

## Research and Development

Adapted from Adventure. The rules may not exactly fit, but they come close and if you want to build a device they are a good framework upon which to hang the invention. These rules apply for creating any invention that duplicates a psionic power. Of course with some imagination, and the Storyteller's input, you can come up with a lot of new things. Decide on an interesting effect, determine the appropriate power level, then refer to "Effect," below to find the R&D time needed and the difficulty involved in creating the invention.

Before creating anything, a character must first have Ability mastery in the relevant Trait, as determined by the intended creation. Constructing a device requires Ability mastery in Engineering, creating an organism takes Medicine, and developing a compound requires Science.

The inventor must also have at least three dots in the Ability most appropriate to the proposed creation. Most often, this is the Ability used to operate the completed invention. So, a pistol that uses electricity to fire projectiles is based on Firearms; a miniature submersible is based on Pilot; a set of automatic lockpicks is based on Legerdemain; a remote-controlled motorcycle is based on Drive; and so on. In some circumstances, the primary Ability of Engineering, Medicine or Science is most suitable, in which case, no secondary skill is required.

The invention then goes through three distinct stages (regardless of whether it's an Advancement or an Innovation): research and development, construction, and use.

Research and development (R&D) can be a long and arduous process, though you don't have to roleplay it out. The time spent on researching information, designing schematics, performing tests and the like is normally considered downtime unless the Storyteller decides to interject a dramatic event of some sort (enemy attack, lab accident, reappearance of an old flame). With the desired research and development project declared, you must still determine two things: how long it'll take to complete the research and whether it's ultimately successful. The R&D roll, based on the character's Ability mastery dice pool, takes care of both those factors.

An inventor won't know if his theory was valid until he completes his research (or at least until after he's a fair ways into it already). These rules call for the roll to be made first, since the successes gained can influence the final time taken. The Storyteller may make this roll if she wants to keep some suspense as to the result. A successful roll indicates the research was favorable. A failed roll reflects some misstep along the way--in the experiments, in some aspect of the theory, etc.--but the basic idea remains sound. A botch reveals the theorized invention is beyond the character's capacity to create (it might also involve some kind of lab accident, depending on the botch's severity). An inventor may attempt a new period of R&D after a Failed roll, but he may never try creating the proposed invention again after a botch. Whatever the result, the character is committed to spending the time required in R&D.

The extra successes from the roll influence how long the research takes. Each design option has a minimum R&D time, listed in days (see the respective charts below). This time assumes the inventor spends roughly 10 hours of the day with no appreciable interruptions in a suitable facility. Standard success on the R&D roll means the character succeeds but takes the full amount of time listed. Each extra success on the

roll reduces this time by one day (to a mini- mum OF one day). Certain variables can further add to or take away From this time, as outlined below.

### Lab Time

The inventor isn't expected to spend all his time on R&D - it would put a serious crimp in his adventuring lifestyle if he did! The listed times allow for 14 hours each day the character Isn't spending in the lab - time spent eating, sleeping, socializing, investigating or attending to sundry other matters.

The inventor can sequester himself and do nothing else but pursue R&D, though. For every three days he's "locked in the lab," the inventor can reduce the total R&D time by one day. The character does nothing but work and sleep (the latter typically on a cot in the corner). Meals are haphazard affairs scarfed down while poring over data, and the inventor Forgoes any outside socialization. Conversely, if the inventor's work is interrupted For an appreciable time - having run out of materiel or resources needed For the project, being forced to leave the lab (willingly or otherwise) to deal with other matters and so on - the countdown pauses until he can resume his research.

### Research Assistants

The Adventure Era is a time of tremendous scientific excitement. Boundaries are being pushed in every direction, and many scientists will stop at nothing to b', the First to break new ground. For every upstanding and ethical researcher, there is a diabolical scientist who will break laws and ethics to achieve his goal ... including stealing designs and prototypes from fellow scientists! Not surprisingly, most inventors guard their research jealously, a great number of them working alone even though an extra pair of hands would help their work tremendously. Other inventors are not quite so paranoid and are willing to bring aboard skilled lab assistants. Yet even the most optimistic inventor understands that the possibility of betrayal exists in this environment. That new lab worker may have impressive credentials, but who's to say he's not spying for the sinister Machinatrix?

