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INTRODUCTION

This is a sequel to ***Ultra-Tech*** *Revised Edition.* Like its parent, it's a sourcebook for ***GURPS Space, Supers*** **and** ***Cyberpunk*** campaigns, or any other setting that requires exotic technology.

We've tried to be a bit more generic this time around. For example, you'll find suggestions for alternative versions of several baseline technologies, such as lasers, blasters and force fields, along with discussions on setting up alternative technology paths.

The toys in ***Ultra-Tech*** *2* are sorted by Tech Level and function. Each chapter describes a general class of technologies. Smaller subsections organize gadgets from their lowest to highest Tech Level, just as in the ***Ultra-Tech*** *Revised Edition.*

About the Author

David L. Pulver once lived in various places around the world, but is currently lurking in Kingston, Ontario (that's in Canada). He's been designing and writing professionally since 1989. The original ***Ultra-Tech*** was his first book.

ABOUT GURPS

Steve Jackson Games is committed to full support of the ***GURPS*** system. Our address is SJ Games, Box 18957, Austin, TX 78760. Please include a self-addressed, stamped envelope (SASE) any time you write us! Resources now available include:

Pyramid **(www.sjgames.com/pyramid). Our** online magazine includes new rules and articles for ***GURPS.*** It also covers all the hobby's top games - ***AD&D, Traveller, World of Darkness, Call of Cthulhu, Shadowrun*** and many more - and other SJ Games releases like ***In Nomine, INWO, Car Wars, Toon, Ogre Miniatures*** and more. And ***Pyramid*** subscribers also have access to playtest files online, to see (and comment on) new books before they're released.

New supplements and adventures. ***GURPS*** continues to grow, and we'll be happy to let you know what's new. A current catalog is available for an SASE. Or check out our Web site (below).

Errata. Everyone makes mistakes, including us - but we do our best to fix our errors. Up-to-date errata sheets for **all** ***GURPS*** releases, including this book, are always available from SJ Games; be sure to include an SASE with your request. Or download them from the Web - see below.

Q&A. We do our best to answer any game question accompanied by an SASE.

Gamer input. We value your comments. We will consider them, not only for new products, but also when we update this book on later printings!

Internet. Visit us on the World Wide Web at **www.sjgames.com** for an online catalog, errata and updates, and hundreds of pages of information. We also have conferences on CompuServe and America Online. ***GURPS*** has its own Usenet group, too: rec.games.frp.gurps.

GURPSnet. Much of the online discussion of ***GURPS*** happens on this e-mail list. To join, send an e-mail message to majordomo@io.com with "subscribe GURPSnet-L" in the body, or point **your** World Wide Web browser to this URL: **www.io.com/GURPSnet/www.**

Page References

Rules and statistics in this book refer to ***GURPS Basic Set, Third Edition, Revised.*** Any page reference that begins with a B refers to the ***Basic Set*** - e.g., p. **B102** means page 102 of the ***GURPS Basic Set.*** UT refers to ***GURPS Ultra-Tech, Revised Edition,*** **S to** ***Space,*** **RO to** ***Robots,*** **CI to** ***Compendium 1*** **and CII to** ***Compendium II.***

Only ***Basic Set*** and this book are required to play. ***GURPS Space*** **and -** ***Tech*** might be handy.


MESSAGE DATA
chapter ONE
STATUS
ACTIVE
ALERT
SJC-23
CHANNEL
SECURE
: TECHNOLOGY
VIDEO TRANSMISSION SCREEN
live feed Vega VII
AS A DYNAMIC PROCESS, INVENTION DEPENDS AS MUCH ON SERENDIPITY AS ON ORDERLY RESEARCH AND DEVELOPMENT.
4
::TECHNOLOGY::

The standard ***GURPS*** tech levels represent just one of many paths describing how different technologies pace one another in development. While we've assumed humans followed this particular course of technical advancement in the standard ***GURPS Space*** background, that need not be the case.

The tech levels of the various items in this book and in ***Ultra-Tech*** should be treated simply as guidelines - a particular culture (human or alien) could develop some technologies more rapidly than others. This might result from accident, simple economics, a ban on research in certain areas or the way the laws of physics work in that particular universe. In the last case, of course, the changes will affect everyone, rather than a particular culture.

ALTERNATIVE TECHNOLOGY

A few "alternative technology" concepts appear below. Feel free to use them, modify them or create your own. They can also be combined, e.g., cyberpunk-hard science.

CYBERPUNK

In many science-fiction worlds, advances in cybernetics, medical science and some computer technology race ahead of other technologies, particularly those of beam weapons and high-energy physics. For example, a typical cyberpunk world may be TL8, but gadgets in these categories may be available at a higher TL:

Body and Brain Modifications: Many cyberpunk worlds have TL9-11 (or higher!) body and brain implants.

Computers: Megacomputers, gestalt computers and even Ghost Comps optionally can be available.

Communications: TL9-11 neural interfaces may exist.

Entertainment: Sensies, Dreamgames and Electronic Ecstasy may exist.

Medicine and Biotechnology: Suspended animation, braintaping, brainwipe and brainburn can show up in an otherwise TL8 cyberpunk campaign.

Melee Weapons: Monowire weapons fit into the genre earlier than their normal introduction.

Stealth: Chameleon and intruder suits optionally may be available, since these essentially rely on high-grade computerized image processing built into the suit.

Wonder Drugs: At the GM's option, TL9 and even TL10 wonder drugs and Instaskill could be available.

The GM will have to decide whether a particular post-TL8 technology has its normal cost or is more expensive. For example, in ***GURPS Cyberpunk*** neural-interface implants cost more, but other TL10 implants are at their regular price.

In some "early" cyberpunk worlds (such as ***GURPS Cyberworld)*** many of these advances will be rumors - but others may be hidden in a corporate lab or loose on the street!

EMERGENT SUPERSCIENCE

Teleport booths in the early 21st century? Force swords and grav belts at TL9? Why not?

Gravity manipulation, force fields of any type, teleportation, reactionless thruster, faster-than-light (FTL) stardrives, FTL radio and time travel all require exotic breakthroughs (or breakdowns) in the laws of physics. These breakthroughs could occur at an earlier (or later) tech level than suggested in ***Ultra-Tech*** or ***Space.*** This lets the GM construct a society that resembles our own, then explore the changes these inventions bring. Good examples of this are several short stories by SF author Larry Niven that focused on the development of teleportation booths in a near-future

IMPROVEMENTS AT HIGHER TLS

All items in this book are listed at the Tech Level (TL) at which they were first introduced. Any technology from lower TLs may be available at higher TLs.

One TL after it first appears, any equipment, as well as wonder drugs, computer programs and services such as medical procedures, costs half as much. Two TLs after introduction prices halve again, to one-quarter the starting price. Price does not decrease further unless specified.

For some equipment additional modifiers apply:

Gadgets

Unless specified otherwise, all devices except weapons, power cells, body armor, vacc suits and other survival suits weigh half as much one TL after introduction and one-quarter as much two TLs later. Many gadgets also improve in effectiveness.

The weight of a gadget will never drop below 10% more than the weight of its power cells!

Armor

Higher-TL versions of armor have increased DR; see the individual descriptions for each type.

Power

Any equipment that runs off power cells gains shots or increased operating time at higher tech levels. This adds 50% to original operating time or shots at each tech level after introduction, reflecting that higher-tech power cells *hold more* power.

Many devices also use the power better at higher tech levels. For weapons, this means shots are more powerful, as well as more plentiful!

For weapons that fire projectiles, but use power cells to provide the energy to operate their mechanism (Gauss guns, chainguns, etc.) the number of shots that can be fired using one power cell increases as above, but the actual rounds in the magazine, ammo cassette or whatever will remain the same. (If this distinction is too much work, GMs should ignore it.)

WEAPON IMPROVEMENTS

Energy Weapons

Energy weapons include all beam, Gauss and Grav weapons, and powered melee weapons such as vibroblades and force swords. For each TL after introduction, add +1 to an energy weapon's damage for every I d of damage it normally inflicts. For weapons with damage adds, 3+ points of existing damage adds also gives a +i. Range also increases; add 10% to 1/2D and Max range per TL after the weapon first appears.

Improvement Limits: Unlike number of shots, damage and range only increase for the first three TLs after the weapon's introduction.

Other Weapons

Conventional slugthrowers and other chemical or spring-powered weapons do not increase in damage, but advanced ammunition types come into use. Explosive warheads have a 50% increase in damage at TL9 (reflected in the weapon description), but after that do not gain in power. Other types of warheads (sonic, nuclear, etc.) do become available at higher TLs.

society. ***GURPS Time Travel*** describes settings where time or dimension travel becomes available at a relatively low TL.

Another common variation involves a starfaring society in which advanced space drives (and sometimes contragravity) exist, but other technology is mid-TL7 or so. A lot of the best 1960s-era military SF used this approach - no beam weapons, Gauss guns or combat armor, just steel helmets and auto-rifles.

HARD SCIENCE

For a campaign in which the laws of physics as understood today better apply **to** the ***GURPS*** world of tomorrow, try these changes:

Beam Weapons: Severe technological challenges face anyone trying to design a hand-held, high-energy weapon - especially some SF standbys such as the sonic stunner (how do you get a unidirectional beam?) and portable x-ray and particle-beam weapons. GMs may want to use some of the rules for raygun control (p. 12) and the power-cartridges rule (p. 60).

For more brutal realism, make these changes: lasers (unless designed using the chemical-laser option) appear two TLs late; flamers, blasters and pulsars appear three TLs late; disruptors and electrolasers one TL late, but all other beam weapons (X-ray lasers, nerve guns, stunners, grasers, etc.) appear four TLs late (or are TL16). Big beam weapons - anything mentioned in the ***GURPS*** *Space* ship-design rules, or any 10,000+ kilojoule weapon built with ***Vehicles*** - appear one TL earlier than the above; thus, ships and tanks could mount lasers by TL9.

Sensors: Bioscanners require physical contact to perform a "scan." Chemscanners have only 1 % of listed range. This also applies to chem- and bio- functions of multi-scanners.

Medicine: Cloning at accelerated "force-growth" speeds is very unlikely (TL 14+). In that case, braintaping becomes harder, as the clone must mature at normal speed. Braintaping also can be assigned a higher TL - possibly TL11+.

Computers: Processing power may actually be *better* than indicated. GMs may wish to allow a jump of +2 Complexity per TL, rather than +1, and increase computer data storage by a factor of 100 rather than 10 every TL, at least from TL8 to TL10. This better reflects projected advances in computer technology.

Faster-than-Light Drives: A rigorously hard SF campaign won't use an FTL drive, instead relying on slower-than-light travel. If FTL drive is used, some form of faster-than-light radio, warp drive or instantaneous jump drive making use of exotic physics is barely plausible. See ***GURPS Space*** for a full explanation of different drive technologies and ***GURPS Vehicles*** *2nd Edition* for many additional slower-than-light alternatives.

Force-manipulating technology: Force-field technology - including force shields, deflectors, force screens, force swords, wards, life-support belts, force beams, and stasis fields or weapons - can move up to TL16 or become unavailable. This will increase reliance on heavy armor and ordinary vacc suits.

