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### 4.2 Systems Design

This section is titled *System Design* because it can be used to design not only weapons, but also some specialized equipment such as grapples and shields. Like the vehicle design system, the following rules let the designer choose the basic performance required, then modify it with special characteristics to represent virtually anything that can be imagined.

Though designed for the Vehicle scale, the various rules listed here can be used to build weapons and systems for any scale: see section 4.4 for Personal-scale and larger scale systems. Other than this, there is no practical limit to what can be done: it is all a matter of putting the right characteristics together.

It is possible to buy several different types of ammunition for a weapon, or multiple modes for a system, by making multiple versions with the desired stats. The more costly version is the system itself, the others are the other modes, each costing only one-tenth (round down) their calculated cost. It requires one action to switch modes or ammunition feed and only one can be used at a time. Damage to one mode affects all equally.

#### Hooks & Tips: Split Systems

Split systems are systems that only work when all components are present. These components do not need to be carried by the same vehicle. The “overall” system is designed as normal. The cost is then split between the carriers as desired. To use the system, all components must be in Melee range of one another and each must spend an action.

Components are damaged like normal systems and any damage affects the whole system (e.g., if three components had -1, -1 and -2 Acc damage, then the combined system would have -4 Acc). If any component is destroyed or does not combine with the others, the system cannot function.

#### Design Notes: Changes

These rules have seen some severe changes from previous versions to make them simpler. Whereas numerous multipliers and references used to be needed, now a system’s stat block will hold all the information required.

#### • 4.2.1 Step One: Basic Attributes

Each system has four basic Attributes: Damage Multiplier, Base Range, Accuracy and Rate of Fire; these may be modified by Perks and Flaws bought later on. Choose the type of system that you are building; this will affect how it will be treated by the rules.

MATTER: This is used for most systems and for weapons that do damage by impact.

MISSILE: The system is a tube containing one (or more) warheads mounted on a rocket motor. Missile systems are always single-use, but are linked for free to all other missiles of the same type: any number can be launched at once at the same target at the cost of one action. The system can be defended against with Anti-Missile fire.

ENERGY: this is used for systems that work by applying energy (lasers, electric gun, etc.).

EXOTIC: this is for “weird” devices, such as psychic cannons, bio-etheric lasers, etc.

#### • Select Damage Multiplier

The system’s Damage Multiplier (DM) is first selected. This is the basic power or damage caused by the system. The effectiveness of Damage Multipliers increases exponentially, not linearly: a DM of 10 is not twice as effective as a DM of 5, it is four times as effective. For weapons, the Damage Multiplier, squared, is roughly equal to the average thickness of armor-grade steel penetrated, in millimeters, given optimum conditions.



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The Damage Multiplier also serves as a measure of the basic effectiveness of a system such as a shield or a flare launcher. In these cases, a higher Damage Multiplier usually means a larger or tougher system. This is fully explained in the relevant characteristics later on.

### • Select Base Range

The system's Base Range (BR) is chosen next. Ranges are expressed in hexes — the real combat range is equal to 5 meters for characters, 50 meters per hex for land and naval attackers, 250 meters for air and 500 meters for space.

The Base Range is the limit of the system's Short Range. The Medium, Long and Extreme Ranges are equal to 2, 4 and 8 times the Base Range, respectively. It is possible to have a system with an Extreme Range shorter than 8: its Base Range will be 0 for cost purposes and the exact range values are established by the designer (for example, 0/1/2/3).

A system can be used five times as far as its Extreme Range, though with little chance of success. If used in space, only the difficulty of hitting at these long distances prevents true line-of-sight range.

Systems with no Base Range are considered to be "Melee" and are only useful in direct contact. They have their own costing formula to take this into account (see section 4.2.4).

### • Select Accuracy

The system's Accuracy (Acc) is the third basic Attribute. A system with standard Accuracy has a score of 0. High quality systems have positive values while inaccurate systems have negative ones. Accuracy cannot go lower than -5 or higher than +5; the reasonable range, cost- and game-wise, is -2 to +2.