Some inventors are willing to take the risk for the sake of science. If nothing else, splitting the work among multiple people helps speed things along. The trick is get- ting assistants trained in the fields the inventor needs. If the inventor often a lucrative wage and or is working on a project that would get even the most jaded researcher frothing at the mouth, it's not hard to get good help. A research assistant gives the inventor additional dice for the R&D attempt, thereby adding to the chance of success on the project (and potentially reducing the time spent on research and development). The player gains bonus dice depending on the composition of the character's research team, as shown in the following table:

<b>Bonus Dice</b>	<b>Research Assistant</b>
1	Has 3 or more dots in the appropriate Ability
1	Has 3 or more dots in one or more related Ability

These dice pool bonuses are cumulative. If the research involves developing a new rapid-fire machine gun, a research assistant with Engineering (the primary Ability) 4 and Firearms (a related Ability) 4 adds two bonus dice. An inventor can have a maximum number of non-Inspired research assistants equal to the sum of his Intelligence and Charisma.

## Construction

Once the research is complete, the character must build his invention. This requires four things: time, funding, facilities and a copy of the completed plans for the invention. Yes, this means that a rival can steal an inventor's only blueprints--or vice versa!

Construction time is left to the Storyteller's discretion but should reflect the complexity and size of the invention in question, as well as the amount of science that went into it. A handgun that fires shotgun shells will take less work than a heavy-duty mineral mining submarine. The following table provides a general guide to construction time as a function of the total time spent on successful R&D:

<b>R&amp;D Time</b>	<b>Construction Time</b>
1-5 days	4 hours
up to 10 days	8 hours
up to 15 days	12 hours
up to 20 days	1 day
up to 30 days	2 days
up to 60 days	2 weeks
up to 120 days	1 month
up to 180 days	2-3 months
up to 270 days	3-6 months
over 270 days	6-18 months

Particularly intricate super-science may require a great deal of funding - while some scientists can build their hardware out of spit and baling wire, most would prefer to use freshly forged steel. The Storyteller is advised to set whatever financial requirements she sees fit, but getting Funding should be an occasional plot point rather than a constant irritant (unless the player insists on constantly devising expensive and unbalancing inventions). In general, the higher the inventor's Resources rating, the less of an issue funding becomes. Super-scientific success can even lead to more Resources, if the scientist markets his product properly.

In addition, most construction above the level of personal equipment requires a dedicated facility--a garage workbench isn't sufficient for zeppelin manufacture. This is a common-sense ruling. Assume that vehicular construction requires a facility at least three times as large as the vehicle itself. Chemical super-science requires a functioning lab, and medical super-science must have a surgical theatre.

## Field Testing

There's a running joke in the military that the most dangerous assignment isn't front-line infantry--it's assisting the munitions lab with R&D work. The same holds true for those brave (or foolish) souls who help scientists expand the bounds of modern technology. Advancements are typically more reliable than Innovations and are easier to use. Anyone with the appropriate Ability can use an Advancement: Firearms for an Advanced pistol, Drive for an Advanced car and so on.

Innovations are more complicated (tired of hearing that yet?). The user must first meet the invention's Usability requirements (see "Innovative Super-science," below). If he doesn't, he can't use it--period. Each use of the invention counts as an action, just like using one of the character's own Abilities or Knacks. The player rolls the invention's dice pool for its effect. If the character has the same Knack that the invention produces,

the player can roll the character's dice pool instead. Each use of an Innovation, successful or not, uses one charge. When the invention's charges are exhausted, it has one reserve charge left. This last charge is the Inspiration that keeps the invention in working condition. If a user drains the reserve charge, the invention breaks immediately after producing the effect - interior wiring melting to slag, delicate components fusing and so on - and cannot be repaired. As long as the inventor retains the schematics, though, he may construct a new invention.

### Repairing Inventions

Nothing runs perfectly forever (except for a perpetual motion machine, but if anyone's built it, they're not talking). When an invention is damaged or suffers malfunction (due to attack, wear and tear, a botch, dramatic editing or a convenient plot point), any character with Ability mastery in the appropriate field of study may perform repairs. Reverse-engineering is difficult, but a sufficiently adept specialist can do it, at the Storyteller's discretion.

### Advanced Science

The Following tables list the various options available to Advancements. A given invention may have a single option or may be equipped with multiple options. (An invention that has options and a is considered an Innovation.) The more options a proposed Advancement has, the more difficult it is to design and the longer it takes to create. The R&D column For each Advancement category shows the number of days the inventor must spend in research and development. An Advancement can only be applied once unless a given option explicitly lists that multiple levels are possible. The time listed is cumulative For all options and levels. So, a single level one option requiring seven days has an initial one week R&D time; increasing that option to level three and adding another level one option that takes 10 days shoots the initial R&D time to 31 days.

