Moving Vehicle. When a character fires at a stationary vehicle treat any inapplicable result as a ”No Effect” result or assign a different effect. For example, when rolling on the Vehicle Damage Table, the referee might choose to treat a “Spin” as a “No Effect” and a “Roll” as wheel or hoverfan damage equal to the “Turn Speed -15” result. [88]

Cumulative Effects. Both special damage and structural damage to vehicles are cumulative. [89]

[87] Williams, Skip. “Sage Advice,” Dragon Magazine, July 1988, p. 44.
[88] Williams, Skip. “Sage Advice,” Dragon Magazine, July 1988, p. 44.
[89] Williams, Skip. “Sage Advice,” Dragon Magazine, July 1988, p. 44.

Explanation of Results

No Effect. (Optional: any damage is applied to the vehicle's structural points.)

Turn Speed -15/Acceleration -20/Top Speed -30. The vehicle's turn speed, acceleration or top speed is reduced by the indicated number of meters/turn.

Steering Jammed Straight/Left/Right. The vehicle's steering mechanism has been jammed. If straight, the vehicle cannot turn. If right or left, the vehicle must turn 45 degrees in the indicated direction after each 20 meters of travel.

For example, a skimmer traveling at 80 meters/turn with its controls jammed in a right turn must turn 45 degrees to the right after/raveling 20, 40, 60and 80 meters during its next move. The skimmer can decelerate or accelerate, but cannot change its direction.

Speed -20 per Turn. The vehicle must reduce its speed at least 20 meters/turn until it is stopped. It can decelerate more than this if the driver wants, but it cannot accelerate.

Spin. See Control Table results.

Vehicle Burning. The vehicle has caught fire. Each passenger will suffer 1d10 points of damage at the start of every turn they are in the vehicle.

Roll. See Control Table results.

Roll and Burn. See Control Table results.

Example: BliCluet the Dralasite is shooting its laser pistol at a street punk that has just stolen BliCluet's hover cycle. Its Dexterity is modified by -10 because the target is a moving vehicle, and by -20 because the cycle is at medium range. BliCluet has a modified Dexterity of 15 for this shot. One of its two shots hits the cycle. BliCluet had the laser set for 7d10 damage.

The player rolls 2d10 and gets a 16. Adding 7 for the damage and 2 because the target was a cycle gives a modified result of 25; the cycle's steering is jammed to the right.

An armored Explorer. Source: star_frontiers___explorer_atv_by_jaythurman-d7jwnz9.jpg

Section IX. Flying Movement and Combat

In the Star Frontiers game there are many aircraft that characters can fly including glijets,flit boards, floater disks, jetcopters, aircars, and air transports. The movement rules for these vehicles are different than those for ground vehicles.

Glijets

A glijet is a combination rocket pack and hang-glider. The rocket pack is used to get the wearer up into the air. The chemical fuel tank holds enough fuel to burn for 20 turns (two minutes).

A character can climb 50 meters straight up every turn he burns fuel. The rocket can be turned off at any time. When it is shut off, the wearer can open the collapsible wings and glide.

The rocket usually is shut off when gliding, but it can be left on to increase speed.

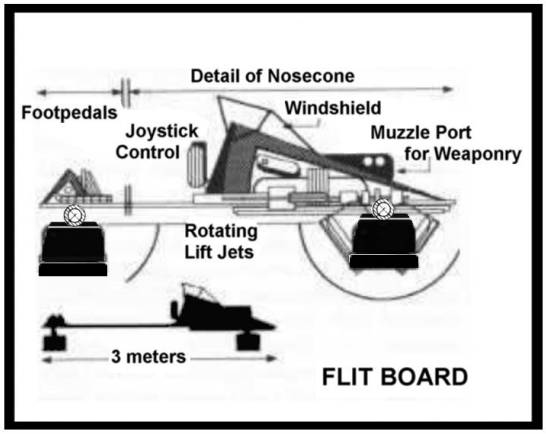
Speed and Distance. If there is no wind, the wearer can glide 5 meters horizontally for each meter he drops vertically. A gliding character drops 10 meters/turn, with or without using the rocket. If the rocket is used in level flight, the speed increases to 100 kph.

Characters can travel much farther and stay aloft much longer if there is wind or if they are riding on rising air currents. This is subject to the referee's discretion, but favorable winds and air currents ca n multiply the distance traveled and the time spent aloft by as much as 10.

Landing. A character that does not use the rocket to land must pass a Dexterity check in order to land on target. If he fails the check, he misses his target square by 2d10 meters in a random direction.

Tactical Movement. A character that is gliding with the rocket off can make one 45 degree turn per game turn. Using the rocket allows the character to turn up to three times at any point in his move.

Flit Boards



A flit board is a 3-meter-long vertical take-off and landing craft (VTOL) that uses small jets instead of blades. Designed for one person, it flies forward like a jet.

The pilot flies it prone, belly-down using a simple joystick and foot pedals to control it. In the very center of the flit board's nosecone is a muzzle port that can be fitted with a rifle, long rifle, or medium-ordinance (1 hard point) weapon.

Tactical Movement. Flit boards are very maneuverable and can make up to six 45-degree turns in one game turn. These turns can be made at any point in the vehicle's move.

These craft can accelerate or decelerate up to 150 meters/turn each turn. If they are stopped, these vehicles can hover in place and turn to face any direction. They can increase or decrease their altitude by 40 meters/turn and can conduct nap of the earth (NOE) flying; see Jetcopters, Aircars and Air Transports for more information on NOE.[90]

The flit board’s nosecone weapon would be considered a fixed mount, capable of firing in a 45-degree arc in front of the craft. The flit board is incredibly quiet

[90] These statistics are a house rule. Zebulon’s Guide only provided the cruise and top speeds for a flit board.

Floater Disks

A floater disk is is a 1.5-meter diameter disk that is 45 cm thick. It normally floats on a cushion of air about 50 centimeters above ground, but can raise itself to heights of 20 meters with the use of its microthrusters. It can maintain this altitude for up to five minutes, it then must return to hover mode for 1 minute before being able to raise itself back up.

The floater disk can be equipped with powerlights, a loudspeaker, a micromissile launcher, and one pistol-sized weapon.

Tactical Movement. One of the greatest advantages of the floater disk is its almost instantaneous ability to turn 360 degrees, offering the pilot a complete field of fire. It has a top speed of 20 kph (33 meters/turn) and a cruise speed of 10 kph (approximately 17 meters/turn). It can ascend or descend by 20 meters/turn.

Thruster Pack

This is a heavy backpack rocket, complete with flammable fuel gel tank. It creates powerful thrust to propel a character skyward. A character can fly around at a rate of 200kph.

Tactical Movement. It takes a RS roll to land effectively (or take 1d10 damage). The character cannot hover and cannot turn well (if using a square map, he must travel five squares in a straight line before making a single 45 degree turn).

The thruster pack can be used for 10 hours (one day of 200kph travel) before requiring more fuel. Yazirians may use this and take full advantage of their fleshy gliding wings – even on high gravity worlds where gliding is normally prohibited. Using their wings and a thruster pack, they are able to hover, turn perfectly (one square forward and up to a 90 degree turn), and climb and dive with great agility.

Jetcopters, Aircars and Air Transports

Tactical Movement. Jetcopters, aircars and air transports can make up to six 45 degree turns in one game turn. These turns can be made at any point in the vehicle's move.

These craft can accelerate or decelerate up to 100 meters/turn each turn. If they are stopped, these vehicles can hover in place and turn to face any direction. They can increase or decrease their altitude by 20 meters/turn.

When scouting, jetcopters, aircars and air transports fly at or above the level of the treetops, 50 to 100 meters above the ground. To stay out of sight they can fly very close to the ground, following the contours of the hills and valleys. This is called Nap of the Earth (NOE) flying.

NOE flying limits a jetcopter to its cruising speed and an aircar/air transport to 100 kph (175 meters/turn).

Aerial Combat

The following modifiers should be used when flying vehicles are involved in combat.

Other modifiers are used when they apply. Jetcopter passengers can not shoot unless the side doors are open.

Aircar passengers can not shoot unless the canopy is open. This exposes the passengers and the pilot to fire, and reduces the aircar's speed to 80 meters/turn.

Damaging Glijets. The only way to shoot down a glijet is to knockout or kill the user. Shooting at the wings has no effect.

Damaging Jetcopters and Aircars. When a shot hits a jetcopter or aircar, the attacker rolls 2d10 and adds the number of dice of damage caused by the attack. This number is found on the Flying Vehicle Damage Table.

Aerial Combat Modifiers Table

Aerial Combat Modifiers	%
Attacker is using a moving floater disk	-10
Attacker is using a moving flit board	-15
Attacker is using a glijet or riding in a moving jetcopter, aircar or air transport	-20
Attacker is on a hovering floater disk or flit board	0
Attacker is riding in a jetcopter, aircar or air transport that is hovering	-10
Target is using a glljet, flit board or riding in a moving aircar or jetcopter	-10
Target is using a moving floater disk or a hovering flit board	-5
Target is in a hovering floater disk, jetcopter, aircar or air transport	0

Explanation of Results

Acceleration -30. The vehicle's engines were damaged, reducing its acceleration by 30 meters/turn.

Turns -2. The vehicle's control and steering equipment was damaged, reducing the number of turns it can make per game turn by two.

Forced Landing. The vehicle's fuel tank or parabattery was hit, leaving it with enough fuel to fly for 10 more minutes (100 turns). If the vehicle does not land within 10 minutes, it will crash.

Loss of Control. The cockpit was damaged by the attack. The pilot must pass a Reaction Speed check to keep the vehicle under control. If he fails the check, the vehicle immediately loses d100 meters of altitude. If the vehicle loses more altitude than it had, it crashes.

Aerial Vehicle Damage Table

# Dice Damage + 2d10 Roll	Effect
2-20	No effect
21-24	Acceleration -30
25-28	Turnss -2
29-31	Forced Landing
32-34	Loss of Control
35+	Vehicle Burning

Vehicle Burning. The vehicle is out of control and burning. It will crash in two turns. Characters can jump from the vehicle (see Movement: Jumping) or use a parawing. A parawing is a small, emergency glider, similar to a glijet with no rocket. A parawing will not work if the character was less than 10 meters above the ground when he jumped.

Crashing

Passengers in a vehicle that crashes suffer 1d10 points of damage for every 10 meters the vehicle fell, plus 1d10 points of damage for every 20 meters/turn it was traveling. This damage is doubled if the character is not strapped into a seat. When dividing the vehicle's altitude by 10 and speed by 20, round fractions down.

If the vehicle is burning, the character suffers an additional 1d10 points of damage at the start of every turn he is in the vehicle. The crashed vehicle will not fly again without extensive repairs.

Example: A jetcopter is traveling 75 meters above the ground at 30 meters/turn when an attack damages the cockpit. The pilot fails his Reaction Speed check, so the copter drops d100 meters. The die roll is 83, meaning the vehicle drops 83 meters. This is more than its altitude, so it crashes.

One passenger jumps using his parawing, but the pilot does not have one. When the copter hits the ground he suffers 7d10 damage because it fell 75 meters and another 1d10 because it was traveling 30 meters/turn.

A group of adventurers has survived an aircar crash, apparently in a hostile environment. The classic Star Frontiers cover by Larry Elmore.

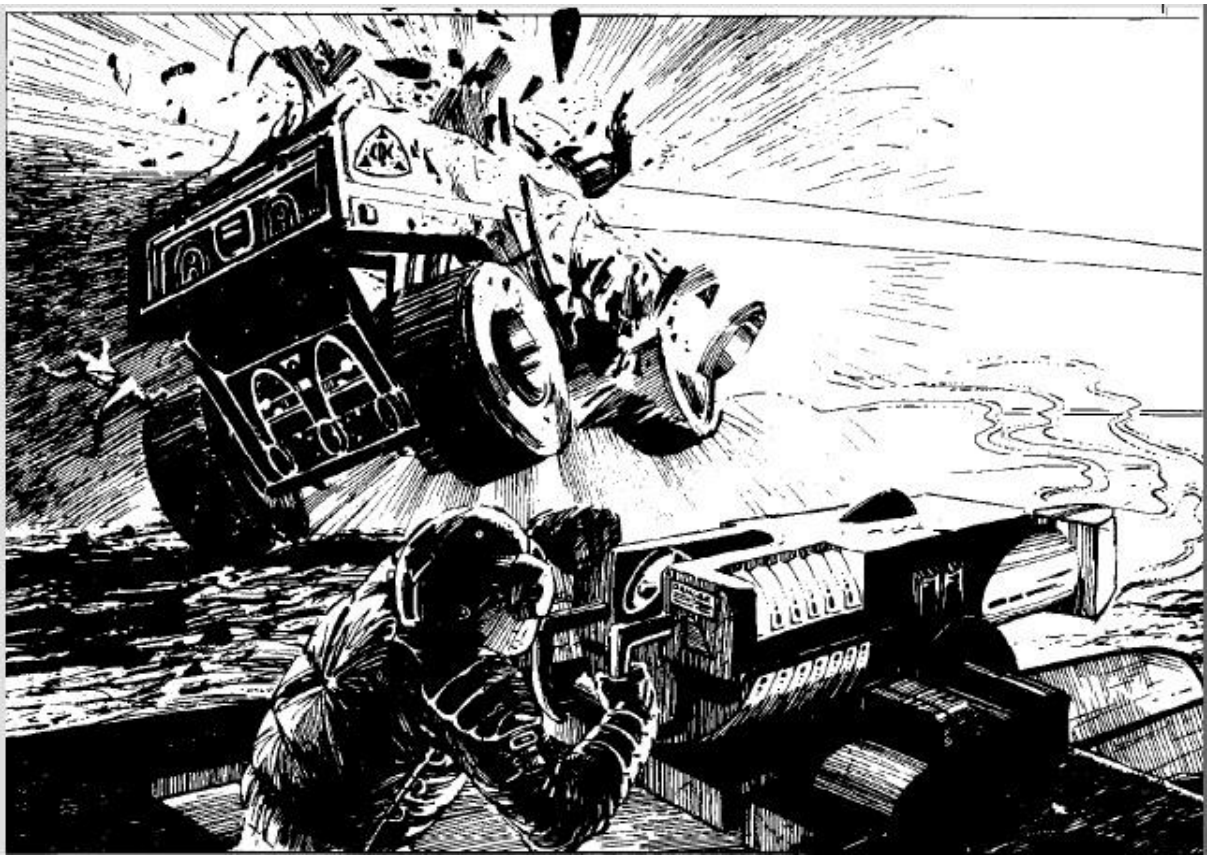


Illustration from Dragon Magazine, issue 99.

Section XI. Tanks a Lot: Expanded Vehicle Combat

Simba the Yazirian and Dandel the Dralasite crested the second-to-the-last dune before the Streel outpost – and almost bumped into a perimeter guard. Simba's sonic sword cut the man in half before he even raised his weapon.

"As I was saying," the unrattled Dandel continued, "the problem with this war is that it's boring. We watch Streel, they watch us, and occasionally somebody gets shot. What we need is some excitement. We need something like…"

Suddenly, the stutter of a machine gun sounded ahead. Simba and Dandel hurriedly climbed that last dune and unslung their magnigoggles. All was clear at the base, but a firefight was in progress along the base highway.

A hover transport with Streel markings was trying to reach the base as an Explorer with GTF insignia gained on it. A jet of oil splashed from the truck; the Explorer fishtailed through the slick, barely keeping control. Slowing down, the Explorer released a guided missile from its roof rack. The transport driver tried to dodge, but the missile hit and the truck rolled over twice under the blast, landing upright but flaming.

As the Explorer approached, one of the trucks turrets turned to face it. Fire from a heavy flamethrower licked over the Explorer's roof, setting off the three remaining guided missiles in a red ball of fire and light.

"Now that," said Simba, "is exciting!"

The Star Frontiers combat rules are excellent, but some areas were omitted – the most unfortunate omission being vehicle-mounted weapons and armor.

Armed and armored vehicles would be used extensively by the Frontier mega-corps, Star Law and other law-enforcement agencies, explorers of planets with hostile native life, and those earning a living by illegal means. Since these categories include virtually all player characters, the need for vehicle combat rules is obvious. This article attempts to rectify that problem.

► **Above is the introduction to Alex Curylo's "Tanks a lot!" story from Dragon Magazine #99.** [91]

Advanced Vehicle Combat Sequence

The Combat Sequence for vehicle combat is the same as for all other STAR FRONTIERS combat, the only difference being in the procedure used to determine hit probability.

The "Mission to Alcazzar" module first introduced explorers with gun turrets into the Star Frontiers game but it was Curylo's "Tanks a lot!" story where the concept of vehicle-sized weapons including heavy machine guns, cannons, guided missiles, and bombs debuted. Under Curylo's system, each vehicle class was assigned a certain number of "spaces" and each weapon class took up a certain number of spaces.

A "man-portable" weapon, such as the heavy weapons from the Alpha Dawn game (heavy laser, sonic devastator, recoilless rifle, etc.) took up one space, for example. Additional equipment and vehicle combat rules were added in Zebulon's Guide and Matt Bandy's story "Here Comes the Cavalry!" from the April 1987 issue of *Dragon Magazine* adding more opportunities for players to cause tabletop mayhem.

[91] Curylo, Alex. "Tanks a lot! Vehicle combat in Star Frontiers gaming," *Dragon Magazine*, No. 99, pg. 71; Curylo, "Tanks again! More material on Star Frontiers vehicle weapons," *Dragon Magazine,* November 1985, p. 78; and additions from Zebulon's Guide to the Galaxy.

Advanced Vehicular Combat Procedure Table

The Combat Sequence for vehicle combat is the same as for all other Star Frontiers combat, the only difference being the procedure used to determine hit probability. This is given below.

1. **¼DEX / ½DEX**. The basic percentage change to hit is ¼ the gunner's Dexterity, since he has no control over the aim (only when to fire). If he is controlling a turreted weapon, the base percentage chance increases to ½ his Dexterity.
2. **+5 Percent per Driver level**. If the vehicle is moving, 5% is added for each level of skill the driver has because he can position the vehicle for the most favorable shots.
3. **Gunner's Skill.** +5 percent per gunner's skill level – 5 percent is added for each skill level the gunner has with the weapon being fired.
4. **Range Modifier.** Subtract the range modifier. See Expanded Game Rules book for range modifiers.
5. **+x % Size.** Cars, Explorers, air vehicles: +5% (Large). Trucks: +10% (Giant).
6. **+x % Movement.** -10 percent if speed is 10-150 meters/turn; -20 percent if speed is over 150 meters/turn. This applies to both attacker and target.
7. **–x % Cover.** See Expanded Game Rules book for cover modifiers.
8. **–x % Dodging.** The driver can weave and otherwise try to prevent a harder target. Subtraction is -5 percent per level of the driver. This applies to attacks on and by his vehicle, and it eliminates modifier #2 above.
9. **-10 Percent per extra weapon**. If firing multiple weapons, a gunner has a -10 percent penalty "to hit" per weapon, for every extra weapon over and above the one weapon he considers his main weapon. A driver has a -10 percent penalty "to hit" per weapon on which he fires.

Example: Simba and Dandel are trying to bring down a Streel jetcopter. Simba (the driver) is firing two weapons; he has a -20 percent on each roll. Dandel (the gunner) is firing three weapons; he also has a -20 percent on each roll.

Once an attack succeeds, apply screen affects (if any), and find the number of dice of damage caused by the attack. Roll 2d10, add the number of dice, and subtract 2 for each coat of armor the vehicle has. Finally, add vehicle modifiers (+2 for cycles; -2 for Explorers), and consult the appropriate Vehicle Damage Table (pp. 32-33, Expanded Game Rules book).

Advanced Equipment: Certain advanced targeting equipment, such as the Mind-Mount progit will also affect combat.

In issue 15 of *Star Frontiersman Magazine*, Larry Moore offered an expanded system to build non-civilian vehicles by offering four different "duty" modifications including: Corporate-Duty, Security-Duty, Paramilitary-Duty, and Military-Duty.

Instead of "spaces," each duty modification offered a certain number of "hardpoints" (HP) to mount weapons. Each duty level offered increasing levels of "protection" – a modifier when rolling on the vehicle damage table – plus structure points based on vehicle size to help determine when an aircar or explorer, etc. became too damaged in combat to remain serviceable.

Vehicle variations due to differences in size, powerplant upgrades, and style variations can have an impact on vehicle combat. These differences were covered in a story by Richard "Shadow Shack" Rose, also in issue 15 of *Star Frontiersman Magazine*, and will be incorporated into this section.

Vehicle Duty

Corporate-Duty. A corporate-duty vehicle doesn't have too many hardpoints, but it is the only non-civilian vehicle in the Frontier that is legal to own in most places without any special permit. The performance of a corporate-duty vehicle is identical to that of its civilian counterpart.

Security-Duty. A security-duty vehicle is often used by law enforcement or for light security detail. They escort civilian and corporate vehicles around the Frontier and provide the highest firepower not designed for a battlefield. Owning and operating a security-duty vehicle will require some sort of permit or license, or will require membership to certain organizations.

Certain militias and light military groups might have security-duty vehicles in their main fleet. Security-duty vehicles are heavier than corporate models and maneuver a bit more sluggishly but their superstructure provides them a decent quantity of hardpoints and damage reduction.

NON-CIVILIAN DUTY TABLE

Vehicle Size	1	2	3	4	5	6
CORPORATE						
Protection	2	2	3	3	4	4
Hardpoints	1hp	1hp	2hp	2hp	3hp	3hp
Acceleration	--	--	--	--	--	--
Top Speed	--	--	--	--	--	--
Cost	275	550	825	1,100	1,375	1,650
SECURITY						
Protection	3	3	4	4	5	5
Hardpoints	1hp	2hp	3hp	4hp	5hp	6hp
Acceleration	--	--	--	--	--	--
Top Speed	--	--	--	--	--	--
Cost	550	1,100	1,650	2,200	2,750	3,300
PARAMILITARY						
Protection	4	4	5	5	6	6
Hardpoints	2hp	4hp	6hp	8hp	10hp	12hp
Acceleration	--	--	x0.95	x0.90	x0.90	x0.90
Top Speed	--	--	--	--	--	x0.95
Cost	1,100	2,200	3,300	4,400	5,500	6,600
MILITARY						
Protection	5	5	6	6	8	8
Hardpoints	3hp	6hp	9hp	12hp	15hp	18hp
Acceleration	x0.90	x0.85	x0.80	x0.80	x0.80	x0.75
Top Speed	x0.90	x0.90	x0.90	x0.90	x0.90	x0.85
Cost	2,200	4,400	6,600	8,800	11k	13.2k

Vehicle Size is used for calculating defenses.
Protection – Subtract this modifier when rolling on the Vehicle Damage Table.

Paramilitary-Duty. A paramilitary-duty vehicle is used by recon or scout groups, by explorers and by urban mercenaries. It requires a special license or membership with an organized military to own and operate such a vehicle. These types of vehicles have more impressive firepower (larger number of hardpoints) than security-duty vehicle.

Less expensive than military-duty versions, paramilitary vehicles have added superstructure for more hardpoints though this trims its handling and acceleration capabilities. Paramilitary vehicles are extremely powerful and tend to be the most dangerous vehicles in use by a megacorporation or government.

Military-Duty. These vehicles are designed for a battlefield. They normally don't make an appearance in a civilian area except to pass through (and normally must disarm their offenses during this time) or to root out aggressors. Player characters won't often find themselves in possession or ownership of a military-duty vehicle, but might end up being chased by one!

Ownership of such vehicles (due to the potential of massive amounts of firepower) is restricted to governments and some mercenary groups given permit in some regions of the Frontier. The added mass necessary to provide so many hardpoints results in some performance reductions to handling, acceleration, and top speed.

Most owners of military vehicles agree that the added damage resistance and large number of hardpoints results in a powerful vehicle despite these penalties.

Hardpoint

A non-civilian vehicle has hardpoints (sometimes abbreviated "hp"). A hardpoint is a reinforced area on a vehicle hull that allows a weapon mount (see Weapon Mounts) to be attached and connected to the vehicles electronic systems. The larger the vehicle, the more hardpoints can be made available.

Vehicles designed for light security detail aren't going to have as many hardpoints as those designed for more rugged military campaigns.

Weapon Mounts

WEAPON MOUNT TYPE TABLE

Mount Type	Size	Hardpoints	Cargo	Cost
Surface	Small	1	--	500
	Medium	2	--	800
	Large	4	--	1,100
Turret	Small	2	--	2,000
	Medium	3	--	2,750
	Large	5	--	3,500
Internal	Small	1	0.1	1,250
	Medium	2	0.3	1,500
	Large	4	0.6	2,000
Internal Turret	Small	2	1	3,250
	Medium	3	3	4,000
	Large	5	6	5,250

MOUNT SIZE TABLE

Mount	Weapon Configuration Options
Small	1 Small Weapon
Medium	1 Medium Weapon, or 2 Small Weapons
Large	1 Large Weapon, or 2 Medium Weapons, or 4 Small Weapons, or 1 Medium and 2 Small Weapons

Having a hardpoint is not enough for a character to install a weapon on a vehicle; weapons need mounts. Weapons' mounts come in different sizes and shapes, some of which are purely external to the vehicle while others take up some internal space as well.

Some mounts are directional turrets, while others are line-of-sight mounts that require the vehicle's pilot to line up his shot. Mounts themselves are containers into which modular weapons can be placed.

The size of the mount (small, medium, and large) affects what size of modular vehicle weapon that can be installed into it.

If a weapon is removed from a mount, a like or smaller weapon can be mounted in its place. In order to install a larger weapon than the mount will allow, the mount must first be removed a replaced with a larger mount.

Note that some mounts require cargo units in addition to hardpoints, so make sure there is enough room for ammunition payloads.

Planetary Restrictions. Some laws govern whether a vehicle can have externally mounted weapons and may require a permit. Otherwise you may have to pay the extra cost to conceal them internally.

Surface Mount. A simple mount or standoff is fixed in place on the vehicle. It has a simple 90-degree firing arc and is very noticeable to passersby. Usually (though not always) fired by the pilot or copilot of the vehicle because vehicle facing is crucial to lining up a shot.

Surface mounts are popular because they take up hardpoints and nothing else, and are the easiest on the pocketbook. However, they are able to be targeted by a gunner with good aim.

Turret Mount. This is a semi-circular mounted turret fixed to the vehicle's surface. It can rotate 360-degrees horizontally or vertically (depending on whether it is mounted to the top or side of a vehicle) but only 90-degrees in the other direction.

Turret mounts are often operated by a gunner other than the pilot since the facing of the vehicle is far less crucial to the targeting of the shot. Turrets have internal components that allow them to rotate and move, but this consumes some of a vehicle's internal cargo capacity.

Although more expensive than the surface mount, turret mounts are popular on vehicles with more hardpoints, especially those designed for the battlefield.

Internal Mount. This type of mount is hidden, concealed within the body of the vehicle itself. When activated, just enough of the mount extends from the vehicle to allow the weapon to fire. This type of mount, despite the fact that it consumes a fair amount of cargo units of the vehicle, is popular among corporate and security duty vehicles because it allows it to pass as a civilian vehicle until the time is right.

Similar to a surface mount, the internal mount has only a 90-degree firing arc. Activating or deactivating the mount takes an action in a combat turn.