Gravitic and reactionless-thruster technology of all sorts - including devices that use reactionless thrusters, gravity beams, grav guns, contragravity, or tractor and pressor beams - should become either unavailable or TL 16. Mostly this will reduce the mobility of individuals at high TLs. This can be a good thing for a GM, since it's hard to make wilderness travel challenging if everyone has grav belts! It also affects the design of spacecraft. (A compromise is to allow artificial gravity for spaceships and vehicles, but not other gravitic technology.)

Eliminating contragravity does not mean that humans will never use gravitic technology. In a hard-science universe, gravity control may be possible via creations such as planetary-mass black holes. This might be used in a huge space ship, but isn't something you'd build into your backpack!

Power Cells: These may not store and release energy as efficiently. A simple fix is to rule that power cells store the same energy, but cannot release it quickly enough to be useful for beam weapons - *use power cartridges* instead.

THE NANOTECH REVOLUTION

GURPS Ultra-Tech makes the playable assumption that molecular nanotechnology (precise engineering of molecules) will develop gradually beginning between TL9 and TL11 before maturity at TL 13. Many futurists don't share this tame assumption. They predict a mature molecular nanotechnology will arrive within 20 to 50 years. creating a society that can build nearly anything for practically nothing.

Such a rapid nanotechnology revolution requires a minimum mid-TL8 background in chemistry and biotechnology. After it begins, spinoff factors will result in across-the-board development in many other technologies, partly due to a vast increase in computing power and materials technology. The TL will increase by one every 2d years until stabilizing at TL13.

For realism, a Nanotech Revolution should combine with the Hard Science pathway - thus, a revolution in nanotech won't quickly produce things like contragrav, force fields or hand-held fusion guns.

HIGH BIOTECH

In this path, inventions in biotechnology outpace inorganic chemistry and metallurgy. This is a common way to differentiate odd alien technologies from human ones, but also can be applied to a particular human society.

In such a culture, biochemical weapons, biocomputers, most biotechnological and medical technologies, wonder drugs and purely organic body modifications will appear one or more TLs in advance of everything else; usually the overall tech level is at least TL8, but the biotech TL is higher. Some other equipment (plastiskin, bioplastic, freeze tube, sensa-skin, braintaping and cloning equipment, viral solvent, chrysalis machine) also may appear at an earlier tech level. If the biotech TL is set high enough (usually TL11+), biological analogs of other devices may also be available, at the GM's option. For instance, automeds or infrared goggles might be gene-engineered living creatures!

In the reverse of this - "low biotech" - the inventions and gadgets described above lag one or more TLs behind everything else. This could result from a deliberate moratorium on biotechnological research for religious or ethical reasons. Or a human colony on another world that had regressed to a primitive state might lag in biotechnology because human biology would differ from all other life forms on the planet. This would keep Experiments on animals from easily translating to humans.

NANOTECH

Nanomachines (sometimes called nanites, nano or nanobots) are cell-sized or smaller programmable robots that manipulate individual atoms and molecules. This molecular engineering is called molecular nanotechnology.

Nanotechnology can be used to manufacture things from the bottom up, starting with atoms and molecules and assembling them into more complex structures. It gives precise control over the structure of matter, making products stronger, smaller, smarter, lighter and cheaper. Computers become vastly more powerful and much tinier, allowing creation of microbots that can be used for everything from medical treatment to sabotage. Reconfigurable or shape-altering materials are easy to make, as tiny motors, light-emitting devices and computers can be incorporated into their structures. Many nanofactured devices use diamond or diamond fiber - easily assembled from carbon using molecular materials - as a structural material. Items built by nanomachines often appear seamless, with no obvious toolmarks. For more details on nanotechnology, see *nanofacs* on p. 21 and *The Nanotech Revolution* on p. 7. Various nanotech gadgets also are described in this book. The use of nanotech in robotics is covered in Chapter 3 **of *GURPS*** *Robots.*

Microtech vs. Nanotech

The prefix "nano" simply means very small, or in scientific terminology, refers to "one-billionth" size. When applied to a product, it usually means it was made by nanomachines, but it can also mean it *uses* them. Specifically, nanotech refers to the precise manipulation of nanometer-scale objects; i.e., objects that are on the order of one-billionth of a meter in size. A useful comparison is to the wavelength of light (about 400-600 nanometers).

GMs should not confuse smart materials and microbots (common *products* of nanotechnology) with the actual nanomachines (the things that cheaply manufacture them). Many types of smart material and microscopic (but not molecular-scaled) robots can be built using traditional top-down manufacturing techniques.

Continued on next page . . .

NANOTECH

Wealth and Ultra-Tech

The cumulative benefits of robot-factories, AI-computer services and nanotech likely will increase personal wealth greatly at higher TLs. Whether this happens - and whether the material benefits extend to the public at large - largely depends on the way society is organized, the availability of key production technologies and factors such as overpopulation and resource depletion.

In some settings starting wealth may not noticeably increase - the future simply brings better goods, and price breaks for lower TL goods, as in the ***GURPS*** standard rules. (Note that this essentially represents a slight increase in prosperity, as more and more basic goods receive the lower-tech price breaks and energy costs decline drastically.)

In other settings, advancing technology also improves overall prosperity, as measured in greater starting wealth and income. One possible schedule for increasing starting wealth and job income is:

TL9 x2
($30,000 average starting wealth)

TL10 x *5*
($75,000 average starting wealth)

TL11 x10
($150,000 average starting wealth)

TL12 x 20
(300,000 average starting wealth)

TL13 x 50
($750,000 average starting wealth)

TL14 x 100
($ 1.5 million average starting wealth)

TL15 x 200
($3 million average starting wealth)

TL16 x 500
($7.5 million average starting wealth)

Continued on next page . . .

RETROTECH

While science-fiction writers predicted robots, hyperdrive and nuclear power, the invention of transistors and microchips caught everyone by surprise. As a result, many famous science-fiction settings conceived as late as the 1960s feature highly advanced physics but drastically inferior electronics. This isn't necessarily bad: it can make for a more exciting space-opera campaign. Without the realistic crutch of smart computers and advanced cybernetics, adventurers have to rely more on their own skills and less on those of their machines.

GURPS Lensman describes how retrotech may function in a particular classic space-opera background. Use these guidelines for a more generic version of retrotech:

Computers: All varieties of computer do not decrease in size, weight or cost as TLs increase. Complexity is reduced by 1 (so a personal computer is complexity 1 at TL8) and only increases at a rate of +1 per *two* full TLs after the system appears. Computer programs never have their own skill levels unless the computer is sentient; they can only aid an operator's skill. Expert-system programs only work for sentient computers. Mass storage at TL8 is 1% of that listed, and only doubles rather than increasing ten-fold for every TL after TL8. Disks are unavailable; portable mass-storage units (tapes) must be used to transfer data. In some settings, sentient computers are completely unavailable. Optical computers don't exist.

Cybernetics: Bionic eyes, ears and limbs may be available. Most other modifications, especially neural-interface technology and chip slots, are unavailable.

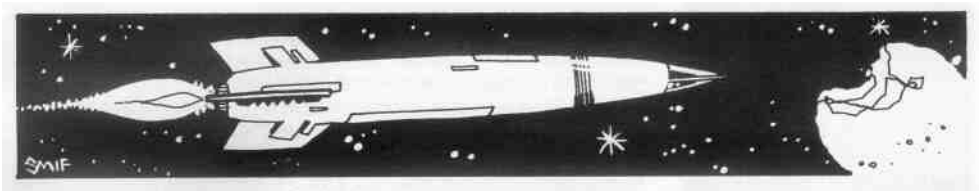
Entertainment and Communications: Virtual Reality, Sensies and Dreamgames do not exist.

Lasers: For a true "classic" feel, lasers (and all related technology, such as compact-disk players, X-ray lasers and grasers) can be banned.

Robots: These may or may not exist, within the limitations described for computers above. If available, they usually possess human shape but an artificial appearance.

Other Gadgets: Gadgets incorporating or relying on small, dedicated computers (such as multiscanners and TL10+ weapons) no longer have them. Devices that store data on computer disks (such as digital cameras) are unavailable. HUDs and holographic HUDs are unavailable.

Nanotechnology: Devices described in this book as relying on nanotechnology are unavailable. This category also includes cybersuits, chrysalis machines, industrial replicators and living metal from ***Ultra-Tech.***



Retrotech doesn't have to be space-opera in flavor: a TL9-13 retrotech setting also can give a similar feel to 1940s and 1950s novels by SF masters such as Asimov, Clarke, Heinlein or Piper. For very limited retrotech, combine it with the Hard Science pathway!

A retrotech setting might also be *artificially* imposed: Frank Herbert's *Dune* series is a good example of this.

SAFETECH

In this technology path, physics and engineering have advanced dramatically (often to TL12-15 levels), but advances that alter the way people think, modify the human body or brain, drastically extend lifespan, or threaten to replace humans with machines are retarded or suppressed. Usually this is for ethical reasons, or because of past wars or disasters that involved the technology.

Without advances in these areas, humans at TL12-15 won't be much different from TL7, other than enjoying space travel and (potentially) greater prosperity. This background is popular in a lot of science-fiction series, especially those with their roots in the 1960s-1970s.

Medicine: Braintaping and human cloning have not been perfected yet, nor has any workable form of anti-agamic, immortality or "rejuvenation" treatment for aging.

Computers: Sentient computers normally are unavailable. A complexity 7+ neural-net can spontaneously become self-aware, but on a roll of 3 rather than 6 or less.

Cybernetics and Neural-Interface Technology: These are unavailable except for the simplest bionic replacements (e.g., an artificial heart, eye or hand), which use TL8 technology.

Genetic Engineering: Nothing more sophisticated than plants or microorganisms is modified, and rigid controls apply.

Nanotechnology: Self-replicating or volitional nanomachines are taboo, most especially living metal and medical or military nanotechnology. Industrial nanotech (e.g., confined to nanofacs) might exist.

Personal items: Devices designed for personal use of contragravity or force fields tend to be unavailable - no grav or force-screen belts.

Robots: Only static, industrial models are made. Powered armor, cybersuits and battlesuits do not exist either, and civilian exosuits are TL8-9 designs. (However, some safetech societies may have fairly dumb robots.)

Note that in many cases above, the Safetech-restricted technologies haven't been invented yet or have been abandoned or banned - they aren't *impossible.* Individual researchers (often of the "eccentric genius" sort) and people working with alien technology may have produced examples of all the above technologies, at TLs ranging from **TL8** to whatever the present TL is. These are usually unique prototypes, costing at least 100 times normal and defying easy reproduction. Moreover, the lack of organized research in these areas means breakthroughs that do occur go out of control or harbor fatal flaws distressingly often. This sometimes results in the premature demise of the scientist involved and a further reinforcement of any bans, and everyone forgets about whatever new discovery was made.

Safe Tech cultures often stop advancement in the social and political sciences, as well. Those fields are as likely to transform society as AI, nanotech or cybertech.

NANOTECH

Note that these benefits usually don't mean *human* labor becomes cheaper. If a TL 13 restaurant employs a real human waiter and cook to barbecue steaks in front of you, you may still pay through the nose even though nanotech or biotech created the sirloins for fractions of a cent. The same holds true for art or inventions or new ideas.

Specialized goods may hold their relative price, as well. In real estate, the land likely will hold its relative price (or far outpace the prosperity multiple!), while the improvements (buildings, roads, etc.) remain at their base prices. In general, multiply all salaries, the price of all non-mass-produced goods and the expense of all services not performed by robots or AIs by the same multiple as the starting wealth. Realistically, rents and mortgages should increase by one-fifth to one-halt of the multiple. Multiply costs of living by the multiple, because greater wealth will increase living standards.

