for EABA™

Stuff!™

you make it, you break it...

BTRC

greg porter

Stuff!™ v1.0

ISBN 0-943891-50-7
BTRC#6109

Published by: BTRC
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Cover art: derived from **Future Combat System** White Paper, 2004
Interior art: US Defense Intelligence Agency, NASA Ames Research Center, NOAA Archives, US Department of Defense

Playtesters: Jerry A!, William Hostman, Aaron Kavli, Abel Lindberg, Phil McGregor, William Myers, Ross Pippin, Rich Spainhour

Special kudos: Phil McGregor

Other thanks: Dream Pod 9, Gold Rush Games, Hero Games, Marco Chacon, Pinnacle Entertainment, Politically Incorrect Games, Sanguine Productions and Steve Jackson Games, for technical assistance

Dedication: for Cathy

WHERE DO I FIND IT?

INTRODUCTION

WEAPONS

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INTRODUCTION

In the Orwell Helicopter Corporation's plant only a few troubleshooters are visible, and these respond to lights that flare up on a board whenever a vacuum tube burns out or there is a short circuit. By holes punched in a roll of paper, every operation necessary to produce a helicopter is indicated. The punched roll is fed into a machine that virtually gives orders to all the other machines in the plant.

-from "Miracles of the Next 50 Years" (written in 1950)

INTRODUCTION - This is the rather unimaginately titled **EABA** supplement called...well...**Stuff!** It carries on a long **BTRC** tradition of design tools for role-players. Most of these have been mind-numbingly dense treatises full of equations and exponents, suitable only for that type of gamer known as the "gearhead". *Much like the author of this book is.*

However, **EABA** is a light, think-on-your-feet, know-the-rules-like-the-back-of-your-hand kind of system, and so a design tool for **EABA** needs to be something you can do on the fly or at worst, with a pencil and some scrap paper. *No calculator required. Guaranteed.*

That may seem like heresy to long-time **BTRC** fans, but trust me, it works. The idea, like in **EABA**, is to break certain things down to only what you need, and to keep that in terms and units you should already be familiar with from **EABA** and the real world. There are still plenty of equations and obscure interrelations in **Stuff!**, but they are all hidden from view in the process of distilling them into **EABA**-centric game stats.

Like our previous major design product (**3G^3**), **Stuff!** will try to provide enough data that you can convert items made with **Stuff!** into other game systems with little difficulty. To keep **Stuff!** current, system conversions will be available on the **BTRC** web site as they are developed, rather than being a published part of the system.

TO THINK ABOUT - **Stuff!** can design just about anything that *can* be designed for a campaign. You can design a city from the top down, from the government to the rats infesting the alleys and the salary of the guy who picks up the trash. You can use it to recreate a medieval culture, or build a futuristic space vehicle. But keep the opening text in mind. It is a reminder about the one consistent feature of our prognostications on the future and its technology. *We always get something wrong, even when we get something right*. The 1950 article actually does a pretty good job (except for the ubiquitous predictions of personal helicopters), but the timescale is where we mess things up. The robotic factory description isn't bad, but our writer in 1950 didn't see how fast computers would advance. The **EABA** timescale is broken down into broad eras to minimize the problems in year-based tech scales. But if you design stuff for the present or near future, correlations may not be perfect, just because technology is advancing faster than we can predict which way it is going to go...

Many of you will use **Stuff!** just for weapons and vehicles. *That's fine*. **Stuff!** is broken into themed sections, so if you want to design a gun, you use the **Weapons** chapter. A car is the **Vehicles** chapter and a radio is the **Gadgets** chapter. Some things will be a more complicated. A tank with a detailed gun and a detailed radio needs all three chapters. Most chapters will be broken down into basic and advanced sections. The basics cover ninety percent or more of your design needs, and are supposed to cover the most common aspects of that design tool. If there is an advanced section, it will cover all the esoteric bits you will want to do *after* you are satisfied you understand the basics. The advanced section might be several times as long as the basic section, depending on the subject matter.

EXAMPLE: You can design a mundane car, plane or boat using just the basic vehicle rules. If you want a mobile anti-aircraft gun, an antimatter-powered exoskeleton or a warp-capable battleship, then don't be surprised if it requires advanced rules.

Every chapter in **Stuff!** ends up relating to everything else *somehow*. Vehicles (chapter 3) will often mount weapons (chapter 2). The same rules that let you make an electric car also end up powering your flashlight (chapter 4). Your wagon ends up being pulled by oxen (chapter 5), and everything is regulated by the government (chapter 6). While each chapter stands alone, it can be used more effectively with info from the other chapters.

EABA

GROUND RULES - *First things first*. You will not *need* **EABA** to use this book for many purposes, but to get *full* use of it, you will have to refer back to concepts or rules that are referenced like (see **EABA**, page 3.4). Similarly, you don't need **EABA** to *use* your final results. You could be designing things for some *other* game system and just want a simple design tool whose results you convert over to some other game.

That's fine with us. Kilograms and meters and liters and watts are universal units that can find a home in any game system.

Universal Chart - Most real-world measurements in **Stuff!** will probably relate to the **EABA Universal Chart**, an expanded version of which is in the back of this book. The **EABA Universal Chart** attempts to relate a whole bunch of different quantities and how they relate to each other. For your purposes, the ones that deal with mass, cost, distance and size will be the most important. If a unit is given in some unrecognizable quantity, like "a cost of +6", just assume that this means "a Money level of 6 on the **EABA Universal Chart**". Once the design process is done, you use the **EABA Universal Chart** to get the real-world measurement you are looking for.

EXAMPLE: If you jump to the back of the rules, you can see that Money of +6 translates out to 8,000 Credits. A distance of +6 is 3 meters, and a time of +6 is 8 seconds. If you design something with a base cost of +6, and you give it some enhancement that is a +2 cost modifier, you can see that the gadget now costs 16,000 Credits. *Go look it up and see what we're talking about.*

If you are only going to print two pages from this book, it should be the expanded **EABA Universal Chart** at the back of these rules. You *will* be using it quite a bit.

Hexagons - **Stuff!** and **EABA** have one unique unit of measurement that you have to wrap your head around. The unit of size in **Stuff!** is a hexagon (or hex). This is a hexagonal area 1 meter across (face to face) and one meter high. It is completely useless for anything except roleplaying, but for that purpose it is absolutely perfect. One hexagon has a footprint of .75 square meters (8 square feet) and a volume of .75 cubic meters (26.5 cubic feet). Many games use one meter or one yard hexes and this is simply a convenient way to represent your stuff on a game map.

An area that a person occupies in a vehicle seat is about one hexagon. A person standing in a hexagon is about two hexagons of volume (2 meters high), while most structures take about three hexagons of volume from one floor to another. This is the only real thing you need to remember when laying out a vehicle or structure floor plan. A van that occupies ten hexes on a game map might actually be a twenty hexagon vehicle in terms of volume. Volume as such is used mostly in the design process. Things related to volume may be used later (such as size modifiers in combat), but the actual volume is seldom a concern once the item rolls off the drawing board and into your game.

If you are not using **EABA**, and play in a game with two meter hexagons, a hexagon that is two meters across and two meters high will hold eight **Stuff!** hexagons of equipment.

Since most handheld equipment by its nature is a wee bit smaller than a hexagon, small items will have a size measured in milli-hexagons, or one-thousandath of a hexagon. One millihex is about the size of your fist. The smallest unit that will be used in **Stuff!** is .1 millihex, which is about the volume of a wristwatch and strap.

Example	Millihexes
Wristwatch	.1
Pocket calculator	.5
Small pistol, soda bottle	1
Medium pistol	2
Heavy pistol	4
Portable computer or light rifle	8
Heavy rifle, large briefcase	12
Desktop computer	16
Large shoulder-fired rocket	32

What about bigger stuff? In general something with the listed size in hexagons will have the approximate dimensions below:

Hexagons (example)	Dimensions Cube	"Ship"
1	.9m on a side	2.3m x .6m
5	1.6m on a side	3.9m x .1.0m
10	2.0m on a side	4.9m x 1.2m
50	3.3m on a side	8.4m x 2.1m
100	4.2m on a side	11m x 2.7m
500	7.2m on a side	18m x 4.5m
1,000	9.1m on a side	22m x 5.7m
5,000	16m on a side	39m x 10m
10,000	20m on a side	78m x 20m
50,000	34m on a side	134m x 34m
100,000	42m on a side	169m x 42m
500,000	72m on a side	288m x 72m
1,000,000	91m on a side	363m x 91m

A "ship" is just a block four times as long as it is wide and high. It's just a shape that you can relate to better when imagining large vehicles. Remember that a hexagon of volume is .75 cubic meters. As a gamer you may be used to hexes 1 meter across, but not with how this compares to volume.

To make things simple, *most* items are going to have a mass of 500 kilograms per hexagon. This is a density of about .65 tons per cubic meter, or about the same as many woods. This takes into account the fact that even heavy machinery has empty space so you can get in to change the spark plugs, and so on. A person takes up a volume of about .1 hexagon and has a mass of up to 100 kilograms. However, a person who access vehicle controls or get at worn items will take up a full hexagon. *It makes a difference*. Body armor is designed to fit a *person*, not the hexagon they are standing in.

For your first practical use of the **EABA Universal Chart**, an item's diameter as a sphere would be its Size level in hexagons minus 3, with the result divided by 3. Some useful relationships are below. Try some to get a feel for the **EABA Universal Chart**. Results are not perfect, but *are* good enough for game uses.