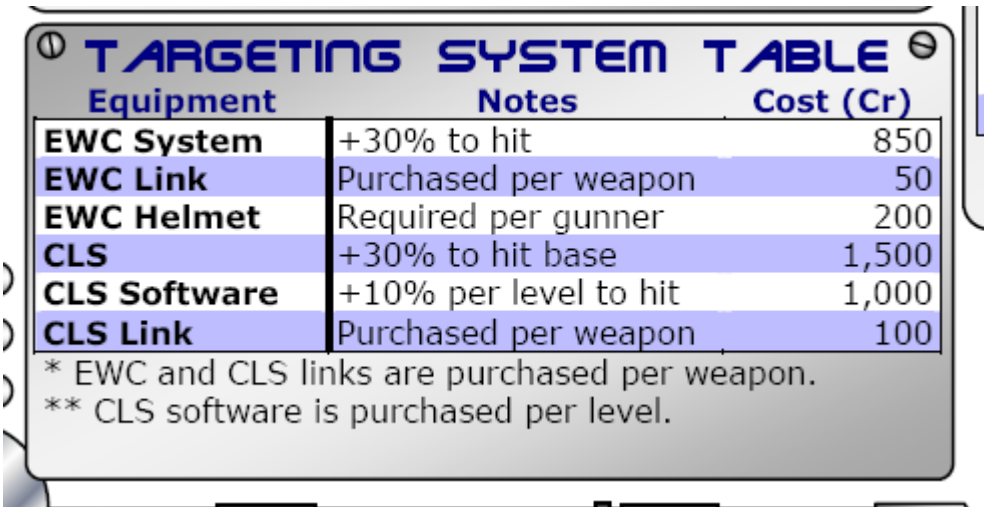
Internal Turret. Invisible until it is needed, once an internal turret is activated, it is able to fire in a full 360-degree arc. This mount resides within the vehicle's body and pops out to reveal a fully-functional turret.

Types of Weapons

A variety of heavy weapons are available for characters to mount on vehicles. Several were listed in the "Tanks a Lot!" and also in Larry Moore's story in *Star Frontiersman Magazine*, including how many hardpoints they take up. Instead of providing an exhaustive list here, these can be found in a separate document – Zebulon Sunset: Weapons Charts – that provides conversions of various Zebulon weapons into the Alpha Dawn system plus listings of the various fan-created weapons.

Damage + Vehicle Damage Table
This option rule involves rolling normal damage against the vehicles SP and rolling on the vehicle damage table. Possibly a little more realistic as hits tend to rip

apart a vehicle and cause malfunctions.



TARGETING SYSTEM TABLE

Equipment	Notes	Cost (Cr)
EWC System	+30% to hit	850
EWC Link	Purchased per weapon	50
EWC Helmet	Required per gunner	200
CLS	+30% to hit base	1,500
CLS Software	+10% per level to hit	1,000
CLS Link	Purchased per weapon	100

* EWC and CLS links are purchased per weapon.
** CLS software is purchased per level.

VEHICLE DAMAGE TABLE

Roll*	Effect
3-10	Roll normal weapon damage and apply the result to the vehicles structural points (SP).
11	Vehicle continues to accelerate uncontrollably during this and subsequent turns. Each turn pilot may make a RS check to get the vehicle's acceleration back under control. Effect only lasts until brought back under control.
12	Vehicle loses ability to accelerate. Sudden lurch requires pilot to make a RS check. Failure results in a roll on the Loss of Control table.
13	Steering jammed straight.
14	Steering jammed hard left or right, if objects are in the way roll on the Loss of Control table.
15	One of the vehicles axles, manifolds, or fans has been damaged; the vehicle limps along or staggers. Maximum speed is 10% top speed. Impact forces a RS check or roll on the Loss of Control table.
16	Vehicle drive-train, primary linkage, or some other central component is structurally damage and vehicle comes to a complete stop until repaired. Top speed 0kph. Pilot must make RS check to avoid a roll on the Loss of Control table.
17	A wedged chunk of body structure jams into the steerage causing straight movement only. Can be freed by a successful RS check but this is a risky maneuver. If the roll fails, the character must roll on the Loss of Control table.
18	Vehicle braking system hit, vehicle will not stop.
19	Vehicle's engine has been damaged in a way that prevents it from starting. It will continue to operate until it is turned off, then won't re-start.
20	Computer hit; loose navigation and targeting controls. Weapons must be fired manually.
21	Turret mount hit and locked in fixed position.
22	Mount hit; random weapon destroyed.
23	One of the vehicle doors is ripped off exposing the inside. If a passenger is close to the door, he may now be targeted directly by other vehicles!
24	Emitter control system hit; loose all screens. Field repair possible at -10 if vehicle is swaying.
25	Computer hit; -20% for functions involving computer system. Field repair possible at -10 if vehicle is swaying.
26	A randomly-selected passenger is jostled and may take no action this turn. Each subsequent turn, he must make a RS check to resume his ability to act normally.
27	Vehicle braking system takes damage. Any turn where the pilot tries to decelerate, the vehicle misbehaves and the pilot must make a RS check. Failure results in a roll on the Loss of Control table.
28	External lighting system fails. This includes high-intensity LED beams and IR systems or whatever type of external lighting exists. If driving at night this obviously reduces the pilots' ability to see.
29	Power plant is reduced to sludge. RS check required failure results in a roll on the Loss of Control table. Power plant must be replaced, it is too damaged to recharge even if such a service is available.
30	Vehicle ceiling is reduced by one category (sub-orbital to high, for instance). If the vehicle isn't an aircraft, assume the underbody bottoms-out and forces a RS check, failure results in a roll on the Loss of Control table.
31	The front or rear window is cracked. The limited visibility causes a -10 to RS checks. The next hit in this area will shatter the glass causing 1d10 damage to all occupants.
32	A randomly-selected passenger must make an RS check or be thrown from vehicle.
33	The vehicles canopy is ripped from the struts. All crew are now able to be targeted directly! Anyone pursuing might have to make a RS check to avoid a roll on the Loss of Control table.
34+	Vehicle engine is reduced to slag. Needs completely overhauled/replaced. Pilot must make a RS check, failure results in a roll on the Loss of Control table.

* **Roll** = 2d10 + Number of d10 damage dice
Target Modifiers: +2 for Size 1 vehicles, -2 for Size 4, 5 and 6 vehicles

VEHICLE LOSS OF CONTROL TABLE

d10	Result
1	Vehicle slides to the left (or right), RS check +10% to maintain the slide and correct the vehicle. Failed check and the vehicle spins 1d10 times before coming to a halt. If the vehicle is airborne the vehicle looses 1d10 x100 meters of altitude instead of coming to a halt. If the vehicle crashes make a RS check +10% to avoid the crash and land.
2	The vehicle starts to roll whether it is a ground, hover or air vehicle. Roll 1d10, even the vehicle rights itself, odd the vehicle is upside down; a successful RS check will right the vehicle automatically. This is a problem for ground and fixed hover vehicles, unless the vehicle is righted, it cannot move.
3	Vehicle catches on fire and will continue to burn until put out. After 1d10 turns, the fire will reach the passenger compartment and crew will have to bail or burn.
4	Vehicle flips over and over out of control. As the vehicle flips side panels are ripped off from smacking the ground or by a gust of air. If the vehicle is airborne it is forced to land. Either case the vehicle may catch on fire.
5	Vehicle flips on its roof and skids 5m for every 10kph before coming to a stop. Roll damage. If the vehicle is airborne it is forced to land. Make a RS check, if successful reduce the damage to 1/2
6	Vehicle's steering mechanism malfunctions. Each turn roll 1d10; 1-4: vehicle turns sharply left, 5-8: vehicle turns sharply right, 9-0: vehicle spins out of control. Passengers not in a seat belt are thrown from the vehicle. Make a RS check, failure results in the vehicle rolling 1d10 times until it stops. If aerial vehicle, make a RS check to right-up the vehicle, for each failure loose 1d10x200 meters of altitude.
7	The vehicle starts slipping to the left/right. Make a RS check to maintain control. Failure and the vehicle spins 1d10 times and stops (aerial vehicles must land).
8	Vehicle catches air gust from under the chassis and starts to revolve. Failure and the vehicle crashes into an object causing 10d10 damage to vehicle and 2d10 damage to each passenger.
9	Wheel, fan, jet, wing comes loose causing the vehicle to whirl uncontrollably. Make an RS check to safely stop the vehicle (or land). Roll damage. If damage was already rolled each passenger takes 4d10 damage instead.
0	Vehicle jaunts and lurches violently and threatens to break apart and does. Vehicle breaks up in 1d10 pieces. Passenger can make a RS check half damage and they are thrown from the vehicle.

* If the vehicle is not moving then ignore this table and roll normal weapon damage.

Vehicle Computers

One of the key optional components of civilian and military vehicles is the vehicle computer (VC). A progit-accepting device, the VC is designed similar to a bodycomp though it is mounted in the vehicle's cockpit and linked to all of the vehicl's functions. It has 12 ports and uses the same type of power packs and processor packs as a bodycomp. Normally the VC will operate off of the vehicle's parabattery and only use its internal power pack when the vehicle is turned off.

Located in a reinforced case, the VCs controls can be mounted between the front seats, on the dashboard, the steering wheel, on the roof, or wherever the referee or player wants them. It can be installed in practically all vehicles except glijets and floater discs.

Power Packs. Four types of power packs are available – the sixpack, tenpack, fullpack, and kingpack – and differ in their duration and amount of progits they can handle at any one time.

Sixpack. The least powerful and cheapest computer power pack. It can provide power for any of the following: a) one processor pack Type A or B and six progits, or b) one processor Type C and four progits.

Tenpack. The most commonly used computer power pack. It can provide power for any of the following: a) one processor pack Type A or B and ten progits, b) one processor pack Type C and eight progits, or c) one processor pack Type D and four progits.

Fullpack. It can provide power for any of the following: a) one processor pack Type A or B and twelve progits, b) one processor pack Type C and then progits, or c) one processor pack Type D and six progits.

Kingpack. The top-of-the-line computer power pack used by the very rich, very important, or very busy. It can provide power for one processor pack of any type and twelve progits.

VC Processor Pack Types	
A:	Handles Type A progits only.
B:	Handles Type A and B progits.
C:	Handles Type A, B, and C progits
D:	Handles all progits.

VC Processor Packs. The VC processor pack is the organizer, brain, and interpreter for the entire system. There are four types of processor packs (all the same size).

A futuristic car display. Source: http://www.pic2fly.com/Futuristic+Dashboard.html

VC Progits: Type A

Audio-Act. The driver can use voice commands to activate various systems on a vehicle ranging from the mundane, such as entertainment and climate controls to more sophisticated devices.

Comp-Talk. Often used in conjunction with Audio-Act, this progit allows the VC to verbally answer the driver or communicate information such as map directions, etc. Often this is done over a vehicle's speakers but it could be synced with headphones or even a device that can be surgically implanted in the owner's head so conversations between the driver and the vehicle computer can be kept confidential.

Dis-Viz. Through the use of this progit, a character can have full visual readouts from his vehicle computer with the information projected onto the windshield, dashboard monitors, or even into a helmet.

Fuel-Scan. This progit monitors the parabattery's output vs. use. It conserves energy whenever possible and increases the range by 25%.

Help-Beam. Its function is to send out an emergency beam on a specific wavelength (specified by the wearer) when a condition is met. It can be linked to a Vehicle-Scan progit for automatic activation, for example, when the vehicle is detected as receiving "excessive physical damage, transmit beam." The Help-Beam progit may be manually activated

Help-Call. This progit activates in the same manner as the Help-Beam, but emits a loud wailing sound rather than a radio beam. It can be linked to a Vehicle-Scan progit for automatic activation or manually activated.

Help-Drive. This progit assists the maneuvering mechanism in such a manner as to subtract 30 from the dice roll after the player has lost control of the vehicle and is determining the vehicle's fate on the Control Table.

For example, Ralph attempts a dangerous maneuver and misses his Reaction Speed roll, thus losing control of his vehicle. He rolls a 1d100 for a result of 97. To this he adds his speed per turn, which was 105 kph. Normally the result would have been 202 and Ralph would have been in a spin, but his Help-Drive progit assisted him so his result is modified – 202 - 30 = 172 – which means Ralph is in a much more favorable skid.

Skid-Hold. This progit coordinates the vehicle's functions in such a manner as to add +20 to the driver's Reaction Speed when performing a Skid Turn.

Turn-Quik. This progit coordinates the vehicle's functions in such a manner as to add a +15 to the driver's Reaction Speed when performing a Short Corner Turn.

War-Bump. This progit coordinates the vehicle's functions in such a manner as to add a +20 to the driver's Reaction Speed when performing or evading a Bumping maneuver.

VC Progits: Type B

Comm-Link. This progit performs the same function as a bodycomp Comm-Link progit; it must be used with Audio-Act and Comp-Talk so it can link to communications devices such as chronocoms, subspace radios, and radiophones. Every Comm-Link has a separate frequency and those frequencies are like phone number (except the numbers are much longer). The Comm-Link has three separate functions:

a) Vehicle-to-vehicle or vehicle-to-character communications. This can be accomplished if the other Comm-Link number is known. A character can then speak quietly with another character in a private conversation. The range is 10 kilometers if not linking into a planet's communications network.

b) Vehicle-to-chronocom communications. The Comm-Link progit can also be set to broadcast to any chronocom in a 5-kilometer range (if the frequency is known) or to all chronocoms in that same range on a general frequency broadcast. A character with this can communicate with a group of characters, broadcast a warning, etc.

c) Vehicle-to-radiophone link-up. This progit can also patch a character through to a radiophone whose frequency numbers are known. The range from helm to radiophone cannot exceed two kilometers; the range for a call from the radiophone is the normal 1,000 km. In addition, the Comm-Link also has a jack and cable for direct hookup with subspace radios.

Dis-Map: (Must be used with Dis-Viz.) This progit contains multiple maps. The maps can be for a huge city, a good-sized country, or a small continent. Thousands of different Dis-Map progits are available covering every explored area in the Frontier. The progit can show an overall view of its contents or zoom in on any locale for more specifics. It will show all known roads, streets, forests, navigational hazards, etc.

Holo-Map. (Must be used with Dis-Viz, Dis-Map, and a mini holographic projector.) This progit is a sophisticated holographic program that enhances the Dis-Map by showing a three-dimensional view of a specific area map. Holo-Map progits also come in thousands of types that will interlink with their Dis-Map counterparts.

Para-Scan. This progit monitors the parabatteries used for non-vehicular functions, such as to power vehicular weapons. It gives a constant update on the status of the system, how many hours are left, etc. If the system is damaged, the Para-Scan gives an indication of the location and extent of the damage.

Plot-Map: (Must be used with Audio-Act, Geological-CAS, and omnoculars.) This progit will automatically map for an individual in much the same manner as a bodycomp Map-Scan progit. The main difference in this progit is the accuracy that the program demands. Consequently, a Geological-CAS is used for precise geological descriptions and omnoculars are necessary for range and height measurements.

Prog-Lock. This progit performs the same function as a bodycomp Prog-Lock progit and comes equipped with four Security Level 2 locks of any type the player desires; door locks, vehicle locks, drawer locks, gun locks, etc.

These four locks, after they have been installed, will resist opening unless they receive a transmission emitted by the progit. This transmission can be a sonic, laser or radio beam code of great complexity. The probability of any other Prog-Lock or sonic sender matching the code is 1 in 1,000,000,000. The maximum activation range from the Prog-Lock to these locks is 10 meters.

Prog-Switch. This progit performs the same function as a bodycomp Prog-Switch progit and comes equipped with 10 switches of any type the player desires including: trigger switches, light switches, microswitches, push buttons, etc. All are a little thicker than their normal counterparts because they are all capable of being activated not only manually but by the Prog-Switch as well. They are activated by a beam transmission from the progit. This is especially effective when combined with an Audio-Act progit. A player can then turn one of these switches by identifying it through his vehicle computer.

Vehicle-Scan. This progit has a full systems check program that can either be set to update the operator every few minutes or hours on the vehicle's condition or can simply wait for activation to perform a vehicle scan. This progit is usually linked to a Comp-Talk progit so the driver need not take his eyes off the road, sky, etc.

VC Progits: Type C

Crash-Wish. This progit performs in similar fashion to the bodycomp's Death-Wish progit but activates certain mechanisms (such as a Help-Beam progit) upon a crash. The definition of a crash can be outlined by the player character at the time of purchase to be anything from a simple fender bender to a devastating Roll and Burn.

Vehicle-Sight. This progit links to a single fixed mounted vehicle weapon. It acts as a stabilizing device for it. It adds a +20% combat modifier when the weapon is fired.

VC Progits: Type D

Master-Comp: This progit performs the same function as a bodycomp Master-Comp and must be used with Audio-Act and Comp-Talk or Brain-Link. This progit ties all other vehicle computer programs into a unified whole. The biggest advantage is its ability to receive conditional orders from all other progits to follow a standard operating procedure.

For example, the VC could be linked to an Atmospheric-CAS to scan every twenty minutes and the driver of any unusual conditions.

The Master-Comp progit is so complete that the driver can instruct it in simple terms and if it has any questions it will ask the character. It takes the place of two progits on the VC.

Mind-Drive. This progit must be used with Brain-Link and is for vehicles that the character has the skill to use. It comes with a set of cables that are permanently attached to it and that can be plugged into the guidance control of various vehicles. Once plugged into the vehicle the character can drive it with his mind, thus his reactions are much, much faster and the chance of avoiding accidents are much better.

While the character still uses his normal skill level for operating a vehicle, he adds a +15 to his Reaction

Speed Check for keeping the vehicle under control during Emergency Stopping, Skid Turn, Bumping, and Stunt Maneuvers.

Mind-Mount. This progit must be used with Brain-Link and comes with one mini-motor specially designed for a man-portable ordinance weapons mount for laser Ke-5000, rafflur M-10, sonic devastator, or mounted MLTC, etc. When physically aiming this weapon, with which the character must already have a skill, the normal modifiers for range, movement, and size are ignored; only the character's skill level is used.

Targeting Systems

Besides the Mind-Mount, numerous targeting systems are in use throughout the Frontier Sector. The most common target systems are manual aiming, cyberlink, and the eye-weapon coordination (EWC).

Manual Targeting. The most common form of using vehicle weapons by civilians and even paramilitary units is manual targeting. This means the gunner operates the weapon by hand, lining up a shot and firing. The gunner using this system must expose himself to enemy fire but will have hard cover if the weapon is mounted on a vehicle. Skill bonuses apply when using this system.

Weapons mounted on turrets may have a telescopic or external camera system that allows the gunner to remain protected and control the weapon by a joystick (antiquated systems might be operated by a mechanical or hydraulic system). Cost for the protected manual aiming system: 500 Credits.

Cyberlink

Effect: Allows the gunner to fire multiple weapons without penalty; 30% base chance to hit + 10% per computer level
Mass: 5 kg + 1 kg per weapon link
Cost: 5,000 Credits per level + 500 Credits per weapon link
Power: 1 SEU per turn per linked weapon

Also called a Computer Linked System, this is a direct mental hookup by the vehicle computer to a weapon to control its firing. Up to 5 weapons can be controlled by one gunner (or 3 by a driver) at no penalty to firing multiple weapons. Each weapon requires a separate link – even if they are in the same turret; this link weighs an additional 1 kilogram uses 1 SEU per turn of operation. The base chance to hit is 30 percent plus 10 percent per progit level.

The cost of the cyberlink progit rises exponentially with the level. Levels 1 and 2 are considered Type B progits and cost 1,000 and 2,000 Credits respectfully. Levels 3, 4 and 5 are Type C progits and cost: 4,000 Credits for level 3, 8,000 Credits for level 4, and 16,000 Credits for level 5. A level 6 cyberlink is a type D progit and costs 32,000 Credits. Anything higher is considered military hardware and is illegal to own and priced accordingly.

Eye-Weapon Coordination

Effect: +30% chance to hit but no weapon’s skill bonuses, +2 IM
Mass: 5 kg + 1 kg per weapon link
Cost: 3,500 + 300 Credits per EWC linked weapon
EWC Helmet: 200 Credits
Power: 1 SEU per turn per linked weapon

EWC systems use a special helmet or electronic goggles that can track the movements of the wearer’s eyes. Through a complex circuitry link, it brings the vehicle’s weapons to bear along the wearer’s line of sight. It provides the gunner/vehicle a +2 bonus for his Initiative Modifier (IM).

When the weapons are aimed at the target, the gunner has only to push a button, flip a switch, or pull a trigger to fire any combination of weapons. The helmet/goggles can be switched from infrared to normal vision and can be turned on or off.

The gunner need not expose himself to enemy fire because the helmet is connected to a set of infrared and video cameras. The images these cameras receive are projected onto the inside of the helmet visor.

The vehicles have one gunner operating each turret who may fire any combination of the weapons mounted on the turret in any one direction on a given turn. Of course, turns must respect their limitations.

EWC gives the user a +30 modifier to hit. The gunner receives no additional bonuses due to weapons skills.

Countermeasures

Electronic countermeasure (ECM) devices are another form of defense which is intended to scramble other types of electronic detection and targeting systems including those that are based on radar, sonar, infrared, etc. One of the drawbacks is that opponents will know someone is jamming them.

Infrared Jammer

Effect: Prevents infrared sensors from locking on; -30% chance for targeting units relying on IR
Mass: 4 kg
Cost: 500 Credits
Power: 2 SEU per turn

IR jammers make the vehicle invisible to infrared sensors.

Radar Jammer

Effect: Prevents radar-based sensors from locking on; -30% chance for targeting units relying on radar
Mass: 5 kg
Cost: 500 Credits
Power: 2 SEU per turn

Radar jammers may also interfere with the radar systems of nearby friendly units.

Chaff Pod

Effect: 40% chance to disrupt a missile lock-on
Mass: 25 kg
HP: 1
Cost: 100 Credits

Chaff pods are carried by aircraft and are dropped after a missile has locked on. The pod explodes, releasing hundreds of metallic coated fibers that cover a large area and provide many false returns. Modern Frontier chaff is useful against radar, sonar, LIDAR, shape, infrared and other sensors. The debris cloud lasts for up to 1-5 minutes unless there is a fierce wind to disperse the chaff.

Corner Reflector Pod

Effect: 60% chance to disrupt a missile lock-on
Mass: 25 kg
HP: 1
Cost: 200 Credits

Similar to chaff pods, corner reflector pods release many-sided objects that re-radiate sensor signals, mostly back toward the source and disrupt missile lock-ons. The debris cloud only lasts 1-10 turns.

Defenses

Defense screens and armor are the two basic vehicle defenses in Star Frontiers.

Structure Points. With the optional rules published in Star Frontiersman magazine,

Vehicle Structure Point Table

Size	SP	Example(s)
1	200	2 person cycles
2	400	2-4 person small cars
3	600	Mid-size cars (standard Star Frontiers ground cars and hover cars)
4	800	Small cargo trucks or vans.
5	1,000	Large cargo haulers, tractor trailers.
6	1,200	Truly large vehicles but excludes mass transports such as monorails.

vehicles also have structure points so you know when they have taken so much damage that they are rendered useless. The structure takes damage when the “No Effect” result is rolled on the vehicle damage table.

The number of structure points (SP) that a vehicle has is equal to its size multiplied by 200.

For example, a civilian ground cycle is considered a size 1 vehicle. It will have a total of 200 structure points.

Note, if characters are trying to break into a vehicle, such as blowing open a door on an armored vehicle, refer to the Structural Damage Capacity table on page ___. This damage may affect the vehicle’s overall integrity, but breaking into a locked glove compartment, however, might not harm the rest of the vehicle.

Coats of Armor and Protection Numbers. The simplest vehicle defense is armor and its effectiveness depends on its composition, method of fabrication, location, thickness, and angle of slope. For the game, all these considerations (as well as details like bulletproof windshields and wheel guards) are neatly integrated into *coats of armor*.

Note: many modifications must be made while the vehicle is being built. Taking an existing vehicle and modifying it may take longer and be more expensive.

Non-civilian duty modifications – such as corporate, security, paramilitary and military-duty – come with reinforcements and structural changes that offer certain levels of protection. When rolling on the vehicle damage table, subtract the protection number located in the non-civilian duty table is subtracted from the result.

Armor also increases the protection number along with increasing the vehicle’s structure points.

- Normal armor adds 5 protection points (PP) and increases the structure point rating by 25 percent (SP x 1.25). The armor also reduces crash injuries to occupants by -1 point per die.
- Heavy armor is restricted to vehicle sizes 3+. It adds an additional 8 protection points (raising the PP value to 13), increases structure points by 50 percent (SP x 1.5) and reduces crash injuries to occupants by -2 points per die.

Normal armor can be made to be concealable – at double the normal cost. Heavy armor cannot be concealed.

Example Damage and Protection: A medium laser cannon damage is 2d10x10, which would cause a +20 modifier when a roll is made on the vehicle damage table. A size 5 vehicle with a security duty modification would reduce the modifier by 5. If the same vehicle has normal armor you would reduce the number by an additional 5. The final result is +10 (20-5-5) on the vehicle damage table.

Feel free to adjust protection numbers to fit your setting accordingly.

Reflective Paint. A vehicle can be painted with reflective paint. This costs the same as an armor coat and provides an additional modifier of -10 from vehicle damage rolls due to laser attacks. Note that these coats are not concealable.

EMP Shielding. Vehicles can also be shielded from an electrical discharge (ED) and electromagnetic pulse attacks at a cost of 1,000 Credits times the vehicle size. For example, an adventurer has a custom-built Explorer (size 4) hardened against an EMP attack. It will cost him an additional 4,000 Credits.

Unshielded vehicles and electronics – even those protected by a gauss screen or anti-shock implant – that suffer an ED attack may require extensive repairs before they are serviceable.

Spray Armor

Another armor technology is a spray-on synthetic armor that helps nullify nearly all kinds of damage. This spray is extremely thick and can be used to protect structures as well as vehicles. The number of layers determines the resistance to damage.

Spray armor is heavy, however, and slows a vehicle down. For every layer added to a vehicle, the

following modifications must be made:

- Each layer of armor can only absorb a total of 25 points of damage; it is destroyed once this amount has been done, but new layers can be applied later.
- All of the armor's protection must be penetrated before damage requires the referee to consult the Vehicle Damage Table.
- The vehicle's maximum speed is reduced – atmospheric craft are slowed by 40 kilometers per hour per layer, all others are cut by 15 kilometers per hour (kph) per layer.
- In a crash, passengers suffer damage as if the crash occurred at a speed that was 10 meters/turn less for each layer of armor.
- Spray armor can be added in addition to the normal and heavy armors previously listed.

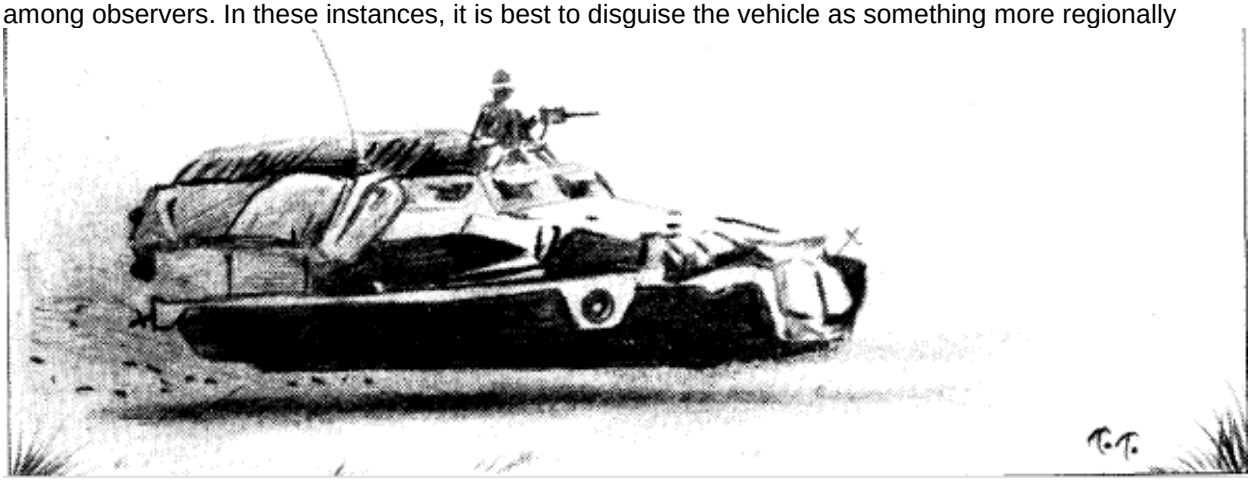
Vehicle Defensive Screens

A defensive screen can also be added to a vehicle including:

Albedo. This screen uses 2 SEU per minute of operation, and it absorbs all laser damage at a cost of 2 SEU per 5 points of damage absorbed.