Each level beyond the First for a single option adds +1 Difficulty to all related R&D rolls (cumulative). This penalty applies even if the inventor adds one level, then enhances the invention with another level at a later date. Refining something gets trickier the Further you go, no matter the time taken in between steps. Unlike the successive refinements of higher levels, working on different options does not add to Difficulty (unless specifically indicated otherwise). It does increase the basic research and development time, however.

The options listed are by no means definitive. While the most common Advancements are to weapons or vehicles, virtually anything is Fair game For scientific improvement. Storytellers should allow players to introduce new enhanced weirdness--with approval, of course! Bear in mind that the systems in this chapter (as with this book as a whole) are meant to provide a streamlined, fun and easy to use framework by which players can give their characters neat things. The point is not to give players an excuse to make the most devastating creations imaginable, then run roughshod all over their opponents. The Storyteller shouldn't hesitate to say a proposed invention is too powerful or simply is not suitable For the game.

## Personal Weapons

Guns lend themselves prominently to enhancement, but other weapons such as crossbows and melee weapons may also be improved. Advanced guns tend to incorporate improvements that a modern--day gunsmith would recognize. Improved accuracy can come from ported barrels, ergonomic grips or even gyroscopic recoil compensation. Advanced damage can be reflected in better ammunition or more efficient use of the chemical energy released by existing ammunition. Increased ammo capacity and range and reduced size are just factors of a more efficient, streamlined and refined mechanical design.

Advanced melee weapons are masterworks that Muramasar or Wyrcon would envy. They conform to the wielder's hand as if an extension of his body, and their cutting edges and striking surfaces are so perfectly honed and shaped as to deliver more energy than would seem possible for something of the weapon's size and weight. It's amazing what you can accomplish by improving on the basis of the level.

A device may include no more than six personal weapon Advancement options in total.

<b>R&amp;D</b>	<b>Option</b>
3	+1 Accuracy (up to 3 levels)
7	+1 damage (up to 3 levels)
3	+50% ammunition capacity (up to 2 levels)
5	+50% range (up to 4 hours)
10	-1 conceal rating (J to P etc.); no smaller than P
7	Disguise true appearance (sword cane, umbrella, pistol, etc.) +2 Difficulty to Awareness to pierce the disguise.
15	Change damage type (bashing to lethal, lethal to bashing)

## Vehicle Weapons

Generally, Advanced vehicle weapons are just like Advanced firearms: more "modern, "man in and early 22nd--century sense. While they don't incorporate electronic targeting, some may have very sophisticated mechanical aids.

A device may include no more than six vehicle weapon Advancement options in total.

<b>R&amp;D</b>	<b>Option</b>
5	+1 Accuracy (up to 3 levels)
10	+1 damage (up to 3 levels)
5	+50% ammunition capacity (up to 2 levels)
7	+50% range (up to 4 levels)
10	Disguise true appearance (support beam, smokestack, etc); +2 Difficulty to Awareness to pierce the disguise.

## Vehicles

Airplanes, steam trains and touring automobiles! with the previous lists, assume each Advancement option is restricted to one level unless explicitly stated otherwise. The total vehicle options possible in a single invention depends on its size. A one- or two-person conveyance can have up to 10 vehicle Advancement options; up to a 12-passenger invention can have up to 20 vehicle Advancement options; anything larger can have up to 30 vehicle Advancement options.

R&D	Option
1	+1 passenger
2	+25% cargo capacity
10	+25% speed (safe and max) (8 level limit)
10	+1 maneuver (5 level limit)
15	+1[2] armor (3 level limit)
10	Conceal existing armor (purchase to armor level)
1	Personal-scale weapons mount (e.g. machine gun)*
5	Vehicle--scale weapons mount (e.g. 3" cannon)*
1	Conceal existing personal--scale weapons mount
5	Conceal existing vehicle--scale weapons mount
10	Heavy industrial equipment (e.g. mining drill crane)
2	Living quarters (Barracks, 4 occupants)*
3	Living quarters (luxury, 1 occupant)*
20	Mobile laboratory*
20	Support facilities for 1 smaller vehicle (e.g. airplane or helicopter hanger)*
10	Improved fuel efficiency (2x normal) (5 level limit)
50	Extra movement mode (e.g. submersible, airplane or hovercar)

\* = This option allows multiple levels. This option is not an increasing refinement of a basic design, so the additional levels do not add to the R&D roll difficulty. Further, the specific level limit depends on the vehicle. Due to the wide range of sizes inherent in vehicles, the Storyteller must apply common sense. A motorcycle won't support the same range of modifications that a dirigible will--just try making 4 men live off the back of that cycle! In additions, it may be easiest to get a copy of a photograph, schematic or blueprint of a typical vehicle and sketch on the proposed additions. If it looks completely implausible even for the genre, it probably is.