Volume:

Diameter of a sphere(meters):	(Size - 3) / 3
Side of a cube(meters):	(Size / 3) - 1
Length of a "ship"(meters):	(Size / 3) + 1

Money:

Pay rate(Credits):	Money
Daily pay(8hr)(Credits):	Money + 6
Weekly pay(Credits):	Money + 11
Monthly pay(Credits):	Money + 15
Yearly pay(Credits):	Money + 22
12 hour work day:	+1 to total
7 day work week:	+1 to total

Distance:

Time of flight(seconds):	Dist. - Movement - 5
Accel. to speed(seconds):	$Move_1$ - $Move_2$
Accelerate to dist.(seconds):	(Distance - Move) / 2 - 2
Throw dist.(meters):	Strength - Weight - 3

EXAMPLE: If you are paying a lackey 8 Credits an hour (Money level of -14) for a 12 hour work day, then you owe the lackey a Money level of (-14 + 11 + 1) = -2 for a week's work, or 500 Credits.

EXAMPLE: You have a spaceship that can do .4 gees (Movement level of 2) and want to know how long it will take to accelerate to 1% of the speed of light (a movement level of 41). The answer is (41 - 2) = a Time level of 39, or 8 days. Like we said, no calculator required!

Dice - **Stuff!** does everything according to the progressions on the **EABA Universal Chart** (**EABA**, page 3.4). Each level of effect is a change of 0d+1 to the final total, and each 3 levels is a change of 1d+0. All of the intermediate steps in **Stuff!** are figured as non-dice levels. See below:

Basic Era weapon	+18 lethal
Late part of an era	+2 bonus
1 hexagon weapon(500kg)	+0 bonus
Takes a minute to reload	+3 bonus
Unreliable in wet conditions	+1 bonus
Manually aimed weapon	+0 bonus
Modifier total	+24 lethal
Total	8d+0 lethal damage

EXAMPLE: A weapon with a base damage of +18 has modifiers that add up to +6, for a total of +24. Since each +3 is 1d+0 of damage, you have a weapon with a final damage of 8d+0. What the listing above represents is the entire design process for a muzzle loading cannon. That's how easy **Stuff!** can be.

You *never* keep a remainder of more than +2. In the previous example, you would *never* end up with a 6d+6 weapon. The +6 always ends up a +2d in the end. It's just easier to add single digits and convert later than to try to add the dice and fractions in your head.

The Pizza Principle - **Stuff!** is sort of a pizza topping system. Instead of lots of equations, it is just a system of simple additions and subtractions, as you saw in the example above (though these tables *are* based on equations). If you are going to use **Stuff!** as an equipment guide for a particular game-world, you will need to apply it *consistently*. If a weapon or a technology has certain characteristics, then it should *always* have those characteristics. One point of difference in a piece of **Stuff!** gear is usually important, just as it is important whether your adventurer has an Agility of 8 or 9. So, if you say a certain weapon is "unreliable in wet conditions", odds are that *all* examples of that type of weapon have that modifier. Changes in the way technology operates is the hallmark of advancement, whether it is the change from muzzle-loading to cartridge weapons, from vacuum tubes to transistors or from gold to paper money. When someone comes up with something better, all the old stuff tends to fall by the wayside.

Got it? If so, you're ready to go.

WEAPONS

As soldiers are tools of destruction, they are

not properly a gentle person's tools.

On necessity will they will use them,

with calm control.

Even winning is no cause for rejoicing.

To rejoice over a war won is to rejoice

over the slaughter of men

So a person who rejoices

over the slaughter of men

Cannot expect to do well in the world of men.

Tao Te Ching, Chapter 31

INTRODUCTION - Yeah, this is the section you may have bought **Stuff!** for, so we're putting it first. This section covers everything from a penknife up to a battleship gun, orbital bombardment cannon or anti-tank missile. Things like cruise missiles, ICBM's or other very long range, self-guided weapons would be better designed as a vehicle with a payload (and we *do* have a chapter for vehicles). However, you *would* design a nuclear payload using the weapons section...

The chapter is laid out the way all the **Stuff!** chapters will be, a short, basic set of rules that will cover over ninety percent of your needs, and a much longer set that covers the other ten percent.

Basics - The default weapon in **Stuff!** design is very much like a gun. Unless you take modifiers to adjust it, the weapon can be used for one attack per major action, has some sort of penalty after each attack that disrupts your aim (like recoil), does lethal damage and affects armor normally. It is reliable in normal conditions, and will probably function at some reliability, range or damage penalty in abnormal conditions (like underwater, in a vacuum, etc.). Pretty much like a 20th or 21st century firearm. So, without any special modifiers, a 29th century "blaster pistol" will operate under the same **EABA** rules as a plain old 20th century sidearm, with the exception that the blaster pistol will do a *lot* more damage... As a comparison, in modern terms (Atomic Era, *maybe* Late Atomic Era), weapons have damages like this:

Damage	Example	Approx. energy/area
0d+0		100 Joules/cm^2
0d+1	pellet rifle	140 Joules/cm^2
0d+2		185 Joules/cm^2
1d+0	.25 ACP, 00 buckshot	250 Joules/cm^2
1d+1	.22 long rifle, 9mm short	340 Joules/cm^2
1d+2		450 Joules/cm^2
2d+0	.45 ACP	560 Joules/cm^2
2d+1	9mm Parabellum	770 Joules/cm^2
2d+2	.357 magnum, 4.6mm HK	1000 Joules/cm^2
3d+0	5.7mm FN, .44 magnum	1250 Joules/cm^2
3d+1	12ga shotgun slug	1770 Joules/cm^2
3d+2	.30 carbine	2370 Joules/cm^2
4d+0	.454 Casull	2910 Joules/cm^2
4d+1	5.56mm, 4.73mm/c	3990 Joules/cm^2
4d+2	7.62mm	5240 Joules/cm^2
5d+0	.338 magnum	6450 Joules/cm^2
5d+1		8980 Joules/cm^2
5d+2	.460 magnum	11,650 Joules/cm^2
6d+0		14,660 Joules/cm^2
6d+1	12.7mm machinegun	19,830 Joules/cm^2
6d+2	14.5mm machinegun	25,780 Joules/cm^2
7d+0	20mm cannon	32,510 Joules/cm^2
7d+1		44,340 Joules/cm^2
7d+2		58,010 Joules/cm^2
8d+0	30mm cannon	73,500 Joules/cm^2
9d+0		164,000 Joules/cm^2
10d+0	60mm cannon	370,000 Joules/cm^2
11d+0	75mm cannon	895,000 Joules/cm^2
12d+0	light AT rocket	1.9 million Joules/cm^2
13d+0	90mm cannon	4.2 million Joules/cm^2
14d+0	120mm cannon	9.5 million Joules/cm^2
15d+0		21 million Joules/cm^2
16d+0	heavy AT rocket	48 million Joules/cm^2

The "energy/area" column is just that, a way to see how "real world" energy translates into **EABA** damage, and to get an idea of how much extra force per unit of area is required to get those little extra +1's of damage. For the non-gearheads, a Joule(J) can be equated to a kilogram lifted a meter. If you weigh one hundred kilograms and you climb ten vertical meters of stairs, that's a hundred kilograms times ten meters, or a thousand Joules. Energy/area means how much energy is applied over how much area, in this case, one square centimeter. A finger pushing into a lump of clay goes farther than a fist. They have the same *energy*, but the finger concentrates it over a smaller area. Don't worry about it too much, this is the *only* place in the rules where it is goes into this detail. One thing you should keep in mind though, is that it takes a *significant* change in energy/area to get a damage bonus. Most of the time, this will involve an increase in weapon mass, ammunition mass, or both.

Size - Each hexagon of weapon will mass half a ton (or each millihex of weapon will mass .5kg). Ammunition normally takes up as much space as the weapon for 200 shots. Vehicle weapons usually use cargo space for ammunition storage, while handheld weapons usually add the ammo size and mass to the weapon to get the weapon's *final* size. You can use any fraction or multiple of 200 shots that you care to. Ammunition does *not* count towards the Hits of a weapon. Hits represent how hard it is to damage the *weapon*. The ammunition may have Hits of its own, but this is usually not a major consideration.

Weapons *can* have final sizes that are fractions of a millihex. Millihexes are just a design tool, your final weapon or any other **Stuff!** item will probably be mostly referenced in kilograms. For reference, the table below lists the actual mass in kilograms of various real-world weapons (*including* a normal load of ammunition), and a good approximation of this *final* size that you can get in **Stuff!**.

Weapon	Weight	≈Stuff! size
Combat knife	.3kg	.6 millihex
Walther PPK	.7kg	1.5 millihex
Beretta 9mm pistol	1.1kg	2.5 millihex
Mini-Uzi submachinegun	3.2kg	6.0 millihex
M-16A3 assault rifle	3.9kg	8 millihex
RPG-7 rocket launcher	9.9kg	20 millihex
.50 cal. machinegun	70kg	125 millihex
TOW missile (tripod mount)	115kg	250 millihex
20mm autocannon	150kg	313 millihex
12-pounder (archaic)	800kg	1.5 hexagon
32-pounder (archaic)	2100kg	4 hexagon
120mm cannon	3000kg	6 hexagon

This should give you something to work with when trying to get a feel how "big" something is.

Other - The basic Accuracy of a *vehicle* weapon will be half its damage dice (rounding nearest). The basic Accuracy of a *handheld*, pintle or tripod mounted weapon is a quarter of its damage dice (rounding nearest), and the basic Accuracy of a thrown weapon is zero.

The following table lists all the *basic* weapon design modifiers, followed by an explanation or clarification of them, along with examples. A "basic" weapon is something similar to a gun or sword, where the mechanism of damage is fairly straightforward and obvious. The advanced or special case modifiers will come later.