The immense increase in wealth at TL13+ primarily results from cheap AI services and nanotechnological manufacturing (see *nanofacs* on p. 21). If the campaign setting tightly regulates or hasn't invented these technologies, wealth may stagnate at TL 10-12 levels. Many other factors can affect how much wealth an ultratech society generates or has available (for instance, a TL13 society on a distant planet may have to reinvest 99 percent of its wealth in maintaining the planet's terraforming, resulting in a real starting wealth of only half the TL7 standard!). GMs should feel free to adjust the starting wealth multiples or disregard them.

POINT COSTS AND CASH

Several gadgets, mostly body modifications such as cybernetics or nanotech symbiotes of various sorts, have a point cost as well as a dollar cost. The GM should decide whether these cost money, character points or both. It's possible to vary this in the campaign, perhaps ruling that starting characters can buy such upgrades for points alone, but existing characters must pay points and find some way to acquire the modification, e.g., have it issued by an employer, buy it, steal it, etc.

GMs may require PCs to earn the requisite character points before undergoing any sort of upgrade. This is fair, I but can be unrealistic: "If I can go down to a clinic and have it implanted, why do I need to wait for points?" The answer is that it's a game-balance rule — and if it's in force, players have an obligation to roleplay around it. For instance, the wait to acquire the necessary points can simulate the character gathering the nerve to have himself cut open and rebuilt. Alternatively, the GM can allow PCs to be rebuilt whenever they feel like it, but hold back future character points to pay for that modification. The disadvantage is that this doesn't really limit upgrades, just slow down other forms of improvement — and it's not as much fun to stall all character development for a year or two while paying off an implant.

A third approach is to require cybernetics or other upgrades be paid for, but at a fractional rate. The GM could require half of earned experience go toward paying off the upgrade, while the other half is free to use.

Finally, the GM can choose not to charge character points for modifications under certain circumstances, or not at all. This might be a general rule, with upgrades simply costing money. Or, it could apply in special circumstances (e.g., an employer gives all the adventurers certain implants they'll need for a mission - since every PC is upgraded at once, game balance isn't an issue). In either case, adjust the PCs' point total by the cost of the cybernetics. Thus, a 125-point character who gains a 25-point implant becomes a 150-point character. Modifications that are disadvantages should *always* work that way: they reduce the recipient's point total, but don't give any new points to spend.

This leads to the "representative democracy (or democratic socialism, or feudal monarchy or whatever) is the ultimate form of government" outlook. This tends to go along with monolithic planetary governments allied in tight confederations or empires with the power to impose bans on "forbidden tech."

GADGET CONTROL

GMs should always feel free to ban equipment, alter the TL it appears at or change its statistics, especially if trying to simulate a particular cinematic or literary background in which that sort of device doesn't exist. GMs also may revise gadgets that look like they might unbalance a particular campaign setting, or offend their sense of realism!

PREVENTIVE MEASURES

Potentially troublesome items can be modified in these ways before introduction into a campaign:

Declare It Doesn't Exist

The device was never invented, period - and maybe it *can't* be invented. Instead of banning it outright, it's also possible to increase the TL it appears at - or can be invented at - to well beyond the current TL.

Change How It Works

Sometimes a very simple change can have far-reaching effects. Do multiscanners make it too easy to solve crimes? Divide their range by 100. Don't like the +4 bonus neural interfaces give to skill? Alter it to a mere +2. And so on.

If you don't want many people carrying a particular class of ultra-tech weapon, but would rather not ban it outright, rule that it is not fully perfected. Increasing malfunction to 15 or 16 can discourage use! This approach also can be taken for non-weapons gadgets, using the rules for "breakdown prone" or "unreliable" bionics (see p. 95).

See *Power Slugs* (p. 14) and *Raygun Control* (p. 12) for more examples of how this type of change can be worked.

Introduce Countermeasures

If one gadget is too powerful, invent another that nullifies or counters it. Or if a countermeasure already exists (e.g., TL 10 distortion belts can counter TL9 multiscanners) but is at too high a TL, have it appear earlier. However, be careful: This sort of arms race can make adventurers rely even more on gadgetry for solutions.

Legality and Expense

If the GM wants to make a device rare, increasing the cost or decreasing the legality are simple solutions. Don't be afraid to radically increase the price, especially for items that simply don't exist today - after all, who knows how hard they are to build? Making all contragravity devices or sentient computers 10 times as expensive as listed is perfectly reasonable! Price and legality control works best for defining what starting PCs and NPCs will use; cunning players tend to find ways to have their characters acquire almost anything, no matter how illegal or costly.

Items also can be made *more* available. E.g., if the GM wants a world where every streetpunk has cybernetics and a neural interface, decrease their cost by up to a factor of 10. This easily can be justified as war surpluses, overproduction or a corporation "dumping" the product to increase demand or drive a competitor out of business!

RETROACTIVE MEASURES

Sometimes a device already has been introduced into play, but after seeing it in use, the GM decides it is unbalancing the campaign. While you could ban the device by fiat, more subtle ways to remove unwanted technology exist.

Moral Outrage

The GM can have current events take place that change legality class. For instance, if you feel that monowire swords (legality 3) are too powerful, the PCs might see a news item that a psychopath used a monowire sword to kill 23 toddlers. A week or two later, pressure from outraged citizens and religious groups leads to the government making monowire blades illegal - the equivalent of Legality 0 - and assigning the death penalty for any crimes committed using them. After this, adventurers probably will be more circumspect about using them, even if they don't actually turn in their swords.

The same sort of thing could affect PCs even if they belong to an organization normally allowed to use powerful or exotic equipment. For instance, an international agreement (like the Geneva Convention) may outlaw the use of certain weapons. Or on the local level, police or agents might suddenly learn they are banned from using a particular weapon, such as X-ray lasers. Maybe an NPC police officer in another jurisdiction accidentally shot a civilian. An investigatory commission blamed the "excessive" X-laser, not the officer's aim.

No rational reason need be created for this sort of law: just take a look at the schizophrenic way in which particular guns and drugs are controlled in many nations today.

Similar changes in legality can occur from other forms of pressure, e.g., the sudden rise of a religious or moral faction that believes drugs, brain implants, cybernetics or sentient computers are immoral. Even if no law is passed, displaying or using such "questionable" gear may result in reaction penalties.

Product Recall

The GM can start circulating news reports that a particular technology is dangerous in some way. Previously, the manufacturer covered it up, but now it's been revealed that...

News **Flash!**

Gatling lasers suffer catastrophic coolant leaks resulting in explosions! "Sooner or later, the laser will malfunction," said one source, "and when it does, boom, like a grenade!" After an explosion that killed six marines in training last June, the Interstellar Marine Corps is removing all Gatling lasers from active service. Goliath Weaponry GmbH, maker of all Gatling laser coolant systems, has issued a galaxy-wide recall. The fix may require a reduction in laser power levels.

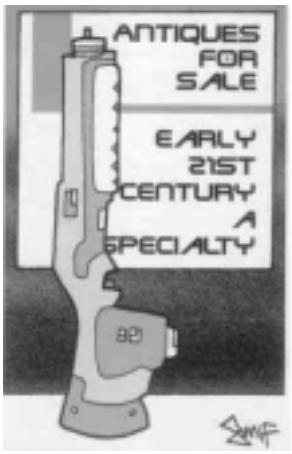
Multiscanner radiation found hazardous! New studies have linked the exotic-active radiation beams used in chem and bioscanning to long-term generic damage

LEGALITY AND ANTIQUES

The GM may choose to allow obsolete weapons (and optionally other devices) to be available at an increased legality class. For every two *full* tech levels by which a device is obsolete, its legality can increase by 1, to a maximum of two over its starting LC or LC 6, whichever is greater. When calculating TL for these purposes, use the TL of the particular gadget, not the TL at which it was introduced or the last TL at which it improves.

Example: A TL8 example of a military laser rifle is LC 0. But four TLs later, at TL12, it's probably been obsolete for centuries! As such, the weapon — or an *exact* replica of it, even if made at TL12 - has its legality class increase by 2, making it LC 2. Consulting the table on p. B249, we find it's still not easily available, but instead of being classed as a heavy or military weapon, it's now a medium weapon, much like a submachine gun. Police (and street criminals) may be carrying them.

On the other hand, a TL11 version of a military laser rifle has benefitted from the *improvements at higher TLs* rule for the last three TLs. It does more damage and has a greater range. As such, it would still be LC 0 at TL12, and wouldn't start to decrease in LC until TL 13.



COMBINATION GADGETS

Want to invent a device featuring an inertial locator, computer and radio all in one handy unit? Here's how.

If the gadgets can be used all at once, weight is that of the heaviest gadget plus 80% of the weight of the others, the weight savings being due to shared housing and components.

If only one of the combined gadgets can work at once, the weight is based on the highest weight among all gadgets plus 50% of the other gadget weights, due to shared electronics and mechanical parts. (Make this calculation using the *empty* weight of the gadget, after subtracting the weight of any power cells and ammunition.)

The same applies to cost, but based on the costliest (which might not be the heaviest) of the gadgets. LC is always based on the lowest LC among all component gadgets.

Combined gadgets may sometimes end up using several different power cells. To make them all run off the same power cell, use the *Power Cell Energy* table (p. 13) and calculate the power requirement *of* each gadget. Add up the combined power requirement, then pick a cell or cells, and work out how much energy will be drained in different modes. Don't forget that changing the types of power cells will modify the gadget's actual weight - just subtract the weight of the old power cell(s) and add the weight of the new one(s).

When combining extra gadgets into a weapon with a ST requirement, the minimum ST may increase. In general, add ST equal to (added weight/4) if the weapon is a pistol or tripod-mounted, (added weight/8) otherwise.

and sterility. Scanners are now subject to recall and legislation is pending to make their use in populated areas illegal. The new models will be safe, but have greatly reduced ranges.

Shocking new research shows braintaping only effective in one out of three cases! The braintaped personality deteriorates after 3d years, leading to massive psychosis and instability. A Special Justice Group probe reveals that a conspiracy of braintaping corporation executives has kept this fact secret for decades! Major indictments are expected shortly, and individuals who have been braintaped are advised to contact a lawyer and neurologist as soon as possible.

Special Justice Group Consumer Safety Alert - plastics presently used to manufacture all neural-interface sockets give off toxic chemicals that studies have linked to brain cancer.

And so on. If the GM rules that the PCs' favorite toys are taken off the shelves this way, they can at least have the satisfaction of joining a class-action lawsuit against the manufacturers. If the adventurers keep using the devices they have, the GM now has a perfect excuse to have it malfunction or misbehave - they've been warned. Or have the characters arrested for carrying "hazardous" equipment. If the GM feels kind, a "downgraded but safe" version of the technology could appear a few months (or years) later - or even be developed by a PC with Engineering skill using the New Invention rules.

REAL LIFE ULTRA-TECH

Since the original publication of ***GURPS Ultra-Tech,*** several gadgets we predicted for TL9 or higher have come into limited production or are under development. When this happens again - and it probably will - feel free to reduce the TL of the device, or to just ignore the "real world" - whichever works best in your campaign. Here's a short list of "revised TLs" for devices:

Laser Sensors (p. UT79): These are being used by military vehicles. Less sophisticated models are presently available commercially for automobiles, now that police have started using lasers in speed traps! As such, personal versions should realistically be TL8 rather than TL9.