### Medical Experimentation

Characters may sidestep their fellow doctors' limits, particularly when performing physical alterations to subjects. Such practice is usually the tool of demented villains no respectable physician would perform chitin on unwilling soldiers!--but some heroes may Find it worth the medical risks and social costs to gain an extra edge in the fights of their lives

Each super-surgery subject is different, and thus, a given procedure must be planned separately For each individual recipient the R&D time remains the same, the actual procedure's duration differs from that required to construct a device. To keep things simple, a super-surgery procedure requires one hour for every day of R&D, with a minimum of four hours. The surgery must be performed in one stretch--it's impossible to split up a single super-scientific surgical procedure. A lead surgeon (minimum Medicine 4 Ability rating) must attend at all times. Particularly long operations may require multiple teams of doctors. Super-surgery reduces the subject to the Crippled health. He must heal up from this naturally (unless a psion or a super-drug speeds his recuperation). Botches during surgery tend to be fatal. Botches during the planning stage usually results that don't turn out quite as anticipated Dr. Moreau, anyone?

Caution: Side-effects may result! Even with a Fully successful operation, adding chitin plating or a prehensile tail can cause certain compensatory limitations. Armor may reduce the character's movement rate, a tail may make most seats painfully confining, and any alteration that makes the character obviously more than human can hamper social interactions. In general, every two obvious non-human options impose a +1

Difficulty on all Social rolls, except those that are specifically intended to inspire fear or loathing.

An organism may include no more than 10 medical Advancement options in total.

<b>R&amp;D</b>	<b>Option</b>
20	Muscle implantation (+1 Strength) (3 level limit)
40	Nerve tweaking (+1 Dexterity) (2 level limit)
20	Structural reinforcement (+1 Stamina) (3 level limit)
15	Sensory enhancement (+1 Perception) (3 level limit)
90	Brain augmentation (+1 Intelligence) (2 level limit)
90	Brain augmentation (+1 Wits) (2 level limit)
5	Plastic surgery (+1 Appearance) (3 level limit)
60	Pheromone implantation (+1 Manipulation) (2 level limit)
75	Lobotomatic behavioral modification (+1 Charisma) (2 level limit)
20	Dermal thickening ([2/0] armor)
60	Subdermal chitin implantation ([1/3] armor)
120	Exoskeletal transplantation ([2/4] armor)
60	Minor animal transplant (surface, minimal connections--e.g. whiskers)
120	Intermediate animal transplant (surface, extensive connections--e.g. tail)
240	Major animal transplant (internal, extensive connections--e.g. claws)

## Chemistry

Better living through chemistry! Enhancements to this Field are as varied as the players and the Storyteller can conceive. Many accomplishments are pharmaceutical in nature, though Advanced chemistry can find uses in constriction or destruction. It is possible to mass-produce Advanced compounds. A note to the wily Storyteller: Advanced drugs are no strangers to odd side-effects. Look at a list of possible problems that modern antibiotics can generate, and go from there--particularly if someone botches during the formulation (R&D) stage ....

A compound may include no more than three chemistry Advancement options in total.

<b>R&amp;D</b>	<b>Option</b>
5	Attribute enhancement drug (+1 for one scene) (3 level limit)
10	Reflex enhancement drug (+2 Initiative for 1 scene) (3 level limit)
20	Acid (3 dice lethal damage) (3 level limit)
20	Advanced poisons (3 dice lethal damage) (3 level limit)
25	Mind control drugs (reduce victim's Willpower by 3 points)
30	Silk--steel (clothes with [2/4,0] armor protection)
40	Superfuel (10x fuel efficiency, +25 % speed) (2 level limit)
60	Advanced alloys (half weight for metal items)
60	Healing enhancement drug (heal lethal damage at bashing speeds)
270	Anti-aging drugs (age 1 year per decade)

## Innovative Super--Science

Innovations venture into an area untouched by Advancements. An Innovative invention is something that does not currently exist in our real world, it's the product of hypothetical science. It may include any of the options available to an Advancement, but an Innovation's main function is to channel subquantum waves to produce an effect similar to those generated by psionics. Put another way, Innovations duplicate psionic

effects. All Innovations have the following Traits, each of which influences the difficulty of the initial Ability mastery roll and the time spent in R&D:

**Effect:** This Trait is the psionic equivalent that the invention produces. A level one psion takes 30 days; a level two psion takes 60 days; a level three psion takes 90 days. The Inspired are physiologically incapable of generating psions above level three, but with super--science, inventions can produce the equivalent of up to level Five effects! (Refer to “Pushing the Envelope.”) Making such an invention is no easy task: A level Four psion effect takes 120 days at +2 Difficulty, and a level five psion effect needs a whopping 200 days at +3 Difficulty. Still, with time and Inspiration, all things are possible. A given invention can only produce one psionic effect.