Technological Era	Damage for 1 hexagon
Primitive (and all melee wpns)	+12 lethal
Basic	+18 lethal
Industrial	+24 lethal
Atomic	+30 lethal
Post-Atomic	+36 lethal
Advanced	+42 lethal
Early part of an Era	-2 penalty
Middle part of an Era	no adjustment
Late part of an Era	+2 bonus
Easy technology	+3 bonus
Average technology	+0 bonus
Hard technology	-3 penalty

Modifiers	Amount
Weapon of .5 millihex	-33 penalty
Weapon of 1 millihex	-30 penalty
Weapon of 2 millihex	-27 penalty
Weapon of 4 millihex	-24 penalty
Weapon of 8 millihex	-21 penalty
Weapon of 16 millihex	-18 penalty
Weapon of 32 millihex	-15 penalty
Weapon of 64 millihex	-12 penalty
Weapon of 125 millihex	-9 penalty
Weapon of 250 millihex	-6 penalty
Weapon of 500 millihex	-3 penalty
Each doubling of space	+3 bonus
Each 25% extra space (max +50%)	+1 bonus
Each 25% less space (max -25%)	-1 penalty
Autofire (Industrial Era or better)	-3 penalty
Autoburst (Atomic Era or better)	-2 penalty
Can use shotgun damage	-3 penalty
Takes several actions to reload	+1 bonus
Takes fifteen seconds to reload	+2 bonus
Takes a minute to reload	+3 bonus
Unreliable (jam on roll ≤7)	+3 bonus
Very unreliable (jam on roll ≤11)	+6 bonus
Detrimental side effect	+2 bonus
Beneficial side effect	-2 penalty
Post-Atomic Era special effect	-6 penalty
Advanced Era special effect	-12 penalty
Bulky ammo (x1/2 capacity)	+1 bonus
Compact ammo (x2 capacity)	-2 penalty
One-use weapon	+6 bonus
Explosive damage (lethal)	-6 penalty
Explosive damage (half-lethal)	-3 penalty
Shaped charge damage	+3 bonus
Handheld (or shoulder-fired)	+3 bonus
Bipod/tripod mounted weapon	+2 bonus
Manually aimed weapon	+1 bonus
Turreted or remote weapon	+0 bonus
Placed weapon	+6 bonus
Strength-based wpn.(special)	-9 penalty
Thrown weapon	-12 penalty

Accuracy modifiers	Amount
Shoulder-fired ranged weapon	+1 Acc
Basic Era or earlier (minimum of 0)	-2 Acc

BASIC WEAPONS - The basic design rules cover only the *function* of the weapon. The monetary cost of the weapon and ammunition for it is in the advanced rules (page 2.39). If you need to determine the armor and Hits of a weapon, you would go to the **Gadgets** chapter and use the rules covering gizmo armor and Hits.

Damage from weapons is assumed to be lethal unless otherwise specified. Half-lethal weapons generally do +1 damage, and non-lethal ones do +2 damage. Each +1d of damage in a weapon represents somewhere between two- and two-hundred-fifty percent more penetrating power, and each +1 is perhaps thirty to thirty-five percent more than the previous value. So, realistically speaking, the difference between a normal weapon and a "magnum" or upgraded version of that weapon is probably no more than a +1 difference.

Something that we are going to mention now and several times later in the text is the nature of modifiers. A weapon modifier that says "+3" or "-3" *does not* make a weapon inherently better or worse. *What it means is that the weapon does more or less damage than an otherwise identical weapon with or without that characteristic*. For instance, if you have a pair of 4 kilogram rifles, and one is a robust single shot elephant rifle, and the other is an autofire assault rifle, you would *expect* the assault rifle to have a lower damage. And in **Stuff!**, autofire capability reduces the damage of a weapon compared to similarly sized weapons without autofire capability.

Explanations of the various modifiers on the previous page follow:

Tech Era - The base damage done by a weapon that takes up 1 hexagon (500kg) at that tech era. Weapons from early or late parts of an era get a -2 penalty or +2 bonus to this damage. A gamemaster can decide to subdivide this further into -1 or +1 increments if desired.

EXAMPLE: An Atomic Era (the overall era in which you are reading this) weapon has a base damage of +30 for one hexagon of weapon. A weapon from the *Late* Atomic Era (which is where we are now) would have a base damage of +32 instead.

Note: Self-contained bullets will usually be considered a Middle to Late Industrial Era item, so "modern" firearms date from that period and later.

While melee weapons or ranged weapons based on muscle power can be at any tech era, for *design* purposes they are *always* considered Primimtive Era weapons (a base of +12 lethal damage). A mass swung by muscles doesn't get any more sophisticated...

Easy Technology (+3) - The "easy technology" modifier represents a weapon technology that is readily accessible and understandable. It can be modified and adapted without requiring more than a tradesman's level of expertise. If it is something that poorly equipped rebels can make out of locally available materials, count it as "easy technology". For Earth's history, most explosives, unguided rockets, melee weapons and archaic ranged weapons like bows, crossbows, etc. are all going to get this modifier.

"Average"(+0) technologies usually represent gunpowder weapons, things that require some sort of technical infrastructure, like iron working, or the ability to make moving parts at fine tolerances, like the action of a flintlock or the cycling bolt of an assault rifle. Conventional firearms are "average technology".

"Hard"(-3) technologies are mostly going to be used in a fantasy or science fiction campaign, and are ways for a gamemaster to tweak certain weapon types to get the level of damage they feel appropriate for the tech era and nature of the gameworld. It represents both the efficiency of the weapon and to some degree the difficulty in making it.

EXAMPLE: If a role-playing campaign was set in a world without significant quantities of iron and tin, then gunpowder weapons would have to be made out of something else, like copper. Copper is not as strong as iron (and is heavier), so making it an "hard" technology (-3) instead of an "average" one (+0) would mean that a copper weapon would have to be heavier than an iron one to do the same damage.

If a weapon uses multiple technologies in its consutruction or means of doing damage, use the average, rounding towards zero.

EXAMPLE: A weapon that uses both "easy" (+3) and "average" (+0) technologies would average to +1 damage. A weapon using "average" (+0) and "hard" (-3) technologies would average to -1 damage.

Note: *Suggested* tech types for the weapons common to many role-playing settings:

Weapon type	Technology type
Melee weapons	Easy(+3)
Grenades/explosive shells	Easy(+3)
Bows & crossbows	Easy(+3)
Repeating crossbows	Easy/Average(+1)
Gunpowder firearms	Average(+0)
Stunners	Average/Hard(-1)
Lasers	Average/Hard(-1)
Gauss weapons	Average/Hard(-1)
Particle beams	Hard(-3)

Size - Each time you double or halve the size of the weapon from the default of 1 hexagon, you gain or lose +3 on the base damage.

EXAMPLE: A 2 hexagon weapon from the Atomic Era does a base damage of +33, while a .5 hexagon weapon does a base damage of +27.

You *can* use the **EABA Universal Chart** (**EABA**, page 3.4) for doubling or fractional amounts. Weapons whose size does not *exactly* match a table entry can be up to 50% larger or 25% smaller, for a bonus or penalty on damage. If you need to go more than this, you should be using the next higher or lower table entry. The small table on page 2.3 should give you an idea of about what a certain class of weapon weighs. If you are trying to recreate an *actual* weapon, start with its *unloaded* weight.

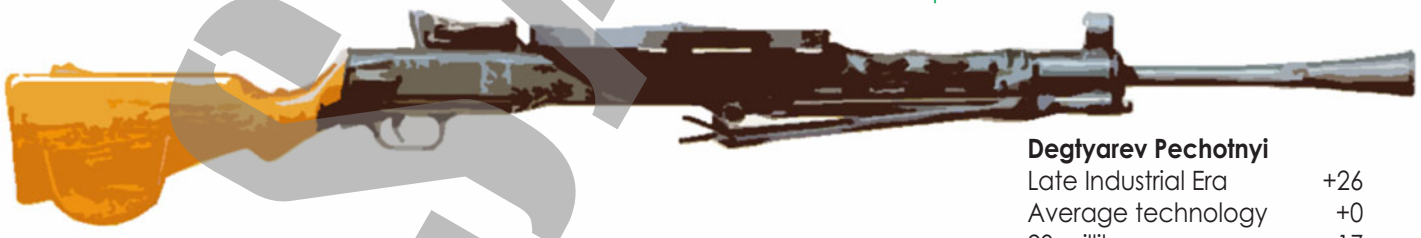
Note: In weapon examples like the one below, design modifiers from the advanced design rules will be in *italics*.

EXAMPLE: Let's say you want a weapon with an empty mass of 1.5 kilograms (or 3 millihexes in volume). There is no "3 millihex" entry, but you could use the "2 millihex" numbers and then apply the "+25% size" modifier twice to get a 3 millihex weapon. This would give you a 1.5 kilogram weapon and it would have +2 on damage over the 2 millihex numbers. Or, you could use the "4 millihex" numbers and apply the "-25% size" modifier once. This would *also* give you a 3 millihex weapon, but it would do -1 on damage compared to the 4 millihex numbers. If you work it out, you'll see the damage is the same in either case.

Keep in mind that for very large weapons you are only buying the *weapon*, not any support services or structures to house it in or on. A battleship turret may be armored, but that armor would be part of the *vehicle* mass, not the *weapon* mass.

Autofire(-3) - The weapon *may* use standard **EABA** autofire rules (**EABA**, page 5.6). A weapon capable of autofire can usually fire single shots as well, especially if it is a handheld weapon. Damage is the same, regardless of the mode used. Note that weapons do not do less damage just because they are autofire. What the -3 damage modifier means is that an autofire weapon doing the same damage as a regular one has to be more heavily built to withstand the extra stresses, either mechanically, electrically or in terms of its ability to dissipate waste heat. A weapon may be autofire or autoburst at only a third the normal damage penalty, rounding down, *if* it is counted as Unreliable (or a level *more* unreliable) when used in autofire or autoburst mode (see **EABA**, page 7.3).

EXAMPLE: A weapon that is unreliable *only* in autofire mode would have a -1 damage penalty (normally -3), and a weapon that is unreliable *only* in autoburst mode has no damage penalty at all (normally -2). This doesn't make an unreliable autoburst mode "free". Autoburst capability *will* make a weapon cost more in Credits.