Gauss. This screen absorbs electrical attacks including those from WarTech bolt weapons and electric swords. It drains 4 SEU per minute of operation and 2 SEU for each hit absorbed.

Halo. Holographic screens are for use in sneak attacks. Vehicles fitted with holo screens will have camouflage feedback loops. In certain terrains this tactic is not effective. In passage over sand dunes, for example, vehicles tend to raise a cloud of dust that the holo screen cannot hide, creating suspicion among observers. In these instances, it is best to disguise the vehicle as something more regionally



appropriate, such as a thundering herd of camels. Holo screens cannot disguise or hide a vehicle from radar or infrared sensors. Holo screens use three SEU per minute.

Inertia. This screen uses 4 SEU per minute of operation, and it reflects half the dice of damage done by ballistic attacks (and crashes) at a cost of 1 SEU per die of damage reflected.

Light Shift. This screen sets up a light-bending shell around the vehicle and uses 4 SEU per minute of operation. Power usage depends on light conditions (see chart on page 68 of the Zebulon's Guide). It will also absorb laser fire at the rate of 1 SEU per point. Three different types of Light Shift screens can be mounted on a vehicle. A Type I light shift screen bends all light away from the shell of the vehicle, creating a totally black area. This type of screen is normally useful at night. A Type II screen shits the vehicle's image a distance of one to three meters in a fixed direction (which is decided upon the purchase of the device). A Type III creates up to five images, with each image being about three meters apart.

Shimmer. This type of screen is available after 100 FY for public purchase. This specialized, power-hungry shield protects a vehicle from all types of damage for short periods of time. The screen shifts between albedo, gauss, inertia, sonic and simp defenses. There is a small chance that a hit penetrates the shield during the instant it shifts from one defensive type to the next. Any hit roll of 01-05 ignores the shimmer shield's effect. Although this screen offers the best protection, no weapons can be fired out of the shield when it is activated. It drains 5 SEU per minute of operation and each hit drains 5 SEU.

Simp. This screen absorbs all damage from rafflur-like weapons. It uses 2 SEU per minute of operation and absorbs all rafflur damage at the cost of 1 SEU per 6 points absorbed.

Sonic. This screen absorbs sonic attacks. It uses 2 SEU of energy for every minute of operation and 4 SEU every time it absorbs a sonic attack. Furthermore, this screen completely masks the sound of the vehicle or its passengers so communication can only be done with radio or hand or light signals.

Example: A hovercar and a jetcopter are slugging it out. The car's universal turret fires a heavy laser (set at 20d10 damage) straight up and hits the jetcopter. The jetcopter's albedo screen absorbs it at a cost of

40 SEU. The jetcopter then drops a heavy bomb (50d10 damage) which hits the car. The hovercar's inertia screen reflects half the dice (25) at a cost of 25 SEU. Its driver now rolls on the Damage table with a +25 on the dice.

Powerpacks. Power screens are powered by the power econopack – 250 SEU, 25 kg, 1250 Credits; 4 weapons adapters, 1 screen adapter, 5 miscellaneous adapters. The cost for the screen varies with the size of the vehicle, as shown on the Vehicle Table.

Vehicle Accessories	Material Weight	Material Cost	Installation Cost
Performance Improvement Devices			
Air Brakes	15%	20%	10%
Auto-Extinguisher	10%	15%	5%
Gyrostabilizer	20%	10%	15%
Rocket Booster	10%	25%	10%
Extra Charges	2%	--	1%
Armor			
Per Layer	5%	5%	3%
Vehicle Weapons Mounts			
Fixed Mount	2%	1%	1%
Swivel Mount	2%	2%	2%

Performance Improvement Devices

These devices can improve a vehicles' performance on the road. All require time in the shop for installation and testing before the owners can use them. The general operations of the vehicles have not changed from the Star Frontiers Alpha Dawn rules.

Air Brakes. Air brakes are pneumatic panels that are fitted into the rear sections of a vehicle. They cannot be seen easily. When activated they jut out and create drag, thus stopping the vehicle faster. A vehicle using air brakes adds 20 meters/turn to its deceleration rate.

A driver using air brakes for emergency braking adds +20 to his Reaction Speed for the purpose of keeping the vehicle under control. The installation time is 10 days. Air brakes can be installed on all vehicles except construction machinery, research vehicles, and other special-purpose machines.

Auto-Extinguisher: The auto-extinguisher comprises of a series of spray nozzles mounted on the inside and outside of a vehicle with lines running to a pressurized tank in the vehicle's storage compartment. The tank contains foam similar to that found in an extinguish foam grenade. The spray

puts out any fire in one turn.

When a vehicle thus equipped rolls, the system is automatically turned on and the vehicle is foamed down. This automatically lowers the Roll and Burn result of a crash to a Roll result.

After one use, the entire auto-extinguish system must be replaced, unless it was activated manually, in which case only the tank must be refilled. The system can be activated manually if the vehicle is on fire for reasons other than a crash. The fire will be extinguished in one turn. The installation time is two weeks. The auto-extinguish system can be installed on all non-cycle vehicles.

Gyrostabilizer: The gyrostabilizer is attached to the underside of a vehicle. Its function is to immediately stabilize a vehicle while cornering, thus the vehicle's turn speed is improved by 20%. For example, a ground car, whose normal maximum safe turn speed is 80 meters/turn, has an additional 16 meters/turn (80 x .20 = 16) of turn speed when a gyrostabilizer is attached making its new maximum safe turn speed 96 meters/turn. The gyrostabilizer has no effect on rolls.

The installation time is 12 days and the gyrostabilizer can be installed on any car, cycle, or transport.

Rocket Booster: The rocket booster pack is a rectangular unit that must be installed in the very center of the vehicle's rear. It has four tubes which have directional propellant charges in them. Each time a charge is ignited the vehicles speed is increased by 30 meters/turn for one turn only. Only one charge can be ignited per turn, unless the entire fourpack is ignited. This is a desperate measure for those rare instances when a super burst of speed is needed: jumping ramps, ramming through obstacles, etc.

This additional speed may exceed the vehicle's normal maximum speed rate. No more than one rocket booster may be attached to a vehicle. Additional charges can be purchased and the tube mounting is reusable, but each vehicle type has its own rocket booster pack and mounting specially designed for its size and shape.

Ignition is controlled from the cockpit. Characters who are five meters directly behind the rocket booster when it is fired suffer 6d10 points of damage. Installation time is five days; the rocket booster can be installed on ground cars, ground cycles, hover cars, hover cycles, and explorers.

Articulated Combat Vehicles (ARCVs).[92] These are basically warbots that have been designed to hold a person to operate. ARCVs are more favored by space-mobile forces than hovertanks, because they are more easily and rapidly deployed. Standing three meters tall, each ARCV gives a single crewmember the firepower of a hovertank, with the ability to cover a wide range of terrain. The three general types of ARCVs available include the M-11B, M-24 "Fire Angel," and the M-38 Spider Tank. (See Star Frontiersman Magazine, issue 9, pp. 23-24 for more information).

M-11B "Gimpie." Using a heavy-duty warbot body, the M-11B is a workhorse ARCV. Armed with a pair of chin-mounted laser cannon, it also has a pair of side-mounted laser batteries), and a single rocket battery on a swivel mount. It is powered by a pair of Type 4 parabatteries.

- **Movement**. The gimpie lacks an upper pair of limbs, having only the lower pair of limbs, allowing them a land movement rate of 120 meters per turn.
- **Defenses**. It has inertia and albedo screens for defense. The body has 500 structure points.
- **Drawbacks**. The lower limbs move with a noticeable stilted gait due to a never-corrected design flaw, giving rise to the nickname gimpie. This flaw requires a Reaction Speed check every turn when the pilot is operating it above cruise speed. Failed checks lead to a crash, as per the vehicle combat rules.

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M-24 "Fire Angel." Vaguely anthropomorhic in appearance, the 3.5-meter tall M-24 Fire Angel has a reinforced super-duty warbot body. It is equipped with both limbs for land movement, plus wings and plasma jets for hover movement.

Its single occupant controls a pair of linked laser cannon in each of the upper pair of limbs, two laser batteries on each shoulder, four rocket batteries in the chest area, and a giant forceaxe (20D10 damage) in the pincer of the left arm. Weighing 60 tons, the Fire Angel is powered by a hydrogen-fueled Type 1 power generator.

- **Movement**. The gimpie lacks an upper pair of limbs, having only the lower pair of limbs, allowing them a land movement rate of 120 meters per turn.

[92] ____ Star Frontiersman, Issue 9, pp. 23-24.

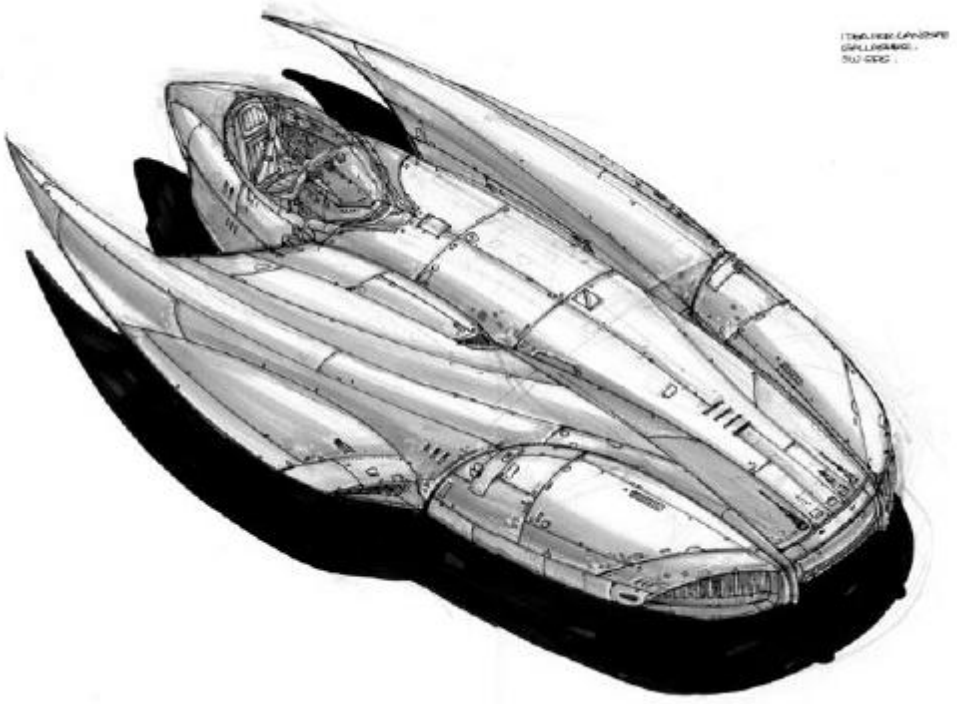
- **Defenses**. the Fire Angel mounts albedo, inertia and gauss screens. The body has 1,000 structure points.
- **Drawbacks**.

M-38 Spider Tank. The 30-ton M-38 Spider Tank is an eight-legged warbot body (with 500 Stamina points) with a hydrogen-fuelled Type 2 power generator, a cockpit and a remotely-controlled turret housing a pair of linked laser cannon and four rocket batteries at the center of the eight legs.

For defense, the Spider Tank has albedo, inertia, and gauss screens.

The crew of two (driver and gunner) enters the cockpit through a hatch at the bottom of the vehicle, with cameras mounted throughout the ARCV giving the crew a 360 degree field of vision outside the cockpit.

Its eight limbs allow it a maximum movement of 160 meters per turn over most terrain which would otherwise be impassible to ground and hover vehicles.



Section XI. Underwater Action[93]

During the course of a campaign, a group of adventurers might want or need to enter an underwater environment which necessitates the use of additional equipment usable in undersea environments. They may need to reach an underwater city covered by a pressurized dome, escape from a damaged submarine, or swim in search of a sunken ship or crashed spacecraft. They might also encounter a sentient race that lives underwater, and they could trade, fight, or otherwise interact with that race.

To survive underwater for long periods, characters must employ a breathing apparatus such as an artificial gill suit (AGS), which covers the wearer's entire body. (See ___ for more information.)

Character Effects

Entering a new type of environment, characters beneath the sea will be challenged mentally and physically.

Ability Score Reduction. A character's Dexterity and Reaction Speed scores are reduced by 25 points; Strength is reduced by 35 points when figuring the effects of melee on the Punching Table. A minimum score of 10 applies to most player character races.

Racial Differences. The STAR FRONTIERS races are each affected differently by the underwater environment.

Dralasites do not care for adventuring undersea, because the AGS does not let them use their senses of touch and smell. They are not greatly affected by increases in pressure (and never get the bends).

Humans are not bothered by the new environment, but Vrusks are very nervous underwater. Vrusks swim awkwardly and, when dealing with underwater races, a Vrusk's chance to comprehend social dealings is halved.

Yazirians tend to be uneasy at first, but come to enjoy swimming because it is somewhat like gliding. Their glider membranes grant them great maneuverability while underwater. This will be discussed later.

Skill Modifiers. A character's skills and their results are also affected while underwater. The effects on Weapon skills are discussed later Demolitions skills work as long as the timers used are built to work underwater. Blast radii are doubled due to the increased powers of shock waves underwater.

The Martial Arts skill will work underwater with a 30% reduction on the success rate. Technician skills work if the equipment and tools are designed to work underwater.

Environmental skills work normally underwater if they apply to the situation. There will be a 20% reduction on their success rates while underwater as none of the Medical skills work underwater, except for Diagnosis which has a 30% reduction on the success rate.

All Psycho-Social skills work when applicable, with a 30% reduction on success rates due to communications problems.

Movement

Characters can swim at a rate of 10 meters per turn (or one kilometer per hour). If a character swims longer than one hour, he will lose five Stamina points for every 30 minutes he continues swimming. These movement rates can be affected by obstacles such as seaweed or coral (or alien equivalents thereof).

If a character swims through seaweed, he must move at a rate of four meters per turn if a character tries to move faster than that, he may become entangled (a cumulative 10% per every turn of movement). This should be checked for every third turn the character will be entangled for 1d10 turns (1d5 if the character

[93] Tracy, William. "Going for a swim? Underwater action in Star Frontiers gaming," Dragon Magazine, June 1986, pp. 88-91. This material has also been supplemented by the Balneum Blue adventure from issue 25 of Star Frontiersman Magaine.

has a sharp instrument with which to free himself).

If a character swims through areas containing coral reefs, he must swim at a reduced rate of five meters per turn. Faster speeds allow for a 10% chance per turn traveled that the character will be cut by the sharp edges of the coral, causing 1d10 damage (half of which can he absorbed by an AGS suit).

Another factor that might affect movement is the presence of underwater currents. Such currents usually have speeds ranging from 1-12 meters per turn, but they can only he found at a depth of 60 meters or less. Characters may enter a current on purpose to increase their speed.

To get out of a current, a character must roll his Strength (minus 2% per meter/turn of speed the current has) or less on percentile dice. The character can attempt to leave the current once every five minutes. After a number of attempts equal to the character's Stamina score divided by five and rounded down, the character must rest 30 minutes before making any more attempts to escape the current.

The characters' movement rates might also be increased with special equipment, such as jet scooters, jet fins, and submarines.

Sighting/Detection Methods

Sighting distance is also modified while underwater.

When attempting to visually perceive the world below the waves without goggles or a mask, images will be blurry and indistinct. Visual range underwater is limited depending upon light sources and water turbidity; but under ideal conditions such as crystal clear water on a bright sunny day and within 10 meters (33 feet) of the surface. A character could see about 10 meters.

However, at 10 meters only indistinct blobs will be discernible – essentially just movement and shadow. That object seen 10 metersaway could be Fred the jolly Dralasite or it could just be a lump of coral.

At 5 meters (16 feet) the viewer will be able to make an educated guess and likely be correct (perhaps 75% of the time). At 2 meters (7 feet) the viewer will be able to accurately see things and know what they are, even though no fine details will be discernible.

Using Goggles or a Mask. When attempting to visually survey an area underwater with goggles or a mask things improve considerably, though the viewer is still limited by light sources and water turbidity. Under ideal conditions when using an Artificial Gill Suit mask with crystal clear water on a bright sunny day and within 10 meters of the surface, visual range will be about 40 meters (131 feet). The viewer will be able to see clearly enough to accurately identify objects.

The AGS is designed to enhance the wearer's vision so that it is not distorted even so; a character's vision will not be as good as when on the surface. Visual range can also be affected by the amount of sediment and plankton in the area, the amount of light shining on the surface of the water, the depth, and passing schools of fish or other life forms.

A character can see with only sunlight as their light source about 3 meters (10 feet) away at 30 meters (98 feet) deep and about 1 meter (3 feet) away at 60 meters (197 feet) deep. Beyond 60 meters (197 feet) deep with nothing but natural lighting, visibility will be non-existent. If the PC is using flood lights, their visual range will increase to the maximum of 40 meters while a flashlight will allow them to see a maximum of 20 meters (66 feet) regardless of depth.

Water Conditions. Lighting conditions are directly affected by turbidity (water cloudiness). Clear turbidity will not change the maximum ranges of visual perception listed above. Low turbidity will reduce visual ranges by 10 meters (33 feet), moderate turbidity will reduce visual range by 20 meters (66 feet) and high turbidity will reduce visibility by 40 meters (131 feet).

What is turbidity? Turbidity is akin to smoke in air. It is a word used to describe the suspended solids in water. It can be the result of sediment stirred up on the bottom and could quickly dissipate. Or it could be the result of a current bringing particulates into an area and increasing the turbidity for an extended period of time or even indefinitely.

For the purpose of this document, turbidity includes such things as high concentrations of algae, agitated sediment, dense schools of fish, etc. – anything that reduces vision (even though that is not the traditional definition of the word). It will be left up to the referee to determine what level of turbidity exists in any particular area when visual range becomes a question.

Old-School Technology. If a character is using old school technology, maximum sighting distance would be 30 meters (98 feet) and the diver would also suffer a -10% modifier to all actions associated with vision as their depth perception would be off.

Infrared detection devices. Infrared detection devices are completely impractical to use underwater as their detection range drops to a mere 1 meter (3 feet). Their only value is if the character has no artificial light source and would otherwise be completely blind.

Night vision detection devices. If only using natural lighting, these devices are only useable if within 3 meters of the surface and are subject to the 40 meter maximum visual range.

However, these devices can be outfitted with a small blue-green laser that is designed to put out a broader beam. Though it does next to nothing to allow unassisted visual detection, it does provide enough light for a night vision detection device to collect, therefore allowing the device to perform its standard function at any depth.

Ultraviolet detection devices. These devices are unaffected in their standard operation by underwater environments but only to a maximum depth of 275 meters (902 feet) and only during daylight hours. They allow the wearer to see visually to a maximum range of 40 meters.

UV devices can operate independent of any light source during the day as previously described. During the night or at depths greater than 275 meters (902 feet), they would require the additional use of a UV laser designed to put out a broader beam in order to function.

Ultraviolet detection devices will not function underground (aquatic caverns either wet or dry) without the aid of a UV laser. Unless noted, other visual devices that enhance vision will function under the constraints of the maximum visual range of 40 meters detailed above.

Hearing. Hearing is a tricky proposition underwater. On the one hand, it is muffled and this would seem to make sounds more difficult to perceive. This is because hearing (from a human perspective) is adapted to sensing sounds in air, not in water.

On the other hand, sound is transmitted through water at a much greater speed and distance than air. This does not, however, translate into sounds being better perceived by the auditory senses of beings adapted to life above water.

Therefore, though sounds will still be able to be perceived readily enough, the direction from which the sounds come can be difficult to discern. To further complicate matters, distance is also audibly distorted. A sound could seem far off, but be close or the other way around.

Radar and Sonar. Radar uses detection techniques based on the sending and receiving of radio waves. Standard radio waves do not transmit well through water. In fact, they are so poorly transmitted through water as to be virtually useless.

Sonar uses a similar principal as radar, but instead of transmitting radio waves and measuring the distance between the transmission and the reception, sonar uses sound waves. As such, sonar is perfectly designed for use underwater.

Though an excellent tool for “seeing” over greater distances underwater, sonar can still be fooled by large numbers of small objects in close proximity; such as large schools of fish. Such objects can be mistaken for the sea floor or even larger objects moving about when in fact, they are simply small fish.

If the sonar source is projecting from a position out of the water, it will not be able to detect objects under the water.

Artificial Gill Suits

To survive underwater for long periods, characters must employ a breathing apparatus known as an artificial gill suit (AGS), which covers the wearer's entire body. It is made of a material that is similar to that used in skeinsuits, and it may be left transparent or colored as the manufacturer desires. Normal goggles may be worn by Humans, Vrusk, and Yazirian divers.

The AGS will absorb one-fourth of all damage caused by projectile and gyrojet weapons, fragmentation grenades, explosives, and melee weapons. It cannot be worn with any other suit of armor, but a screen may be used with it. When the AGS has taken 35 points of damage, it will be ruined and useless as armor.

The AGS for Humans, Yazirians, and Vrusks conforms to their basic physical shape The AGS for Dralasites will stretch to accommodate their shape-changing abilities. A Yazirian AGS covers the glide-wing membranes without hampering their use in swimming (see below).

Much of the exterior of the AGS is covered by a series of microfilters, all made of tough, translucent plastic. These microfilters draw oxygen from the water, pumping the gas mixture through small tubes to the area of the body where the wearer inhales air. The waste gases produced are released directly from the suit.

The whole system is regulated by a computer chip and powered by a small energy cell good for five hours before it needs to be recharged. The AGS also has a small digital display which can easily be seen by the wearer. The display shows the diver's depth, time in the water, and the amount of power left in the suit's energy cell. The suit also has a built-in low-frequency radio system, which has a range of one kilometer.

The suit can be safely used at a maximum depth of 110 m (361 ft) on earth-like planets (100 m or 328 ft on Balneum Blue). Weight: 5 kilograms. Cost: 800 Credits.

Characters might also purchase the hard artificial gill suit (HAGS) or the military version (MIHAGS).

Artificial Gill Suit (Hard). The hard artificial gill suit (HAGS) allows a full range of motion and is identical to the AGS except it has an internal air conditioning unit which allows the wearer to remain comfortable in water that is between 1 degrees Celsius (33.8 degrees Fahrenheit) and 100 degrees Celsius (212 degrees Fahrenheit). This AC unit consumes 4 SEU per hour of operation and can use standard or long e-clips, a beltpack or a backpack.

Under normal conditions, the AGS allows a diver to descend to a depth of 110 m (361 ft) on an earth-like planet (100 m or 328 ft on Balneum Blue). However, the HAGS is made of a hard polymer that is reinforced with federanium and that allows the diver to achieve a depth of 1,075 m (3,527 ft) on an earth-like planet (1,065 m or 3,493 ft on Balneum Blue). Similar to the AGS, the HAGS will absorb one-fourth of all damage caused by sources of inertia damage but it can withstand 75 points of damage instead of just 35.

The HAGS has external mounts where things like flashlights/floodlights or scanners can be mounted. These extraneous devices can not be powered by the the same power source powering the suit. They must be hooked up to a separate power source worn as a beltpack or backpack. It can use power from its rechargeable, internal power source (which allows for 5 hrs of operation before it needs to be recharged), long or short e-clips, power beltpacks or power backpacks. It uses 4 SEU per hour of operation to power its basic functions.

The suit is covered with hard 'cargo-style pockets' designed to hold extra gear in strategic locations for easy access. Items like an emergency rebreather mask, flashlight, spare e-clips or even a folded beltpack. It weighs 15 kilograms and cost: 2,500 cr.

Artificial Gill Suit (Military Issue Hard). The military issue hard artificial gill suit (MIHAGS) is nearly identical to the HAGS detailed above except it will absorb one-half of all damage caused by sources of inertia damage and it can withstand 100 points of damage before its protective capacity is exhausted. It also contains military grade radio equipment built into the helmet which has a range of 1.5km and utilizes a built-in encryption unit in order to keep outside forces from listening in. Weight: 20 kilograms. Cost:

3,000 Credits.

Old-School Dive Gear

If the referee plans to use current (early twenty-first century) dive technology for an adventure, some information is being provided below in order to incorporate such “old-school” technology in the Star Frontiers setting.

Decompression Sickness

In the real world, the body absorbs nitrogen from breathing compressed air (or from holding one's breath). This can be an issue if the diver remains underwater for lengthy periods of time or at great depths. When the diver returns to the surface, the reduction in pressure can cause the nitrogen to form bubbles within the diver’s bloodstream. This condition can be deadly if it is not properly managed.

This condition is not particular to underwater activity and can be a factor in other environmental situations where breathing compressed air in pressurized environments is necessary. But those are issues for other bodies of work and fall outside the scope of this document.

In Star Frontiers this situation is circumvented by the use of an Artificial Gill Suit (AGS) that filters breathable air directly from the water and does not use compressed air. Decompression can still occur even when using an AGS, if the AGS malfunctions for whatever reason and the character in question must hold their breath for a prolonged period of time while rapidly reaching the surface to take a breath.

Treatment involves the use of hyperbaric oxygen therapy in recompression chambers or the use of a freeze field until the injured character can be treated properly.

Generally, if the diver spends more time at a certain depth (see table below) than is considered safe, they must spend time gradually coming back to the surface in order to decompress. This time varies and is subject to complicated algorithms that will serve no real purpose in this game setting.

For the purpose of the game, suffice it to say that a diver, having spent more time at depth than he should have, should return to the surface no faster than 10 m (33 feet) per minute. This usually involves ascending in 10 m (33 feet) increments, then stopping for 1 minute and repeating until the diver has reached a point about 5 m (16 feet) from the surface.

At that point, the diver will usually stay there for an additional 5 minutes as a safety precaution in case there was a malfunction in his timing equipment. This should be sufficient to allow the referee to calculate a reasonable passage of time to simulate the experience within the confines of the game. The numbers presented in this paragraph shall remain constant no matter the gravity on the world where the divers are operating.

Below is a table detailing how long a diver can stay at the listed depth without having to take steps to counteract decompression sickness.

Time at Depth Table		
Grav. 1.0 Depth in meters (feet)	Grav. 1.1 Depth in meters (feet)	Max. time spent at depth without decompression
9 m (30 ft)	0 m (0 ft)	No Limit
15 m (50 ft)	5 m (16 ft)	100 minutes
30 m (100 ft)	20 m (66 ft)	25 minutes
37 m (120 ft)	27 m (89 ft)	15 minutes
43 m (140 ft)	33 m (108 ft)	10 minutes

46 m (150 ft)	36 m (118 ft)	5 minutes

This chart offers a contrast between a world with a gravity of 1.0 and one that has a gravity of 1.1. Notice that the adjustment of 0.1 atmospheres reduces the depth by 10 meters

It is possible to protect oneself from the effects of decompression sickness, even if a rapid ascent (emergency) is required. This is accomplished by breathing compressed oxygen (rather than compressed air) just prior to, and continuously during, the ascent to the surface. This helps mediate the effects of decompression sickness by helping to eliminate excess nitrogen from the body much faster than usual. This is not a fool-proof fix however and the best method of avoiding decompression sickness is to ascend slowly with frequent breaks, breathing normally during the process.

Nitrogen Narcosis

In situations where a diver descends beyond 20 meters (66 feet), the nitrogen in compressed air can have a detrimental effect on mental processes. This affect manifests in the form of mild to severe intoxication.