**Dice Pool:** Use this pool when rolling the invention’s psionic. The invention begins with a base dice pool equal to half what the user’s would be if he had the psion questron (rounded down). Refer to the specific psion description to determine the appropriate dice pool. Each additional die up to what would be the character's equivalent dice pool adds three days to the R&D time. Each die past that, up to one-and-a-half times the character's equivalent dice pool (rounded up), takes nine more days and adds +1 Difficulty to the Ability mastery roll.

**Secondary Function:** This Trait covers any non-Inspired options the invention might have. Choose from the Advancement options listed above and apply R&D times and difficulty modifiers as appropriate to the variables by the Effect above. An Innovative invention may have up to 10 options or the amount listed for the item type, above, whichever is less. Secondary functions do not require subquantum energy to operate (see “Powering Innovations”).

**Usability:** Inventions don’t always have standardized controls - indeed, they’re often too esoteric for a conventionally minded operator to comprehend. Any Innovation is automatically usable by its creator. With +1 Difficulty to the initial R&D roll, the inventor can make the invention usable by any of his own type of Inspired character. For +2 Difficulty, the invention is usable by any type of psion. For +4 Difficulty, even the normal can use the device, though this also requires a psionic energy source (see below). These difficulty ratings are not cumulative.

**Durability:** “Kick it and it’ll start working again” isn’t always the best solution. Each invention has a soak rating and health or structural levels equal to one less than those of its least durable material component. The inventor can increase this durability by applying +1 Difficulty to the initial Ability mastery roll for each extra soak point or each extra health/structural level. Each score is restricted to twice its base rating.

**Warranty:** All Innovations have a base life expectancy, after which point they grow increasingly unreliable (a hallmark of super-science). Once the invention is constructed, the player rolls the Ability mastery Trait used in the initial R&D. The successes rolled indicate the number of months the invention functions reliably. At the end of this life expectancy, the invention has about a week of unreliable functionality left, sometime during which it fails at a dramatically appropriate moment (Storyteller’s discretion). The inventor can increase this period of functionality by giving the invention an overhaul before its standard functionality expires (see “Rebuild,” below). To ensure an invention has an “unlimited” warranty--that it always runs smoothly (barring targeted damage or outright destruction, of course) - the inventor may spend one permanent Willpower on his creation when it’s built or during a rebuild period. (If applied to an invention made

during character creation, the limit on the character's number of starting inventions is based on his Willpower rating before that invention was made and does reduce his starting temporary Willpower pool.)

### Rebuild

With a rebuild, the character completely disassembles and reassembles the invention, cleaning every part and replacing anything that's wearing out. The player makes a new Ability mastery roll, which starts its warranty afresh (see above). To maintain a sense of mystery about how well an invention truly functions, the Storyteller may make the roll and keep the results secret. A complete rebuild takes roughly one-tenth the time it took to construct the invention in the first place and requires the same Willpower expenditure. Obviously, the invention cannot be used while it's being rebuilt.

### Powering Innovations

An Innovation requires telluric energy (Inspiration) to Function. An Inspired character who can operate the invention may spend her own Inspiration to power its effect, just like she would For a Knack. This act can be literally draining, though, so most inventors attach a subquantum energy source to the invention. A telluric energy source has a unique resonant Frequency and electromagnetic Field that absorbs the ambient telluric radiation flowing through the entire known universe, which can power all manner OF equipment. Artificial and natural cells are available (see below), though both are extremely rare. Size and mass are directly dependent on storage capacity, as listed below:

<b>Capacity</b>	<b>Mass</b>	<b>Size Equivalent</b>
1	100 grams	Modern D cell
2	500 grams	Modern soda can
5	2 kilograms	Gallon paint can
10	10 kilograms	Five-gallon paint bucket
25	250 kilograms	55--gallon oil drum
50	2 tons	Small car
75	5 tons	Large truck
100	20 tons	Small house