Degtyarev Pechotnyi

Late Industrial Era	+26
Average technology	+0
20 millihex	-17
Several actions to load	+1
Autofire	-3
Unreliable	+3
Reduced range	*+1*
Bipod mounted	+2
Modifier total	+13
Final damage	4d+1

Most hand-held autofire or autoburst weapons will take the unreliable autofire option as a weight-saving measure. Weapons firing explosive rounds are less concerned with weight and more with safety, and do not usually take the option (and imagine the problems with unjamming an artillery piece!). If a weapon has global levels of unreliability, it will automatically apply to autofire mode as well, and an unreliable autofire mode cannot be taken unless it is *more* unreliable than normal fire.

EXAMPLE: A weapon that is "unreliable"(+3) and "autofire"(-3) is unreliable in normal fire *and* in autofire modes. It could, however, have "very unreliable autofire"(-1). This means it is Unreliable in normal use and Very Unreliable in autofire use.

Autofire weapons firing explosives, shaped charges or any sort of bulky package take a -9 penalty *instead of* a -3 penalty (-6 for autoburst).

You *may* take the autofire modifier more than once. Extra uses of autofire or autoburst are at a -1 penalty each instead of the normal penalty, but reliability adjustments only apply to the *first* modifier (second and further autofire or autoburst modifiers are always at least a -1 penalty). Each extra level of autofire or autoburst just increases the number of hits on a successful roll by one, and one additional hit for each amount the roll is made by. A rotary cannon or other very high rate of fire weapon might have this modifier several times. Remember that each extra time you take this modifier results in ten extra shots being fired each time you pull the trigger.

EXAMPLE: A weapon that has the autofire modifier three times (-5 damage) would get three hits on a successful "to hit" roll, and three *extra* hits for each two points the roll was made by. Each time the trigger is pulled, this weapon fires thirty shots from its supply of ammunition. If this weapon were unreliable only in autofire mode, only the first -3 penalty is altered by the reliability option (to -1), and the other -2 are counted normally, for a total damage modifier of -3 instead of -5.

Autoburst(-2) - A weapon that can only fire short bursts instead of sustained autofire only takes a -2 penalty (or -6 for lightweight or bulky packages). This is handled the same as regular autofire, but will limit the maximum number of hits to three. This lesser modifier can also be applied to weapons with a slow rate of autofire, like the autocannons mounted on many light armored vehicles. Lesser autofire weapons only shoot three shots per major action instead of the normal ten.

Shotgun(-3) - The weapon may use its normal designed damage, *or* adjust this to do multiple hits at less damage, using normal **EABA** shotgun rules (**EABA**, page 5.6). To be able to fire multiple small projectiles, shotguns typically have larger barrels and correspondingly larger mechanical assemblies, making them heavier than conventional weapons doing the same damage. Shotgun rules may also apply to things like continuous beam lasers, where they do several hits before the target can possibly move out of the way. Conventional weapons which fire extremely rapid bursts should probably use a multiple autofire or autoburst modifier. The damage a weapon has *after* this modifier is applied represents that of a single large slug. See the **EABA** rules (page 5.6) for rules on shotshells.

Reloading(variable) - The default reloading time for a weapon is an action, depending on your Agility or skill with the weapon (you could always blow the roll). This is the default, for something like a clip-fed weapon where you can pop the old one out and put a new one in (provided you had a replacement clip already in hand). A weapon that takes several actions to reload might be a revolver that cannot use speed loaders (load one bullet at a time), a belt-fed machinegun, or a weapon large enough that you simply can't move ammunition into the gun in one action (like an artillery piece or mobile rocket launcher). This modifier means the reloading time is a major action per shot for multiple shot weapons, or at least two actions for a weapon that only holds one shot. Weapons that take a minute or more to reload a shot are typically siege weapons, very large cannons or archaic muzzle-loading weapons. To be most accurate, the bonus you get for a particular reloading time is one-quarter the Time level needed to reload (so the +2 modifier is actually sixteen seconds).

Note! - Reloading time *assumes* you have what you need to do the reloading with. If an artillery piece is manually loaded and has 100 kilogram shells, the reloading time *assumes* there are enough people there to manhandle the shells into the weapon. Keep this in mind. As a rule of thumb, reloading archaic weapons takes the listed time if you have 1 person for each full 2d+0 in the tech era and size of the weapon. For instance, an archaic weapon whose size and tech era alone gave 10d+0 damage would require a five-person crew to reload in its listed time.

The reloading modifier may also be used for weapon preparation time *before* use, even if the weapon cannot normally be reloaded. For instance, if a disposable man-portable rocket launcher requires several actions to prepare it for firing, it *can* use the "reloading" modifier for the *pre*-fire sequence, even though it cannot be reloaded and thus has no *post*-firing delay. Weapons may have both a pre-loading *and* re-loading modifier.

Unreliable(+3) - A weapon which has a chance of malfunction *even in ideal conditions* can take this modifier. Ones that are *very* likely to have problems can take the more severe form at +6 (for detail, see **EABA**, page 7.3). These modifiers would typically be used on archaic weapons, or on very cheap weapons, on the the early models of a new design, or on poorly designed autofire weapons. An autofire weapon that is just a little too light to reliably handle the stress might take the less severe modifier as well, especially at Industrial Era levels of technology or if the weapon is cutting edge (built just a little ahead of its time). If a weapon has a global "unreliable" modifier, this supercedes something like "reliable autofire". It is unreliable in *all* conditions.

A weapon that is only unreliable in certain modes of use or in certain operational conditions only gets a +1 bonus instead of +3. See the **Autofire** modifier for an example (only unreliable in autofire mode).

EXAMPLE: A flintlock pistol that is just normally "unreliable", but is "very unreliable" when in wet conditions would get an +4 damage instead of the +6 it would get for being "very unreliable" all the time. A flintlock rifle that reliably fires when kept in good order, but "very unreliable" in wet conditions would be a +2 damage instead of +6 damage.

Note! - *Do not apply this modifier gratuitously as a easy way to get extra damage!* Taking a "gun is very unreliable underwater"(+2) bonus is only going to be significant if adventurers are underwater a lot... *All* weapons are going to have conditions that make them unreliable to some extent. This modifier is only for those conditions that are going to be *commonly* encountered.

For reference, if the user has a 4d+2 skill roll, the chance of an Unreliable weapon misfiring is about one percent, and the chance for a Very Unreliable weapon to misfire is about ten percent. The real-world chance of misfire for a modern weapon in good order is no more than a half of a percent.

Side effects(±2) - Side effects are things above and beyond what would normally be expected from a weapon at that level of technology or which gives a penalty/advantage in the **EABA** system. For instance, a pistol might have recoil, but this is not a *detrimental* side effect unless it is so severe that you *can't* fire more than once a turn. Similarly, a laser has *no* recoil, which is a *beneficial* side effect for maintaining your aim. Armor-piercing ammunition is usually *not* a special effect. Ammunition is *not* something inherent to the weapon. A rifle can fire regular ammunition *or* armor-piercing ammunition. Both do the same damage. The *weapon* hasn't changed, the *ammunition* has.

On the other hand, an advanced energy weapon *might* be inherently armor-piercing, or the *only* ammunition available to a weapon might be armor-piercing, and this *could* be a beneficial side effect inherent to the weapon.

Side effects(+2) that cause damage to the firer (or those near them) as part of normal weapon operation are normally half-lethal damage of half the weapon's normal damage. A weapon *can* have more than one side effect, but they should not be related to each other if each one is to be worth a separate bonus.

Things that are a beneficial or detrimental side effect related to the weapon's *operation* are only worth half (a +1 or -1) and this is purely optional. For instance, if a class of weapon can *only* be used in vacuum, this does not affect normal **EABA** combat rules, so it would only be a detrimental side effect worth +1. A rocket with backblast that only causes side effect damage if used in a vehicle or enclosed space would be a +1, or an unbalanced melee weapon would be a +1. Operating limits may be *part of* a +2 or -2 side effect, but will *not* add to it.

***Possible* side effect**	**Beneficial**	**Detrimental**
Gunpowder	none	may have severe recoil
Rockets	none	backblast
Laser	no recoil	blocked by smoke
Particle beam	armor-piercing	none
Gauss weapon	none	none
Stunner (electrical)	none	non-lethal, easily blocked

ADVANCED TOPIC: EXCESSIVE RECOIL

Weapons with recoil typically just cause the shooter to lose any aiming bonuses or cause consecutive shot autofire penalties. If a recoiling weapon fired from one hand has a damage of *more than* the firer's Strength plus 1d, the excess is taken by the firer as half-lethal damage to the firing arm. For a weapon fired from both hands (but *not* braced on the shoulder), the limit is the firer's Strength, plus 2d. For a shoulder-fired or bipod mounted weapon, the safe amount of recoil is the firer's Strength, plus 4d. Subtract 1d from the safe limit if the weapon if the weapon is autofire or uses shotgun damage (2d if both!). In the case of pistols, padded gloves or hand armor can absorb up to 0d+1 of the damage (the shock still travels up the arm). For shoulder-fired weapons, torso armor of up to 1d+0 can apply against this damage. Weapons using the "recoil compensation" modifier (page 2.28) increase the damage threshold for safe weapon operation.

EXAMPLE: A person with a Strength of 2d+0 can safely fire one-handed a recoiling pistol of up to 3d+0 damage (3d+1 with a padded glove). They could safely fire a recoiling rifle of up to 6d+0 damage (7d+0 with shoulder padding). Or, they could safely fire a recoiling *autofire* rifle of up to 5d+0 damage (6d+0 with shoulder padding). If they fired a 5d+0 pistol one-handed while wearing padded gloves, they would take 1d+2 half-lethal damage (1d+1 non-lethal and 0d+1 lethal hits). People *have* actually been hit in the face by their own recoiling pistols...