Euphoria can set in causing the diver to act recklessly. They may become wildly overconfident, combative toward friends attempting to help or may become completely disoriented and simply wander off.

The simple act of returning to the surface will reverse the condition completely.

Again, as with decompression sickness, this malady can also be circumvented by using the advanced technology of Star Frontiers (the AGS) as this technology does not use compressed air. Both decompression sickness and nitrogen narcosis have been presented here for the benefit of those referees that wish to use “old school” (current) dive gear.

Maximum Depth

For the purpose of this adventure setting, the maximum depth that a PC can go (unless otherwise specified in their racial description or detailed in '*Going For A Swim*') will be 36 m (118 ft.) with standard (current) equipment. If using the AGS, this depth is increased to 100 m (328 ft.). This depth (36 m) is assuming that the diver in question is using standard compressed air (no exotic mixtures) and standard (current) equipment. This depth (36 m) can dramatically increase when specialty gas mixtures and gear is included. Records (on earth) having been noted for dives as deep as 304 m (1,000 ft) and one for 610 m (2,000 ft) using a 'hard suit'.

As a rule of thumb, the pressure increases by one atmosphere for every 10 m of descent meaning that the average PC can withstand 4.6 atmospheres of pressure at 46 m (150 ft.) on earth which translates to 36 m (118 ft.) on Balneum Blue. This standard rule of thumb translates directly to equipment and vehicles as well.

Drowning

Obviously drowning is a very real possibility in a setting such as this where the environment is as dangerous as or even more dangerous than the creatures that occupy it. As in space, every task underwater is fraught with peril and is magnified many times in difficulty. A simple accident can prove fatal if it is enough to cause a malfunction in a critical piece of gear separating the individual from direct exposure to the environment.

For the purpose of this work, drowning shall begin to occur whenever a PC finds himself without adequate air to breath. Once that criterion has been met, the PC will be able to hold his breath for a number of turns equal to the character's current STA/5. After that, the PC will begin taking 2d10 points of damage each turn until death.

Hypothermia

Hypothermia is a condition in which the core body temperature of an individual drops to a point below that which is necessary for normal metabolism and body functions. This is unlikely to happen in this setting because the PC's equipment is generally artificially warmed by the power regulators of their various suits. Even the new, bio-engineered power armor has its own source of warmth (it is a living creature) to help keep the PCs warm. However, situations could arise that find the PCs in the water, unprotected for a period of time. In a case such as that, this information would be helpful and so, it is being included.

Hypothermia is divided into differing degrees of severity which are associated with very specific sets of debilitation. For the purpose of simplicity, each race will be treated the same in regards to the disabling aspects of each level of severity (as described from a human point of view). In reality however, each race would be different and the GM should feel free to adjust these guidelines as he sees fit to better differentiate between the various races.

Mild onset hypothermia. Mild hypothermia is usually distinguished by mild shivering, tachycardia and mild mental confusion. This could be simulated in the game by applying a -15 to all actions.

Moderate onset hypothermia. Moderate hypothermia is usually distinguished by violent shivering, labored movement and obvious coordination issues, mental confusion, pale skin and extremities (fingers, toes and lips) may become blue in appearance. This could be simulated in the game by applying a -30 to all actions.

Severe onset hypothermia. Severe hypothermia is usually distinguished by decreases in heart and respiratory rates, reduction in blood pressure, difficulty speaking and amnesia. In the latter stages the victim will lose most motor control, walking/swimming will be difficult if not impossible and they will become incoherent. This could be simulated in the game by applying a -60 to all actions.

How long does it take for hypothermia to take hold? This question is impossible to answer definitively as it depends upon a number of factors. In a worst case scenario, a PC can go from normal to severe onset hypothermia in a matter of minutes. It all depends upon the degree of extreme temperature that is being encountered, the quality of the gear that is being used to insulate the body and the physical condition of the victim.

Since there are so many variables, the following table will attempt to condense it all into a relatively simple mechanic to approximate this dangerous condition. It will not, of course, be perfect and the GM is encouraged to consider his own guidelines if the situation ever arises in his adventure. The following table is considering PCs that are completely or mostly submerged and that have no protective covering or a protective covering that is malfunctioning and no longer adequately retaining or producing heat.

Hypothermia table:

Temp of Water	Modifier	Mild: -15 to all actions	Moderate: -30 to all actions	Severe: -60 to all actions
27C (80F)	+10%	Roll STA per hour	Roll STA per hour	---
21C (70F)	+00%	Roll STA per hour	Roll STA per hour	Roll STA per hour
16C (60F)	-10%	Roll STA per hour	Roll STA per hour	Roll STA per hour
10C (50F)	-20%	Roll STA per minute	Roll STA per minute	Roll STA per minute
04C (40F)	-30%	Roll STA per minute	Roll STA per minute	Roll STA per minute
-01C (30F)	-40%	Roll STA per minute	Roll STA per minute	Roll STA per minute

The modifier column is the bonus given to the STA at the time of rolling. The negative modifier given for all actions if hypothermia is present does not apply to the hypothermia roll itself. Example, a PC becomes mildly hypothermic. The following hour the GM rolls to determine if the hypothermia advances to moderate, but does not apply the -15% to all actions from the mild hypothermia.

In those areas that say, 'Roll STA per hour' the GM should roll a current STA check each hour to determine if the PC begins to become hypothermic. In all of the 'per hour' categories, falling victim to hypothermia equals the loss of 1 STA per hour until such time as the victim is able to raise their core temperature.

In those areas that say, 'Roll STA per minute', the GM should roll a current STA check each minute to determine if the PC begins to become hypothermic. In all the 'per minute' categories, falling victim to hypothermia equals the loss of 1 STA per minute until such time as the victim is able to raise their core temperature.

Once the core temperature of the PC has been stabilized, they will begin to regain STA at a rate of 1d10 per hour.

Simple warmth and rest is enough for them to quickly rebound. In reality, it is more complicated than this and indeed, there are further complications that could occur but for the purpose of this game, this will suffice.

Though this information could be similarly applied to out-of-water situations, there would be some very different things that could happen or that could impose other modifiers; wind chill and frost bite (which could cause lasting or even permanent damage) for example. These things are not being addressed in this section as that falls outside the scope of this document.

Some temperature ranges for the core four races are detailed below. It will be left up to the GM to determine the specifics of any other races if he wishes to. This table can be utilized if the GM wishes to go into detail for the benefit of a medical PC in order to heighten the RP experience.

Racial body temperature table:

The following table is being presented to allow the GM to to see what temperatures to expect at particular depths in

order to aid in determining adverse effects on PCs who are not adequately protected from the cold (this can occur if their suit/vehicle is damaged such that the heating properties are no longer functioning or if they are out of power to supply their artificial heat source).

see what temperatures to expect at particular depths in

Race	Average Body Temp	Onset of Hypothermia (mild/moderate/severe)
Dralasite	30C (86.0F)	Degrees C: 25-28/21-25/13-21
---	---	Degrees F: 77-82/69-77/55-69
Human	37C (98.6F)	Degrees C: 32-35/28-32/20-28
---	---	Degrees F: 90-95/82-90/68-82
Vrusk	38C (100.4F)	Degrees C: 33-36/28-33/21-28
---	---	Degrees F: 91-96/83-91/69-83
Yazirian	39C (102.2F)	Degrees C: 34-37/29-34/22-29
	---	Degrees F: 93-98/85-93/71-85

order to aid in determining adverse effects on PCs who are

Oceanic Zone	Depth	Average Temp
Epipelagic	200 m or less	38C to 15C (100F to 59F)
Mesopelagic	200 m - 1,000 m	5C (41F)
Bathypelagic	1,000 m - 2,000 m	4C (39F)
Abyssalpelagic	2,000 m - 6,000 m	2C (36F)
Hadalpelagic	6,000 m or more	1C (34 F)

Underwater Radio Communications:

Traditional radio waves do not work well underwater at all - to the point of being worthless. However, very low frequency (VLF) radio waves are capable of transmitting about 20 m (66 ft) underwater. Such radios are extremely cheap as their effectiveness is questionable. They are however, fairly popular in recreational diving gear as they are inexpensive and readily available.

Extremely low frequency (ELF) radio waves are a different story however. Civilian markets are capable of achieving a range of about 1km (about one fifth of a mile or 1,094 yrds) underwater utilizing ELF radio waves and such devices can be applied to AGS, HAGS and civilian submersible craft.

Militarily speaking, the range has been extended to 1.5km (about one third of a mile or 1,640 yrds) and an encryption unit has been added.

The figures presented above are for radio communications from one underwater radio source to another underwater radio source. For the purpose of an above water radio source transmitting or receiving to/from an underwater radio source the maximum untethered range will be 1.5 km (about one third of a mile or 1,640 yrds).

These ranges can be extended considerably between an underwater source and an above water source if the underwater source surfaces, extends an antenna to within at least 20 m (66 ft) of the surface or releases a tethered antenna buoy that can get to within at least 20 m (66 ft) of the surface. Any of these actions taken by the underwater

source will allow it to conduct normal radio operations and should be handled as usual.

None of this is applicable if the sender and receiver are tethered by a radio cable, in which case the range is only limited by the length of the cable.

Scent and taste perception:

Perceiving scents and tastes may only be accomplished by PCs whose racial description notes their ability to breathe water.

Alpha Subsection 1c:

Deeper Dives. If a deeper dive is attempted, there is a cumulative 5% chance per 10 meters below the safe limit that the AGS will malfunction. This chance must be rolled for every five minutes, with an additional 1% chance of failure added for every additional five-minute period spent beyond the first.

The wearer will also take one point of damage for every 10 meters he dives past the maximum safe depth. This damage will be taken every minute and is caused by increased pressure.

Dralasites will not start taking pressure damage until they reach a depth of 160 meters, due to their elastic abilities. There is also a 10% cumulative chance per 10 meters of depth beyond the maximum safe limit, checked for every 10 minutes, that a Human or Yazirian character will have vivid hallucinations for five minutes as a result of nitrogen narcosis. A check against the character's Logic score lets him disbelieve the hallucinations.

Malfunctions and Drowning. If the AGS malfunctions, the character wearing it must hold his breath until he can reach the water's surface. A character can hold his breath for a number of turns equal to the character's Stamina score divided by five.

If the character is still underwater after running out of breath, the character will take 2d10 damage for every turn spent under water until death occurs from drowning. If a character dives deeper than 10 meters, the character must ascend slowly (at a rate of five meters per turn) or risk getting a case of the bends.

The Bends. Bends are caused by nitrogen bubbles forming in the bloodstream, due to the quick change in pressure. This can cause intense pain, doing one point of damage per round until the character is placed in a freeze field or a decompression chamber to stop the loss of Stamina points. The damage from decompression will never exceed 40 points, though death can still occur as a result of it.

Note that there is a chance of dying as a result of the bends, independent of the amount of damage taken, as per the table below. Dralasites do not get the bends.

If death is indicated, it will occur in 10 minutes. During these 10 minutes, the character will lose one-tenth of his current hit point value (rounded up) every minute

This procedure can be stopped by a freeze field or a decompression chamber. A character must stay in a decompression chamber for a number of minutes equal to the lowest depth in meters that the character reached. If a character dives below 60 meters, even if he did not contract the bends, he must spend some time in a decompression chamber. If the character does not do this, he will get a case of the bends, like that described above; within 1d5 hours Dralasite characters will never contract the bends due to their unique physiology.

If characters need to dive deeper than their limits, they will have to use a submarine or an AGS designed for greater depths

.

Underwater Equipment

For 50 Credits, a wide-beam underwater flashlight can be found. The flashlight will be attached to the AGS, around the character's chest. The flashlight's energy cell can go for 100 hours before needing a recharge. The flashlight enables the character to always have a minimum visual range of two meters, except in extremely murky water. It illuminates a cone-shaped area, ranging from .5-2 meters at the widest part of the cone.

Jet Scooter. This vehicle is a streamlined cylinder made of light alloys, one meter in width and two meters long. It has a built in jet turbine which enables it to go 20 meters per turn. The character lies on

top of the scooter and steers it with a steering rod, which controls small tins on the sides of the scooter.

The scooter weighs five kilograms and costs 300 Credits. It is powered by a small rechargeable energy cell, which can power the scooter for five consecutive hours.

Jet Fins. Working on the same principle as the scooter, fet fins enable a character to move at a rate of 13 meters per turn without requiring rest breaks every hour. A pair of fins weighs 500 grams and cost 50 credits. **They are powered by two small, rechargeable energy cells good for two hours of use**.

Submarines. These “undersea boats” can only be used by a character with the appropriate skill. The most common type of submarine that can be bought or rented by non-military characters is the Explorer Sub. If the characters want larger or armed submarines, they must either be working with a government, a mega corporation or willing to purchase one (legally or illegally).

Explorer Sub. A typical explorer submarine costs 20,000 Credits, but usually rents for 100 Credits, plus a 250 Credit deposit per day. The submarine has a top speed of 250 kilometers per hour, with an average cruising speed of 20 kilometers per hours. Six passengers may be accommodated aboard it, though in VERY cramped comfort. The sub carries four in relative comfort. The cargo limit is 1,000 kilograms, within a space of two cubic meters.

This submarine is powered by a parabattery (type II) which has to be recharged every 200 hours of use. The submarine’s movement rates are not affected by coral reefs or seaweed, though visibility is affected.

This type of submarine can be used to a maximum depth of 200 meters. If it is used at greater depths, there is a cumulative 10% chance per 10 meters below the maximum depth that the submarine will spring a leak. This chance should be checked for every five minutes spent below the maximum depth. If a leak occurs, a person with Technical skills can repair it, but first the submarine must move to the surface. If the leak is not fixed, the submarine fills with water in 10 minutes.

The submarine contains six AGS suits in case of emergencies, hut donning one in a cramped, sinking submarine can be tricky. Structural damage of 100 points or more to one area will cause a leak in the sub, which has a total of 400 structural points.

If a submarine is involved in undersea combat, see Section XII. Watercraft and Other Modes of Transportation for the appropriate rules.

Character Underwater Combat

While underwater, characters will have to deal with various modifications to the combat system. The Ranged Weapon Combat Procedure Table, on page 22 of the Expanded Game Rules book, should have the following additions and modifications when combat occurs underwater.

Fighting Underwater. Characters must use modified versions of the ranged weapons they usually use. These weapons cost 50 Credits extra for underwater modification. Such weapons act normally above water unless otherwise noted.

Underwater versions of gyrojet weapons are available. When used underwater, they have the following alterations made in ranges (the rest of the statistics are normal when used underwater).

Sonic disruptors and sonic stunners are both produced in versions that can be used underwater. These weapons have double normal ranges undersea, because of the effects of the denser medium through which the sound waves pass. The damage for the sonic disruptors is doubled accordingly.

Modified versions of grenades can be used underwater. They can’t actually be thrown, but they may be dropped on characters that are at a greater depth than the attacker. Unless surprised, the victim may be able to get out of the grenade’s blast radius. The grenades will drop at a rate of six meters per turn. Grenades can also be delivered with grenade rifles modified to work underwater. Such weapons have the following ranges when used underwater:

Short	0-15
Medium	16-30
Long	31-55
Extreme	56-100

An underwater version of the toxyrad gauge costs 25 Credits; its functions are slightly different from the regular type, and it will not work above water. If the red light shines, it means that there is a chemical in the area that can affect the character through his AGS, but the special filters mentioned earlier can filter them out before they reach the character. A flashing blue light indicates that there is dangerous radiation nearby. A flashing yellow light indicates that there is a chemical in the area that is so powerful that even the special filters mentioned above cannot filter them out.

An underwater version of the exoskeleton can be found for 2500 Credits; this version also works above water. While wearing the exoskeleton, a character is able to swim 20 meters per turn without having to rest. While underwater, the character has a +10 bonus to hit in melee, and does five additional points of damage.

The exoskeleton is designed to be worn outside the AGS without hampering any of the suit's functions.

Because of the heat-absorbing properties of water, an AGS cannot have built-in infrared vision capability. Freeze fields cannot work underwater, either.

An underwater radiophone can be bought for 550 credits, and will work regularly above water. It only has a range of 50 kilometers underwater, and is connected to the communications system of the user's AGS.

Underwater Solva-Way comes in small plastic bulbs which must be crushed by the entangled victim. It then spreads out and dissolve the threads, remaining potent for one turn. A bulb of underwater Solva-Way costs 15 Credits, and it will not work above water.

Regular Tornadium D-19 works underwater, but special waterproofed Variable/Timer Detonators must be used. They cost 7 Credits each and work above water, too.

Finally, special power backpacks (300 Credits) and powerclips (150 Credits) can be bought that work underwater.

Other Notes

This section assumes that the area where the characters are diving has a fairly comfortable climate. If the characters dive in water with extremes in temperature, an AGS can be bought with a heating/cooling system. This modification costs 100 Credits extra and adds two kilograms of weight to the AGS. This system is powered by a small energy cell which works for four hours before needing a recharge. The system protects the character in water with temperatures ranging from -35—C to 70—C.

Special AGS's may be created if the characters are going to dive in waters which contain dangerous chemicals or poison. These AGS must be tailor-made for the body of water in which the characters are going to dive. Such suits cost an average of 1000 Credits.

The modified weapons and equipment mentioned earlier have a tendency to malfunction due to powerful pressure from deep dives, as do AGS's. Weapons and equipment must be further modified if taken into water containing powerful chemicals; this modification will cost a further 50 Credits.

The natural gravity of a planet will also affect the pressure at deeper depths. For every tenth of gravity less than one, the AGS is able to dive 10 meters deeper before a chance for malfunction occurs.

The opposite is true if the gravity is greater than one. This rule applies to the weapons and equipment, too.

This article may be used as the basic foundation for running an adventure underwater. It should not be considered a strict set of rules. The final judgments are up to the individual referee.

Alpha Subsection 1d:

Alpha Subsection 1d:

Underwater Combat:

Character stats:

As noted in '*Going For A Swim*', unless the PC's race is amphibious or aquatic, their statistics will be adversely affected in this environment:

"*A character's Dexterity and Reaction Speed scores are reduced by 25 points; also, a character's Strength score is reduced by 35 points when figuring the effects of melee on the Punching Table (page 25, Expanded Games Rules). A minimum score of 10 applies in all cases.*"

This adventure module has been written with this in mind.

It should be noted that the gnatha carapace power armor found in Zeta Subsection 1 nullifies this effect.

Melee Combat:

Any melee attacks that rely upon impact in order to transfer damage to the target will effectively be useless underwater. As such, only bladed weapons intended for short, slashing strokes or stabbing actions will be capable of really accomplishing anything.

If a target is physically grappled, the full STR of that target may be used to stave off the grappling attack.

Throwing Things:

Throwing attacks are all but useless in an underwater environment. At best a PC might be able to lob an object a meter or so assuming they are properly braced against something solid and exert all their effort toward the goal of flinging that object.

More likely is the notion that the PC will drop an object from a shallower depth. In this way, properly sealed grenades could be dropped upon an enemy below and cause considerable damage through concussive force. The shrapnel from a fragmentation grenade won't be nearly as effective as it would be above water. But the concussive force would be doubled. Unlike what is stated in '*Going For A Swim*', it seems more likely that the fragmentation grenade would effectively work in a very similar fashion as it would above water, except that the damage would be impact-related rather than shrapnel-related.

Regardless, that is a decision that will be left up to the GM and is being expanded upon here simply to supply the GM with another option to choose from.

Technology:

The technology addressed below will be spoken of in general terms in order to give the GM some footing when attempting to convert some items that have not been covered either in '*Going For A Swim*' or in this work.

Pneumatic/Tension (devices which throw stabilized projectiles like arrows):

Unless designed specifically for underwater use, all weapons that rely upon forced air or spring tension in order to propel their damaging component downrange will be affected adversely by the resistance of the water. This adverse effect will manifest as all ranges and damage being reduced by 75%.

Explosive Projectile (devices which throw solid slugs like bullets):

Unfortunately, projectile weapons suffer dramatically from the resistance applied to their projectiles from water. This leaves them with an extremely short range and decidedly reduced power which directly affects their lethality. This makes them all but useless underwater even if they have been adapted for underwater use.

Fire:

Unless the source of the fire is some sort of chemical reaction as can be found in underwater welding (or hyperbaric welding), weapons that use flame in order to distribute their damage simply are not possible underwater.

Electricity:

Unless the operator of the weapon is somehow properly insulated, using a weapon underwater that damages targets using electricity is never a good idea. As the weapon in question, no matter what it is (unless otherwise noted), will act as a burst weapon doing its damage to everything (including the operator!) within a given area every time it is activated.

Light:

Traditional laser weapons are next to useless underwater as the light gets diffused quickly and renders the weapon ineffective.

There is a solution however. Blue-green lasers. This type of laser is specifically designed for underwater use. It is identical in all respects (relating to damage, range, accuracy, weight, etc) to standard lasers except that they are specifically designed for underwater use. Unfortunately they cost 50% more to purchase.

Sound:

Sonic attacks have the benefit of interacting well with the fluid environment. This doubles the range of all sonic weapons when used underwater. Unfortunately, visibly is rather low even under the best of conditions rendering this advantage basically moot.

Mental powers (Mentalism/Psionics):

Mental powers would work as well beneath the waves as above them. The only difficulty may be in acquiring a line of sight and holding it long enough to use the ability.

An exception to this would be any pyrotechnic mental abilities. They would still work on a molecular level, thereby causing their damage, but they will not cause nearby flammable objects to ignite. Instead, the immediate area will begin to boil. Furthermore, as soon as the user stops concentrating, the affect would immediately cease. The GM is, of course, free to rule on this differently as fits into his universe.

Miscellaneous Equipment:

Gear which has been previously published has been cited so that readers may go back to those sources and find more information concerning those items as only pertinent information has been reproduced here. Items that have no citations have been fabricated just for this adventure and cannot be found anywhere else.

Chemical Light Stick (aka, chem stick or chem light):

Disposable chemical light sticks come in a variety of sizes and are labeled size **Class A-E**. They can be made to emit light that is visible to the naked eye and UV, IR and Night Vision visual detectors. Or they can be produced so that only technological detectors can detect them at the same cost. Or they can be made so that they can be seen by the naked eye and have no special properties toward technological detectors. Whichever option is chosen, it must be specified at the time of purchase.

A **Class A** chem light can emit enough light for any of the aforementioned technological devices to 'see' out to half of their standard range. All other classes of chem lights emit enough light for these sensitive pieces of equipment to 'see' out to their maximum range. They can be configured to generate light in any color that the buyer wishes but they are most common in white, green, yellow and red.

To activate a **Class A-C** chem light, the plastic tube is simply bent in order to snap a small glass ampule inside which releases a secondary chemical that reacts with the primary chemical. Then the device is briefly shaken, causing a dull light to be emitted without heat. To activate the **Class D & E** chem lights, a

spring-loaded button situated on one end is depressed. This releases a small firing pin inside that shatters the glass ampule. **Class D & E** chem lights do not need to be shaken as the ampule is completely shattered at the time of activation.

These devices are made standard to function as described on dry land or underwater at any depth. They can be made to function in space for double the listed price.

A **Class A** chem stick is small, only about 16 cm (6 in) long and 1.5 cm (0.5 in) in diameter. They can illuminate an area of about 3 m (10 ft.) in diameter for 24hrs. Weight: 1kg for 10 sticks. Cost: 1cr each.

A **Class B** chem light is mid-sized, about 32 cm (12 in) and 3 cm (1 in) in diameter. They can illuminate an area of about 5 m (16 ft.) in diameter for 24 hrs. Weight: 1kg for 5 sticks. Cost: 2cr each.

A **Class C** chem light is a bit larger at about 61 cm (2 ft) in length and 5 cm (2 in) in diameter. They can illuminate an area of about 10 m (33 ft.) for 24 hrs. Weight: 0.5kg. Cost: 5cr.

A **Class D** chem light is large at about 1 m (3 ft) in length and 8 cm (3 in) in diameter. They can illuminate an area of about 20 m (66 ft) for 24 hrs. Weight: 1kg. Cost: 25cr.

A **Class E** chem light is a bit larger at about 1.5 m (5 ft) in length and 10 cm (4 in) in diameter. They can illuminate an area of about 40 m (131 ft) for 24 hrs. Weight: 2kg. Cost: 50cr.

Life Bubble (**p.58 & 91 Zebulon's Guide to Frontier Space**):

The life bubble is of the same material and basic design as the infla-tent but completely envelops the wearer in one turn. They are worn like a backpack and are used by sailors or downed pilots on a watery world or sea. The normal oxygen supply inside one of these bubbles is two hours maximum but a small air hole can be opened for use with an attached snorkel, then sealed again against the elements. A life bubble will keep most bioforms alive until they are rescued or run out of provisions, but the enveloped character must keep movement down to a minimum to stabilize the air hole's position above the water. Weight: 20kg. Cost: 175cr.

Manta Mini-Sub (**p.54 SFMan08**):

The Manta mini-sub is a portable, inexpensive submersible vehicle available on the open market. It is often used by research organizations, but also sees use by the security departments of major corporations with ocean-going assets. It and other vehicles like it are common sights on aquatic worlds, where they replace terrestrial cars as the major mode of civic transportation.

The Manta's extremely efficient design and magneto-hydrodynamic drive enable it to achieve relatively high speeds. The drive requires the use of a Type 3 parabattery to meet its power needs. It has a maximum depth capacity of 1,100 m which would be 1,090 m on Balneum Blue (approximately 3,576 ft.). It can ascend at a rate of 210 m (approximately 700 ft.) per minute, or 21 m per turn. It can descent at a rate of 120 m (approximately 400 ft.) per minute, or 12 m per turn.

Two passengers can ride comfortably within the Manta. A third passenger can be stuffed into the interior in case of an emergency, but must be small. Two passengers can be accompanied by up to 50 kg of extra cargo, which can occupy a storage volume of up to one cubic meter and is accessible from the interior of the mini-sub.

The Manta is equipped standard with basic GPS and communications gear, civilian sonar and forward-aiming flood lamps. It has life support capacity for 96 hours before needing to refresh. The Manta has no hardpoints for mounting weapons and cannot be modified except with great difficulty for this purpose. Mantas can be ordered with upgraded electronics systems, including better GPS, sonar

and communications packages at the GM's discretion. Top Speed: 35 kph (22 mph). Cruise Speed: 20 kph (12 mph). Cost: 10,000 cr.

Personal Watersled:

This is a single-person form of conveyance. It can transport one person (or a person wearing a HAGS or even power armor adapted for use underwater) through the water (surface or underwater) at a top speed of 10 kph (6 mph), cruise speed of 5 kph (3 mph). The rider simply lies on top of the board, grasps the

handles and is propelled forward by twin power fans. It takes two 20 SEU power clips (one for each motor) to power it or can be plugged into a power backpack or beltpack and consumes 2 SEUs per hour. Weight 5 kg. Costs: 500 cr.

Pump Action Scattergun (**p.16 SFMan04**):

The most common civilian model is the pump action (PA) scattergun. This model does not automatically load a round into the chamber after a round has been fired, but instead requires that the user 'pump' the weapon (slide the fore-grip back and then forward again) to load another round into the chamber. Pump action scatterguns do not use a conventional magazine, but instead hold their rounds internally. Because of this, the weapon must be reloaded manually instead of changing magazines. A character can load up to half his Initiative Modifier worth of rounds into a scattergun in one round. These scatterguns are typically used as personal defense weapons by frontier settlers, and as hunting firearms.

Because scatterguns fire a cluster of small pieces of shot or flechettes, attacking with a scattergun is very similar to using a burst attack with an auto-weapon. Each 'shot' from a scattergun contains 10 projectiles. A shot can be aimed at up to five adjacent characters in an area up to 5 meters wide, or at just one character. Only one die roll is needed to hit all the characters aimed at. Because of the number of projectiles fired, the shooter gains a +10 bonus on the hit chance. If the shot is aimed at one character it causes 2d10 points of damage. If it is aimed at more than one character, it causes 2d10 points of damage plus 1d10 for each additional target. These points are divided as evenly as possible among all the targets. Any leftover points of damage are lost.