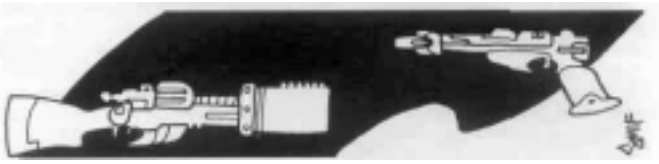
Infrared Cloaking (p. UT79): Personal infrared cloaking is being developed today by the US Army. Again, this gadget is most likely a mid-TL8 rather than TL9 invention.

Minifacs (p. UT17): Computer-controlled factories have existed for several years. GMs should use the "TL10" minifac rules as a template for any TL8+ robotic factory. Thus, a TL8 minifac can easily and cheaply produce TL7-quality goods.

Personal Transponder (p. UT66): These are being tested now. They are early TL8 technology, not TL9.

Recognition Pad (p. UT66): These personalized "smartgun" identity locks began to be sold commercially in 1997. This makes them very late TL7 technology, not TL9!

Brilliant Missiles (p. UT54): Today, the term "brilliant" refers to a class of autonomous guidance systems that are now entering service. While the guidance system of ***Ultra-Tech's*** brilliant missiles is nothing special by TL8 standards, they *are* TL9, thanks to their extremely compact size and high-performance warheads and propulsion systems. To design TL8 brilliant missiles, see ***GURPS Vehicles.***



POWER CELLS

Most gadgets that need power get their energy from power cells. Power cells come in several sizes, from AA to E, each storing an order of magnitude more energy than the previous size.

For quick reference, their costs and weights are:

AA	$2	0.000125 pounds.	C	$100
	0.5 pounds.			
A	$10	0.0025 pounds.	D	$500
	5 pounds.			
B	$30	0.05 pounds.	E	$2,000 20 pounds.

Power cells are described in more detail on p. B247, p. UT10 and pp. CIII5-19.

POWER CELL ENERGY

So how much energy *does* a power cell store? Quite a lot, actually, since they can power potent energy weapons! For reference purposes, the chart below shows energy storage in kilowatt-seconds (kWs) and kilowatt-hours (kWh):

AA cell: 1.8 kWs or 0.0005 kWh x (TL-6).
A cell: \ 8 kWs or 0.005 kWh x (TL-6).
B cell: 180 kWs or 0.05 kWh x (TL-6).
C cell: 1,800 kWs or 0.5 kWh x (TL-6).
D cell: 18,000 kWs or 5 kWh x (TL-6).
E cell: 180,000 kWs or 50 kWh x (TL-6).

Rechargeable cells store only half as much energy.

Want to find out how many kilowatts a gadget uses? First, find the energy its cell stores at the TL it first appears at, then divide that by the number of seconds the cell runs the gadget for. (There are 3,600 seconds to an hour, 86,400 to a day, 604,800 to a week and assume 2,592,000 to a month.) The same can be done for weapons. For example, a gatling laser is TL9 and gets 150 shots from an E cell. At TL9, an E cell stores 540,000 kWs. Thus, each shot drains 540,000/150:3,600 kWs of stored energy.

Power slugs (see p. 14) store the same energy as power cells, but are considerably heavier. By way of comparison, a typical 9V battery (0.1 pound) stores about 18 kWs.

RAYGUN CONTROL

It's pretty easy to extrapolate how futuristic slugthrowers may work, since they simply improve on existing weapons and prototypes of caseless, liquid-propellent and even Gauss weapons have been designed.

Personal beam weapons are another matter. Only laser weapons have seen any real testing outside the laboratory, and even there results have been mixed at best. It's a long step from these bulky and fragile devices to the compact, lethal military lasers and blasters that appear at TL8 and TL9 in ***GURPS.*** In recent years, a lot of science fiction has swung away from the "blaster as future sidearm" paradigm. To create a similar setting in which futuristic beam weapons are less potent, the GM can assume that many of the problems relating to beam weapons were not solved as quickly as they are in the standard TL system. Here are some possible options; feel free to make up others or use more than one at a time! If desired, these can also be used in Conjunction with the slower development of beam-weapon technology described in the Hard Science technology path on p. 6.

Alternative #1: Beam **Weapons *Are* Expensive!**

Beam weapon cost is multiplied by a certain amount across the board. An increase of 2 or 3 times will make beam weapons too expensive for most armies. They will still attract usage by military snipers or special forces, and enjoy favor as the sidearm of rich adventurers, secret agents, etc. A greater cost increase would mean they are most likely still in the prototype stage, and not widely available.

Alternative #2: Beam Weapons Are Fragile

Beam weapons work fine in the laboratory or on the firing range, but once in the field they tend to become very temperamental. A wire or lens easily can be knocked out of alignment by careless handling, and ensuring the weapon will work requires constant maintenance.

Continued on next page . . .

RAYGUN CONTROL (Continued)

The GM could rule that all beam weapons are fragile, that only certain types (e.g., X-ray lasers) are or that weapons are fragile only at the tech level of introduction, becoming reliable one tech level later.

A fragile beam weapon's malfunction number becomes 16. If a weapon is dropped, roughly handled or poorly maintained, the Malf. drops to 15. If the weapon is used as a club, to parry with, etc., it will always break until repaired. AH rolls to repair the weapon are made at -2. The weapon also may not work in high (100 degree-plus) temperatures, or possibly in low temperatures (below 0 degrees).

While no one wants an unreliable weapon, the other advantages of beam weapons may result in a military force issuing them in limited numbers. Historically, military forces often find themselves saddled with complex and fragile new weapons (e.g., the Chauchat machine gun issued to U.S. troops in World War I, the first M16 rifles in Vietnam, the Dragon missile, etc.). Usually the weapon is either rejected or modified after a few years, but sometimes lack of funding for a replacement or the difficulty of fixing it keeps it in service for years!

This limitation could be applied not just to beam weapons but also to Gauss and grav guns as well, if the GM wants chemical slugthrowers to reign supreme!

Alternative #3: Power Slugs

The power cells in ***GURPS*** can release an awful lot of energy at once. In some science-fiction backgrounds — and, as far as we know, the real world - compact power sources of this type prove less capable of rapidly discharging the tremendous energy needed by beam. Gauss and Grav weapons.

If this assumption holds true, then energy weapons must use power slugs, with the users wearing them as belts or backpacks.

Continued on next page. . .

POWER SLUGS

These appeared in ***GURPS*** *Cyberworld,* and can be used as an intermediate "low TL8" step between power cells and TL7 batteries. If GM feels power cells are too powerful, slugs can replace them at all TLs. Power slugs come in the same sizes and capacities as cells, but are substantially heavier;

AA slug:	1 ounce, $1.
A slug:	1/2 pound, $5.
B slug:	7 pounds, $15.
C slug:	20 pounds, $50.
D slug:	40 pounds, $250.
E slug:	120 pounds, $1,000.

Slugs can power any equipment that uses power cells. The slug is held in a belt pack (B slug) or a backpack harness (C-E slugs), joined to the device by a heavy cable ending in an adapter plug that fits into the socket where the cell would have gone if the device used standard power cells. The plug and heavy cable (or increased housing size, in AA and A cells) weigh the same as an old-style power cell, so the weight of the device doesn't change, but the weight of the slug is *extra.*

Example: A military laser rifle normally weighs nine pounds, which includes a D cell. If operated by a D slug, the laser would still weigh nine pounds (the laser, adaptor plug and heavy cable), with the D slug backpack an extra 40 pounds.

Special Applications: In campaigns where power slugs exist, some cells may be too big to fit in small devices. Instead, assume use of the next lower-sized slug and divide duration of use by 10; if an AA cell won't fit, just assume it has a custom-designed battery that fits and has 1/10 listed duration.

Power slugs also can be used *with* power cells, representing fast-discharge cells needed for energy weapons while other cells power normal devices. See *Raygun Control* on p. 13.

BLACK MARKET EQUIPMENT

Items illegal in a particular jurisdiction often can be bought on the black market. Finding black-market goods normally requires going out and checking out sources in person, rather than just working the phone or net - this can be dangerous!

Successful rolls against Streetwise (or Merchant-3) skill will be necessary to find a source. Subtract the local Control Rating (p. B249). Add +2 if the city, country or planet is known as a criminal sanctuary, and an additional +2 in an area known for sleazy dealings, such as a typical starport startown. Add +1 or more for previous dealings with the underground in that particular region. Subtract 4 to find legality -1 gear, 2 to find legality 0 and 1 for legality 1 gear; searching for very large consignments of goods can impose additional penalties. Optionally, the GM can impose a -1 if an item (or the combined cost of the consignment) costs over $1,000, -2 if over $2,000, -3 if over $4,000, -4 if over $8,000, -5 if over $16,000 and so on. If a group splits up, roll each day for every person looking.

A critical success means the searcher has found an excellent source for what he requires, unless the GM rules the item isn't available at all in this area. In that case, he's found a solid lead as to where he should start looking for it.

Ordinary success can mean finding exactly what the character wants, but more often it means only partial success. E.g., someone looking for a machine pistol might only find a regular semi-automatic pistol, or a cheap street model, or one that works but doesn't have the correct ammunition. Or the device could be defective and require repairs. Finding someone who stocks the appropriate parts may require additional searching! Alternatively (especially in the case of big-ticket items, such as powerful weapons) it may simply mean he has found a clue as to where to look for someone who has the item, or discovered someone who can order the item, but doesn't have it yet. GMs should feel free to require the player to make decisions about where to look next or how to approach sources, as opposed to relying on the dice.

Ordinary failure means nothing is found - the PCs may try again, but the GM also can decide that nothing will be found unless the searcher changes his approach or checks out a different area, or waits a week or two. A critical failure means the character is mistaken for a police spy or encounters a scam artist, police sting operation, gang war, etc. and runs into trouble, or is offered goods that are dangerously defective.

RAYGUN CONTROL (Continued)

The GM can require everything to use power slugs, as described under *Power Slugs* on p. 14. However, another option - one that is more realistic, actually - is to allow normal gadgets to use standard power cells, while only beam, Gauss and grav weapons use power slugs. The assumption here is that both types of power unit store the same energy, but that only power slugs have the capacitors, superconductor loops, homopolar generators or whatever that enable rapid discharge. If desired, smaller-sized power slugs Can be used if so, just divide the number of shots by 10. (Note that for Gauss and grav weapons, rounds per magazine don't decrease, only the number of shots that can be fired before depleting the slug.)

The GM can have power slugs replace cells at all TLs, or allow power cells to replace them at a certain TL after a specific breakthrough occurs (lightweight room-temperature superconductors, cold-fusion cells or whatever).

PLUG-IN GADGETS

TL8+ electronic gadgets usually are designed to plug into other gadgets, either directly or using data cables, combining their functions. Most often, this permits a computer to talk to (and control) multiple devices as peripherals, but other combinations can exist. This allows considerable scope for improvisation by adventurers.

Also, most TL8+ electronics can be preprogrammed for a few simple remote functions (basically, the way you program a VCR), and are assumed to have a simple "clock" function so they can be set to turn on or off various functions at a specific time or upon receiving particular input based on what they do.