Accuracy represents the system's quality, but also how wide the beam/spray/blade is, how easy it is to move the system around and use and a host of other factors that determine whether or not its use will be successful.

### • Select Rate of Fire

A Rate-of-Fire (ROF) rating indicates systems that are capable of quickly repeating action, such as sustained, wide area automatic fire. Negative ROF are possible, show the number of rounds required to recharge or reload the system.

Ammo consumption increases dramatically in automatic weapons, but makes special attacks possible (see *Burst Fire*, section 5.4.4). Weapons which fire only a short, tight burst (say, three bullets per shot) would not require a ROF bonus; the three rounds would be considered as one "shot" of ammunition, i.e., one firing of the weapon.

### • 4.2.2 Step Two: System Perks

System Perks are what make a gun different from a missile launcher or a laser. They serve to make each system unique, much like Vehicle Perks and Flaws do. Applying the same characteristic several times does not improve the system more than once, except when explicitly noted otherwise.

Some Perks have an associated value listed besides their names as an exponent. Powerful Perks have higher values, meaning they count as multiple Perks for costing purposes. When costing out the weapon (section 4.2.3), the total number of System Perks multiply the basic cost; if only one Perk is selected, the cost is multiplied by 1.5.

Some of the characteristics cause no damage. This is obviously negated if another characteristic is taken that cancels this effect. For example, "Aerosol" alone causes no damage, but an Armor-Piercing Aerosol shell (while strange) certainly will.

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### System Perks

CHARACTERISTIC	Count as...
Adhesive	1
Anti-Infantry	1
Aerosol	1
Anti-Missile	1
Anti-Structure	1
Area Effect	
• Area Effect Radius	Perk Value
0	1
1	2
2	3*
*Add one for each additional hex of radius after 3.	
Armor-piercing	1
Armor-crushing	1
Attack/Target	(See page 244)
Biological	1
Chemical	1
Concealed	1, 2 if "pop-up"
Disintegrator	6
Energy-homing	1
Entangle	1
Fire-Fighting	1
Gravitic	2 if single mode, 3 if double-mode
Guided	2
Hand-held/Hardpoint	1
Haywire	2
Illumination	1
Incendiary	1
Indirect Fire	1
Knockback	1
Liquid	1
Location-specific	1
Mass Destruction	12
Minebuster	1
Paint	1
Parry	1
Shield	(See page 246)
Shield (Energy)	(See page 246)
Persistent	2
Redundant	1
Remote	1
Scatter	1
Seeking	(See page 246)
Smart	(See page 246)

### System Perks

CHARACTERISTIC	Count as...
Smoke	1
Hot Smoke	(See page 247)
Stealth	1
Target Designator	1
Wide Angle	(See page 247)
• Angle (degrees)	Perk Value
10	1
60	2
180	5
360	10
Winch	1

### • 4.2.3 Step Three: Flaws

### System Flaws

CHARACTERISTIC	Count as...
Attenuating Damage	(See page 248)
Clumsy	-1
Defensive	-1
Flicker	-1/-2
HEAT	-1
Heavy	-1
Minimum Range	-1
Non-Lethal	-1
Power-hungry	- (See page 248)
Random	- (See page 248)
Recoil	- 1
Time Delay	-1
Unreliable	- (See page 248)
Overheating	- (See page 248)

### • 4.2.4 Step Four: Cost

Each system has a base cost that is calculated using one of the following formulas and rounded to the nearest whole number. DM is Damage Multiplier, BR is the Base Range, ROF is the Rate of Fire (assign a cost only if ROF is greater than 0). The Accuracy is not used directly: check the *Accuracy Multiplier* table for the proper multiplier.

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Find where the desired “ammo” capacity falls and use the next higher entry (for example, a gun with 300 rounds would use the “600” line). Multiply the system’s cost to get the final point total.

(The goal here is not to optimize systems to the last TV point but to provide a balanced view of their game usefulness.)

### Cost Table

Ranged Base Cost =  

$$[((DM+ROF)^* \times (DM+ROF)) + ((BR+ROF) \times BR \times BR)] \times$$
 Accuracy Multiplier

Melee Base Cost =  

$$[(DM/2 + ROF)^* \times (DM/2 + ROF)] \times$$
 Accuracy Multiplier

\*The sum of DM+ROF or DM/2+ ROF can never be smaller than 1, or negative. If it is, count it as 1.