Ammo costs 10cr for 20 loose rnds.

Weapon	Cost (cr)	Wgt (kg)	Damage	Ammo	Rate	Defense	Range
Scattergun (PA)	200	3	2d10	5 shots	2	Inertia	5/15/40/75/150

Rebreather Mask (**p.21 SFMan03**):

This mask seals around the face, adhering to the wearer's flesh easily. It draws oxygen through its specialized membranes, and provides sufficient breathable air to the wearer for about 120 turns (that's about 12 minutes). It cannot be worn when in normal atmospheres, only when submersed. Rebreather masks must be purchased for, and will only work for, the species for which it is designed. The membranes do not have a long shelf life. If kept in storage too long, the membranes wear as if used for one minute per week of storage. For this reason, they are usually hermetically sealed in a plastic shrink-wrap until needed. The mask is discarded when its membranes are spent. These masks are routinely kept in one of the pockets of the AGS or HAGS so that they will be available in a diving emergency. Weight: 1 kg. Cost: 100 cr.

Standard Sea Survival Pack (**issue #149 Dragon Magazine**):

The standard sea survival pack is a small, durable, buoyant backpack that contains the following: one all-weather blanket, one first-aid pack, four survival rations (eight days of food), one compass, 10 salt pills, 10 liters of water, one flashlight, one pair of sea goggles, and an emergency beeper that emits a signal for 20 km for 48 hours. Weight: 1kg. Cost: 150cr.

Underwater Radio (Civilian ELF):

The civilian extreme low frequency (ELF) underwater radio is a small radio unit that can fit into the helmet of an AGS, HAGS or can be fitted into the console of any civilian submersible. It has a range of 1 km (about one fifth of a mile or 1,094 yrds) between two underwater sources or that same distance between

an underwater source and an above water source. Weight: 0.5 kg. Cost: 500 cr.

Underwater Radio (Military ELF):

The military extreme low frequency (ELF) underwater radio is a small radio unit that can fit into the helmet of a MIHAGS or can be fitted into the console of any military submersible. It has a range of 1.5 km (about one third of a mile or 1,640 yrds) between two underwater sources or that same distance between an underwater source and an above water source. Weight: 0.5 kg. Cost: 1,500 cr.

Underwater Radio (Recreational VLF):

The civilian very low frequency (VLF) underwater radio is a small radio unit that can fit into the helmet of an AGS, HAGS or can be fitted into the console of any civilian submersible. It has a range of only 20 m (66 ft) underwater and cannot be picked up above water unless the underwater radio source surfaces - in which case it will act as a standard chronocom radio. Weight: 0.25kg. Cost: 50cr.

Underwater Radio Antenna:

This is nothing more than a telescoping radio antenna that is usually mounted on the top of a submersible vehicle. They are usually about 10 m (33 ft) in length once completely extended and will allow longer communication ranges between underwater radio sources and above water radio sources as long as the submerged radio source is able to get

the antenna to within at least 20 m (66 ft) of the surface. Weight: 250kg. Cost: 450cr.

Underwater Radio Buoy:

The radio buoy is a buoyant sphere containing antenna and amplification equipment. It is tethered to the parent submersible craft by a pre-set length of cable (determined at the time of purchase) which, when released, with float to the surface (or just below the surface). This enables the submerged craft to use its normally short ranged underwater radio as a standard above water radio. This device is functionally very similar to the underwater radio antenna listed above but it allows the submerged craft to remain at greater depths while still enabling long distance communications. Weight: 50 kg. Cost: 250 cr for the buoy and 10 cr per meter (3 ft) for the cable.

Section XII. Watercraft and Other Modes of Transport

Many other types of transportation are available in the Star Frontiers game…f

Water Vehicles

Ships of many varieties are found throughout the Frontier. Players can find anything from three-mast sailing ships to luxury liners and supertankers.

Hovercraft are used commonly in areas where the sea is relatively calm. Skimmers can be used over water if the waves are not more than 40 cm high.

Surface Vessel Table

Hull Type	Size	Accel. m/turn	Decel. m/turn	Turn Speed m/turn	Bump No.
Skicycle	A	100	40	250/100	
Motorboat	B	70	40	200/80	
Yacht	C	60	40	170/60	
Transport Ship	D	70	40	160/40	
Minisub*	C	70	40	170/60	
Transport Sub*	D	40	30	160/40	

***Only Surface movement shown**

Submarines are used on worlds where the seas are very rough, covered with ice or otherwise unsuited to surface travel. They are common around underwater cities and sea-bottom mines.

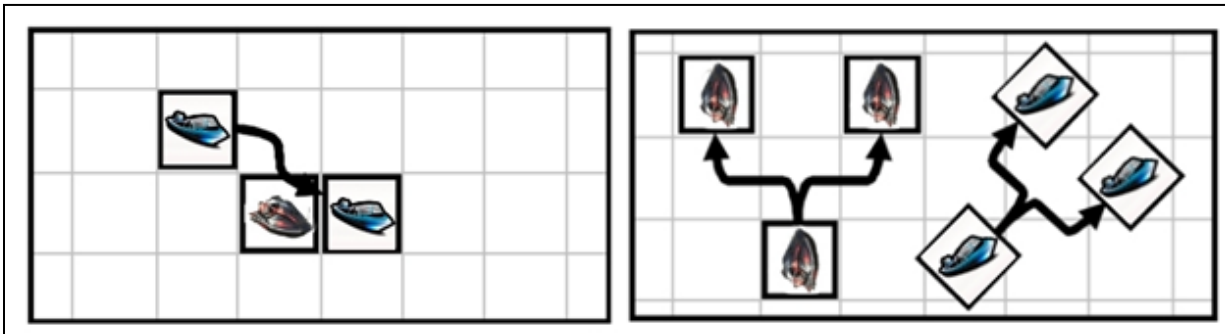
Although missing from the original Alpha Dawn combat rules, Matthew M. Seabaugh provided the following watercraft combat rules that were originally printed in Dragon Magazine.[94]

Sea-Vessel Movement

In general, surface-vessel move similar to land vehicles while submarine movement is much like aerial movement. The rules for acceleration, deceleration, maximum speed, backing up, and turn speed are the same. See the Surface-Vessel Table for more information.

Special maneuvers:

Various movement actions may be performed including bumps and slips, skid turns, stunts, short corners, etc.



Above, left, a motorboat performs a bumping move against a skicycle. Above, right, a skicycle and motorboat are shown doing slip maneuvers.

[94] Seabaugh, Matthew M. "From freighters to flying boats: traveling the high seas in the Star Frontiers game" dragon magazine, #146, p. 46.reprinted in Star Frontiersman, issue 15, pp 34-38.

Bumps and Slips. All ships can perform bumps and slips similar to ground vehicles.

Skid turns. Only ships of hull size C or smaller can perform skid turns as well as the other maneuvers. However, yachts must attain a speed of at least 90 meters/turn to accomplish a skid turn.

A skicycle performs a skid turn.

Stunts. Other special maneuvers, such as stunts, are up to the referee's discretion to use and define..

Short corners. Any ship may attempt a short corner, but this is especially dangerous on the open sea. If the character performing the short corner doesn't make his Reaction Speed check (or a skill check), there is a 15% chance the ship will capsize.

If the ship doesn't capsize, roll 1d100 and add the ships current speed in meters/turn, then apply the total to the Surface Vessel Control.

Water Combat Bumping Table

Craft Type	Bump Number
Hovercycle Light Body Robots	1
Ground Cycle, Standard Robots	2
Standard Reinforced Robots	3
Hovercar	4
Ground car, Heavy-Duty Robots	5
Hover Transport	6
Ground Transport, Heavy-Duty Reinforced Robots	7
Warbots with Heavy-Duty and H-D Reinforced Bodies	8
APC (hover)	9
APC (ground); Super-Duty Robots	10
Hovertank, Warbots with Super-Duty Bodies	12
Explorer	13
Tank	14
Battlewagon	16

Surface Vessel Control Table

Speed (m/turn)	Result
2-79	Speed reduced by 20 meters/turn
80-139	Speed reduced by 50 meters/turn
140-199	Decks awash
200-259	Engine flooded
260+	Capsized

Collisions. If a vessel strikes an object above the waterline, treat the collision as per the Alpha Dawn

Above, left, a motorboat performs a bumping move against a skicycle. Above, right, a skicycle and motorboat are shown doing slip maneuvers.

expanded rules. However, if the object is struck below the waterline, there is a 1% chance per meter/turn of the vessels speed that the vessel will take on water. Unless repaired by technicians with a total of four levels of Technician skill, the ship sinks.

A ski cycle sinks in five minutes, a motorboat or minisub in 10 minutes, a yacht in 15 minutes, and transport ships and subs in 20 minutes.

When submerged, submarines may make up to six 45-degree turns in one minute (one such movement per game turn). These turns may be made in succession or at different times during the minute. If a sub is at a dead stop, it may turn to face any direction before moving. A sub may also increase or decrease its depth by 30 meters/minute to a maximum depth of 600 meters.

Surface Vessel Combat

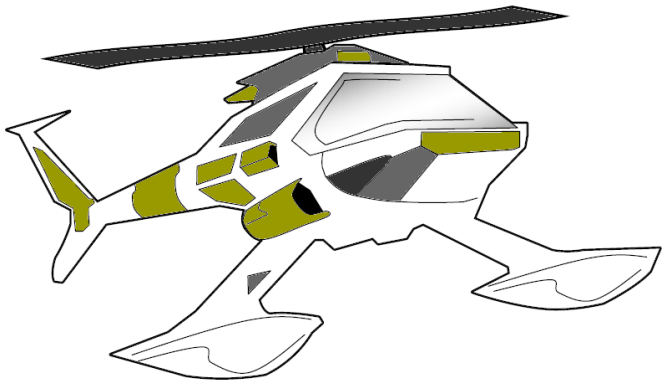
A ship is divided into two parts – the hull and the superstructure. The hull is the part of the ship below the water line; the superstructure is the part above the water line.

If a ship's hull is hit, the damage will affect the speed of the ship or cause the ship to sink. If the ship's superstructure is hit, the direction, speed, or communications will be affected: fires may break out, and the ship might capsize.

There are three types of combat between ships: contact combat, which includes ramming, bumping, and boarding; ranged combat, which involves both personal and mounted weapons; and explosives.

The same three types of combat also apply to submerged combat, with some modifiers.

Contact Combat



Bumping between two ships is similar to bumping between two land vehicles, but the sizes of the vessels involved are much more influential in sea combat than in land combat.

To apply this factor, a system is used similar to the bump number system. When a bumping situation occurs, the referee finds the difference between the two vessels bump numbers and multiplies it by five. This number is added to the Reaction Speed of the pilot of the ship with the higher bump number and subtracted from the Reaction Speed of the pilot of the other vessel.

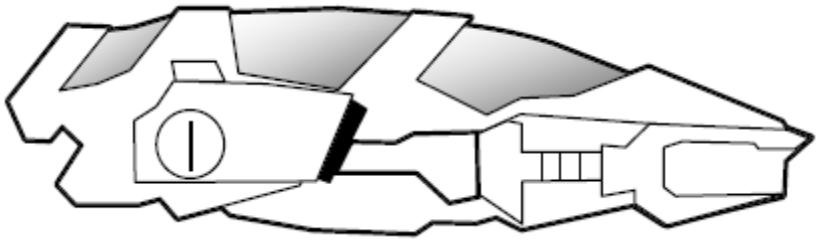
The referee now rolls a 1d100 check for each pilot's revised Reaction Speed score. A successful roll indicates the pilot has maintained control of his ship, while a failed roll indicates the pilot of the ship has lost control of his vessel. When a pilot loses control, roll 1d100 and add his vessels current speed in meters/turn, then apply this result to the Surface Vessel Control Table.

Ramming. Both ships are damaged in a successful ramming attempt, not just the defender. When a ramming attempt is made, each pilot must roll 1d100, add his Reaction Speed, add his ships bump number multiplied by three, and then subtract his opponents speed in meters/turn.

If the attackers total is higher than the defenders, the ramming attempt is successful. If the ramming attempt succeeds, both ships are damaged. Damage is calculated by taking the attackers speed in meters/ turn, dividing that figure by 10, then adding the result to the attackers bump number multiplied by three.

The total is applied to the Hull Damage Table for the results. Damage to the attacker is figured in the same way, substituting only the defenders bump number for the attackers bump number.

Boarding. The crew from one ship moves over to another ship for hand-to-hand and ranged weapon combat. This usually causes little or no damage to either the attackers' or the defenders' ship. Even so, boarding can be the trickiest of any of the contact combat maneuvers.



Two requirements must be met for boarding to take place. First, the ships must have the same speed and heading for three turns prior to boarding, and must be at most 10 meters apart.

Second, at least three grappling hooks must connect the two ships. Grappling hooks are treated as thrown weapons for purposes of determining the success or failure of the grappling attempt.

After all these criteria are met, characters may climb across the ropes to the opponent's ship. The climb takes three turns at most. A climber hit by weapons fire must make a Dexterity check or else fall into the sea. After a character boards his opponents' ship, combat proceeds as usual.

For obvious reasons, boarding between high-powered ships is rarely used except against stationary ships or under extreme circumstances

Weapons combat

There are two sorts of weapons used between seafaring vessels: personal weapons and mounted weapons.

Usual ranged-weapons procedures are used for personal weapons, with these additional modifiers to hit. of the target ship only, unless intentionally aimed below the waterline. Then the attacker suffers the aforementioned penalty.

Circumstance Modifier	
Attacker on hull size A or B ship	-10
Target ship is hull size C	+5
Target ship hull size D	+10

When a hit is scored, the attacker rolls 2d10 and adds the number of dice of damage inflicted. This number is applied to the Superstructure Damage Table unless the hit was intentionally aimed at the hull, in which case the number is applied to the Hull Damage Table. Note that these effects only apply to relatively small ships with little or no armor, as would be found on most colony worlds.

Shooting at a really large ship, like an aircraft carrier, is an exercise in futility (and probably in suicide as well).

The number and type of mounted weapons a ship may have depends on the ship's size and ship type. Ski cycles may only have forward-firing laser pistols.

Motorboats may have any type of rifle mounted on a swivel mount. Transports may have up to four heavy weapons mounted on swivel mounts.

Mounted weapons are subject to the same modifiers as personal weapons, including the previously given modifiers for target hull size and aiming below the waterline.

Explosives

These come in three different types: thrown explosives, placed explosives, and mines.

Thrown explosives. These include grenades and are treated as ranged weapons and use the same modifiers.

Placed Explosives. Used often in espionage or ambushes, a demolitions expert can place explosive charges inside or outside the ship. Determine whether or not the blast will count as either superstructure damage or hull damage, given its location.

Getting the explosives to the ship without detection is the tricky part. Mines are often used to guard harbors and military installations. Mines are often stationary, although some may break loose, floating

freely. If a ship strikes a mine, treat it as 10 dice of damage applied to the Hull Damage Table.

Undersea combat

A submarine is a versatile vessel able to fight either on the surface or underwater. When a submarine is surfaced, it follows the same surface rules as other ships. When submerged, the submarine follows a different set of guidelines.

There are three different types of underwater vessel combat: contact combat, torpedo combat, and explosives combat. Contact combat underwater is similar to surface contact combat. The same three basic maneuvers are used: bumping, ramming, and boarding.

Bumping. A bump maneuver exerted underwater uses the following modifications: the submarine maneuvers in a three-dimensional environment, meaning bumps can be inflicted from the top or bottom. A bump from above grants a +5 to rolls on Table 6 made to see if the bumped vessel keeps control. In addition, maneuvering undersea is no mean feat.

Most of the maneuvering of the sub is done by relying upon the onboard computers; you cannot maneuver a sub underwater by sight.

Ramming. Underwater craft can ram one another using the same mechanics as surface ramming, with the following modifiers: First, speed is divided by five rather than ten. Second, if a ship is descending in depth as it is ramming, five additional points of damage are done to the defender, and five fewer points of damage are done to the attacker. All such damage is applied to Table 7.

Underwater Boarding. Entering an underwater vessel is usually done on rescue missions rather than in combat, as it is tricky. Any men attempting to board during combat must come through the air locks, so they are easy targets for the men inside. Hence, most boarding actions against submarines take place on the surface against engine-damaged subs; holes must be cut in the enemy's hull to enter at different places. Many ships simply sink obstinate submarines rather than board them.

Underwater Weapons Combat

Submarines or surface vessels firing at underwater targets can use torpedoes, depth bombs, blue-green lasers that are designed to operate underwater, and possibly sonic weapons.[95]

Torpedo. A self-propelled undersea missile, a torpedo is approximately four meters long. Most torpedoes carry 150 grams of TD-19 that explode on impact (15d10 points of damage).

There are three different types of guidance systems on torpedoes.

- Straight running torpedoes are the simplest, and are aimed and follow their courses for 2 kilometers, when their fuel runs out.
- Acoustic torpedoes guide themselves after being fired from the sub, homing in on engine sounds from the target until they hit or run out of fuel after 2 kilometers.
- The most deadly type is the wire-guided torpedo, which can be guided from the launching sub using a computer with a radio antenna. Its range is also 2 kilometers.

Combat involving torpedoes is intense and deadly. One lucky shot may disable a ship. Deception and speed are invaluable. A minisub can carry up to four torpedoes, while a transport sub can carry up to eight. These tubes are usually divided, facing fore and aft.

Straight-running torpedoes use the guidelines for mounted weapons. There is no to-hit modifier for careful aim or for the water being soft cover.

Acoustic torpedoes follow the same guidelines with a +10 modifier to hit if the opponent is moving or if his engines are running.

[95] Gorman, Ben. "Balneum Blue," Star Frontiersman Magazine, issue 25, p. 8.

Wire-guided torpedoes are not subject to any modifiers. The only way to escape these terrors is to outrun them; they travel at 125 meters/turn for 16 turns, then detonate if they haven't hit their intended targets. Damage from a wire-guided torpedo is 2d10 + 15 points, applied to Table 7.

Explosives in submarine warfare are occasionally encountered. Some harbors contain mines at the depth that a sub would have to travel to enter the harbor undetected. At other times, spies may board ships and sabotage them. Underwater mines each carry 100-200 grams of TD-19 (doing 10-20 dice of damage).

Ship-vs-Submarine Combat

Submarines almost always have the advantage of surprise against surface ships. However, they have fairly low firepower when compared to other ships of the same size. Also, surface ships tend to be faster than subs, so escape may be difficult for a detected submarine.

A submarine must be fairly close to the surface to fire the torpedoes it carries. This means that if a sub is sighted before it fires; it can be fired upon with deck guns from the surface ships. When a torpedo strikes a surface ship, the damage is considered hull damage, and the attack gains an additional 2d10 points of damage on Hull Damage Table to represent the surprise factor.

Along with torpedoes, some subs have a recoilless rifle or heavy laser mounted on deck. This mount takes three turns to arm and may then be used as the surface combat rules dictate.

Depth Charges. Often, the only weapons the surface ships have available to fight submarines are depth charges. These are special charges of TD-19 set to go off at a certain depth or on contact. The base chance to hit a sub with a depth charge is 20%.

If the surface ship is using sonar (1,000 Cr/ km range), the chance improves to 45% as long as the sub has its engines on; if the sub shuts off its engines, the chance decreases to 35%. A sub hit by a depth charge takes 2d10 + 20 points of damage, applied to Table 7.

Ramming. Another mode of attack available to submarines is to ram ships from underneath. This is especially damaging, and the defender takes one and one half times normal damage while the sub takes normal damage. In this case, the sub rams under surface combat rules. The damage to the surface ship is applied to Hull Damage Table, while the damage to the sub is applied to Table 7.

Hull Damage Table

# Dice Damage + 2d10 Roll	Result
2-15	No effect
16	Current speed reduced by 20 kph
17	Current speed reduced by 30 kph
18	Acceleration reduced by 20 meters/turn
19	Deceleration reduced by 20 meters/turn
20	Top speed reduced by 20 kph
21-25	5% chance of sinking
26-30	10% chance of sinking; add 3 to next damage roll on this table
31-33	30% chance of sinking; add 9 to next damage roll on this table
34-36	50% chance of sinking; add 9 to next damage roll on tis table
37+	70% chance of sinking; add 12 to next damage roll on this table.
***All sinking results are cumulative per turn.**	

Escape from Sinking Ships

The methods of escape from vessels vary. Every seafaring vessel under UPF jurisdiction must carry a safe means of escape.

Size A ships generally carry life jackets, and size B ships carry either life jackets or life bubbles. Life bubbles are zip-open plastic spheres that can encase one passenger each, having enough air for two hours and a small snorkel for additional air if needed. They will take 5 points of damage before collapsing. Life bubbles cost 50 Cr.

Size C and D ships generally carry a life jacket for every passenger in addition to a number of lifeboats. Lifeboats are small boats that carry six people. These boats always have oars and a collapsible sail. More expensive versions may be motorized.

Submarines carry an equivalent of a lifeboat, called an escape capsule, which is essentially a lifeboat that is pressurized for the depth. The capsule rises to the surface where its canopy opens and is treated thereafter as a lifeboat. Capsules may also be motorized. Capsules cost 100 Cr more than comparable lifeboats.

Superstructure Damage Table	
Modified die roll	**Result**
2-15	No effect
16	Radio knocked out
17	Steering jammed right
18	Steering jammed left
19	Steering jammed straight
20-24	Decks awash
25-29	Engine flooded
30-33	Fire
34+	Capsized

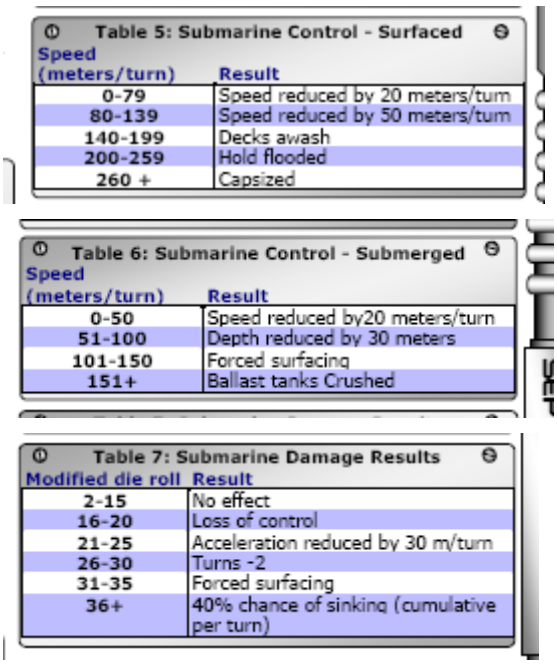


Table 5: Submarine Control - Surfaced

Speed (meters/turn)	Result
0-79	Speed reduced by 20 meters/turn
80-139	Speed reduced by 50 meters/turn
140-199	Decks awash
200-259	Hold flooded
260 +	Capsized

Table 6: Submarine Control - Submerged

Speed (meters/turn)	Result
0-50	Speed reduced by20 meters/turn
51-100	Depth reduced by 30 meters
101-150	Forced surfacing
151+	Ballast tanks Crushed

Table 7: Submarine Damage Results

Modified die roll	Result
2-15	No effect
16-20	Loss of control
21-25	Acceleration reduced by 30 m/turn
26-30	Turns -2
31-35	Forced surfacing
36+	40% chance of sinking (cumulative per turn)

Results of Tables 2-7

Ballast tanks crushed: The submarine sinks toward the ocean bottom.

Capsized: The boat rolls over and all aboard take 2d10 points of damage if outside the ship, or 3d10 points if inside (C and D hull sizes only). In addition, anyone inside a C- or D- size ship when it capsizes has a 25% chance of being trapped in an air pocket with 1d10 x 10 minutes worth of air. This amount is divided equally among characters if more than one person is trapped.

Decks awash: The bow of the ship suddenly dives into the waves, and its decks are flooded. There is a 50% chance that any character exposed outside will be washed overboard.

Engine flooded: The engine immediately ceases to function, and the vessel slows to a stop. It takes 1d10 turns for the ship to completely stop, after which the engine will not start for 3d10 minutes.

Fire: Flames burst from a referee determined part of the ship. Those within 10 of the blaze take one point of damage per minute. If less than 75% of the crew helps, the fire burns an additional 1d10 minutes. For every minute the fire burns, there is a 1% cumulative chance of an explosion. If the ship explodes, the blast radii per hull size are as follows: A 50 meters; B 100 meters; C 150 meters; D 250 meters. All people within the blast radius take 7d10 points of damage; no type of screen or suit affects this damage.

Forced surfacing: The sub must immediately surface. All aboard take 5d10 points of damage, and the sub cannot submerge again until repaired, or else it sinks.

Hold flooded: Water pours into the submarine through the hatches. Speed is reduced by 20 KPH for 3-30 minutes, until the pumps can empty the ship again.

Loss of control: The submarines speed is checked on Table 6 for the effects.

Radio knocked out: The antenna for radio communication has been downed. The antenna takes 1d10 hours to repair.

Depth reduced by 30 meters: The subs depth is decreased by 30 meters (i.e., the sub rises, possibly reaching the surface). All aboard take 3d10 points of damage.

Sinking: If a ship has a chance of sinking, the ship has taken water into its hold. The referee rolls 1d100, and if the roll is less than or equal to the designated percentage, the ship begins to sink. A ski cycle sinks in 5 minutes; a motorboat in 10; a yacht in 15; a transport in 20. During this time, deck guns can continue to fire until one minute before sinking.

If the ship doesn't sink, the appropriate modifier is applied to the next damage roll.

Speed reduced: The vessel immediately loses the indicated amount of speed unless it is over one-half of the vessels current speed. In the latter case, the ship loses half speed at most. Any result below zero meters/turn is a full stop.

Steering jammed: If jammed straight, the vessel cannot turn. If jammed right or left, the vessel must turn 45-degrees in the indicated direction after each 20 meters of travel. The ship can accelerate or decelerate, but it cannot change direction.

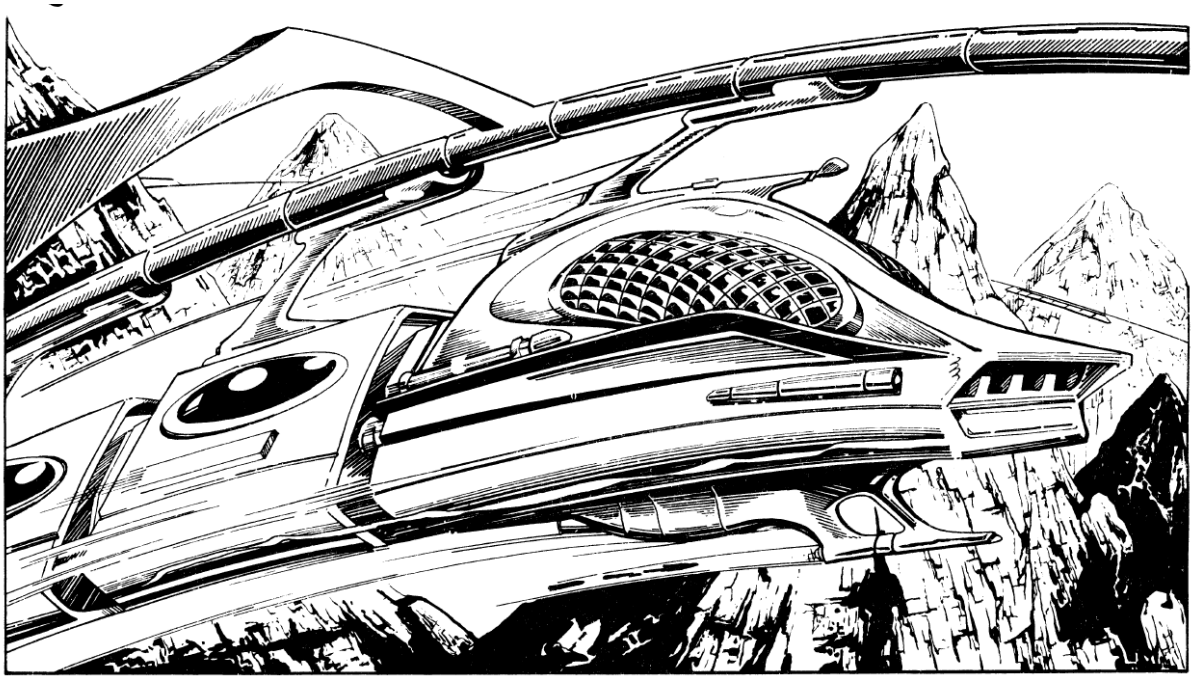
Turns - 2: The maximum number of 45-degree turns the submarine can make in one minute is reduced by two.