For example, a recorder (p. UT38) could be plugged into a communicator to play a message at a certain time, or upon receiving a specific signal or to act as an answering machine. A plastex charge's detonator could be plugged into an inertial compass so it would go off when the subject reached a specific destination. And so on. "Wireless" connectivity is also possible: plug in a communicator set to a specific frequency, and you can talk to the device using a computer and a datalink.

Of course, devices that must be manually pointed can't be easily operated remotely. A gun with a communicator plugged into it could fire, but unless it also had a plugged-in sensor, the firer wouldn't know whether there was a target. And unless a gun with sensor was attached to something like a tripod motor (p. 62). it could only be fired at someone who crossed its sights. As always, the GM should rule on whether a particular piece of gadget programming is possible.

Linking devices usually takes about a minute, assuming compatibility. If they aren't, or if a particular combination is very complex, the GM may require a toolkit and Electronics Operation roll. Useful devices for linking gadgets include datacable (p. 40), datastring (p. 43) and micro-communicators (p. 42).

Black-Market Prices

Dealers tend to charge 10%-60% above normal prices if the black-market equipment is in high demand, as stated in ***GURPS*** *Space.*

In some times and places, supply may exceed demand. In this case, GMs may wish to roll Id-Id and multiply the result by 10% to find the actual price. For instance, a roll of 3-4 would be -10%. This will vary greatly depending on the locality. For instance, during and after the Soviet Union's collapse, Russian military equipment began flooding the gray and black market in Germany and other eastern European nations, as dispirited or unpaid soldiers tried to make a little extra money by selling equipment to dealers and collectors.

A similar situation also can take place *during* a war, if one side or the other is corrupt or demoralized. Afghanistan and Vietnam are both good examples of this situation; in a black market gun bazaar in wartime Saigon or in a village on the Afghan-Pakistan border, a crate of $500 assault rifles might easily sell for only $50 each. Of course, bargain-hunting near war zones has its own risks!

Whatever the price, bargaining is acceptable. Successful use of Merchant skill can lower the asking price by 10%; a critical success knocks off 20 percent, while a critical failure doubles the normal price, take it or leave it. Alternatively, the GM can roleplay any bargaining session; also, some dealers may be interested in trades of goods or services. If the price is too high, threats or burglary might work - but many black marketeers have good security and powerful friends in the local underworld.

Black-Market Software

Illegal computer programs can be found on the net and simply downloaded from outlaw databases. Checking through the net can be faster than hunting in person: roll every four hours instead of every day. Pirate copies of legal software are 10% to 60% of list cost. Illegal software costs 10% to 60% *over* list cost. When searching through computer networks, Area Knowledge (Net) or Computer Hacking-3 skill can be used instead of Streetwise.


MESSAGE DATA
chapter TWO
STATUS
ACTIVE
ALERT
SJC-23
CHANNEL
SECURE
CHASE TRANSMISSION: XX334245-230/44 GURPS ULTRA-TECH 2
ENCRYPTION LEVEL 12 //SLIP ENCRYPTION DECODING . . . HEADER FOLLOWS
: EQUIPMENT
WARNING: GURPS ULTRA-TECH 2 ACCESS UNAUTHORIZED DISENGAGE
//SLIP DISENGAGE . . . . . .
VIDEO TRANSMISSION ENGAGED PREPARE TO RECEIVE VIDEO
MESSAGE BODY FOLLOWS — CUT HERE — CUT HERE —
VIDEO TRANSMISSION SCREEN
THE MUNDANE BECOMES ANYTHING BUT, AS TECHNOLOGY PLACES INCREDIBLE POWER AT EVERYONE'S FINGERTIPS.

This chapter catalogs general-purpose technology, from tools and factories, to sensors and exploration gear.

TOOLS AND CONSTRUCTION MATERIALS

Clothing Fabricator (TL8+)

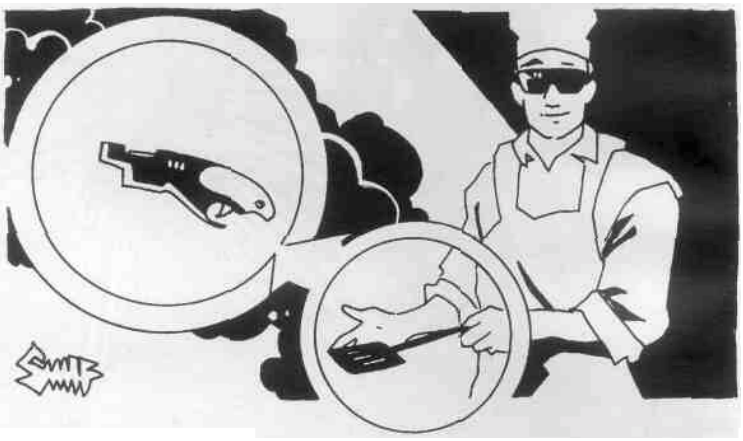
A clothing fabricator automatically produces clothing of different cuts, weights, patterns and colors, using a simple laser-scanning booth to tailor and fit it to individual taste and measure. It is voice controlled; a holographic screen or projector shows what the user would look like in various selections. Fitting and tailoring can take as little as 15 minutes - but much longer if the user can't make up his mind!

The cost of fabric will make up around 20 percent of a finished suit of clothing. The fabricator is limited to the kind of materials it has in storage. It can also wash, clean, fit, modify or even recycle old clothes.

Clothing fabricators can make flexible armor as long as the fabricator is at least one TL higher than the armor, and provided that it possesses appropriate materials (e.g., monocrystaline fibers, ablative fabrics, etc.).

A fabricator equipped to tailor armor designs normally costs more (it needs to be able to work tougher material). Fabricators cannot produce armor that incorporates reactive, stealth or other special capabilities, such as reflex armor or bioplastic.

It uses 0.1 kW of power (a D cell powers it for 100 hours). It weighs 400 pounds, takes up 40 cubic feet and costs $50,000; double the cost for one that can tailor flexible armor.



Industrial Water Knife (TL8+)

This device resembles a thick hacksaw with a 5-inch gap where its blade should be, plus a switch and power cell built into the handle and an attached hose.

When connected to a water source and switched on, a jet of hypervelocity water crosses the gap, forming a "blade" capable of slicing through flesh, wood and even thin metal. Since the water continuously circulates unless blocked by a substance too hard to cut through, little splashes off - the typical "wastage" is one gallon per hour. The water knife is safer than a chain saw: if the blade can't cut through something, instead of breaking or the chain snapping back, the only "danger" is a spray of harmless water. The water knife's other advantage is that it doesn't have to be sharpened or cleaned, though a special self-sterilizing version need be used for medical and similar applications. This version cycles the water through filters after each use, ensuring most contaminants will be removed. It is used in the most common industrial use for water knives: slicing meat, at slaughterhouses, restaurants and so on.

If used as a weapon, a water knife does 2d cutting damage per turn and is wielded at DX-4 or Axe/Mace-2. Reach is one yard.

The basic water knife weighs four pounds and costs $160. Backpacks vary with tankage; a full two-gallon model is $40, weighs 18 pounds and has a 2-yard-long hose that connects to the water knife. Users often place the backpack on the floor while at work. A C cell powers the knife for 10 hours.

The tank for a self-sterilizing water knife weighs 26 pounds and costs $1,200 in the standard two-gallon size. Otherwise, it has the same statistics as the basic tank. Its filters require replacing with each change of the power cells. Replacement filters cost $175.

Memory Plastic and Metal (TL8+)

Memory plastic is a "smart" plastic material that "remembers" a particular shape and can snap back into it upon receiving a specific signal, usually an electric pulse but sometimes impact shock, microwave pulse or another trigger. Bioplastic (p. UT17) is an example of a highly sophisticated form of memory plastic. At TL9+, "memory metals" also may exist with similar capabilities. Most memory plastics and metals are only capable of two distinct forms, both of which must be the same mass and about the same size. Memory materials offer a wide variety of uses, some described in other gadgets in this book. Gadgets incorporating memory materials usually cost about 5-10 times more than those using normal materials. Until

TL10, complex mechanical parts or electronics cannot be made of memory materials. At TL10+, memory materials merge with other "smart" materials manufactured using technologies such as nanotechnology (p. 7).

Molecular Glue (TL8+)

This glue bonds nearly any substance instantly (setting in one second) and one application will cover up to one square inch and hold 400 pounds per square inch. Strength doubles at TL9 and again at TL10 for the same price. It comes in non-conductive and conductive (metal-impregnated) varieties. A tube of 200 applications costs $10 and weighs one ounce.

Plasma Torch (TL9+)

This close-focus hand flamer excels at heavy cutting and welding. *It* projects a stream of ionized plasma. It eventually cuts through the toughest materials when held steady: whether or not the flamer's damage penetrates DR, every 10 hits of damage reduces DR by one, allowing it to eventually burn through. Plasma torches cannot penetrate force-field DR; GMs also may rule they cannot burn through certain types of matter, e.g., neutronium.

A plasma torch can be used in combat as a beam weapon at Flamer-3. Used as a weapon it does 7d fire damage, and is SS 8, Ace 2, 1/2D 3, Max 10, RoF 1, ST n/a, Rcl 0. It weighs four pounds, costs $750 and works for 60 seconds using a C cell.

Heavy Plasma Torch (TL9+)

A larger version of the plasma torch, this inflicts 2()d damage, and is SS 12, Ace 2, 1/2D 4, Max 12, RoF 1, ST 12, Rcl. 0. It weighs 40 pounds, costs $3,000 and operates for 200 seconds on an E cell. The torch and pistol grip itself weigh only 10 pounds. A 30-pound backpack unit houses the E cell and plasma generator.

Smart Rope (TL9+)

This is a half-inch-thick cable constructed of memory metal and plastic fibers (or at TL 10+, from non-metallic bioplastic). A smart rope can support up to 1,000 pounds at TL9; increase this by 200 pounds per TL after TL9.

A small key controls smart rope by sending an electric current through it on touch. The key can send a "flex" or "rigid" signal. In flex mode, the rope behaves exactly like ordinary rope. In rigid mode, the rope locks into its current position as if a stiff, metal wire. In this position, it cannot be untied. Removing a rigid rope without ordering it into flex mode requires cutting through it. The rope has DR 10 and two hit points. If a smart rope is severed, it loses its "smart" properties, becoming two simple cables retaining the flexible or rigid quality it had when cut.

Smart rope may be purchased in a variety of standard lengths, starting at one-yard increments.

Smart rope weighs 0.2 pounds and costs $20 per yard. A smart-rope key has negligible weight and costs $10.

Easymatter and Craftyknives (TL11+)

Easymatter can be textured to look and feel like wood, plastic or metal. It actually consists of countless microscopic, sensor-equipped interlocking blocks, each with a tiny computer. With the proper tool, the modules can be made to release their grip on one another or grip more tightly, allowing easymatter to be easily reshaped into something else.

A *craftyknife* is a tool for shaping easymatter. It doesn't look like a knife - more like a large magic marker.

It has three settings: On "cut," the craftyknife signals those easymatter micromodules in contact with the tip of the knife to let go of each other. Simply by pressing down, the craftyknife can slice through easymatter like the proverbial hot knife through butter.