### Accuracy Multiplier Table

ACCURACY	MULTIPLIER	ACCURACY	MULTIPLIER
+5	180	-1	0.7
+4	36	-2	0.5
+3	9	-3	0.4
+2	3	-4	0.3
+1	1.5	-5	0.2
0	1		

### • Perks/Flaws Cost Modifiers

The Base Cost just calculated for the system will be modified by the number of Perks and Flaws chosen for it (if any). Some powerful Perks or Flaws have higher values, meaning they count as multiple Perks or Flaws for costing purposes (for example, Guided counts as two Perks).

Multiply the basic cost by the total number of Perks; if only one Perk is selected, the cost of the system is multiplied by 1.5.

When this is done, divide the modified cost by the total number of Flaws; if only one Flaw is selected, the cost is divided by 1.5.

### • Ammunition Cost

Point-wise, the rules do not differentiate between the various types of ammunition: projectile, shell, capacitor, etc. All that counts is the actual game effect: the system is used once. Check the table in the next column.

### Ammo Cost

# OF USE	COST MULTIPLIER
1	0.1
2	0.2
4	0.3
9	0.5
16	0.7
25	0.9
50	1
150	2
600	3
2400	4
Unlimited (Ranged System)	5
Unlimited (Melee System)	2

### Design Notes: Hey, where's Minimum Size?

Previous versions of Silhouette had minimum Size requirements to mount a system due to mass, volume, recoil, energy requirements, etc. While this made sense, it also added to the complexity of the rules and brought little to the game aspect (the system acts the same, no matter who uses it). After all, a high-tech setting might mount a tank gun on a motorcycle; increasing its cost made little sense, since the motorcycle, while presumably nimbler, is also more fragile. The rule was thus removed, saving one calculation in the design process.

Here's the formula, if you want to use them to fact-check your design (if a HEAT-based system, multiply the result by 0.75):

Minimum Size = cube root (System Cost/2)





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### 4.3 Special Cases

The Mechanical Design System is very complete: it allows the creation of any type of vehicles and objects, from a bicycle to a gun emplacement to a huge spaceship. However, since the scale of the system is somewhat large to accommodate all those vehicles' different sizes, the smaller and larger ones tend to suffer from a certain lack of detail. In addition, more specialized items require additional explanations and special case rules.

This section explains how to design small vehicles (anything between Size 1 and 5), large vehicles (above Size 30), very large vehicles (spaceship-sized), emplacements and robots. It also contains rules for "offbeat" systems, such as faster-than-light engines.

#### • 4.3.1 Small Vehicles

Small scale vehicles (Size 5 and smaller) are easy to define using the normal rules, with a change of perspective. By adding decimals to the statistics and using them in the design formulas, an accurate and more detailed pattern will emerge just like the other, larger, vehicle types.

#### • Size

The main adjustment lies in the Final Size decided upon. The standard Size values have been subdivided into smaller ranges for convenience. The Size value provided by that table is used in the TV calculations as usual, complete with the decimals.

**Battlesuits and Powered Armors:** If the vehicle is designed as a suit of armor worn by a character, the vehicle cannot be smaller than the pilot. In addition, entry 6 ("Roll Twice") on the System Damage Table is replaced by a duplicate Crew entry.