Other Vehicles

Many other means of transportation besides those described above are available in STAR FRONTIERS games. The systems and vehicles listed below will not be used in combat very often, but players may find ways to work them into their adventures.

Public Transportation

Monorails are the most common mass transit systems on Frontier worlds. Monorail cars can hold up to six



passengers and travel at 70 to 100 meters/turn.

Monorail passengers usually pay 1 CR per day for an unlimited number of rides. Occasionally, monorails are built underground and called subways.

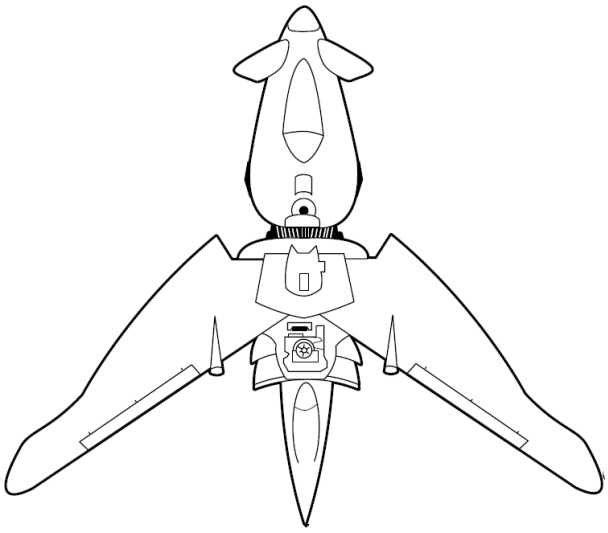
Cabs of many types are common. Ground cars, skimmers and even cycles are used as cabs. Some are operated by drivers while others are piloted by robots or computers. A typical price is 2 Cr for the first kilometer traveled and 1 Cr for each kilometer after that.

Moving Walkways, also called people-movers or sliders, are sidewalks that are built like conveyor belts.

A person simply steps onto the slider and it carries him, her or it along at 10 meters/turn. Using a slider does not cost anything.

Flyers

Super-Sonic Transports, or SSTs, are large jetpowered aircraft capable of flying at very high altitudes at several times the speed of sound (sound travels 1,988 meters/turn). They are used as luxury passenger planes flying between large cities, as large cargo haulers supplying cities under construction, etc.



Orbital shuttles, often called orbiters, are a cross between an airplane and a space ship. They are powerful enough to fly into orbit around a planet, and sturdy enough to re-enter the atmosphere and land on the surface. They are commonly used to carry supplies and passengers to orbiting space stations and spaceports. An orbiter can reach an orbiting space station in one to two hours.

Animals

Riding Animals and beasts of burden are used on many planets where the local technology is not advanced enough to build other vehicles. They also are used to get into areas that are too rough for ground vehicles, or where their natural abilities to sense water or danger are needed more than a vehicle's speed and reliability.

Bicycles

Character-powered land conveyances – i.e. bicycles, tandem-bikes, and even tricycles and quadricycles are available on many Frontier worlds…

Liking their stability, Vrusk prefer tricycles or even the quadricycles…

Kápolnás Gergely: Recumbent bicycle. Part of the exhibition of the winners of Moholy design prize (not in the collection) at the Museum of Applied Arts, Budapest. Labeled: NonCommercial — You may not use the material for commercial purposes.

Section XIII. Space Action[96]

When characters venture into space, they will need specialized equipment. This section incorporates the information found in the Knight Hawks rulebook and provides equipment that is uniquely suited for use in space.

Spacesuits

Standard Suit. A spacesuit insulates a character from the lifeless vacuum of space. A standard spacesuit includes a self-sealing, double walled shell of flexible plastic, enough oxygen for 20 hours, a clear, high-impact Plexiglas bubble helmet, a short-range (10 km) communicator, and an emergency patch to repair punctures.

Automatic Puncture Sealing. Spacesuits are made of a self- sealing material that will automatically close a puncture that is 1 centimeter or less in diameter. If the puncture is larger than 1 cm across, there is a 25% chance for each additional cm that the suit will be unable to plug the hole.

For example, there is a 50% chance a suit will not automatically seal a 3 cm hole. A suit can never automatically repair a hole that is 5 cm or more in diameter; such punctures require a patch. The roll to determine if a hole seals itself is made as soon as the suit is punctured. If it is successful, the hole is patched immediately. (See Combat in Spacesuits on page ___).

Emergency Patches. If the suit does not repair the puncture automatically, an emergency patch can be applied. An emergency patch is a 10 cm circle of adhesive spacesuit material. It can be applied in one turn. The character applying the patch must make a Dexterity check. If the hole is in the front or side of the suit, the referee may allow a +20 modifier on the Dexterity check. If the hole is in the back of the character's suit, the check must be made at -10.

If the check is successful, the patch is applied and bonds instantly. If the check is unsuccessful, air is still leaking around the patch. The character can attempt to reseal the patch, making another Dexterity check. If the second check is unsuccessful, the adhesive on the patch will no longer function and the character must find another means of patching the leak (or try another patch).

A character can apply a patch to someone else's suit, if necessary. Extra patches can be carried, as explained under Optional Spacesuit Equipment.

Effects of Leaks. If a leak is not repaired, the character will lose consciousness in a number of minutes equal to 10 minus the diameter in cm of the hole.

After losing consciousness, the character must make a stamina check every five turns (30 seconds). A character who fails this Stamina check dies immediately. The diameters of holes caused by various weapons are listed in the Close Combat section.

Defensive Suits and Screens. A character can wear a skein- or albedo suit under a spacesuit, and receive all of that suit's defensive benefits in combat. Only defensive screens that have been made to operate in space can be worn on a spacesuit (the cost of such a unit is +15% over a regular unit).[97]

Putting on Spacesuits. A character with a Dexterity of 45 can get into a spacesuit in five turns, if he really hurries. For every 5 points of Dexterity above 45, one turn can be subtracted from this time, although it always will take at least two turns to suit up. For every 5 points of Dexterity below 45, a character must add a turn to the amount of time required. Because of their many limbs, all Vrusk

[96] Tracy, William. “Going for a swim? Underwater action in Star Frontiers gaming,” Dragon Magazine, June 1986, pp. 88-91.

[97] This is a house rule. Knight Hawks does not allow characters to use defense screens when wearing a spacesuit. However, the powered armor rules, later published in Dragon Magazine, seem to contradict this prohibition.

characters must add two turns to the amount of time they need to get into a spacesuit.

Spacesuit Options

Armor. Spacesuit armor is a semi-rigid shell of metalized plastic which is worn over a spacesuit. Armor reduces a character's Dexterity and Reaction Speed by 10, and cuts that character's movement rate in half when he is walking, running, climbing, or moving under his own power in any other way. The speed of a character traveling through space with a rocket pack is not affected by armor.

Armor will protect a character to some degree from most weapons. The Spacesuit Protection Table displays the effect of armor on various weapons. When the suit has a percentage chance to protect the wearer, the character being hit must roll d100.

If the number rolled is less than or equal to the suit's protection percentage, the weapon does not penetrate the armor. If the roll is unsuccessful, the weapon has punctured the armor, but causes only half of its normal damage to the character.

Spacesuit Protection Table

Weapon Type	Protection	Weapon Type	Protection
Axe, knife, etc.	100%	Fragmentation Grenade	35%
Gas Grenades, bombs, etc.	100%	Gyrojet	35%
Needlers	100%	Recoilless Rifle	35%
Sonics*	100%	Rocket Launcher	35%
Flamethrower*	70%	Electric Sword	30%
Spear or sword	70%	Guided Missile	30%
Bullets	65%	Vibroknife	25%
Lasers	50%	Electrostunner	0%
Bolt, Maser Weapons	50%	Shock Gloves	0%
ECM Rifle/ED Warhead	45%	Stunstick	0%
Explosive Warhead	35%	Tangler Grenade	0%

*Sonics and flamethrowers and incendiary weapons cannot work in the vacuum of space. This rating assumes a character is in an environment, such as a space ship, where such a weapon can be used.

Optional: Once spacesuit armor has absorbed 300 points of damage it is no longer effective.[98]

Combining Armor. If a character is wearing a defensive suit inside an armored spacesuit, the defensive suit will reduce the amount of damage that the character suffers. For example, a character wearing a skeinsuit underneath an armored spacesuit will take only one-fourth of the normal dam age from a bullet or other ballistic or fragmentation weapon. Note, this will not protect a character from spacesuit punctures.

Armor Punctures. Spacesuit armor is designed to fit tightly over a suit, so any punctures in the armor will also puncture the suit. Emergency patches may be placed directly over the armor to repair these punctures.

Rocket Pack. A rocket pack is a device that allows a character in a spacesuit to travel through space. A rocket pack has 20 bursts of fuel. Each burst provides enough thrust to travel 50 meters per turn, until something causes the character to change course or speed. Only one burst can be used per turn. A character can accelerate by firing several bursts over several turns, adding 50 meters/turn to his speed with each burst.

[98] This is a house rule to conform to most other armors in the Star Frontiers game.

Once a character starts moving, an equal amount of power is needed to stop moving! A character could use all 20 bursts to accelerate to 1,000 meters/turn (about 380 miles per hour!), but he would keep traveling at that speed in a straight line until someone or something stopped him, since there is no fuel left in the pack to decelerate with.

A character using a rocket pack to move through space toward an object must make a Dexterity check to move directly toward that object. This check should be modified by the referee according to the distance traveled and the size of the target.

For the purpose of comparison, a 1 km trip to a spaceship of hull size 5 should be a standard check.

Shorter distances and larger targets should allow positive modifiers, while longer distances or smaller targets are more difficult to hit. Modifiers should not exceed plus or minus 20.

A character will quickly realize if he is on the wrong heading, and should be allowed to correct his trajectory. This requires another burst of fuel, and another Dexterity check must be made to make a proper adjustment. These adjustments may or may not increase the character's speed, at the discretion of the character using the rocket pack.

Even if the burst does not accelerate the character, it must be counted as one of the pack's bursts. A character can keep making direction adjustments as long as the rocket pack has fuel.

If the character gets himself aimed at the target and has enough fuel remaining to stop when he gets there, he can come to a gentle stop at the destination by using the appropriate number of bursts to decelerate.

If a character is aimed correctly at a target but does not have enough fuel in the pack to slow down, he will take 1d10 points of damage for each 50 meters/turn of his speed when he hits the object. In addition, the character must make a Dexterity check to stop at the object, or he will bounce off the intended target and travel at one-half of his previous speed in a direction determined by the referee. This Dexterity check has a -5 modifier for each 50 meters/turn that the character is traveling upon impact.

Space Skills: If using a Zebulon Guide-based skill system, a character can learn the Vehicle: Space skill that will enable him to operate any space vessel support vehicle such as a launch, workpod, or a cargo bay loader arm. It also familiarizes spacers with such EVA equipment as the rocket stake, EVA stick, magnetic grapple, external repair bay, clamp-on airlock (equipment based on the Traveller 2300AD game system), laser power torch and anchors. In addition, characters with this skill get a +10 modifier to all Reaction Speed checks when using a rocket pack and receive only half damage from colliding with objects

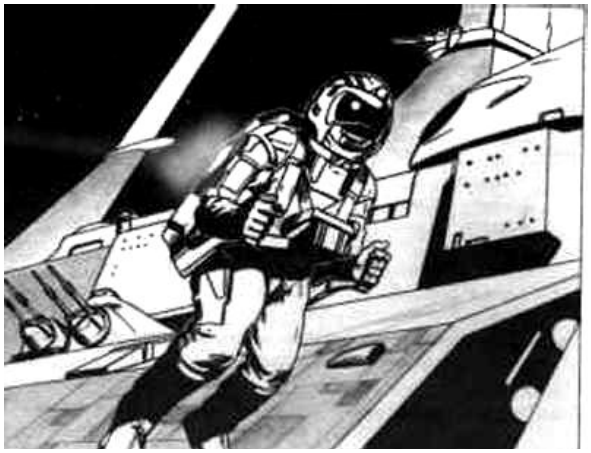
Magnetic Shoes. These heavy boots allow a character to walk across a metal surface, such as the hull of a spaceship or space station, in a weightless environment. The walking rate with magnetic shoes is one-half of the character's normal rate.

Magnetic shoes can be used without a spacesuit for walking in the zero-gravity sections inside ships and stations, where air pressure in the compartment makes a spacesuit unnecessary.

If a character with a rocket pack is in danger of bouncing off his destination because of excessive speed, magnetic shoes will give him a +20 modifier on his Dexterity check to see if he can hang on.

Velcro Boots. These boots allow a character to walk through carpeted sections of a spaceship while weightless. Since it is standard procedure to carpet all inhabited sections of a ship, Velcro boots are a very common accessory. The walking rate with Velcro boots is one-half of the character's normal rate.

Additional Life Support. This important optional package includes enough water, compressed food and oxygen to support a character for an additional 20 hours beyond a suit's normal capacity. Up to two packages of additional life support can be added to a suit, for a maximum time of 60 hours.



A character uses a rocket pack to scoot along the surface of a warship.

Anchors. Spacesuit anchors are self-adhesive disks attached to flexible, lightweight cables. An anchor will bond to any rock, metal, plastic, or even wooden structure that is reasonably free of grease and dust. An anchor comes with 100 meters of cable, but a character can carry up to 1,000 meters of cable if he purchases extra. An anchor is used to prevent the character from drifting off into space.

An anchor also comes with a special belt that the character wears on the outside of his suit. By pushing a button on the belt, the character can be reeled in at a comfortable 20 meters/turn.

Extra Patches. A packet of two of these potentially life-saving devices can be added to a suit. The packet is carried on the suit's sleeve. A character can carry up to two packets (four extra patches).

Space Vehicles

None of the normal air or land vehicles will work in the weightless vacuum of space, yet there will be times when a character needs something smaller than a shuttle for transportation and working in space. Launches and workpods are two types of small space vehicles are available.

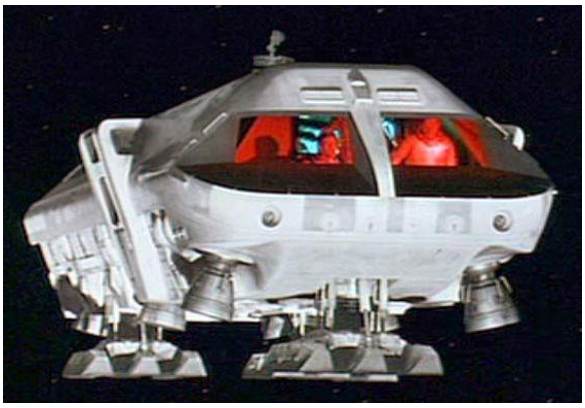
Launches

A launch is a small "space car" that is powered by a rocket engine. It is very short-ranged, and is used primarily to travel from one ship to another nearby ship or station.

Most launches can be purchased in two sizes: 4-passenger and 10-passenger. Both sizes have the same acceleration and handling characteristics.

A launch travels like a rocket pack, but a launch can carry 40 bursts of fuel. Characters inside a launch do not need to wear suits, as the cabins are fully pressurized and carry enough oxygen to support a full load of passengers for 10 hours.

Launches are unarmed, but characters can fire small arms from a launch if the canopy is open. Of course, characters in a launch with an open canopy will die unless they are wearing spacesuits! Refer to the Vehicle Damage Table if weapons are fired at a launch.



The Lunar Exploration Vehicle (LEV) from 2001 A Space Odyssey is a type of space launch used in a low gravity environment. It acts more like a space-based explorer.

All steering hits are treated as "No Effect."

Any hit that damages the speed of the launch disables its rockets, so the launch will keep traveling in a

straight line until repairs can be made or something stops its progress.

Spins, rolls and fires are treated normally, except that the launch will not come to a stop after the maneuver.

Most launches are not equipped with airlocks, so the only means of entering or leaving one is through the bubble canopy (some can be equipped with rear doors instead of canopies, so it can dock with an airlock).

In the launch dock of a ship or station, this bubble opens into the pressurized atmosphere of the ship. Once the launch is in space, however, a character cannot enter the launch without opening the bubble and exposing any passengers not in spacesuits to instant death.

If characters are hurriedly evacuating a ship, they can enter the launch at the rate of one character per turn (six seconds). The first character in can start the engines and begin releasing the docking restraints. The launch may take off five turns after the first character has entered it.

All Spacefleet ships of Assault Scout class or larger carry a small launch. Cruisers and larger ships will have several small launches and a large launch. Most space stations maintain a complement of launches of different sizes and types.

Workpods

A workpod is a sort of one-man, space-going toolbox that enables a character to make repairs or perform construction in space. The pod is a round object about 4 meters in diameter, with four mechanical arms attached to it. Six small jets give the pod an exceptionally delicate maneuvering capability.

A work pod from 2001 A Space Odyssey.

In addition to the four arms, a workpod can extend a welder, riveter, and net under the control of the operator. The welder and riveter are used for working on ship and station hulls, while the net, which is on a 100 meter tether, is used to retrieve objects adrift in space.

If the operator of a pod wishes to retrieve something with the net, the referee must determine whether the object is in range. If it is, the pod operator must roll one-half of his Dexterity or less (as if shooting a weapon) to capture the object. If the net misses, 10 turns must be spent reeling it back in before the operator can try again.

Note, see the reference about the Vehicle: Space skill, which a skilled character would use instead of Dexterity checks.

A pod carries enough oxygen to support its operator for 20 hours. It may use up to 25 bursts of fuel traveling to the work site and back to its launcher. Each burst propels the pod at 20 meters/turn. The tiny jets used to control the pod as it moves around while working are not charged against this fuel supply, since these delicate maneuvers use very little fuel.

A character can enter a pod in one turn when not wearing a spacesuit. A suited character needs two turns to get inside. Once the operator is inside, the pod can be activated and launched from the ship in four turns.

A workpod is standard equipment on all Spacefleet vessels. The chance other types of ships will be equipped with a pod is listed on the Workpod Frequency Table in the Knight Hawks game.

Space Tools

The tools included in the various toolkits from the STAR FRONTIERS Expanded Game rule book will all prove useful in spaceships. Some additional, specialized tools that are designed specifically for use in space are listed below.

Engineer's Toolkit

Engineers routinely carry a Techkit. In addition to the items in the techkit, however, the engineer will have three specialized tools.

Wellaser. Laser welders can repair punctures and tears in sheet metal.

Plastiseal. Package of compressed plastic which, when activated, expands to a 2 meter x 2 meter sheet of airtight plastic, used for sealing holes in ships. Several sheets of plasti-seal can be used together to patch a very large hole.

Inssuit. This insulated suit protects engineers while they are working on atomic engines. It is also worn by fighter pilots to protect them from the nearby atomic drive.

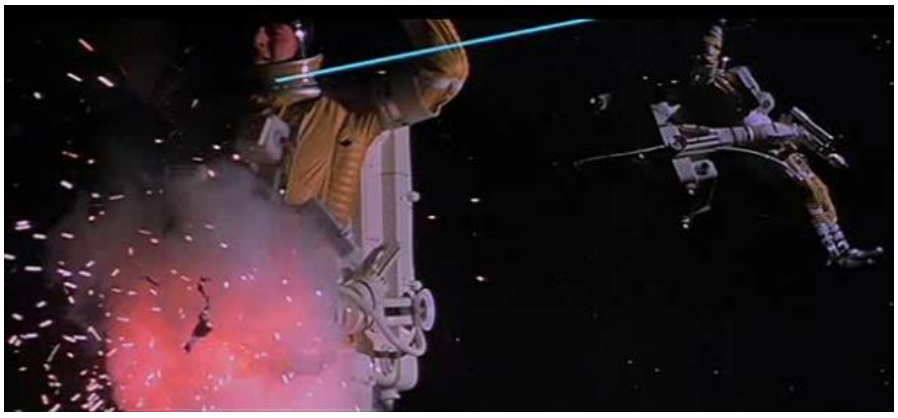
Laser Powertorch

The Laser Powertorch (LPT) is designed to cut holes through the heavy metal hatches and hulls of enemy ships so troops can board. An LPT will cut a slash 1-meter-long in a ship's hull in one turn; a hole 1-meter-square could be made in four turns.

An LPT is powered by a special power backpack that holds 300 SEU. This backpack is so heavy it can be used only in a weight less environment. The torch uses 30 SEU per turn. When not cutting metal, an LPT can be used as a laser rifle which causes 20d10 of damage with a successful hit. There is no variable power setting.

A character using an LPT as a weapon can use his Beam Weapon skill as a modifier. Because the LPT is not designed to be a weapon, however, the character can add only +5 per skill level to his chance to hit, instead of the normal +10.

An LPT is designed for coning a surface that is close to the tool, so it is not very effective as a long range weapon. The ranges for the LPT as a laser rifle are: Point Blank: 0-10, Short: 11-20, Medium: 21-40, Long: 41-60, Extreme: 61-100.



A character engaged in a space laser battle is hit and his suit begins to depressurize. Source: *Moonraker*, the James Bond movie.

Close Combat

See the Knight Hawks game for how to conduct space battles. This section only uses the information needed for characters to conduct close combat such as Boarding Actions, Combat in Spacesuits, Escaping from Destroyed Ships, Sabotaging Spaceships, and Self-Destruction of Spaceships.

Boarding Actions

Generally, the crew of an attacking ship does not want to completely destroy an enemy's ship. Instead, they will try to board the ship and accomplish some objective inside. Rescuing prisoners, stealing cargo or capturing the ship intact are a few reasons why boarding parties would be used.

Entering an Enemy Ship. Getting inside a defended enemy ship is the most difficult part of a boarding action. The attackers must decide what section of the enemy ship will be boarded, and how the attempt will be made.

Boarders must wear spacesuits or be inside some type of vehicle or machine when they cross the 10 or 20 meters separating the two ships. Once they reach the enemy ship, there are two ways boarders can get inside: open the hatches or cut holes in the hull.

Opening Hatches. Hatches on a hostile ship must be opened by force. Each hatch has 200 + d100 structural points. The hatch can be attacked with Kaboomite or hand weapons.

When damage equal to the hatch's structural points has been caused, the hatch is shattered and an opening big enough to step through is made. If the hatch separating the airlock from the rest of the ship also is secured, it must be destroyed the same way.

A man is being sucked into the vacuum of space as the deck of a moon base undergoes explosive decompression. He has failed his Dexerity check to grab ahold of something solid. Source: Space: 1999, season 1, episode 4, "War Games."

Explosive Decompression. If both of the airlock's hatches are destroyed, the deck connected to that hatch will depressurize. Anything on that deck that is not fastened down, including characters, will be swept into space with the rushing air. Characters using Velcro or magnetic shoes, and characters who are strapped down, are safe.

Other characters must make a Dexterity check; those who pass manage to grab something solid.(Note: a character with the Survival Zero-G skill should receive a +10% bonus per level to his ability checks.)

Those who fail are swept toward the airlock. A character can make another Dexterity check at the airlock. A successful check means the character catches himself at the hatch and, although he will be a tempting target for boarding enemies, he is not swept into space.

If the character fails the second check, he is carried into space and will die in one turn unless wearing a spacesuit. A character swept into space will drift directly away from the ship at the rate of 20 meters per turn (six seconds).

Air will continue rushing out through the shattered airlock for a number of turns equal to the ship's hull size. For example, one deck of a destroyer (hull size 6) will depressurize in six turns (36 seconds). At the end of that time, the deck will be a vacuum.

Any compartments behind closed hatches or pressure doors will hold their air as long as the hatch or door stays closed. Elevator shafts and ladders between decks have automatic seals that will prevent a leak on one deck from depressurizing other decks. Regular doors, however, are not airtight.

Exposure to Vacuum. Any character directly exposed to vacuum will die in one turn. Characters on a deck that is depressurizing will die one turn after the deck is fully decompressed, unless they can get through a pressure door or hatch that has air beyond it. Opening the door will take two turns.

On the third turn, the character can move through the door and close it behind him if he passes a Dexterity check. Note, characters with the Survival Zero-G skill receive a +10% bonus for his ability checks. The character can make one Dexterity check per turn, but must get through the door before the chamber beyond depressurizes.

Entering the Ship. Boarders cannot get through a hole that is depressurizing a ship. Any shots fired from outside the ship at characters inside have a -20% penalty. Characters wearing spacesuits who are anchored inside the ship can fire at targets outside the ship with no penalty.

Once the deck is depressurized, the normal rules for weightless movement and combat apply. The spacesuits on the deck being attacked.

Opening Holes in a Hull

Rather than enter through an airlock, boarders can make their own entrances with explosives or laser power torches. If explosives are used, consider a ship's hull to have 200 + 2d100 structural points.

The referee should describe the ship's hull in detail to the boarders, so they can decide where to enter. The referee is the final judge of where the attackers' holes actually break into the ship. If the ship has skin sensors or outside cameras, the crew will know where the attack is coming from and can prepare to defend the ship.

Precautionary Decompression

Most starships require all passengers to don spacesuits before a fight, and then depressurize the interior of the ship. This prevents violent decompression due to battle damage or boarding attempts.

Combat in Spacesuits

Combat in the cold vacuum of space is a risky business. The injuries caused by weapons are of secondary importance when compared to the threat of depressurization caused by bullet and laser holes in a character's spacesuit!

Puncture Diameter Chart: Examples of Common Weapons

Weapon	Diameter of puncture (cm)	Auto-seal	Weapon	Diameter of puncture (cm)	Auto-seal
Electrostunner	0	--	Gyrojet Rifle	3	50%
Pistol Bullet	1	100%	Heavy Laser	3	50%
Needler Weapon	1	100%	Laser powertorch	3	50%
Frag. Grenade	2 (=d10 holes)	75%	Knife	1d5	Varies
Gyrojet Pistol	2	75%	Sword	1d5+2	Varies
Laser Pistol/Rifle	2	75%	Spear	1d10	Varies
Bolt/Maser	2	75%	Vibroknife	1d10	Varies
Machine Gun Bullet	2	75%	Electric Sword	1d10+2	Varies
Rifle Bullet	2	75%			

The description of spacesuits explains the procedure for patching suits. The Puncture Diameter Chart is a

list of weapons and the diameter of the holes caused by them.

Note that sonic weapons will not work in a vacuum. Bullets can be fired in space if the firing chamber of the gun is equipped with an oxygen supply, which is standard equipment on most modern automatic rifles and pistols.

Melee weapons can cause punctures of different sizes. The exact size is determined by rolling 1d5 or 1d10, and sometimes adding a modifier. These variables reflect the fact that melee weapons can be used to slash or stab.

If a character is hit by a burst from an automatic weapon, the suit will be punctured in several places. To determine how many punctures are made, the 10 bullets in the burst should be divided by the number of characters struck by the burst, with any remaining bullets ignored.

For example, if three characters are hit by a burst, each will have three holes in his suit, and the tenth bullet is lost. If one character is struck by the burst, he must find a way to repair 10 holes in a hurry!