On "bond," the craftyknife causes those portions of easymatter it touches to become "gluey." Gluey easymatter will bond with any other easymatter surface (but nothing else) that it touches. The gluey property endures for 60 seconds, but the bond is seamless and permanent until severed by a craftyknife on "cut." This allows easymatter to be effectively welded or for multiple layers to be "glued" one atop the other to increase thickness.

On "key" the craftyknife locks the *entire* easymatter structure with a particular pass code, so it will not respond to other craftyknives unless programmed with the same code. A craftyknife's codes can be uploaded into a computer and transferred to other craftyknives.

Using the first two settings, a craftyknife can sculpt and join easymatter into all manner of solid shapes in a small fraction of the time needed to cut and shape metal or wood. With a craftyknife, easymatter can be shaped using Blacksmith, Carpentry, Sculpting, Woodworking or Mechanic skill. A structure entirely built from easymatter with no real moving parts (such as a house, sword or boat hull) can be assembled or repaired in one-tenth the usual time.

Easymatter often is used to build semi-permanent structures, and for manufacturing furniture and interior walls. A building with interior walls of easymatter can be redecorated easily (cut a new doorway in seconds, and save the slab - later you might want to replace it). Whether or not exterior walls use easymatter depends on how worried the owner is about security against craftyknife-wielding intruders!

Easymatter structures cost about as much as normal structures: the higher expense of easymatter offsets the lower labor costs resulting from reduced construction time.

Where easymatter shines is in the ease of repairing or modifying the structure. Most ultra-tech structural materials, including bioplastic and living metal (see p. UT18) are available in easymatter forms.

Easymatter is somewhat less resilient than a truly solid structure: its own DR will be two-thirds that of an equivalent thickness of normal solid material. A craftyknife ignores its DR.

A craftyknife also comes with a plug for connecting it to a computer to download or upload specific pass codes. TL11+ industrial robots and minifacs often incorporate tools or arms that contain built-in craftyknives for shaping easymatter.

A craftyknife's A cell powers it for 100 hours of continuous use. It weighs 1/2 pound and costs $400.

Any melee weapon blade can have a craftyknife option. Add 20% to weight and double the cost (minimum cost is $400).

Gravitic Screwdriver (TL12+)

This "swiss toy" (resembling a 20th-century computer mouse in size and shape) actually houses a short-ranged tractor-pressor beam guided by a ranging laser. It has a range of one foot and its controls can be worked by one hand. The user can apply a pencil-thin beam of controlled gravitic force to a single object with about the same dexterity as a thumb and forefinger working together. The gravitic screwdriver can perform many tasks, e.g., slowly levitate objects (up to one-quarter pound in weight), turn a screw without touching it, suck the dust off a shard of ancient pottery or remove a foreign object from a jammed mechanism. It also excels at picking mechanical locks or even pockets. It gives an additional +1 to any applicable skill in situations where the GM thinks it would be useful. It works for six hours on a B cell. Weight is 1/2 pound, cost is $500.

Long-Arm Glove (TL12+)

This heavy gauntlet, which includes a thick wristband housing the power cell, contains a set of miniature tractor/pressor-beam generators (a thumb beam and finger beams) allowing the user to pick up and handle objects that are out of his reach as if he had invisible, extra-long arms. The user can reach out to 10 yards with effective ST 12.

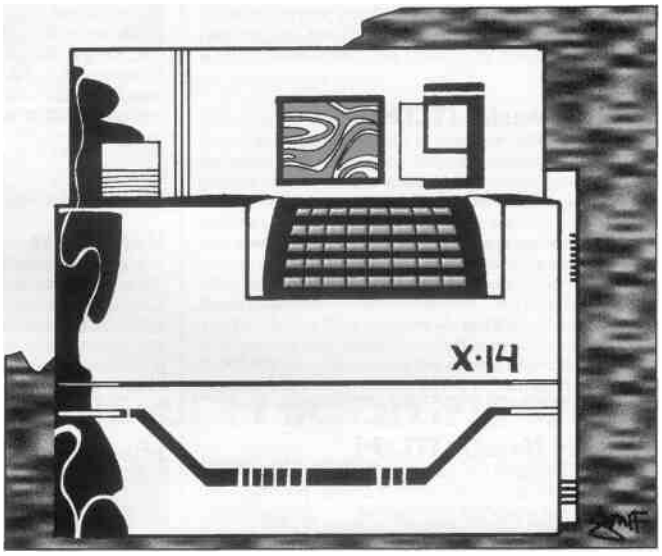
The gloves incorporate a neural-induction field in the palms so that the user can mentally control the tractor beams exactly as if they were his own hand, seeing the movement of the invisible tractor/pressor hand through graphic images projected into his brain. Thus, reaching out or pulling back causes the force field "hand" to extend or retract, while moving the user's hand in the glove manipulates the gravitic fingers.

The gravity hand cannot reach through solid objects, but it can grapple, use a weapon or operate a control panel. Any two-handed action requires a second glove. Long-arm gloves are not easy to use: the wearer's DX and all DX-based skills

(e.g., firing a weapon with the glove) are at -4 at TL12 or -2 at TL13+.

Putting on or taking off a long-arm glove takes four seconds. The gloves are fairly clumsy even when the beams are not in use and give a -4 on any DX or DX-based skills that require careful manipulation. This drops to -2 at TL13 and -1 at TL14+ as the gloves get lighter.

Longarm gloves normally have PD 4, DR 20, but they can also be built into any vacc suit or body-armor gauntlets (just add the cost of the gloves to that of the suit and use the suit's armor PD and DR if it is higher). Each glove weighs two pounds and costs $6,000. A C cell powers a glove for 12 hours.



Nanofacs (TL13+)

A nanofac is an automated factory that can build almost any product using molecular nanotechnology. Nanofacs provide the industrial-replicator technology described on p. UT18; at TL13 they largely replace the minifacs and robofacs described in ***Ultra-Tech.*** They likely will have a tremendous economic impact (p. 7)

A typical nanofac is a box containing a manufacturing chamber or vat and coolant system connected by feed lines and pumps to a storage tank. The storage tank houses molecule-sized assemblers, prefab parts and industrial chemicals (such as carbon and silicon). The assemblers are tiny (molecule-sized) factory robots equipped with their own computer brains, jointed arms, plugs and sockets. Prefab parts are molecular structural fibers, motors, brackets, fasteners and computers.

A nanofac contains a dedicated computer that controls and programs the molecular assemblers. It can accept standard minidisks containing new blueprints. A one-gig database can hold nanotech blueprints for one very complex device such as a suit of powered armor or a nanofac, or 10 complex gadgets or weapons, or 100 simple gadgets. Blueprints cost 100 times the item's cost.

The nanofac's operator selects a design and the manufacturing program initiates, programming the assemblers with their instructions. The computer pumps a fluid-like mixture of prefab molecular parts, assemblers and chemicals into the manufacturing chamber. The assemblers begin work, seizing the prefab parts and snapping them together or bonding them chemically. Per the program's pattern, the molecular-scale parts undergo sorting and assembly in stages to form gradually more complicated structures. The desired object quickly takes shape, growing within the manufacturing chamber around the assembler "seeds."

Nanofacs come in a variety of sizes, rated for the greatest mass of object they can manufacture. Time required to manufacture a product *in hours* is best expressed by cost rather than weight, since more complicated structures take longer. Even a small-capacity nanofac can build a big object, however, by making modular parts that can later be fully assembled outside the nanofac. A big gadget that was built piecemeal from multiple smaller modules will usually take an hour or so of work (and an appropriate Armoury, Electronics, Engineering or Mechanical skill roll) to put together per $1,000 it cost *times* the number of modules used. GMs should feel free to modify this if desired. Some parts (armor plate, weapon barrels, etc.) only retain full structural integrity if produced as single units - GMs may wish to reduce reliability, DR or hit points if a normally one-piece device undergoes modular construction.

Replacement tanks of assemblers and prefab parts cost about $10 per pound. Nanofacs do not have to rely on prefab molecular parts; a nanofac can manufacture additional stocks of molecular assemblers and prefab molecular parts from industrial chemicals at one-tenth its normal production rate. A tank of raw industrial chemicals for this purpose costs about $ 1 a pound.

Nanofacs cannot change the atomic structure of objects. If an object must include rare elements, for example, they will have to be provided for the nanofac to build it. Similarly, a nanofac could not make antimatter (though it could certainly build the particle accelerator that could do so).

Conversely, nanofacs would render some presently valuable materials cheap, e.g., they can make synthetic diamond out of carbon. Note that many of these processes (synthetic diamonds, perfectly spherical ball bearings) already will see cheap production prior to TL13, and that in the case of jewels.

natural versions likely will retain some value over perfect fabrications in defiance of logic.

Nanofacs can produce organic matter (e.g., food), but not living things. Nanofacs designed to manufacture small or non-solid objects (food, a quantity of microbots or doses of drugs) usually also manufacture a container to store the objects.

Nanofacs and the Law

Anyone with a nanofac *and* the right software can make weapons and other illegal devices. A society worried about this may opt to restrict nanofac ownership, monitor their use with built-in surveillance or regulate the blueprints for illegal devices.

Desktop Nanofac (TL13+)

This is the smallest model of nanofac in common use. A transparent, synthetic-diamond window in the production chamber allows viewing the product as it forms. The desktop nanofac can assemble products weighing up to five pounds, provided their longest dimension does not exceed one foot. Individual parts for modular construction of larger items may not exceed these limits, either. Manufacturing time required equals the item's cost divided by $500, in hours, with a 15-minute minimum. The desktop unit's tank can store enough assemblers and prefab parts to make up to 20 pounds of product.

The nanofac itself weighs 100 pounds and costs $40,000. It takes up 10 cubic feet. A D cell powers it for a day, or it can run off vehicle/building power (2 kW will meet peak demand).

Standard Nanofac (TL13+)

This larger-capacity nanofac, about the size of a big washer-dryer unit, might be installed in an apartment building, small business or the workshop on a starship. It can manufacture objects weighing up to 20 pounds, provided their longest dimension does not exceed one yard.

The manufacturing time required equals the item's cost divided by $1,000, in hours, with a minimum of 15 minutes.

A single E cell powers a standard nanofac for two days, or it can run off building power (8 kW). Its tank can store enough assemblers and prefab parts to make up to 200 pounds of product. The nanofac itself weighs 500 pounds and costs $100,000. It takes up 100 cubic feet.

Industrial Nanofac (TL13+)

These larger-scale factory models build products that may range in size from furniture to spacecraft. Excluding its tank, a typical industrial nanofac weighs 4,000 pounds, costs $200,000 and takes up 400 cubic feet and requires 50 kW *per* 200 pounds or fraction of manufacturing capacity. Tanks can reach any size in line with the nanofac's capacity, some as big as buildings.

An industrial nanofac requires (cost/n) hours to build something. The value of *n starts* at $1,000, but doubles for each ten-fold increase in maximum capacity from 200 pounds ($2,000 at one ton, $4,000 at ten tons and so on). Though the 15-minute minimum applies for a particular item, at this scale several examples of inexpensive products can be fabricated at once. This means the nanofac's operator must wait (at least) 15 minutes after programming before the first item is finished, but the industrial nanofac effectively can create low-cost items in seconds. The integral tank can store enough assemblers and prefab molecular parts to make up 10 times as much product as an industrial nanofac's manufacturing capacity.