Special effect(special) - This is something that is above and beyond accepted science, some wierd effect that *might* be possible once understanding of the universe has progressed beyond where it is now. That is, we can't tell you what the effects are because they are impossible according to current theory. An example in the **EABA** rules is "disruptors", weapons whose energy beam only interacts with a specific atomic or molecular signature, and thus ignores any barrier not made of that substance. Obviously, this is an *extremely* powerful modifier for a weapon. A special effect for Post-Atomic Era weapons is a -2d modifier, and a -4d modifier for Advanced Era weapons. Normally, effective countermeasures for a special effect will be developed within a fraction of a tech era, so if a particular special effect first becomes available in the middle of the Post-Atomic Era, the first countermeasure will be available by the late part of the era. Usually, neither the weapon with the special effect nor the countermeasure will be all that common, and both are usually restricted military tech in terms of weapon or armor cost.

A special effect can also be some neat but highly impractical or space-intensive function given to a weapon, like a high-tech quarterstaff that collapses to the size of roll of quarters with the push of a button, or an energy blade that disappears into its hilt when turned off. The penalty for this is whatever the gamemaster says it is. Since a ±3 change in damage is a change in energy of a factor of about a two-and-a-half, that can be a guide for other changes a special effect might have.

Compact/Bulky ammo(special) - Ammunition normally takes up the same space as the weapon for 200 shots. Each time you halve this, you get a +1 bonus to damage, and each time you double it, you take a -2 penalty to damage. Numbers in parentheses on the following table apply to *normal* weapons (200 shots equals size of weapon).

Weapon volume x1	Damage
shots x 250 (50k shots)	-16 penalty
shots x 125 (25k shots)	-14 penalty
shots x 64 (12.5k shots)	-12 penalty
shots x 32 (6400 shots)	-10 penalty
shots x 16 (3200 shots)	-8 penalty
shots x 8 (1600 shots)	-6 penalty
shots x 4 (800 shots)	-4 penalty
shots x 2 (400 shots)	-2 penalty
shots x 1 (200 shots)	+0 bonus
shots x 1/2 (100 shots)	+1 bonus
shots x 1/4 (50 shots)	+2 bonus
shots x 1/8 (25 shots)	+3 bonus
shots x 1/16 (12 shots)	+4 bonus
shots x 1/32 (6 shots)	+5 bonus
shots x 1/64 (3 shots)	+6 bonus
shots x 1/125 (2 shots)	+7 bonus
shots x 1/250 (1 shot)	+8 bonus

Bulky or compact ammunition affects the cost of ammunition, but *not* the cost of the weapon. Normally, ammo equal to the weight of a weapon will have a certain cost. The same applies here, but you are getting fewer or more shots for the same amount of money. The size of the ammunition also matters if it has an explosive payload. The bigger each shot is, the more explosives you can pack in.

Compact ammo might be used once or twice for certain modern weapons, or used several times for science-fiction weapons whose power packs hold a seemingly endless number of shots. Bulky ammo might be used once or twice for pistol cartridges, shotguns or for some archaic weapons that have inefficient ammunition types.

EXAMPLE: An Advanced Era weapon could lose 4d (-12 on the table) and still do the damage of an Atomic Era weapon of similar size and mass. But if the Atomic Era weapon has a clip holding 20 shots, the Advanced Era equivalent would hold 1250 shots!

Note - Most *reloadable* shoulder fired rockets will have this modifier at the "3 shots" level, which gives +6 damage, the same as for a *disposable* weapon (page 2.10).

In **Stuff!**, the ammunition for a weapon increases in mass as the weapon does. Bigger weapons fire bigger bullets. *But what if they don't?* The ammo weight rules work okay for weapons *in the same size range*. But, if you have a 4 millihex machine pistol that fires the exact same ammunition as a 2 millihex pistol, then their ammo *should* weigh the same, a twenty shot magazine for the machine pistol being the same size as a twenty shot magazine for the pistol. *What to do?*

If you are designing a family of weapons using the same ammo in different size ranges, but they have the same ammunition capacity for their weight (pistols to pistols, rifles to rifles), apply the "compact" ammunition modifier once for each change in weapon size. So, if your submachinegun is twice the size of a pistol, then the ammo would need to be half the size.

EXAMPLE: A 4 millihex machine pistol would get +3 in damage compared to a 2 millihex pistol, but would take a -2 penalty for compact ammo for a net result of +1 damage, quite reasonable when you figure the machine pistol probably has a longer barrel and sturdier construction. The design result is that weapons of the same type larger than the basic item are +1 damage for each larger size or -2 damage for each smaller size category, while ammo weight stays the same.

What does it all mean? This modifier tweaking is something you can usually ignore unless you are trying to make a weapon match a particular real-world weapon, or if you are designing a broad family of weapons to use the same ammunition and thus have similar final damage. If you *are* trying to model or recreate real-world weapons, there are detailed notes at the end of the advanced design section.

ADVANCED TOPIC: AMMO CAPACITY

Weapons of the same type from different tech eras may have different ammunition efficiency. You *may* apply the "bulky" or "compact" ammunition modifiers as needed to get that extra damage you need at more primitive tech eras, or to get the extra shots you want at more advanced eras.

The actual mass of things like ammunition is very hard to accurately generalize in as broad a system as **Stuff!** For instance, the bullets in a policeman's pistol do *less* damage than those in a soldier's rifle, but may weigh *more*. The pistol fires a large but slow lead bullet, while the rifle fires a small bullet, but at much higher velocity and penetrating power. The weight of the lead is why the pistol bullet is heavier. **Stuff!** does not have the detail to take things like this into account, and just assumes that bigger weapons have bigger ammunition. You would have to use **BTRC's** older weapon design book, **3G³**, in order to accurately design hand-held weapons down to the bullet level.

One-use weapon(+6) - This modifier is meant for disposable weapons, use once and throw it away. A grenade is a perfect example. A weapon which holds more than one shot but is still a one-use weapon (like a disposable pistol) might use "several actions to reload" or "bulky ammunition" modifier, not the "one-use weapon" modifier, which is meant for things like rocket launchers or other single shot devices that *include their ammunition mass in the designed size and mass*. This modifier is *more* effective than taking the "bulky ammo" modifier, since the weight of the one shot is included with the weapon rather than added to it.

Explosive damage(-6) - The weapon does damage as an *explosion* of the listed dice. A lethal explosion typically involves fragmentation or flames. Half-lethal or non-lethal explosion damage is only a -3 penalty, and is more representative of regular explosives, or "stun grenades".

EXAMPLE: An normal Atomic Era fragmentation grenade would be about this:

Atomic Era weapon	+30
Easy technology	+3
1 millihex weapon(.5kg)	-30
Lethal explosion	-6
Single use	+6
Thrown/placed weapon	+6
Modifier total	+9
Total	3d+0 lethal explosion

If it were a stun grenade (half-lethal damage), it would be a 4d+0 explosion instead.

A weapon can either *be* explosive, or *use* explosives. These are *very* different. If a weapon *is* explosive, like a land mine or disposable rocket or grenade, you use the -6 modifier on the weapon. And even for reloadable rockets, this works for many designs. But to be accurate, if the weapon *fires* explosives, like an artillery piece, grenade launcher or reloadable rocket, you apply the -6 modifier to the damage you would get from the size of *one* unit of ammunition. A unit of ammunition would usually be an "easy technology"(+3), "one use"(+6) device and be "explosive"(-6), for a final damage that is around +3 more than the base for its size. This is a case where having bulky ammunition is a *benefit*, since it means explosive payloads can be larger.

EXAMPLE: An 8 millihex one-shot rocket launcher would apply the -6 modifier to the *weapon* to figure explosive damage. It *is* an explosive weapon. On the other hand, an artillery piece *fires* explosive weapons. A 4 hex artillery piece normally holds 200 shots in a space equal to that of the weapon, or 20 millihexes per shell. *One* shell is a modifier of -14:

16 millihex weapon(.5kg)	-18
25% extra size	+1
Easy technology	+3
Lethal explosion	-6
Single use	+6
Modifier total	-14

If this were an Atomic Era shell (base damage of +30), then the artillery *shell* (-14 modifier) would have an explosive damage of +16 (or 5d+1).

If a weapon uses explosive ammunition, it can *usually* still fire other kinds. A tank can fire shells filled with explosives, *or* penetrating rounds. Note that the damage of an explosive warhead is *not* affected by the range to the target, because with an explosive warhead, range to the target is always zero (from the explosive, that is). However, the range at which the weapon would start to lose dice (see page 2.18) will be the weapon's *absolute* maximum range (explosive shells do the same damage at all ranges, but have a maximum range they can reach).

An explosion that is a *secondary* effect of the weapon would be a +3 *bonus* to the main effect, but a -18 penalty to the explosion part (see the "shaped charge" modifier).

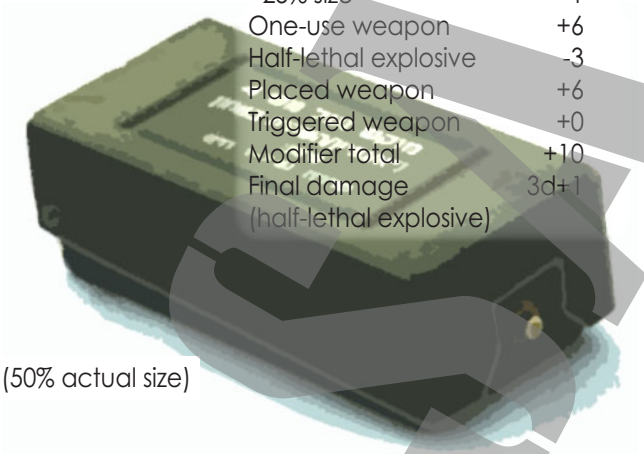
EXAMPLE: A weapon that is an anti-tank warhead will use an explosive charge to generate an intense armor penetrating effect. The effect on the target will be a lot more dice than the explosive effect on things in the immediate area.