Weapon Ranges in Zero Gravity

In space, there is no atmosphere to slow down bullets or diffuse a laser beam, and no gravity to pull projectiles away from their targets. To account for this boosted efficiency, the ranges of all ranged, hand-held weapons can be doubled when the weapons are used in space.

See the chart below for an example of the normal and doubled ranges for an automatic pistol are:

Example of Doubled Range for an Automatic Pistol					
Range	PB	Short	Medium	Long	Extreme
Normal	0-5	6-15	16-30	31-60	61-150
Doubled	0-10	11-30	31-60	61-120	121-300

Damage

Besides putting a hole in the spacesuit a weapon does its normal damage to the character inside the suit. A spacesuit does not reduce the amount of damage taken, although armor may.

Spacesuit Armor. Spacesuit armor protects its wearer from damage, but if a weapon penetrates the armor, it makes a hole in the armor the same size as the hole in the spacesuit.

Effects of Wounds. Characters who have taken damage equal to or greater than one-half of their Stamina have a -10% modifier on their Dexterity checks when trying to patch punctures in their spacesuits.

Sabotaging Spaceships

Occasionally, it might be possible for a character or group of characters to sneak aboard a spaceship and damage it from inside. Getting inside is the first obstacle. Once inside, technicians, demolitions experts and computer experts all can damage the ship in various ways.

Gaining Access to Enemy Ships. Spaceship hatches are routinely protected by locks. The levels of these locks vary with the type of ship; this information is displayed on the Spaceship Security Table.

The lock can be destroyed (see Boarding Actions) or a technician can use his Opening Locks subskill.

If a ship's computer has an Installation Security program, other security devices at the hatch must also be detected and deactivated. Otherwise, alarms will be set off in the ship's control panel.

Characters must decide what types and levels of locks they install on their own ships. The Spaceship

Security Table lists the levels of locks and the types and levels of other security devices likely to be found on various types of NPC's ships.

Spaceship Security Chart

Ship Type	Lock Level	Security System and Level
Spacefleet (1-14)	5	Heat Sensitive (5)
Spacefleet (15-20)	6	Heat Sensitive (5)
Militia	4	Sound Sensitive (3)
Pirate	5	Video (4)
Spaceliner (6-12)	3	Sound Sensitive (3)
Spaceliner (13-15)	5	Video (4)
Freighter	4	Sound Sensitive (3)
Shuttle	2	Mechanical (1)
Research Ships	2	Pressure Sensitive (2)
Agriculture Ships	1	Mechanical (1)
Mining (8-12)	5	Video (4)
Mining (13-20)	6	Heat Sensitive (5)
Exploration	3	Sound Sensitive (3)

The numbers in parentheses following a ship type are a range of hull sizes that use that level of security device. Larger ships typically have more advanced security systems, and smaller ships have simpler security systems.

Once characters have gotten aboard, they must deal with any other security systems they run into, as well as any guards or crew members that might resent the intrusion. These obstacles are left to the referee's discretion.

Types of Sabotage. A computer expert can do all sorts of nasty things to a space ship's computer programs. A demolitions expert can place explosive charges at key points to destroy sensitive equipment, while a technician can use his or her knowledge of machinery to disrupt various electrical and mechanical systems aboard a ship.

Other Spaceship Rules

For more information about sabotage plus rules about escaping from destroyed ships, castaway survival chances, self-destructing vessels, etc. please refer to the Knight Hawks game.

An escape capsule rests on the shore of a strange planet.

Section XIV. Area Effect Weapons

Zebulon's Guide to the Frontier added information about weapons that inflict damage over a wide area. Larger explosives have an immediate and a secondary blast area. Area effect weapons include:

- All grenades (previously covered under Grenades and Thrown Weapons)
- Explosives, including artillery and recoilless rifle shells, TD-19 and TD-20 packs, specialized gyrojet ammunition
- Grenade rifles and mortars
- Mines
- Bombs
- Missiles, rockets

Combat Modifiers

The interpretation of "slow" and "quick" is different for missile combat. When firing a missile at a target, the referee should consider not only how fast the target is moving, but how far away it is.

Example: A jetcopter flying at full speed within 50 meters of an attack is moving quickly. Flying at the same speed hundreds or meters away it may be considered to be moving slowly. The referee must use his common sense.

The only time target size is considered for missile combat is if the target is relatively huge in comparison to the attacker. Then a +10 percent modifier may be granted to the attacker. Generally, though, area effect damage negates the consideration of size.

Remember, rocket launchers, recoilless rifles, missiles and artillery are considered heavy weapons and the -10 percent to-hit modifier applies to the attacker firing them. Units engaged in indirect fire, such as artillery, receive an additional -10 percent penalty.

Automatic Hits and Misses

An automatic miss means that any detonation is too far away to do any damage to the target or anything else of importance. Otherwise, the attacker must roll 1d10 and consult the **Ranged/Dropped Weapon Miss Chart** on page ___ . (This is based on the classic Alpha Dawn Grenade Bounce Chart.)

For more information about **Automatic Hits** and **Automatic Misses**, see Section IX. General Combat Rules, page ___.

Rates of Fire

Each weapon has its own rate of fire, check the Weapons Charts and equipment descriptions.

Note that the type I missile's rate of fire is listed as variable. This applies to MLTCs (Multiple Launch Tube Clusters) that commonly fire type I missiles and can be automated to launch more than one at a time.

Normally a hand-held type, the micromissile has a rate of one launch per turn. Type I missiles require one turn to launch. Type II missiles usually require two turns to launch and type III's take three turns to launch.

Advanced military robotic loaders may speed up the reloading process, at the referee's discretion, but such equipment should not be readily available to players unless they are serving in the armed forces.

Immediate and Secondary Blast Areas

When high explosives detonate, the blast radius on the Weapons Table is the immediate blast area.

Every character, robot, vehicle, structure or other item within that area will take damage.

Roll individually and then determine what effect armor, defensive shields and other cover may alter the result.

If the blast occurs in the open – and it is the result of TD-19 packs, type I through III missiles or artillery rounds – there is a secondary blast area. Refer to the explosives' description for its secondary blast radius but for rockets, missiles, bombs and artillery shells, the secondary blast radius is equal to 1.5 times the radius of the immediate blast area.

For example, if the immediate blast area has a radius of 15 meters, the secondary blast radius extends out another 7.5 meters. Anyone (including robots) from 15 to 22.5 meters from the detonation site must pass a Reaction Speed check. Characters who fail the check must roll on the Secondary Blast Radius: Effects Resolution Table.

Secondary Blast Radius: Effects Resolution Table
► For Explosives ◄

01-05	Roll for damage, but divide the result by 4. The character is stunned for 1d10 turns	**51-60**	No Effect
06-10	Roll for damage, but divide the result by 10. The character is stunned for 1d10 turns	**61-70**	Stunned for 1 turn
11-25	Stunned for 1 turn	**71-80**	Stunned for 1d10 turns
26-30	No Effect	**81-90**	No Effect
31-35	Stunned for 1 turn	**91-95**	Roll for damage, but divide the result by 10. The character is stunned for 1d10 turns
36-50	Stunned for 1d10 turns	**96-00**	Roll for damage, but divide the result by 4. The character is stunned for 1d10

Types of Warheads

Like grenades, the warheads for area effect ordinance come in a variety of styles. Missiles can mount sensor, antimissile, electrical, field crusher, standard explosive and high explosive. The foam warheads include acid, chemical defoliant, dye, extinguish, irritant, slick, solid, and rad-blast. Gas warheads include doze, dusk, nightfall, poison, and smoke. While rounding out the selection are incendiary, sonic stunner, and tangler warheads.

Although they act similar to their smaller grenade counterparts, because of the larger size of missiles, bombs, large mines, and artillery shells, they also have a secondary blast area. Typically the effects of these weapons are reduced by half or are greatly diminished.

Sensor Warhead. This non-damaging warhead can only mounted on type II or III missiles (mines, artillery shells, and bombs can use sensory fuses, but they are much smaller and more limited).

A sensory warhead uses, radar, infrared, ultraviolet, radiation, and shape detectors so a missile can lock on to its target, providing a +30 percent modifier to hit. However, the sensor can only identify objects within a 45-degree cone in front of the missile.[99]

[99] This description differs a bit from Zebulon's Guide, which had characters pick from a number of "scanning"

Antimissile Warhead. This specialized munition is normally mounted on Type II or III missiles. Its purpose is to destroy an incoming missile before it hits its target.[100] It does this by exploding near the incoming missile (or flight of missiles and rockets) and releasing shrapnel and hundreds of metallic coated fibers that cover a large area and provide many false returns. Thus it acts similar to a chaff pod (See Countermeasures).

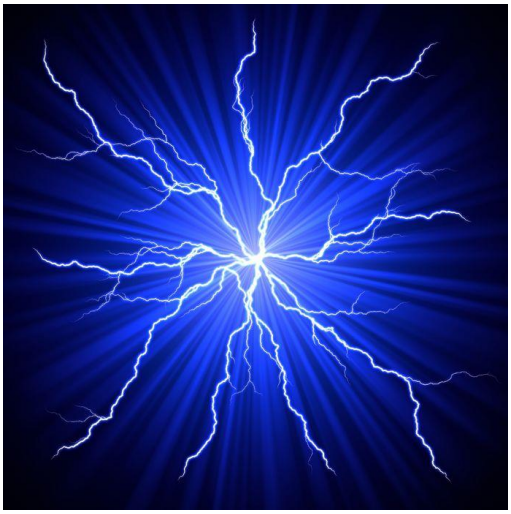
To be successfully used, it must be paired with a sensor warhead.

An antimissile warhead can destroy/distract not just one incoming missile, but a whole flight of rockets that were fired from one enemy during the same turn. However, the player firing the antimissile would need to roll to hit each missile.

Type III missiles can carry two antimissile warheads, but this helps increase the chances of knocking out one attacker's missiles. The second warhead cannot be used to target another missile (or flight of missiles) coming from a second or third attacker.

In desperation, a character can fire an antimissile at another target. It will explode and has a blast radius, but it is generally not as effective as it is against missiles and rockets, hence the decreased damage rate.

Electrical Discharge: Releasing a high charge of electrical energy when it strikes, the electrical discharge warhead short-circuits every device in the blast radius including computers, chronocoms, and other normal electronics. It can stop an unshielded vehicle, warbot, etc. dead in its tracks, requiring extensive repairs.



A electrostatic discharge. Source: http://blog.1stcompucare.com/2013/01/25/electro-static-discharge

The ED warhead acts as an electrostunner set to damage for every bioform in the primary blast area.

If the target is specially insulated, the damage is negated. This insulation is not a power screen, but rather an extensive hardening of a device's/robot's/robot's internal circuitry that is much more comprehensive than installing an anti-shock shock implant.

Bioforms equipped with an anti-shock implant or protected by a gauss screen are 100 percent shielded from the ED warhead's effects, but the same is not true for their other electronic devices.

If EMP shielding is included as part of the robot's (or vehicle's, computer's or device's) initial construction, the cost is an additional 50 percent of its body style while weight only increases 10 percent. If this shielding is installed later, the modification is an added 90 percent of the robot's body style cost while weight increases 20 percent.

Effects: an anti-shock implant is only 10 percent effective against an ED or EMP weapon. A gauss screen is only 20 percent effective. EMP shielding is about 70 percent effective. It can be combined with an anti-shock implant and/or gauss screen to theoretically provide 100 percent shielding (an automatic hit by an EMP weapon will overcome any protection).

While most unshielded robots, vehicles, computers, and devices will need extensive repairs if they suffer an EMP attack, those that have EMP shielding have a cumulative 5 percent chance per turn of "rebooting" and being able to resume operations.[101]

Within the secondary blast radius, the ED warhead will "stun" an unshielded robot, vehicle and other

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warheads such as radar, infrared, etc. The cost is also a bit less.

[100] Zebulon's Guide, remastered, p. 67-68.

[101] Cabadas, Joseph. "Robot's Rules of Order Revised," Frontier Explorer Magazine, Issue 17, Summer 2016, p. 12. Zebulon's Guide provided little in the way of practical applications for an electronic discharge warhead, so these are fan-created rules.

electronic systems for 1d10 turns/warhead size; bioforms need to conduct a Stamina check with a + 20 percent modifier or likewise will be stunned for 1d10 turns. For example, a robot within the secondary blast radius of an ED warhead will be stunned for 3d10 turns.

Any bioform, robot, vehicle, computer, or device shielded by a gauss screen or A-S implant will be fully protected from an ED warhead if they are within the secondary blast area.

Standard Explosive and High Explosive Warheads. Standard explosive warheads will cause normal damage to people, structures, robots, vehicles, and other objects within their primary and secondary blast radii. High explosive warheads are more designed to inflict maximum damage to "soft targets" – i.e. people, animals, light structure buildings. But, when used against armored robots, vehicles, buildings, spaceships, etc. the amount of damage they inflict is similar to a standard explosive bomb.

Field Crusher. This warhead only damages force fields and other energy screens such as inertia, albedo, gauss, light shift, simp, sonic, shimmer, etc. Refer to the Weapons Charts for the amount of damage it will cause within the immediate blast area to these types of fields. It will also cause holographic screens to collapse, draining an equivalent amount of energy from their power sources as it would by damaging other screens. Field crushers only inflict half-damage on protective screens in the secondary blast area. Otherwise, these munitions have no other effect on bioforms or electronics.

Foam. This warhead behaves as a foam grenade of the same type. Within the secondary blast radius, cut its effects in half. For example, if a chemical defoliant bomb is used, not all vegetable matter within the secondary blast radius will be hit (a 50% chance of not being hit); an extinguish foam will only put flames out half the time in the secondary blast radius; etc.

Note, because warheads are much larger than grenades, they will affect larger creatures easier. For instance, a large animal might be able to break free from the effects of a solid grenade, but it will be caught by a small solid bomb going off.

Gas. This warhead behaves exactly like a gas grenade of the same type, however, it is much more persistent. Assume that the resulting gas cloud – barring a fierce wind – will last for 1 turn times the weight of the warhead. Thus, the doze gas cloud from a small bomb weighing 15 kilograms will last for 15 turns.

A breeze will also cause such a cloud to drift from its original location, following the direction of the wind, and any gases will sink into lower lying areas. So, if a character is taking cover in a ditch, the gas cloud from a poison bomb may drift to where he is at.

Since the size of warheads, bombs, and artillery shells are much larger than grenades, the gas will affect larger creatures as if multiple grenades had been successfully thrown at it.

In the secondary blast radius, characters receive an initial +30 percent bonus to avoid the effects of the gas warhead. If characters do not escape a gas cloud or do not have any kind of gas mask, they will need to keep rolling each turn they remain in the area of effect to avoid falling victim to its effects.

Incendiary. This warhead causes fire damage, with the flames continuing to burn long after the initial explosion, which causes more damage. Keep in mind, if an incendiary warhead is used in a highly combustible location, such as a building, forest, etc., it will probably start a raging fire that will spread and grow even after the effects of the incendiary device have passed.

In the secondary blast radius, characters can make a Reaction Speed check to avoid damage. Otherwise, they receive half-damage from the incendiary warhead.

Sonic Stunner. Zebulon's Guide only offered the sonic stunner warhead. Anyone failing a Stamina check within the immediate blast area will be stunned for 1d100 turns. In the secondary blast radius, a character receives a +30 percent bonus to avoid falling victim to the stunning effect, which would only last 1-50 turns.

Tangler. These warheads throw out hundreds of strong, sticky polymer threads. These threads stick to everything within the blast radius. Characters can try to avoid this effect with an Reaction Speed check. An entangled individual cannot move until the threads decay (in 30 minutes) or until solvaway is spread over the threads. Any creature with more than 100 stamina points can break out of tangler threads in one

turn.

Note, because warheads cast far more tangler threads than a grenade, even if a character avoids being entrapped in the polymer threads, they may be trapped in the “safe” area that they sought shelter until the threads decay.

Characters, robots and creatures within the secondary blast radius also need to make a RS check to avoid entrapment, otherwise they are snared for 15 minutes. Any creature with more than 50 stamina points can break out of the threads in one turn.[102]

Explosives[103]

Three basic types of plastic explosives are available for purchase on the Frontier including Tornadium TD-19 (also called “kaboomite”), Tornadium TD-20, and Plastid (an illegal substance that is sold on the black market). The referee is free to create statistics for other types of explosives if one wants TNT, gun powder or nitroglycerin but what follows should provide some basic rules.

Characters can throw up to 500 grams of kaboomite as though it was a grenade. Anyone inside the 1 meter blast radius takes full damage (5d10 points). Anyone within twice the radius of the blast – the secondary blast radius – must pass a Reaction Speed check or be stunned for one turn.

Fifty grams of Tornadium D-19 ("kaboomite") causes 5d10 points of damage to anyone or anything within 1 meter of the explosion. Each additional 50 grams causes an additional 25 points of damage. The immediate blast area increases by 1 meter for every 100 grams used.

Up to 250 grams of TD-19 can be thrown like a grenade, and causes full damage to living creatures but only half damage to structures.

Tornadium D-20 is a modified version of TD-19 and is used in the construction of shaped charges. TD-20's maximum damage is 3d10 points for a 50-gram charge, and an additional 15 points maximum damage for every 50 grams additional weight to any living creatures within its blast radius, but it will do twice this damage to structures.

TD-20 is sold in set shapes and weights and a character cannot reshape it. Once the thin plastic disc is peeled away from the base, the sticky base can be attached to almost anything. Since it is a shaped charge and explodes in only one direction, TD-20 allows the user can remain one meter away from the explosion and suffer no damage whatsoever.

A demolition expert sets an explosive charge. Source: https://commons.wikimedia.org/wiki/File:Eod2.jpg. Labled for reuse.

A cone of TD-20 is perfect to attach to walls, floors, doors, etc. and blow an entry into another room.

If anyone is foolish enough to try to throw a charge of TD-20 as a weapon, use the Area Effect Weapon Miss Diagram to determine the direction of the blast. A thrown TD-20 charge inflicts only half its normal damage to bioforms and structures. The blast range is identical to that of TD-19. TD-19 and TD-20 use the same detonation devices.

Plastid is a stabilized plastic acid is illegal on most planets. It usually comes in a plastic or ceramic alloy wrap and is shaped like thick spaghetti. One hundred grams of plastid applied to a lock and ignited will

[102] Note, these descriptions are a combination of the Zebulon rules and house rules. As I revise these rules, I may enhance the effect of tangler bombs and other ordinance so they are more powerful than the grenade versions.
[103] The following section combines the Alpha Dawn rules on using TD-19 with Zebulon’s Guide. The Alpha Dawn rules take precedence.

melt the lock in one turn (five turns for heavy duty locks)..

Affecting only plastics and metals, Plastid must be applied directly to the material it is to melt; ***it cannot be thrown***. Special detonators that use acidic chemical reactions are required to activate a plastid charge. Plastics or metals that have been laminated with glass or ceramics are not affected by plastid.

Determinations of quantities needed for large-scale melting are left to the discretion of the referee.

More information on explosives is given in the Skills section and Equipment section. See the section on Area Effect Weapons for a further explanation about secondary blast radius.[104]

Grenade Rifles and Mortars

Grenade rifles and mortars are ranged weapons that use special grenades as a warhead. They only have an immediate blast area. They can be set to explode in one of two ways – either on contact or with its built-in timer. A character must declare at the beginning of the turn which method he is using.

If the grenade was set to explode on contact, it detonates 1 to 10 meters away from the target in the direction indicated by the Grenade Bounce Chart. The actual distance depends on the situation and how far the grenade bullet/mortar round was fired.

The referee must discretion and should check for any damage caused to anyone or anything in the blast area.

If the grenade is on a timer then it could bounce quite a distance. The direction is determined by the Grenade Bounce Chart. The diagram could be anything up to one-half the distance from the shooter to the target.

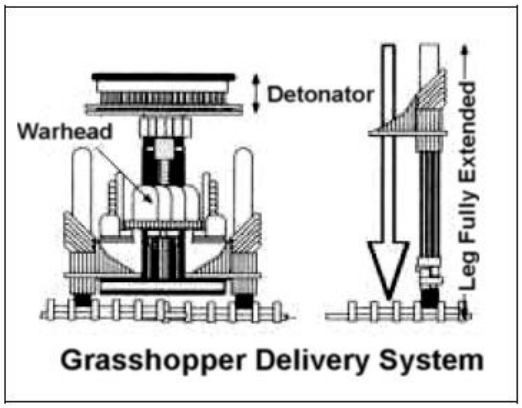
Again, the referee should check for damage caused to characters or objects other than the target in the blast area.

Mines

Land-mines come in several different sizes and types. They are defensive weapons, often used to help protect a position or campsite, used to funnel an enemy into a particular area, and are effective in difficult terrain where an attacker cannot simply bypass a minefield. Mines have also been used in guerilla warfare to target civilians.[105]

Some of the types of mines that characters might be able to purchase or encounter include: EMP Field Mine, Grasshopper Mine, Leap Frog Mine, and the small land mine that would contain a grenade. Larger mines are designed to be equipped with type I, II or III missile type warheads.

Characters could also employ improvised explosive devices (IEDs) using explosives, bombs or warheads without using an official mine kit.



The Grasshopper Mine jumps up to three meters in the air before its warhead explodes. It is useful against low-flying or hovering vehicles. Illustration from Zebulon's Guide.

Land-mines do not have secondary blast areas. They use motion, pressure, proximity, time delay, voice or photon or other activation sensors.

Detecting Mines. When entering an area with mines, characters without mine detection equipment should make an Intuition check to notice the device(s). Characters with a demolitions skill and technical

[104] Zebulon's Guide, remastered, p. 10.

[105] See the discussion "Stepping on Land Mines," http://www.starfrontiers.us/node/5509.

skills, such as detecting alarms and defenses, should make a skill check. Since mines are normally concealed, those relying strictly on an Intuition check might receive a -10 to -30 percent penalty to notice and avoid a mine.

Other equipment, everything from ground penetrating radar sensors to trained bomb-sniffing animals can be used to varying degrees of success to detect land-mines.

Disarming/Clearing Minefields. A character with a Demolitions skill can attempt to disarm a land-mine, though the best way is to avoid them or use various remote-controlled devices to cause the mine to "harmlessly" explode.

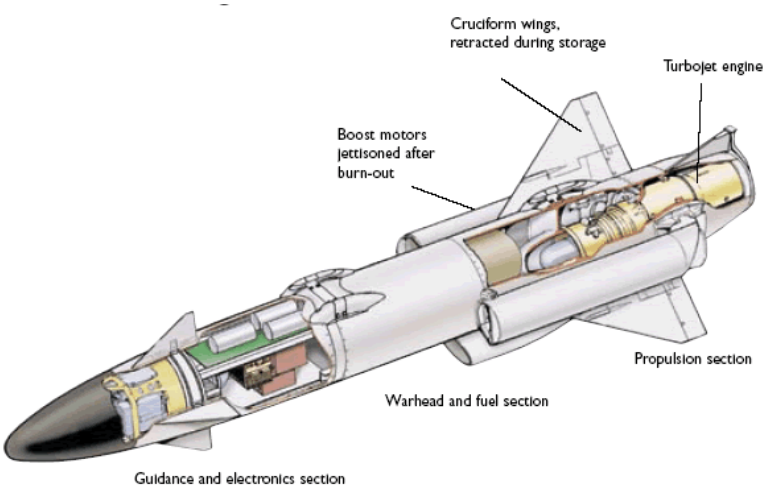
Grasshopper Mines. These weapons will fling themselves up to three meters straight up in the air before detonating, which can help them attack low flying or hovering targets. If it hits an obstacle on its way up, it will be deflected two meters in a random direction before detonating. Use the Area Effect Weapon Miss Diagram for random direction.

Leapfrog Mines. This mine is made to jump toward its target. Use the Grenade Bounce Chart to determine where it lands. The trigger system is usually a scanner, as it must know which direction to leap toward the target. (See the equipment section of the Zebulon's Guide to determine how scanners work.)

Missile Weapons

Rockets are a form of unguided missiles that were introduced with the Alpha Dawn rules. Larger, vehicle-mounted rockets were then added with the Dragon Magazine story "Tanks a Lot!" along with a guided missile.

The missiles of *Zebulon's Guide to the Frontier* come in four standard sizes including the micromissile, which is a portable weapon that inflicts kinetic energy along with the larger type I, II and III missiles that can carry a variety of warheads. Each missile size indicates its size and what kind of payloads they can carry.



A cutaway illustration of a missile. The forward part of the RBS15 Mk3 missile includes guidance and electronics section followed by warhead and fuel section. The rearward section consists of wings and turbojet engine. Source: Image @defenceindustrydaily.co

Micromissiles. These are 10-centimeter long rockets that can be launched using a detachable tail rod or by a "popper" multi-launch tube cluster. The most common method is to hold it by a detachable tail rod. The attacker presses the rod's ignition button to send it at its target. When fired this way, the character can only aim one every turn, but does not suffer from the -10 percent penalty for using a heavy weapon.

Type I Missiles. Although similar to unguided rockets, type I missiles have a longer range (5 kilometers). Modular, they can only carry one warhead at a time, but a variety of different warheads are available. (See Warheads, for more information.)

Type I missiles – also called the bantam size – are considered heavy weapons (-10 percent modifier to fire one). They can be fired from a man-portable missiler Type I launcher or from a multi-launch tube cluster (MLTC).

Type II Missiles. Twice the size of a Type I Bantam missile, Type IIs have a maximum range of 10 kilometers and carry up to two warheads. These warheads are larger and incompatible with those on a type I missile. They can be fired from a man-portable missiler Type II or from a MLTC

Vigilant. Type II Missiles equipped with only one warhead are known as the Vigilant. Though they are modular, they cannot mount two warheads without modifications. Such modifications would require a technician with the proper tools and parts and would take 1d5 hours, adding 15 percent to the cost of the missile.

Astra. Type II Missiles equipped with a Sensor and a warhead are known as the Astra. Also known as a "fire and forget" missile, the sensor is a specialized array of radar, infrared, ultraviolet and shape detectors allowing the missile to lock-on to its target and provide a +30 percent chance to hit. The Astra's second warhead bay is modular, capable of accepting a wide variety of type II warheads. (Se

Prahar. Type II Missiles without a sensor that are equipped with two warheads of the same or different type are known as the Prahar. Before reaching its target, the warheads can separate and hit the same or adjacent targets (with-in 20 meters). When firing at two different targets, apply a -20 percent modifier when rolling to hit the second opponent.

Type III Missiles. Also known as the Vympl, these missiles can be equipped with 1-3 warheads. Before reaching its target, missiles with 2-3 warheads can separate and hit the same or adjacent targets (with-in 20 meters). When firing at two or three targets, apply a -20 percent modifier when rolling to hit the second and third opponents. These missiles are generally fired from an MLTC.

Missile Launchers

The most common types of launchers for missiles are the man-portable Popper (for micromissiles), the Missilier (Type I and Type II missiles need separate launchers), from a multi-launch tube cluster (MLTC), or aircraft can have single missiles mounted on a rail. Note, Glijets cannot mount missiles.

Popper. This is a type of multi-launch tube cluster missiler that holds six micromissiles and can launch two per turn. A popper, however, weights 15 kilograms and is considered a heavy weapon. Thus a character using one receives a -10 percent modifier.

Missilier Type I and II. Type I and II missiles can be fired from a man-portable launchers known as a Missiler. These launcher are similar in cost and weight to a Rocket Launcher -- 5,000 Credits and weighing 15 kilograms. It is designed to fire either one type I or type II missile per turn.

Due to the size difference between a Type I and a Type II missile, a Missilier Type I cannot fire a Type II missile and vice versa. They are heavy weapons.

The weapon's range depends on the missile type. The launcher ignites the missile's propulsion unit with a small electrical charge (costing 1 SEU). The missilier can use normal powerclips, minipowerclips, or be connected to a powerpack or other power sources.