Suitcase Nanofac (TL13+)

This is an expensive, portable, miniaturized nanofac built into (and resembling) a large suitcase. It can build products up to 2.5 pounds weight, and no more than 9 inches long in any dimension, taking (total cost/$250) hours to build, with a minimum of 30 minutes. A D cell powers it for 2 days (0.5 kW). It stores enough assemblers and prefab parts for 10 pounds of product. A suitcase nanofac is the perfect gadget for use by secret agents operating on primitive worlds, since they can make pretty much whatever they need, including wealth (e.g., a "perfect" $10,000 diamond in 40 hours, etc.). It weighs 30 pounds and costs $60,000.

Nano-Pipes

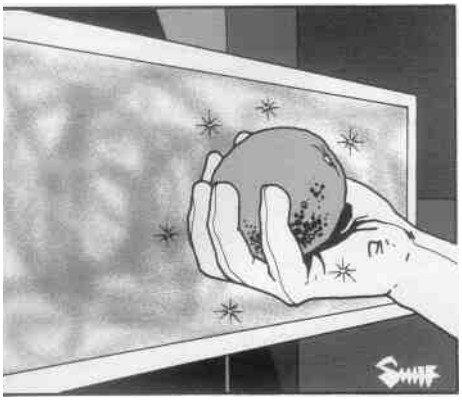
Nanofacs installed in fixed locations such as houses or businesses routinely connect to "utility main" systems that allow the nanofac user to open a tap and cause prefab molecular parts and assemblers, or raw chemicals, to flow into the nanofac. The supplier may be the state or a corporation. The price ($10/pound for prefab, $1/pound for raw chemicals) usually is metered and treated as a utility bill. Installing a nano-pipe connection to existing mains takes $1,000 and roughly one day.

Miracle Fog (TL15+)

Perhaps the ultimate in nanotechnology, miracle fog (or "utility fog") is an invisible cloud of cell-sized microscopic robots that can lock together to form a solid object out of the air upon voice command. Each miraclebot is a cell-sized aerostat (lighter-than-air vehicle) equipped with hooked arms, a molecular-scale computer, a simple sonar or laser sensor and an air turbine or reactionless thruster for station-keeping. Normally, a cloud of miraclebots will float in the same spot. The cloud allows free motion through it, but on command will coalesce into the form of a solid object.

One hex of miracle fog can form objects of up to 10 pounds; multiple hexes can form larger objects. It comes programmed with a database containing every TL14 or less object known to its culture for which Legality Class is equal to or less than the fog's. New ideas can be programmed into the fog by radio, laser or infrared, beaming the information to the fog as a data upload.

Miraclebots can form ordinary solid materials (e.g., a chair or a dinner set) as well as mechanical and electronic devices, Objects formed from miracle fog cannot include those that require exotic elements, special alloys or organic components, nor can other types of nanomachines be created with them. Thus, a rocket engine, a power cell and many high-energy weapons may be impossible, The GM should fee) free to use this requirement to limit things he doesn't want constructed out of thin air. In general, very tough objects can't be formed: maximum DR is 20 (double that every TL after TL15).



Once the object is solidified, it can be moved. On command, it will dissolve back into fog, taking up station where it was moved to (in its cloud form, the fog can't be moved). A hex of miracle fog costs $10,000. Legality class depends on the minimum LC of item a fog's program allows it to make.

Matter Transmitter (TL16)

At TL16, energy can be turned easily and safely into matter. Essentially, a molecular pattern and energy (lots of it!) are fed into a matter transmuter and the desired product materializes inside. A portable transmuter can create a duplicate of any object within its capacity if it can access complete blueprints.

A matter transmuter functions exactly like a nanofac (p. 21) except that it requires no feed stock of assemblers and molecular parts, and it measures manufacturing time in seconds rather than hours. Unless the GM rules otherwise, a transmuter *can* create duplicates of living beings. Whether or not they "are" the individual is up to the GM, but they are effectively equivalent to braintaped copies.

A transmuter requires far more information than a nanofac. Blueprints must detail a device's structure to the atomic level. Even with data compression, this requires 1,000 times the disk space of nanofac blueprints. When blueprints are unobtainable, the transmuter can use its built-in subatomic scanner if an example of the device is available. The item is placed within the machine, scanned into its memory, and then removed, after which the transmuter can make any number of copies.

Transmuters use enormous quantities of energy, but built-in total-conversion power packs easily meet demand. Transmuters come in the same sizes and types as TL 13 nanofacs, and cost 10 times as much as nanofacs do at TL13. The power packs need garbage to be thrown in as fuel every few months.

SENSORS, VIEWING AIDS & SCIENTIFIC GEAR

SENSORS AND VIEWING AIDS

Anti-Glare Contacts (TL8+)

These polarizing contact lenses darken automatically to cut glare and ultrabright light. They are slightly less effective than the bulkier anti-glare goggles (p. UT20), but still add +4 to HT on rolls to resist the effects of blinding light. The contacts have negligible weight and cost $200.

Backpack Radar (TL8+)

This man-portable radar unit mounts in a small suitcase or backpack and connects by cable to a wrist control panel. It includes no display screen of its own, but comes with a second cable that needs to be plugged into a computer monitor, HUD, interface, etc.

Its normal setting searches a fan-shaped, 120-degree area in front of the user out to five miles, hunting for rat-sized or larger moving targets and displaying them as blips on a screen. Darkness, smoke and bad weather do not impair it, but it cannot see over the horizon or through solid obstacles. The only information it provides is a digital readout of target speed, altitude, position and approximate size.

The radar is good for tracking vehicle-sized or larger targets, or any moving targets. It can't distinguish a moving human from a moving animal or robot of similar size. Background items (trees, garbage cans, etc.) make spotting stationary human-sized or smaller objects on the ground virtually impossible in anything but open terrain.

The GM can assume that most moving targets that fit the radar's criteria are detected automatically. If a target is using radar countermeasures or being stealthy, the GM can require an Electronic Operation (Sensors) skill roll, or a quick contest of skill between the radar operator and the target's Stealth. Non-moving targets can be assumed to be impossible to distinguish from ground clutter *unless* the user previously has seen that particular "blip" moving.

The backpack radar weighs 15 pounds, including a D-cell power pack, and costs $5,000. The D cell lasts eight hours. If desired, a longer cable can connect the radar and its control panel - this sometimes proves tactically desirable, since radar emissions can be detected over quite a distance. Instead of reducing weight and cost at TL9 and TL10, the radar's range optionally can double at each higher tech level. Range also doubles at TL11.

Backpack AESA (TL8+)

Similar to backpack radar, this unit contains an active electromagnetic sensor array (AESA) composed of a variety of sensors - radar, millimeter-wave imaging radar and ladar. In radar mode, it functions exactly like a backpack radar. It can be switched to these other modes:

Low-res imaging radar: Has a range of only 2.5 miles, but

resolves a fuzzy silhouette of the target - can tell a standing man from a garbage can or a tree, for example.

High-res imaging radar: Has a range of only 180 yards but resolves all non-flat details and can see dense objects even through thin clothing or vegetation - it can distinguish the shape of a person's face, spot a gun in a holster, count the number of coins in someone's pocket, etc. If plugged into a computer database that contains sensor profiles on various objects it can be used to identify things such as vehicles or weapons by their radar image.

Ladar Imaging: This has the range of low-res imaging radar but the resolution of the high-res setting! It cannot penetrate smoke, prism, blackout gas, blizzards or clouds, and gets only half-normal range in rain or light snow. Radar detectors don't detect ladar imaging, but laser sensors (p. UT79) do.

Switching settings takes a Ready Weapon maneuver. The backpack AESA weighs 20 pounds and costs $25,000. Its D cell operates it for eight hours. Instead of reducing weight and cost at TL9 and TL 10, range optionally can double at each higher tech level. Range also doubles at TL11.

Mini-Radar and Mini-AESA (TL8+)

These function like a backpack radar or AESA, but are much smaller with only one-fifth range. They come in a hand-held version or one that mounts on the shoulder and plugs into a helmet or goggle HUD.

A Mini-Radar weighs three pounds and costs $1,000. A pair of C cells runs it for eight hours. A Mini-AESA weighs four pounds and costs $5,000, and also runs on two C cells for eight hours. Otherwise, they perform identically to their larger cousins.

Personal Radar Detector (TL8+)

This small unit will alert the user (beep, flash, display on HUD, etc.) if he's in the path of a radar beam at up to twice that radar's range. It cannot detect radars of a higher TL than itself. TL8 soldiers often carry radar detectors (built into combat helmets, for instance). They become rarer at higher TLs, since the more versatile rad-scanners can perform the same function. The device weighs 1/2 pound and costs $50. It runs for three months on an A cell.

Sonic Motion Detector (TL8+)

This small, omni-directional air sonar emits sound waves allowing the user to detect moving objects even in total darkness. It displays their location on a pop-up screen, which is the main advance over TL7 sonic motion detectors. Data also can be fed to a HUD, neural interface, etc.

The detector will work through thin wood or plastic walls. Range is relatively short (about 30 yards). It will not detect stationary objects and the GM can require an Electronics Operation (Sensors) roll to detect very slow (up to one yard a second) or small (under rat-sized) targets. If someone deliberately moves slowly and quietly, make it a contest of Electronics Operation (Sensor) and Stealth skills. Sonic screens (p. UT86) and audio-damping cybernetics (p. 107) block the effects.

The detector weighs two pounds and costs $1,000. A B cell powers it for a week. Instead of reducing in weight and cost, its range optionally can double at TL9 and again at TL10+.

Tactical-Sensor Array (TL8+)

This sensor looks like half a backpack with a turret sticking up over the wearer's shoulder. It includes a peri scope-mounted lens that follows the user's head movement, so it always points in the same direction. The sensory periscope incorporates an optical imager, thermograph, sonic-motion detector and parabolic microphone. The periscope is two feet long, attached to an upper corner of the backpack. It can fold flush with the backpack, or rotate to look around corners or over cover while the user is crouching or lying prone.

In order to use the tactical-sensor array, the wearer must plug it into a helmet containing a HUD or holographic HUD, or the system and user must be equipped with a neural HUD (p. 111) or neural interface. The user can choose to use the array or normal vision at any time. When using the array, replace Vision rolls with an Electronics Operation (Sensors) roll. All sensors in the array can be used simultaneously.

The optical imager gives the user the equivalent of the Night Vision advantage as long as there is at least a minimum level of light. It also incorporates x5 power magnification and

an electronic rangefinder. The system automatically compensates for very bright light levels - +5 to HT to avoid being blinded while using it.

The sonic-motion detector functions the same as the system on p. 24, except that it uses the tactical-sensor array's interface.

The thermograph is a high-resolution infrared imager that can see through absolute darkness, or normal fog or smoke. More effective than ordinary infravision, the system boasts no penalty for fighting at night using it, and the user gets +3 on Vision rolls to spot living things in daylight. It also offers a bonus to Tracking rolls, since it can follow a heat trail: +4 if the trail is less than 10 minutes old, +3 if less than 20 minutes old or +2 if less than 30 minutes old. It can even sense heat shapes behind thin brush or walls, although the GM can require an Electronics Operation (Sensors) roll with a penalty equal to DR+HT of the wall. The system's range is two miles. Infrared cloaking and similar technologies affect it exactly like ordinary infrared sensors.

The parabolic microphone zooms in on a particular sound or area, filtering out background noise from the desired sounds, giving up to (TL) levels of parabolic hearing. The table below shows how far away a listener must be from various sounds for them to have the same volume as normal conversation at one hex.