### SMALL SCALE SIZE-TO-MASS CHART

Size	Mass in Kg	Size	Mass in Kg	Size	Mass in Kg
0.1	0-8	2.1	301-380	4.1	2401-2600
0.2	9-16	2.2	381-460	4.2	2601-2800
0.3	17-24	2.3	461-540	4.3	2801-3000
0.4	25-32	2.4	541-620	4.4	3001-3200
0.5	33-40	2.5	621-700	4.5	3201-3400
0.6	41-48	2.6	701-780	4.6	3401-3600
0.7	49-56	2.7	781-860	4.7	3601-3800
0.8	57-64	2.8	861-940	4.8	3801-4000
0.9	65-72	2.9	941-1020	4.9	4001-4200
1.0	73-80	3.0	1021-1100	5.0	4201-4400
1.1	81-102	3.1	1101-1230		
1.2	103-124	3.2	1231-1360		
1.3	125-146	3.3	1361-1490		
1.4	147-168	3.4	1491-1620		
1.5	169-190	3.5	1621-1750		
1.6	191-212	3.6	1751-1880		
1.7	213-234	3.7	1881-2010		
1.8	235-256	3.8	2011-2140		
1.9	257-278	3.9	2141-2270		
2.0	279-300	4.0	2271-2400		

#### • Movement and Maneuver

Small vehicles use the standard movement types with no modification to cost or capabilities. Man-worn suits always use the Walker movement system. Speed is expressed in kilometers per hour, just like all other vehicles. To get the speed in meters per roleplaying turn (6 seconds), the speed in kilometers per hour is multiplied by 1.65, rounding to the nearest whole number.

Small vehicles are generally more nimble than larger ones. Generally, small vehicles will not have a Maneuver of less than -3.

#### • Armor

Small vehicles may have Armor ratings based on the Personal scale rather than the Vehicle scale. When this is the case, the Personal-scale Armor rating is divided by ten for Threat Value (TV) calculation. If facing a normal-sized vehicle, it is also divided by ten, but is rounded

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to the nearest whole number. For example, a powered battlesuit could have an Armor rating of 45 on the Personal scale. This would translate to an Armor rating of 4.5 for calculation purposes and 5 for vehicular battles.

### • **Small Scale Weapons**

Small scale weapons can also be designed using the standard formulas. Again, decimal values are used for extra detail. Vehicular weaponry causes ten points of Personal-scale damage per point of Vehicle scale damage.

For example, a machinegun carried by a mechasuit could have a Damage Multiplier of x22 in Personal scale. This will translate in the as a vehicle Damage Multiplier of 2.2 (22 divided by ten). The minimum vehicular damage caused by a weapon is always equal to one — it is not possible to design a vehicle-mounted weapon causing less damage than ten points on the personal scale.

### • **4.3.2 Large Vehicles**

Just like small vehicles, large vehicles can be built with specialized rules to better represent their capabilities and peculiarities. This section explains how to design large vehicles (anything above Size 30).

Large vehicles can be built as one large structure, but they are sometimes broken down into smaller parts to facilitate construction, reduce costs and increase their survivability. In Silhouette terms, this means that the vehicle is composed of a main hull, which has the primary movement system(s), plus a number of superstructures and components that perform certain function and are “towed” by the main hull. Examples of this include weapon turrets, communication towers, booster units, etc. For the sake of simplicity, these are referred to as “sections” in the text.

A section is considered fixed in place. If the design calls for a turret, the weapon is bought with the Turret fire arc as normal.

### • **Size**

The main adjustment for large vehicles lies in the Final Size. Movement systems are generally designed into the main hull, which is then used to “tow” the rest of the vehicle. The true Size of the overall vehicle (for collisions, physical attacks and transport) is thus the total of the mass of the main hull *plus* the mass of the sections added to it. This must be remembered if the vehicle is to tow or carry anything.

### • **Crew**

Each section requires at least one crewmember, human or computer. Actions are determined separately for each part of the vehicle, including the main hull. Crew casualties are likewise applied to each separate section as damage is received.

Crew may be reassigned to other sections. A number of crewmembers equal to the Size of the smallest section involved in the exchange may be transferred each turn. Transferred crewmembers do not count for action purposes in the round during which they are transferring.

### • **Maneuver**

Large vehicles are generally slower than small ones and their Maneuver rating should reflect this. Generally, large vehicles will not have a Maneuver of more than -3. All sections must have the same Maneuver rating as the main hull. They use the same movement modifiers in combat (e.g. if the main hull is moving at Combat speed, each section will be treated as moving at Combat speed).

Sections ignore any Maneuver-related damage result, but still lose Armor points as usual (1 for Light damage, 2 for Heavy damage). They are affected by any Maneuver damage suffered by the main hull.