A dual-use explosive charge like this will count the *largest* damage for any other effect that is based on the final weapon damage.

Note - Explosions are an area effect, but if the explosive actually hits its intended target, the effect *on the target* is +1d over the normal damage.

Shaped charge(+3) - A shaped charge is a special type of explosive warhead exceptionally good at penetrating armor. They first become possible early in the Atomic Era. In addition to the damage bonus, it is counted as an armor-piercing attack, and is considered to already have the "half-lethal explosion" modifier. The "shaped charge" modifier is usually taken on things like anti-tank rockets. A weapon that is a shaped charge must have a damage of at least +18 *before* applying this modifier in order to qualify. Ammunition, thrown or placed weapons that use shaped charges must also have a damage of at least +18 *before* applying this modifier in order to qualify.

NO4 Anti-personnel mine	
Atomic Era	+30
Easy technology	+3
.5 millihex	-33
+25% size	+1
One-use weapon	+6
Half-lethal explosive	-3
Placed weapon	+6
Triggered weapon	+0
Modifier total	+10
Final damage (half-lethal explosive)	3d+1



(50% actual size)

Note! - For a gameworld, you can always say a weapon is a shaped charge, even if less than 6d+0, but it has no special effect. So, you *could* say a big pistol gets its punch from tiny shaped charge bullets, but it would *not* count as extra damage nor have a secondary explosion.

A shaped charge counts as armor-piercing against armor of the same era or before, and also count as a half-lethal explosion, at -18 less than the adjusted attack itself.

EXAMPLE: An +24 attack becomes a +27 shaped charge (which is *lethal* damage), and also acts as a *+9 half-lethal* explosion.

Shaped charges will count as a "weapon enhancement" for determining weapon cost (page 2.39). The shaped charge modifier *may* be taken more than once. Larger shaped charges are more effective than smaller ones, and large enough weapons can have "stacked" shaped charges, where the first one starts punching a hole and the second one follows through with the knockout. The shaped charge modifier may be taken a maximum of once for a 1 millihex weapon (or 1 millihex unit of ammunition), and once more for each two rows of weapon size past this (4 millihex, 16 millihex, 64 millihex, etc.). *Each* extra modifier is a weapon enhancement for cost purposes, and will make the final weapon (or its ammunition) +1 cost. Multiple shaped charges simply count the *final* damage for determining the -18 penalty for any secondary explosion effects.

EXAMPLE: A weapon that is an +33 shaped charge because it took the modifier three times will also act as a +15 half-lethal explosion (+33 with a -18 penalty).

Note! - Explosions and shaped charges will blur the line between "weapon" and "ammunition". Is the grenade launcher the weapon, or is is it the grenade? We'll deal with this in the ammunition cost section (page 2.39), but you would generally deal with it like the explosives example on page 2.10.

Hand-held(+3) - Ranged weapons that are designed for personal use are generally lighter than their vehicle-mounted counterparts, so they have higher damage for the same mass. Hand-held weapons get the largest bonus. Bipod or tripod weapons are not as good as shoulder-fired weapons, but still get a bonus. Weapons mounted on a vehicle or stationary ones which require an operator for all aspects of targeting get a small bonus, and weapons which *require* vehicle controls, a turret mount or otherwise require a functioning vehicle to operate are the default (no bonus). The main concept is that a non-vehicle weapon will be limited by human hand-eye coordination, which puts an upper limit on its Accuracy. You won't be shooting down air-to-air missiles with a weapon that is *manually* aimed...

EXAMPLE: A rifle, pistol, shoulder fired grenade launcher or rocket gets a +3 bonus. A tripod-mounted machinegun gets a +2 bonus. A ball-mount or pintle-mount machinegun on a tank gets a +1 bonus, as would an archaic field piece, but a coaxial turret-mounted machinegun gets no bonus. However, the turret-mounted weapon can have a higher aimed Accuracy than any of the other weapons, giving it a longer useful range.

Note! - If it is light enough (say anywhere in the -1d encumbrance penalty range), a bipod or tripod mounted weapon can be carried and fired from the hip. It would have an Accuracy of 0 if used like this.

Placed weapon(+6) - A placed weapon would be like a grenade or satchel charge. There is no real "weapon", just an poorly aimable means of doing damage and a means of triggering it. *This modifier cannot be used in conjunction with the "hand-held" modifier*. If you are throwing or placing it, this assumes you are already holding it in your hands. A thrown or placed weapon has an indeterminate upper size, depending on the campaign, but it should normally be around the normal lifting capacity of a normal person. For gameworlds where an **EABA** Strength of 2d+0 is the human norm, this would mean a maximum size of 100 millihexes (50 kilograms).

EXAMPLE: A satchel charge would be an easy technology(+3), half-lethal explosive(-3), one-use (+6), placed weapon(+6), for a total +12 modifier. So, an 8 millihex(-21) Atomic Era(+30) satchel charge would end up at +21, for a 7d+0 half-lethal explosion.

Strength-based(-9) - A Strength-based weapon is something like a knife, sword or axe. The final damage of the weapon is its *addition to punch* damage for melee purposes. The base modifier assumes the weapon can be used (or loaded) with one hand. The modifier is only -6 if it is a two-handed weapon.

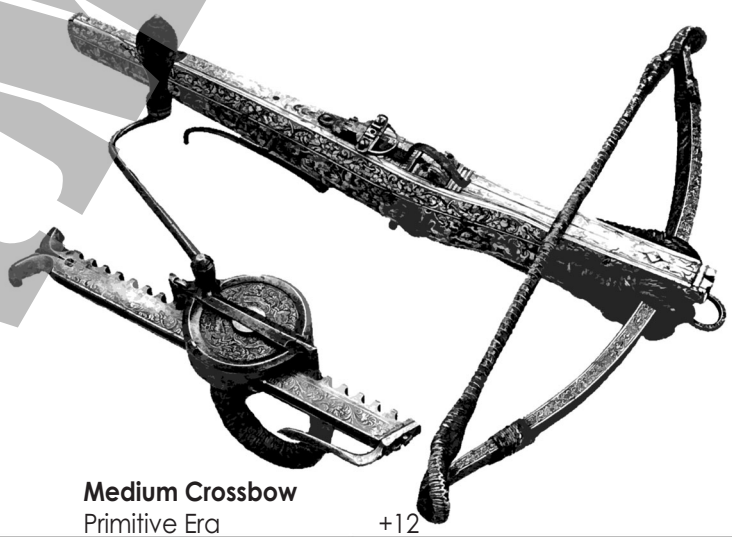
EXAMPLE: A melee weapon with a designed damage of 1d+0 does punch+1d lethal damage.

Strength-based weapons that do half-lethal damage get a +1 modifier to damage, and non-lethal ones get a +2 modifier to their damage. A normal ranged weapon that does not do lethal damage can also use these half-lethal or non-lethal modifiers.

An extremely important note for any Strength-based weapon is that ***all*** *modifiers on damage except tech era are divided by three, rounding down. This* ***includes*** *the Strength-based weapon modifier.* For instance, a +3 modifier becomes a +1, or a -6 modifier becomes a -2. Modifiers of less than +3 or -3, or any fractional amounts are not counted, unless there are enough of them to accumulate to +3 or -3, in which case they become a +1 or -1.

EXAMPLE: A 50% to weapon size is normally a +2. This would have no effect for a Strength-based weapon, since it is less than +3. However, if the weapon design also had a +1 modifier like half-lethal damage, the two together would add to +3, which would become a +1.

Thrown weapon(-12) - A thrown weapon is any projectile whose damage is directly or indirectly based on muscle power. This could be a thrown knife, spear or axe, but could also be a crossbow, bow or hand-cranked catapult. Grenades or other thrown weapons with *inherent* damage use the "placed weapon" modifier. A thrown weapon also gets the +1 for half-lethal damage and +2 for non-lethal damage, though few thrown weapons would ever be less than half-lethal damage. Since thrown weapons are Strength-based, all modifiers for them are divided by three as well.



Medium Crossbow

Primitive Era	+12
Easy technology	+1
8 millihex	-7
Bulky ammo (shotsx 1/8)	+1
One minute to reload	+1
Thrown weapon	-4
Basic Era bonus	+1
Shoulder-fired	+1
Modifier total	+6
Final damage	2d+0

(remember that modifiers are one-third normal value)

A melee weapon which can also be thrown (or vice versa) would just be designed with the same physical parameters for both aspects. It just might end up with different damage in the different ways it is used. Since the adjusted difference between the thrown and Strength-based is 1 point, a thrown version of a weapon normally does 1 point less damage than it does when normally wielded.

Strength-based or thrown weapons *always* start with Primitive Era damage, though their materials technology may be of any era and this will affect their Armor, Hits and cost. A weapon like a bow, crossbow or siege engine *can* be designed as a thrown weapon, but in practical terms many would be better designed as normal weapons with longer reloading time, possibly bulky ammunition, and a detrimental side effect on operation that limits their use to those with sufficient Strength to cock the weapon. This would be Strength minus 1d for weapons cocked by arm strength, and Strength for those where you can put your whole body into it. A weapon using stored mechanical energy and the "thrown weapon" modifier can only use Primitive Era damage as its base. However, as a special case, you get +3 to damage for each tech era past Primitive (+1 after dividing by three), or +1 to damage for each fraction of an era past Primitive (which may include fractions that round to +0 after dividing by three). This represents lighter or more advanced materials and technologies, like compound bows.

EXAMPLE: A Basic Era crossbow would be made out of wood and metal, while an Atomic Era crossbow could be made of carbon fiber and various synthetics. While the ergonomics of how a crossbow works mean the two crossbows are about the same size, the more efficient Atomic Era model will do +2 damage compared to a Basic Era model of the same size (and be considerably harder to cock).