Multi-Launch Tube Cluster (MLTC). These are clusters of launch tubes for Type I, II or III missiles. These launch tubes can fire any number of missiles in one turn – from a single missile to the full cluster. They must be connected to a power source and a firing computer to work properly.

It takes 1 SEU per missile to ignite each missile's propulsion units. MLTCs can be mounted on vehicles, trailers, buildings, robots, or even some kind of ground mount. They are not considered "man portable" weapons, however.

Type I MLTCs come in six sizes: the I-2, I-4, I-6 and I-10 launchers. The number indicate the number of missiles they can carry. Type II MLTCs come in the II-3, II-6 and II-8 sizes while Type III MLTCs include the III-3 and III-6. MLTC's can be connected to a variety of power sources, ranging from banks of minpowerclips, powerclips to power backpacks, parabatteries, etc.

Rail Launcher. Basically this is the same cost and weight of a single MLTC. It requires a power source to ignite the missile's propulsion system and is considered a heavy weapon.

Mounting/Dismounting Warheads

Although not stated in the Zebs rules, assume it takes at least 1 minute (6 combat turns) to mount or dismount a warhead from a missile by hand under ideal conditions. Robotic systems could cut this time by half.

Thus, if a character wanted to swap out one warhead with another, it would take him a minimum of two minutes (12 turns).

A type III equipped with two antimissile warheads can knockout two incoming missiles that were fired from the same opponent without any penalty.

Dropped Weapons

Small and medium sized bombs were first introduced as a vehicle weapon in article "Tanks a Lot!" by Alex Curylo in issue 99 of *Dragon Magazine*. They were not covered in Zebulon's Guide, so what follows is based upon Curylo's story plus Matt Bandy's story "Here Comes the Cavalry!" from the April 1987 issue of *Dragon Magazine*. One should also consult the aerial combat rules for more information.

Bombs released from very low altitudes are typically set to explode one turn after being dropped, giving the bomber (such as a jetcopter or aircar) that amount of time to vacate the blast radius. Failure to vacate the blast area results in damage to the bomber.

To successfully use bombs, a character should have a new skill: Dropped Ordinance. This can be added to the traditional Alpha Dawn skill system or a Zebulon-Alpha Dawn style system, such as Star Frontiers 2000.

New Skill

Weapons: Dropped Ordinance
Type: Military PSA/Enforcer
Success Rate: ½ DEX or LOG + 10% per level
PR: None

Also known as a bombardier or "bomb aimer," characters with this skill are proficient at aiming dropped munitions – or even supplies – from an aerial craft by using bomb sights or advanced targeting systems. It does not help a character throwing grenades or other explosives from an aircraft but it can include dropping munitions/supplies from a low-orbiting space vehicle.

Bombardier Ranges

Skill Level	Point Blank	Short	Medium	Long	Extreme
1	10	30	60	120	121+
2	20	60	120	240	241+
3	30	90	180	360	361+
4	40	120	240	480	480+
5	50	150	300	600	601+
6	60	180	360	720	721+
7	70	210	420	840	841+
8	80	240	480	960	961+

For each level of this skill, the bombardier also increases his range brackets. For example, the point blank range for a level 1 bombardier is 10 meters, but it increases to 20 meters for a level 2 bombardier and progressively improves.

Falling Off Target

The distance by which the bomb misses its target is dependent upon the altitude of the bomber, as shown on Bomb Miss Chart.[106]

Bomb Miss Chart	
Altitude of bomber	**Miss distance**
Point Blank	20 m
Short	50 m
Medium	150 m
Long	250 m
Extreme	350 m

Ranged/Dropped Weapon Miss Chart

2,3	4	5	1	2,3	4	10	1	2,3
1	*	6	10	*	5	9	*	4
10	9	7,8	9	7,8	6	7,8	6	5

Direction of Firing/Drop
(* is intended target square)

Taking Cover from Bombs and Artillery

Characters caught in the open during an artillery or bomb attack are particularly vulnerable to injury or death. Going prone on the ground should be treated as having hard cover and it will cut the damage/effects of explosive, stun/sonic, and tangler attacks by 75 percent unless the attacker has rolled an automatic hit. Prone characters in the secondary blast radius receive no damage.

Going prone does not protect against gas attacks, but it will mitigate the effects of foam bombs, electrical discharge, field crusher and incendiary warheads. If caught within the immediate blast radius, treat a prone character as being in the secondary blast radius (unless the enemy has rolled an automatic hit). Prone characters in the secondary blast radius receive no damage.

Characters in unarmored vehicles are subject to damage from artillery, bomb and missile attacks. Those in armored vehicles, such as tanks, may have partial or even full protection from damage until any defenses are breached.

Energy screens can protect or reduce the damage done to characters, vehicles and structures.

Taking cover in trenches, underground bunkers, caves, etc. may completely protect characters from damage. But, if a character is in a low-lying shelter, they are potentially even more vulnerable to gas attack weapons.

The Wartech MGX-1 Assault Rifle fires standard bullet clips but uses a magnetically guided hurling chamber to accelerate the bullets to a higher velocity to pierce armor. From Star Frontiersman magazine, issue 4.

[106] Bandy, Matt Bandy. "Here Comes the Cavalry!"*Dragon Magazine,* April 1987, p. 73.

Artillery Rules

Star Frontiers never provided much in the ways of artillery rules (the only exception was the Sathar automatic cannon that was featured in the “Starspawn of Volturnus” module.

The “Tanks a Lot!” article offered cannons and a howitzer, it never tackled the concepts of indirect fire, time on target (coordinating the fire from many weapons so the rounds land at the same time), or even an abstract idea of how long it takes an artillery shell to travel from its firing location to a distant target. What follows are some suggested house rules providing an Artillery weapons skill, direct fire versus indirect fire, spotters, Time on Target, and counter battery rules.

New Skill: Artillery

Most characters will not be able to use artillery weapons without the specialized Weapons: Artillery skill. An artillerist can fire a weapon directly at a target if he can see it. If he is firing the weapon at a target he cannot see, the artillerist uses indirect fire and will usually need a forward observer of some sort – a character or robot – or will be relying on other remote sensor information or calculating a to-hit roll based upon a known distance. Otherwise, firing such a weapon blindly is almost guaranteed to miss.

Weapons: Artillery
Type: Military PSA/Enforcer
Success Rate: ½ LOG + 10% per level
PR: Alpha Dawn: None; Zebulon: Mathematics 2

A military specialist with this skill is capable of firing artillery-like weapons, maintaining such equipment and acting as an artillery observer. Unlike most weapons skills, it is based on a character’s Logic (LOG) score rather than Dexterity or Strength. Outside of a few specialized planetary militia units and the UPF Landfleet, this skill is uncommon. This character can also use grenade mortars and grenade rifles.

Even if the first few shots miss a target, each turn that a forward observer provides information, the artillerist can add +5% to his success rate to a maximum of +20% bonus.

Direct Fire

As with the use of lasers, gyrojet, projectile and sprayer weapons, an artillerist who has a line-of-sight to his target can fire directly at it. To direct fire a weapon accurately, it should have a sighting device and the firer needs an unobstructed view of the target.

If there is intervening terrain, buildings, or other units in the way, the attacker cannot use direct fire.

Opponents are easily able to fire back at an artillery unit that utilizes a direct fire attacks.[107]

Heavy Weapon Modifier. Remember attackers using artillery have a -10 percent penalty when firing.

Indirect Fire

Indirect fire is the preferred way that artillery units operate. Targets are out of the line-of-sight of the enemy and munitions are fired on a ballistic trajectory. Shots are normally directed by a forward observer. Artillery can than shoo over obstacles and friendly units while being concealed from direct fire attacks.

However, artillery units are vulnerable to enemy artillery counter-battery fire.[108]

[107] Direct Fire,” https://en.wikipedia.org/wiki/Direct_fire.

Game use. In addition to the -10 percent modifier for heavy weapons, the artillerist receives an initial -10 percent penalty for using indirect fire. Each turn that a forward observer provides information, the artillerist can add +5% to his success rate to a maximum of +20% bonus. (This adjustment of fire is called "registering.")

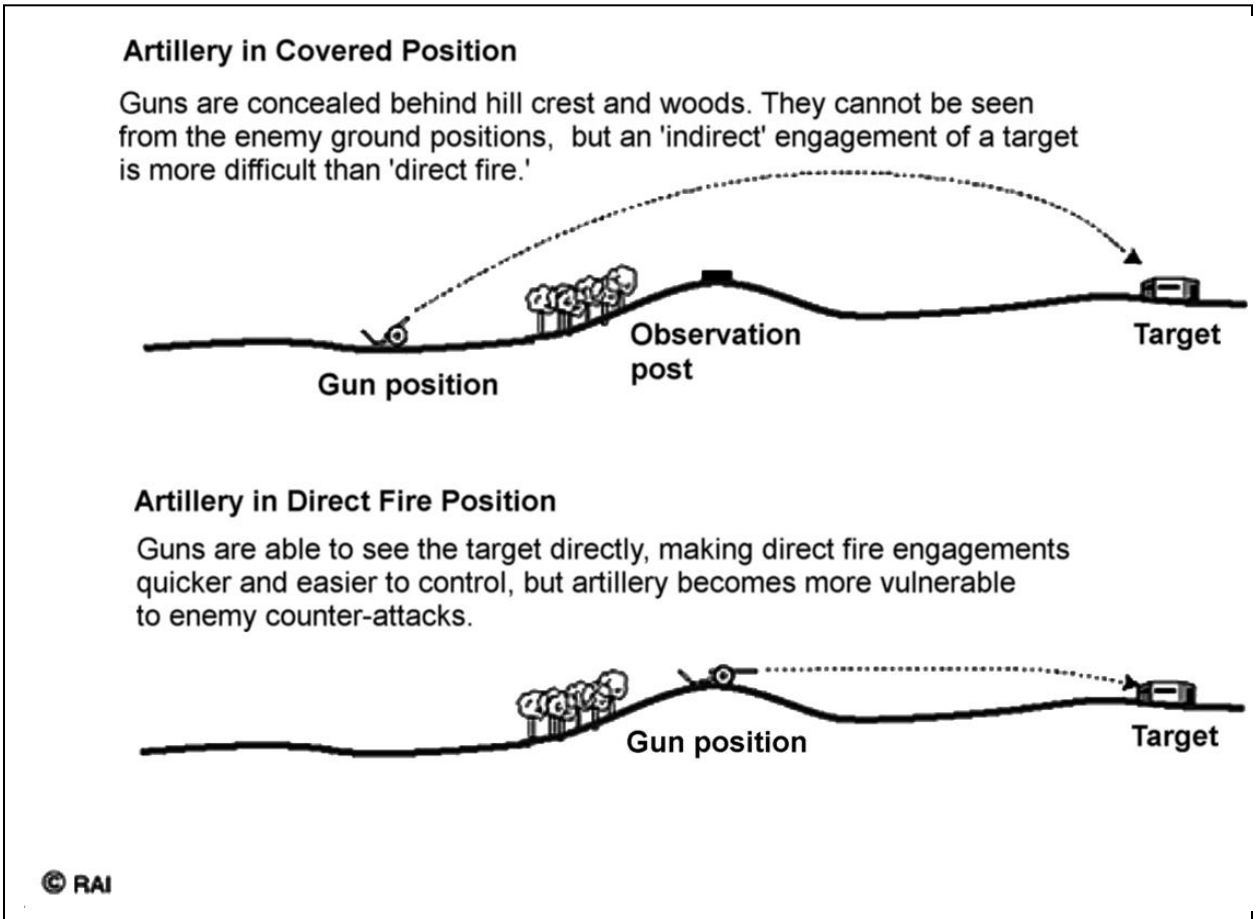


Illustration source: Source: http://www.gutenberg-e.org/mas01/mas12.html

Spotters

A forward observer is critical when it comes to directing indirect artillery fire. This observer can be airborne, a satellite, a robot, a remote sensing device, a drone, or a person. The spotter's job is to provide real-time information to artillery units so they can hit their targets.

Remote sensors can also act as spotters. For example, a seismic sensor post could detect enemy troop movements and opposing artillery fire and can be used to triangulate on an area. In game use, characters using such a remote system to target artillery fire receive an initial -15 percent penalty modifier.

As the spotter provides more information , the artillerist can add +5% to his success rate to a maximum of +20% bonus.

[108] "Direct Fire," https://en.wikipedia.org/wiki/Direct_fire and "Glossary of Useful Terms," : http://www.gutenberg-e.org/mas01/mas12.html.

Time on Target

It was long discovered during the ancient wars of the Humans, Yazarians and Vrusk that most casualties in an artillery bombardment occur within the first few seconds when troops are in the open. Once the initial rounds hit, soldiers go prone on the ground or take cover. This dramatically reduces deaths and injuries due to shrapnel or high-explosive blasts.

As a result, artillery units learned how to fire their weapons in an order so that all their shells would hit a target at the same time and inflict the most damage possible. [109]

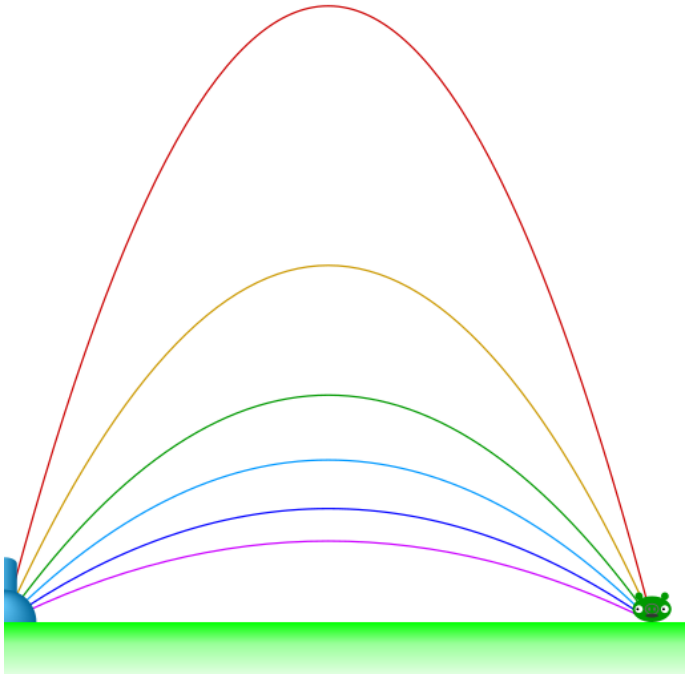
Small, medium and large cannons as well as howitzers are capable of using time on target attacks, firing multiple shots at different elevations, speeds and timing so they will arrive at the target area at about the same time.

Small and medium cannons can fire four TOT shots. Large cannons, howitzers and railguns can fire up to six such shots.

A player must declare that they are using a TOT attack, up to how many shots they are firing in this manner, and write down the locations on the map that the shells are aimed at. The shells will all arrive on the same turn after the last one is fired.

TOT Usage. Small, medium and large cannons have a rate of fire of one shell every two turns (1/2). It will take 8 turns for small and medium cannons to fire a maximum of four shells.

If a large cannon fires a maximum of six shots in a TOT attack, it will take 12 turns before they all strike.



This illustration shows how time on target (TOT) is used so that the artillery munitions will arrive at the target about the same time. The artillery unit has fired six different shots at different elevations, speeds and timing so they will arrive at the same turn. Source: https://en.wikipedia.org/wiki/Time_On_Target

A howitzer has a ROF of one-fourth (1/4) so it will take 24 turns for it to fire its last shell in a TOT attack. A railgun has a ROF of one per turn so it will take 6 turns for it to fire its last round in a TOT attack.

How long before an artillery shell hits? A number of factors come into play in the modern world to determine how long it takes for an artillery shell to reach its target from the gun that fired it. Such factors include gun speed, the angle and gravity.

For game purposes, assume that all artillery shells hit a target that it takes 1 second for an artillery shell to travel 1 kilometer. So, if the target is 6 kilometers or less from the gun, it will be hit the same turn the round was fired unless the artillery unit is using a Time on Target attack. For every 6,000 meters of distance the target is away from the gun, add a turn before the shell hits. [110]

Enemy units with radar or other scanners can detect incoming artillery rounds, which will allow them to sound an alarm so soldiers can take cover, turn on inertia screens and activate anti-missile or anti-artillery lasers. (Note, sound travels 1,988 meters per game turn, so an artillery unit can be heard firing up to two kilometers away during the same turn.) Any ready counter-batteries may then fire in retaliation even before the first artillery shells in a TOT attack hit their targets.

[109] "Time On Target," https://en.wikipedia.org/wiki/Time_On_Target

[110] Adopted from: Grining, Peter. "Artillery in 2300AD," http://www.users.globalnet.co.uk/~dheb/2300/Articles/PG/PGArt.htm

Counter-Battery Fire

When an artillery unit fires, not only will it make a tremendous sound (assuming it is used on a planet with an atmosphere), which will provide a warning to any nearby opponents, but its shells are visible on radar. For each round fired by an artillery unit, it gives the enemy a vague idea where the shots are coming from, permitting them to fire back at that location. Basically, a counter-battery radar would act as a forward observer.

Game use. Use the indirect fire rules. For each round fired by an enemy artillery unit, the counter-battery receives a +5% bonus to zero in on the attacker's location.

The only way to avoid counter-battery fire is to relocate an artillery piece between shots. Otherwise, stationary artillery units are dead artillery units.[111]

Anti-Aircraft Mode

Artillery weapons – cannons, howitzers and railguns – can be used in an anti-aircraft mode. To do this, they must be mounted in a manner that allows them to shoot upwards, such as a universal turret. They will fire standard or high explosive shells with proximity fuses. Most other specialized munitions are not useful against aircraft, though one could imagine the nasty effects a tangler explosive may have against an aircar's engines. These guns have an additional -15 percent to hit a flying aircraft, however. A "near miss" – within a roll of "5" from the to-hit number, means that the enemy aircraft was in the secondary blast area and will take damage that way. Need to add more info. Railguns versus assault shuttles and landing ships?

A missile is fired from a truck. Source: https://commons.wikimedia.org/wiki/File:Firing_Qader_Missile_from_a_truck_launcher_(1).jpg. Labled for reuse.

Section XII. Critical Rolls: Optional Ablative Damage Rules

Zebulon's Guide to the Frontier added information about weapons that inflict damage over a wide area. Larger explosives

Fiona Talenc from "Aramax One," *Imagine Magazine,* July 1983.

Ability Score Limits, #6-p22
Ablative Damage, #8-p45
Ablative Damage Sheets, #14-p30
Articulated Combat Vehicle, #9-p24

A Shot in the arm

By Jason Pamental and David Packard

A special damage system for STAR FRONTIERS® games
From Dragon Magazine #124 August 1987

The combat system used in the STAR FRONTIERS® game is generally realistic and simple, but the damage system lacks that realism. You never see anyone with a broken limb, a wound, a concussion, etc. The only damage taken is to one's Stamina.

The following rules make the damage system more realistic and provide information about broken limbs, wounds, and cuts, and how this damage can be healed.

It also provides realistic damage to robots, computers, weapons, and equipment. Vehicle damage is already covered in the game rules.

The system

Each character has a percentage chance to cause special damage to an opponent when that character performs a “to hit” roll. This chance is figured out by the formula: 3% + (skill level x 2), where the skill level refers to the appropriate weapons skill.

For example: Fl’remp, a female Vrusk, fires a laser pistol at a Human. She has a level 4 Beam Weapons skill, so her chance to cause special damage is 11%.

She rolls a 06 on her “to hit” roll (less than her chance), so she has scored special damage. A character can add 1% to his special-damage chance for each round spent aiming at a target. A maximum of 10% may be added this way. If a character’s chance to hit an opponent is less than the chance to cause special damage, then special damage cannot be scored.

After a character has caused special damage, the player must find out the type of damage done (this special damage is in addition to normal Stamina-reducing damage).

To determine damage, the player rolls Id10. Add or subtract any applicable modifications to this roll, as shown on Table 1. The referee may modify this number with modifications not found on Table 1 as seen fit. Note that a target in an activated defensive screen cannot take special damage.

There are two damage type tables: one for living beings and one for robots. Computer damage is explained elsewhere.

To read the damage tables, go from left to right. The first column on the left is the number a player has rolled. The next column shows how much extra damage is taken to the target’s Stamina score. The third shows what kind of special damage is taken, and the final column shows how many pieces of equipment have been destroyed.

There is a 10% chance that a weapon will be destroyed instead of equipment. The victim’s player can pick which piece of his equipment has been destroyed. If the character has more than one unit of a certain type of equipment, then two units of the equipment are destroyed (two clips, two rations, etc.).

Special damage need not only occur due to an attack using weapons. Vehicle accidents, falling, and fires are just a few of the other possibilities, although this article is only concerned with weapon-related damage. The referee should keep track of damage for NPCs, creatures, robots, and computers, while players should keep track of their own damage themselves (unless the referee doesn’t trust them).

If the referee feels that damage to a character might greatly lessen the other players’ chances for completing their mission, then he may alter the damage taken by that character.

Computer damage

Computer damage is easy to determine because a computer has no major moving parts. Take the modified 1d10 roll generated above and divide it by 5, rounding down; this represents the number of programs which have been destroyed. The lowest-level programs are destroyed first, highest level last. If the computer has a Computer Security program which has not been destroyed, then any alarms it controls are set off.

CREATIVE REFEREEING
A computer may be repaired, but the programs may not be brought back unless a computer specialist knows them (as per the Computer skill). A computer which has more programs destroyed than it possesses
will explode, causing 6d10 damage points to anyone within 5 meters of it (Reaction Speed check defense). A computer destroyed in this way cannot be repaired.

Healing special damage

Adventurers may find it necessary to heal damage caused to them. To heal a *wound,* all Stamina points of damage caused by the attacking weapon must be healed, and 1d10 +1 hours of game time must pass until penalties caused by the wound are nullified.
A cut may be healed as a wound, but it takes 4d10 hours until the penalties caused by the cut are nullified.
A ***deep* cut** may be healed this way, but it takes 1dl0 +1 days until those penalties are nullified.
A ***broken limb*** may be mended if all the Stamina points are healed and the limb is set in a cast or splint. If it is not set within two hours, the limb does not heal until the character enters a hospital (costing 50 Credits per day for 3d10 days). A limb set in a cast or splint takes 3d10 +1 days until the penalties are nullified.
A ***concussion*** may be mended if all Stamina is healed and the PC rests at least 10 hours per day for 1d10 days. Hospital fees for this time amount to 200 Credits.
The ***back wound*** is special. It may be mended if ail Stamina is healed, major surgery is used to repair paralyzation damage, and the PC rests for 2d10 hours.
Otherwise, it heals in 3d10 days. A hospital charges 200 Credits for these services.
A Dralasite cannot have a broken limb, but it looses the ability to grow one until the spot heals where it was hit. This healing takes 3d10 days. The Dralasite still suffers the same penalties as if it had broken limbs.
If a character has multiple damage, such as a chest wound and a broken leg, it still takes 1d10 +1 days for the leg to heal. Healing times are not cumulative.
A Vrusk with a damaged arm requires a 1d10 roll to find out which arm was hit: 1-5 is the left arm; 6-10 is the right.
A Dralasite is not able to absorb a paralyzed leg until it is healed. Because of this, the Dralasite suffers the special penalties caused by the paralyzed leg.
An electrostunner does not break a limb. If a ***broken limb*** is indicated because of an electrostunner or other electrical damage, then the limb has excessive nerve damage instead. The same penalties occur, and the nerve damage may be healed the same as would a broken limb.

Special Damage
Modifiers

Special Damage Modifiers	
Modifier	**Reason**
+1	Short range
+2	Point blank range
+2	Explosive weapon
+1	Careful aiming *

+2	Firing a burst
+1	Per 5 SEU used by weapon
+1	Target hit twice in same turn
+1	Small target
+2	Tiny target
+1	Per skill level with weapon
+2	Per Robotics or Computer skill * *
-1	Large target
-2	Giant target
-1	Long range
-2	Extreme range
-1	Moving target* * *
-2	Suit-type defense
-2	Target is underwater
-2	Target makes RS check
* +1 is added for each round spent entirely on aiming, up to the maximum of +5.	
* * This applies only to attacks against robots or computers, respectively.	
* * * This modifier is counted only once, even if both attacker and defender are moving in any manner.	

Repairing a robot

Repairing a robot is easier than healing a living creature. A character with Robotics skill is required. ***Damage*** to a robot takes 2d10 minutes to repair. A ***broken*** part takes 5d10 +5 minutes to fix, while a *cracked* item takes 4d10 +5 minutes. Add 10 minutes to the repair time for each joint which is ***damaged*** or ***broken,*** and 20 minutes if the brain casing has been hit. If the brain casing and the body have been ***cracked,*** add 1 hour to the repair time.

Weapon Modifiers	
Weapon type	**Modifier**
Projectile pistol	+2
Projectile rifle	+3
Heavy projectile	+5
Beam rifle or pistol	+3
Heavy beam	+4
Gyrojet pistol	+2

Gyrojet rifle	+3
Heavy Gyrojet	+6
Short melee *	+1
Long melee *	+2
Fist	+1
Grenade**/Other thrown weapon	+2
Bow or crossbow	+2
Tooth, claw, etc.	+2
* Whips, swords, pole arms, spears, chairs, and big clubs are long; axes, bottles, small clubs, knives, nightsticks, pistol butts, shock gloves, etc., are short.	
* * Only a fragmentation or incendiary grenade can cause special damage. Each counts as an explosive weapon on Table 1.	

Damage Results Table: Living Beings			
Modified 1d10 roll	**Stamina damage**	**Special damage**	**Units of lost Equipment**
1 or less	0	None	0
2	5	Chest wound	0
3	5	Leg wound	0
4	5	Arm wound*	1
5-6	8	Shoulder wound *	1
7	9	Arm wound**	1
8	10	Head wound	1
9-10	10	Leg broken	1
11	15	Chest deeply cut	1
12-13	8	Arm broken *	1
14	8	Arm broken **	1

15-16	15	Abdomen deeply cut	1
17	15	Back wound, leg paralyzed	2
18	12	Shoulder deeply cut **	2
19	15	Side deeply cut	2
20-22	30	Head concussion	2
23+	1,000	Head removed, body falls apart, target vaporized, etc. (pick one)	5
*Secondary side (i.e., the left side if on a right-handed person)			
**Primary side (i.e., the right side if on a right-handed person)			
Special damage effects			
Chest wound: -5 to hit.			
Leg wound: -3 meters/turn on movement.			
Secondary-side arm wound: -5 for firing rifles, can only fire one weapon, -10% for doing tech, robotics, medical, demolitions, and computer skills.			
Primary-side shoulder wound: -10 for firing rifles, same other modifiers as a secondary-side arm wound.			
Primary-side arm wound: -30 to hit, can't use rifles, -15% on above-mentioned skills.			
Head wound: -5 INT/LOG, 50% chance to be unconscious for 1d100 minutes.			
Leg broken: Only 2 meters/turn movement.			
Chest deeply cut: -10 to hit, -5 DEX/RS.			
Secondary-side arm broken: No rifles can be fired, -10% to all skills mentioned for a secondary-side arm wound, may only fire one weapon.			

Primary-side arm broken: Same as with secondary-side arm broken, but with -25% to all above mentioned skills, -10% to hit with all other weapons.
Abdomen wound: -3 meters/turn on movement, -5% to hit with all weapons, -8kg on limit for carrying items.
Back wound, leg paralyzed: Only 2 meters/turn on movement, -15 kg for carrying items.
Side deeply cut: -8 DEX/RS, -10 kg for carrying items.
Head concussion: -10 INT/LOG, -5 DEX/RS, 75% chance to be unconscious for 1dl0 hours.
Dead: Dead beyond a doubt, no chance of revival.

A medium-size bomb. Source: http://www.iwm.org.uk/collections/item/object/30021900