A medium crossbow might start off as a Primitive Era weapon (+12), 8 millihex (-7), easy technology (+1), thrown weapon (-4), shoulder-fired (+1), for a damage of 1d+0. The Basic Era model would do 1d+1 damage, and the Atomic Era one would do 2d+0. Modifiers such as reloading time and bulky ammunition could combine to give more bonuses to damage. For instance, If you made the ammunition bulkier than normal (quarrels take up more space than bullets) and said the crossbow took extra time to reload, you could easily get +2 on the damages previously figured (see example to the left).

For weapons which would require the efforts of more than one person to cock, you would take the *average* Strength of those involved, and add +3 to their effective Strength each time you double the number of people involved. Extra mechanical leverage (like winches) is usually reflected in an increased reloading time modifier.

EXAMPLE: Eight 2d+0 individuals using a winch that takes a minute to crank could ready (in one minute) a "thrown" weapon with a modifier of +18 (or +6 after dividing by 3). This is +6 for their Strength, +9 for three doublings, and +3 for reloading time.

You normally design such a weapon by getting the size and tech era damage, then determinine the "minimum crew" (see the reloading notes on page 2.6) then figure out how long it takes that number of people to reload it and seeing if you want or need to add extra people.

EXAMPLE: A 16 hexagon Primitive Era trebuchet has a raw damage of +24 (+12 for era, +12 for size). So, it has a *minimum* crew of 4 (1 per 2d or +6). If the crew had Strengths of 2d+0, you would start off with +12 "cranking strength" (+6 base, +6 for two doublings). You can see that for any sort of final damage, it would take forever for four people to reload it and crank it into position (you would need a +12 from reloading time). Four people *could* do it, but you would want more.

ACCURACY MODIFIERS - Vehicle-mounted or emplaced weapons have a default Accuracy of half their damage *dice* (rounding nearest), while hand-held weapons have a default Accuracy of one-quarter their damage (rounding nearest).

Ranged weapons that are fired using two hands *and* braced on or over the shoulder (*or* using a bipod/tripod) get +1 Accuracy at no extra cost. All ranged weapons from the Basic Era or earlier get -2 to Accuracy (but may also get the "shoulder fired" bonus). Accuracy for weapons cannot be less than zero (they can't be *less* accurate when aimed).

EXAMPLE: A Basic Era rifle with a damage of 3d+0 would have an Accuracy of 0 (a base of 1, +1 for being shoulder-fired, and -2 for being Basic Era or earlier. This Accuracy *can* be bought up at an extra cost in Credits.

To buy extra Accuracy for a weapon (up to the limits for its tech era) can be done in two ways. One is in the **Weapon Cost** section (page 2.39), and is simply an "increased ability" for each +1 Accuracy. The other way is to use part of an "autonomous weapon" modifier (page 2.21) as an Accuracy bonus instead of a skill bonus.

LET'S SEE IF IT WORKS - That's all you need to design a vast array of conventional weapons. Can you really design up a practical weapon in a minute or less? Let's make a light machinegun that an Atomic Era soldier can carry around, something like the M-60 used by the United States.

Atomic Era weapon	+30
Average technology	+0
16 millihex weapon(8kg)	-18
Extra 25% size(+2kg)	+1
Autofire(reliable)	-3
Takes fifteen seconds to reload	+2
Bipod-mounted weapon	+2
Modifier total	+14
Total	4d+2 lethal damage

That's the weapon! It's 10 kilograms empty (a basic M-60 weighs about 11 kilograms empty). A 200 shot belt of ammunition has the same weight as the weapon (another 10 kilograms), and its base Accuracy is a quarter of its 4d+2 damage (round nearest), plus 1 because you need both hands and a shoulder to fire it, for total Accuracy of 2.

What about an archaic cannon? Something like you might find on a 17th century battlefield:

Basic Era weapon	+18
Late part of an era	+2
Average technology	+0
1 hexagon weapon(500kg)	+0
Takes a minute to reload	+3
Unreliable in wet conditions	+1
Manually aimed weapon	+1
Modifier total	+25
Total	8d+1 lethal damage

That's your cannon. It's 500 kilograms for *just* the cannon (a gun carriage is an advanced modifier (page 2.28)). Since 200 shots of ammunition has the same weight as the weapon (500 kilograms), we can figure about 2.5 kilograms per shot, which would make this cannon about what would be called a "six-pounder". Its Accuracy is a quarter of its 8d+0 damage (rounding nearest), or 2, minus 2 for being a Basic Era weapon (primitive aiming ability), for a total Accuracy of 0.

What about a melee weapon? Something like a nice longsword?

Primitive Era weapon	+12
Easy technology	+1
4 millihex weapon(2.0kg)	-8
Reduced 25% size(-.5kg)	ø
Strength-based weapon	-3
Modifier total	+2
Total	punch+2 lethal damage

There you go! Note how all the modifiers (aside from era damage) are divided by three. Melee weapons are always counted as Primitive Era for figuring the damage they do, but the materials they are made from may affect their armor, hits and cost. Handheld weapons have a base Accuracy of 0, so you get a weapon that does punch damage +2 in lethal damage for 1.5 kilograms.

Here is a fairly detailed basic design that you can reference back to later. This design project is the 40mm Mk19 autofire grenade launcher as used by the United States military.

Atomic Era damage	+30
Average technology	+0
Weapon of 125 millihex(62.5kg)	-9
Autofire(explosive weapon)	-9
Takes fifteen seconds to reload	+2
Explosive damage(lethal)	-6
Tripod mounted weapon	+2
Modifier total	+10
Final damage	3d+1 lethal explosive

This weapon has an empty mass of about 63 kilograms, and has ammunition of the default weight, so a belt of 200 grenades will also mass about 63 kilograms (.31 kilograms each). To compare, the actual weapon has a mass of either 43 or 54 kilograms, depending on which tripod you use, and the grenades weigh about .35 kilograms each. You could also design it around the grenade rather than the launcher:

Atomic Era damage	+30
Easy technology	+3
Weapon of .5 millihex(.25kg)	-33
50% extra space(+.13kg)	+2
One-use weapon	+6
Side effect	+1
Explosive damage(lethal)	-6
Placed weapon	+6
Modifier total	+9
Final damage	3d+0 lethal explosive

This gives a grenade that weighs about .38 kilograms. The operational side effect is that while it is a placed weapon, it *requires* the launcher to place it (you *can't* throw it manually). The launcher is designed much the same as before, but the costs of weapon and ammunition will be different.

This is an example of using the rules to design the same weapon two different ways, depending on the level of detail you want.

DESIGN PAGE 1 - If you are viewing this page as a pdf, it has forms that allow you to do many aspects of weapon design right here on the page, and then print off your finished design. *Cool, eh?*

Stuff! v1.0

0.000		Clear	Cancel

7	8	9	x	=
4	5	6	/	
1	2	3	-	
0	.		+	

Insert weapon name				
Middle	Atomic Era		d+	0
Average technology			d+	
Weapon of 1 hexagon			d+	0
No size adjustment		0	d+	
Normal rate of fire			d+	
Normal damage			d+	0
Reload as an action			d+	
Reliable			d+	
No side effects		0	d+	
No side effects		0	d+	
No special effect			d+	0
Normal ammunition (shots x 1)			d+	0
Normal weapon			d+	0
Normal damage			d+	0
Normal damage			d+	0
Handheld (shoulder-fired)			d+	
Normal ranged weapon			d+	0

Autocalc off	M60 LMG	Mk19 gren.
Reset form	6-pdr	Flamethrower

Weapon size		millihexes
Ammunition size per shot		millihexes
Enter shots carried/type	1	clip
Default Accuracy		
Enter Accuracy adjustments	0	
Default cost level		
Other cost levels (p.2.39)	0	
Approximate historical date		

Advanced design modifiers

Fixed mount weapon		d+	0
Conventional damage		d+	0
Direct fire weapon		d+	0
No submunitions		d+	0
Normal range (Level+10)		d+	
Normal range	0	d+	0
No proximity fuze	0	d+	0
Non-triggered weapon	0	d+	0
Normal technology		d+	0
Non-autonomous weapon		d+	0
Unguided weapon		d+	0
Normal targeting	0	d+	0
Normal speed weapon		d+	

No duration effect		d+	
Instant effect		d+	0
No area effect		d+	0
Normal effect		d+	0
Non-adjustable damage	0	d+	
Single weapon	0	d+	
No recoil compensation	0	d+	
No self-charging		d+	0
No gun shield/carriage		d+	
Not dismountable	0	d+	
No gizmos	0	d+	

Subtotal		d+	
Final weapon damage		d+	

Name	Uses	Accuracy	Damage	Shots	Weight	Cost	Armor	Hits
Insert weapon name	insert	0		Shots he	0	0Cr	1d+0	Hits

EABA Universal Scale

Level	Attribute cost	Lifting capacity	Kick damage	Distance	Size or movement	Time	Money	Information
-18	-	.2 kilograms	-	-	.004 meters	-	2Cr	-
-17	-	.25 kilograms	-	-	.006 meters	-	3Cr	-
-16	-	.3 kilograms	-	-	.008 meters	-	4Cr	-
-15	-	.4 kilograms	-	-	.011 meters	-	6Cr	-
-14	-	.5 kilograms	-	-	.016 meters	-	8Cr	-
-13	-	.6 kilograms	-	-	.022 meters	-	11Cr	-
-12	-	.8 kilograms	-	-	.031 meters	-	16Cr	-
-11	-	1 kilogram	-	-	.045 meters	-	23Cr	-
-10	-	1.3 kilograms	-	-	.06 meters	-	32Cr	-
-9	-	1.6 kilograms	-	-	.09 meters	-	45Cr	-
-8	-	2 kilograms	-	-	.12 meters	-	65Cr	-
-7	-	2.5 kilograms	-	-	.18 meters	-	90Cr	-
-6	-	3 kilograms	-	-	.25 meters	-	125Cr	-
-5	-	4 kilograms	-	.06 meters	.35 meters	-	175Cr	-
-4	-	5 kilograms	-	.09 meters	.5 meters	-	250Cr	-
-3	-	6 kilograms	-	.12 meters	.7 meters	-	350Cr	-
-2	-	8 kilograms	-	.18 meters	1 meter	.5 seconds	500Cr	-
-1	-	10 kilograms	-	.25 meters	1.4 meters	.7 seconds	700Cr	-
0	0A	13 kilograms	0d+0	.35 meters	2 meters	1 second	1KCr	1 word
1	1A	16 kilograms	0d+1	.5 meters	3 meters	1.4 seconds	1.4KCr	
2	2A	20 kilograms	0d+2	.7 meters	4 meters	2 seconds	2KCr	2 words
3	3A	25 kilograms	1d+0	1 meter	6 meters	3 seconds	2.8KCr	
4	5A	32 kilograms	1d+1	1.4 meters	8 meters	4 seconds	4KCr	5 words
5	7A	40 kilograms	1d+2	2 meters	11 meters	6 seconds	5.6KCr	
6	9A	50 kilograms	2d+0	3 meters	16 meters	8 seconds	8KCr	10 words
7	12A	63 kilograms	2d+1	4 meters	23 meters	11 seconds	11KCr	
8	15A	80 kilograms	2d+2	6 meters	32 meters	16 seconds	16KCr	20 words
9	18A	100 kilograms	3d+0	8 meters	45 meters	23 seconds	23KCr	
10	22A	126 kilograms	3d+1	11 meters	64 meters	30 seconds	32KCr	40 words
11	26A	159 kilograms	3d+2	16 meters	90 meters	45 seconds	45KCr	
12	30A	200 kilograms	4d+0	23 meters	125 meters	1 minute	64KCr	80 words
13	35A	252 kilograms	4d+1	32 meters	175 meters	1.4 minutes	90KCr	
14	40A	318 kilograms	4d+2	45 meters	250 meters	2 minutes	125KCr	160 words
15	45A	400 kilograms	5d+0	64 meters	350 meters	3 minutes	175KCr	
16	51A	504 kilograms	5d+1	90 meters	500 meters	4 minutes	250KCr	320 words
17	57A	636 kilograms	5d+2	125 meters	700 meters	6 minutes	350KCr	
18	63A	800 kilograms	6d+0	175 meters	1 kilometer	8 minutes	500KCr	640 words
19	70A	1.0 tons	6d+1	250 meters	1.4 kilometers	11 minutes	700KCr	
20	77A	1.3 tons	6d+2	350 meters	2 kilometers	15 minutes	1MCr	1,250 words
21	84A	1.6 tons	7d+0	500 meters	2.8 kilometers	23 minutes	1.4MCr	
22	92A	2.0 tons	7d+1	700 meters	4 kilometers	30 minutes	2MCr	2,500 words
23	100A	2.5 tons	7d+2	1 kilometer	5.6 kilometers	45 minutes	2.8MCr	
24	108A	3.2 tons	8d+0	1.4 kilometers	8 kilometers	1 hour	4MCr	5,000 words
25	117A	4.0 tons	8d+1	2 kilometers	11 kilometers	1.4 hours	5.6MCr	
26	126A	5.1 tons	8d+2	2.8 kilometers	16 kilometers	2 hours	8MCr	10,000 words
27	135A	6.4 tons	9d+0	4 kilometers	23 kilometers	3 hours	11MCr	
28	145A	8.1 tons	9d+1	5.6 kilometers	32 kilometers	4 hours	16MCr	20,000 words
29	155A	10.2 tons	9d+2	8 kilometers	45 kilometers	6 hours	23MCr	
30	165A	12.5 tons	10d+0	11 kilometers	64 kilometers	8 hours	32MCr	40,000 words
31	176A	16 tons	10d+1	16 kilometers	90 kilometers	11 hours	45MCr	
32	187A	20 tons	10d+2	23 kilometers	125 kilometers	16 hours	64MCr	EABA rules
33	198A	25 tons	11d+0	32 kilometers	181 kilometers	1 day	90MCr	
34	210A	32 tons	11d+1	45 kilometers	250 kilometers	1.5 days	125MCr	160,000 words

EABA Universal Scale

Level	Attribute cost	Lifting capacity	Kick damage	Distance	Size or movement	Time	Money	Information
35	222A	41 tons	11d+2	64 kilometers	362 kilometers	2 days	175MCr	floppy disk
36	234A	50 tons	12d+0	90 kilometers	500 kilometers	2.5 days	250MCr	320,000 words
37	247A	65 tons	12d+1	125 kilometers	725 kilometers	4 days	350MCr	
38	260A	82 tons	12d+2	181 kilometers	1000km	5 days	500MCr	640,000 words
39	273A	100 tons	13d+0	250 kilometers	1450km	8 days	700MCr	Bible
40	287A	126 tons	13d+1	350 kilometers	2000km	11 days	1BCr	1.3 mil. words
41	301A	159 tons	13d+2	500 kilometers	2800km	16 days	1.4BCr	
42	315A	200 tons	14d+0	700 kilometers	4000km	22 days	2BCr	2.5 mil. words
43	330A	252 tons	14d+1	1000km	5600km	1 month	2.8BCr	
44	345A	318 tons	14d+2	1400km	8000km	45 days	4BCr	5 mil. words
45	360A	400 tons	15d+0	2000km	11,000km	2 months	5.6BCr	
46	376A	500 tons	15d+1	2800km	16,000km	3 months	8BCr	10 mil. words
47	392A	640 tons	15d+2	4000km	23,000km	4 months	11BCr	
48	408A	800 tons	16d+0	5600km	32,000km	6 months	16BCr	20 mil. words
49	425A	1000 tons	16d+1	8000km	45,000km	8 months	23BCr	Encyclopedia
50	442A	1250 tons	16d+2	11,000km	64,000km	1 year	32BCr	40 mil. words
51	459A	1600 tons	17d+0	16,000km	90,000km	16 month	45BCr	
52	477A	2000 tons	17d+1	23,000km	125k km	2 years	64BCr	80 mil. words
53	495A	2500 tons	17d+2	32,000km	180k km	32 months	90BCr	CD
54	513A	3200 tons	18d+0	45,000km	250k km	4 years	125BCr	160 mil. words
55	532A	4000 tons	18d+1	64,000km	360k km	5 years	180BCr	
56	551A	5000 tons	18d+2	90,000km	500k km	8 years	250BCr	320 mil. words
57	570A	6400 tons	19d+0	125k km	700k km	10 years	350BCr	
58	590A	8000 tons	19d+1	180k km	1 mil. km	16 years	500BCr	DNA molecule
59	610A	10k tons	19d+2	250k km	1.4 mil. km	20 years	700BCr	DVD
60	630A	12.5k tons	20d+0	350k km	2 mil. km	32 years	1TCr	1.25 bil. words
61	651A	16k tons	20d+1	500k km	2.8 mil. km	40 years	1.4TCr	
62	672A	20k tons	20d+2	700k km	4 mil. km	64 years	2TCr	2.5 bil. words
63	693A	25k tons	21d+0	1 mil. km	5.6 mil. km	80 years	2.8TCr	
64	715A	32k tons	21d+1	1.4 mil. km	8 mil. km	125 years	4TCr	5 bil. words
65	737A	40k tons	21d+2	2 mil. km	11 mil. km	160 years	5.6TCr	
66	759A	50k tons	22d+0	2.8 mil. km	16 mil. km	250 years	8TCr	10 bil. words
67	782A	64k tons	22d+1	4 mil. km	23 mil. km	320 years	11TCr	
68	805A	80k tons	22d+2	5.6 mil. km	32 mil. km	500 years	16TCr	20 bil. words
69	828A	100k tons	23d+0	8 mil. km	45 mil. km	640 years	23TCr	
70	852A	125k tons	23d+1	11 mil. km	64 mil. km	1000 years	32TCr	40 bil. words
71	876A	160k tons	23d+2	16 mil. km	90 mil. km	1250 years	45TCr	
72	900A	200k tons	24d+0	23 mil. km	125 mil. km	2000 years	64TCr	80 bil. words
73	925A	250k tons	24d+1	32 mil. km	180 mil. km	2500 years	90TCr	
74	950A	320k tons	24d+2	45 mil. km	250 mil. km	4000 years	125TCr	160 bil. words
75	975A	400k tons	25d+0	64 mil. km	350 mil. km	5000 years	180TCr	
76	1001A	500k tons	25d+1	90 mil. km	500 mil. km	8000 years	250TCr	320 bil. words
77	1027A	640k tons	25d+2	125 mil. km	700 mil. km	10k years	350TCr	
78	1053A	800k tons	26d+0	175 mil. km	1 bil. km	16k years	500TCr	640 bil. words
79	1080A	1 mil tons	26d+1	250 mil. km	1.4 bil. km	20k years	700TCr	
80	1107A	1.3 mil. tons	26d+2	350 mil. km	2 bil. km	32k years	1QCr	1.25 tril. words
81	1134A	1.6 mil. tons	27d+0	500 mil. km	2.8 bil. km	40k years	1.4QCr	Libr. of Congress
82	1162A	2 mil. tons	27d+1	700 mil. km	4 bil. km	64k years	2QCr	2.5 tril words
83	1190A	2.5 mil. tons	27d+2	1 bil. km	5.6 bil. km	80k years	2.8QCr	
84	1218A	3.2 mil. tons	28d+0	1.4 bil. km	8 bil. km	125k years	4QCr	5 tril. words
85	1247A	4 mil. tons	28d+1	2 bil. km	11 bil. km	160k years	5.6QCR	
86	1276A	5 mil. tons	28d+2	2.8 bil. km	16 bil. km	250k years	8QCr	10 tril. words
87	1305A	6.4 mil. tons	29d+0	4 bil. km	23 bil. km	320k years	11QCr	