Each level of Parabolic Hearing either doubles the range at which a sound can be heard (move one line down) or reduces the level of sound that can be heard at a given distance by 10 decibels (move up one line). For instance, Parabolic Hearing 10 enables hearing a normal conversation at 1,024 hexes or a 10 decibel sound at 256 hexes with the unassisted clarity of a normal conversation at one hex.

Sound Level (decibels)	*Example*	*Range (hexes)*
10	Leaves rustling	1/4
20	Quiet conversation	1/2
30	Normal conversation	1
40	Light traffic	2
50	Loud conversation	4
60	Noisy office	8
70	Normal traffic	16
80	Quiet rock band	32
90	Thunder, heavy traffic	64
100	Jet plane at takeoff	128
110	Very loud rock band	256
120	Rocket at takeoff	512

In addition, the microphone can detect the existence and direction of any subsonic or ultrasonic sonar emissions (e.g., from a sonic-motion detector or an implant that allows ultrasonic speech) at up to twice their range.

The tactical-sensor array weighs six pounds and costs $20,000. A pair of B cells power it for two weeks.

Watchdog (TL8+)

See p. 80.

Sensor Web (TL11+)

This skintight jumpsuit is controlled by a small dedicated computer woven into the web's fabric and linked to the user through a neural interface. A sensor web extends the ranges of the user's normal senses (sight, smell, hearing and touch) to a sensitivity greater than most animals'. The computer converts the data into sensations that a human brain can perceive. Vision can be extended into the infrared and ultraviolet - even to X-rays and radio, allowing detection of radiation like a rad-scanner (p. UT19). Hearing can be tuned to both subsonic and ultrasonic ranges or intensified to give up to a +5 bonus. Touch, taste and smell are also at +5. Smell can be rendered acute enough that the user can discriminate between individuals' scents like a bloodhound. Touch becomes fine enough that the user can use the air movements created by a person behind him to locate their exact position, or read ink or microdots with his fingertips.

The sensor web also can translate between sensory modalities, making it of considerable interest to artists. When so programmed, the belt computer can shift sensory perceptions. For instance, if light is perceived as a tactile sensation, the impact of different wavelengths of electromagnetic energy might be felt as a constantly varying breeze. Sound could be experienced as a sensation of shifting colors; with enough experience, the

user might be able to interpret the different colors as different frequencies.

No other clothing or armor may be worn over the Sensor Web for it to function properly; a force screen, being transparent to slow-moving objects and most harmless wavelengths of sound and light, does not interfere with the sensor web except to screen out electromagnetic radiation beyond the infrared to visual portion of the spectrum.

A sensor-web suit has PD 1, DR 2. The suit weighs four pounds and costs $30,000. A C cell powers it for about a month. It also can be built onto the surface of a vacc suit, combat armor or similar suits for the same cost and weight.

SCIENTIFIC GEAR

Geosensor (TL8+)

This sensor box can determine the exact composition of mineral samples placed inside it within 10 seconds on a successful Geology+3 or Prospecting+3 roll. It straps onto a belt. The Geosensor is powered by a C cell (good for 100 samplings). It weighs six pounds when empty and costs $2,000.

Indicator Goo (TL8+)

A clear, positive answer to whether an environment is healthy for humans is extremely difficult to obtain from instrument readings alone. Indicator goo offers a partial solution. It consists of living cells, similar to those of a human, floating in a test tube. If the fragile cells die in great numbers, the tube's content will turn red. If this happens within an hour or so after the user put a sample (air, water or whatever) into the tube, he has detected a harmful contamination. The indicator goo has to be kept at room temperature and requires special nutrients. A set of twelve tubes in an insulated case with a nutrient envelope good for a year weighs one pound and costs $200. A refill kit is $160.

Suitcase Lab (TL8+)

The suitcase lab combines a wide array of scientific instruments, a dataport for linking them to a personal computer and sealed subcompartments for storing solid, liquid or gaseous samples of various sizes. The suitcase also includes a laser printer for producing hard copies of scientific reports. Suitcase lab computers often are equipped with expert system and database programs (pp. UT33-34).

Different versions of the lab complement the Biochemistry, Chemistry, Forensics, Geology and Metallurgy skills. They fulfil the basic equipment requirements for gathering and analyzing samples at the lab's TL. For example, a suitcase chemlab is a portable chemistry workshop. It allows anyone with Chemistry skill to analyze complex compounds including planetary atmospheres, exotic alloys and compounds, and so on. It can also manufacture chemical compounds (such as chemical explosives) in small quantities. Modifiers and time depend on the complexity of the task attempted, but a chemist is at -2 without at least this much equipment.

A suitcase lab comes in a sturdy case (DR 8, +DR 4 per TL over TL8). The lab weighs 20 pounds and costs $12,000.

Nanoscanner (TL8+)

A hand-held, high-resolution active sensor (two-yard range), this can distinguish individual microbots and clouds of nanomachines that might otherwise be too small to see. An Electronics Operations (Sensors) roll must be made. Its readout estimates the number of bots and displays magnified images of typical examples. On a successful roll vs. Electronics Operation or Electronics (Robotics) skill, the user can estimate their general purpose from their shape; they also can be compared to known types by plugging the scanner into a database of known nano or microbots. If micro or nanobots are considered a threat, computer-controlled nanoscanners may be built into doors, etc. to watch out for intruder machines. A nanoscanner weights two pounds and costs $500. It runs for 100 hours on an A cell.

EXPLORATION, SURVIVAL & PERSONAL GEAR

EXPLORATION AND SURVIVAL GEAR

Mini Life Jacket (TL8+)

This small life jacket inflates automatically if totally submerged. It reduces Swimming skill by 3, but the wearer won't sink even if he wants to. One jacket will support 400 pounds in water. It weighs two pounds and costs $20.

Indicator Goo (TL8+)

See above.

Pressure Box (TL8+)

This is a pressurized container (internal dimensions are 2 x 1 x 1 feet) for carrying fragile items (or pets) through vacuum or hostile environments. It includes connections for air tanks and has its own life-support pack that regulates the environment. The modular walls can link together to form a larger container from several boxes. Sealing or unsealing the pressure box takes six seconds; linking boxes together takes 10 seconds per box. A pressure box has DR 3 and takes up three cubic feet. It weighs four pounds and costs $400.

Watchdog (TL8+)

Campers often use this device. See p. 80.

Smart Rope (TL9+)

Seep. 19.

Survival Watch (TL9+)

The size and shape of a large watch, this incorporates a dedicated wrist computer (complexity TL-7) with a 100-meg database of survival lore, a chronometer, a radiation counter, a magnetic compass, a homing beacon (p. 40) and an inertial compass (p. UT22). It is voice-activated and displays information on a tiny, high-res screen. The watch weighs 1/4 pound and costs $300. It works for a year on an A cell.

Spider Cage (TL9+)

Biological survey teams and trappers favor this capture device. It has a starfish-like shape consisting of a floor base surrounded by a few dozen jointed arms, the whole lying flat against the ground. When the central floor is stepped on, it triggers a pressure sensor and the hinged bars spring up and bend forward at high speed to form a roofed cage.

If the victim is not surprised, a successful Dodge roll allows jumping away in time, but PD does not add to Dodge. The padded bars cause minimal injury, but the closing cage will do Id-2 crushing damage if the victim is larger than the area of the trap. A spider cage uses bars of padded memory metal with HT 4 and DR 20, with a two-inch separation between bars. The cage weighs 10 pounds and costs $1,000 for every hex of size. It also features a door on the side (some of the bars swing out in unison) with a conventional electronic and mechanical lock.

Survival Food Processor (TL10+)

This machine converts plants and animals into edible paste similar to that found in concentrated rations, removing harmful toxins and viruses and adding any necessary vitamins and nutrients. As long as it has a source of compatible protein, food can be created indefinitely, though its store of vitamin supplements will run out after one man-year of use. At TL 12+ this problem disappears; the food processor can duplicate just about anything via molecular restructuring.

The processor can use nearly any organic substance, terrestrial or alien. It works automatically, taking one to six hours (depending on the quality of the raw material) to process enough for a single meal. In its raw state the end product is not too tempting - a bland-tasting paste of dry, flaky cake, often gray or brown - but is perfectly edible. Flavor additives can make it more palatable. One hundred additive packets (each good for one meal) weigh five pounds and cost $50. The processor also can distill simple organic compounds, such as alcohol.

The survival food processor weighs 20 pounds, costs $5,000 and comes in backpack-mounted and vehicular versions. It runs on a D cell for 1,200 hours; solar cells often are installed for emergencies. A spare dietary-supplement pack weighs one pound and costs $100.

Force Snare (TL12+)

This specialized tractor-beam generator is about the size of a paperback book. If any moving object of mouse size or larger (to a maximum of two-hex size or 1,500 pounds weight) comes within a yard of the generator, its sensor will trigger the trap. When that happens, a gravitic tractor field will grab the object and hold it rigid.

A trapped person is protected by a PD 8 deflector force field. A victim can attempt to use their muscles (or Telekinesis) to override the field - roll a Quick Contest of ST vs. the field's ST 30. The victim can make one roll immediately, but if that fails, only one additional attempt per minute. Success means the victim breaks free and the field generator shuts down.

The generator itself is outside the field, thus someone else can easily shut it off or destroy it. This makes it most useful against a single victim or for hunting. Once it has trapped someone, the snare cannot function again until the first person is released and the generator is reset.

The generator comes with a chameleon- and infrared-cloaking surface that makes it very hard to spot even in the open -roll vs. IQ-5 or Traps-5 to spot it (also apply Speed/Range modifiers - it's harder to spot a trap while moving). As with any trap, use of Camouflage skill can further conceal it.

A force snare weighs two pounds and costs $2,000. A C cell powers the sensors for 24 weeks or until the trap is set off. Once the snare has erected the force field, each minute drains the same power as a week of sensor use.

PERSONAL EQUIPMENT

Hoverplate (TL8+)

This flat, two-foot-diameter cart floats on an air cushion generated by a relatively quiet, electric-powered ducted fan. **It** boasts no motive system, but can be towed or pushed with ease (at the pusher's Move).

Hoverplates often are seen around air and spaceports, used for moving cargo and luggage; other versions serve as baby carriages and shopping carts. They can carry 500 pounds over smooth ground or water, and make a humming sound audible to a normal Hearing roll at 30 yards. A hoverplate weighs 20 pounds and costs $300. It runs off a D cell for two weeks. Voice-controlled robot versions with Move 4 are available at double cost.

Catalyst Crystals (TL9+)

These crystals produce a chemical reaction when dropped into water, quickly bringing it to a boil without affecting its drinkability. Each packet (good for 10 cups) weighs one ounce and costs $2.

Suitspray (TL9+)

This spray tube contains a smart polymer that sticks to bare flesh and solidifies into a skintight fabric with the look and feel of a silk bodystocking.

Suitspray provides about as much warmth as a t-shirt (light summer clothing), while still being porous enough to allow the wearer's skin to breathe. Various colors are available, including skin tone, metallic colors and translucent models. It has no **PD** or DR.

Donning suitspray requires spraying it over the body. It adheres to flesh but remains semi-liquid for about 30 seconds, enabling it to be lathered about for full coverage. The smart polymer can sense if it is *not* stuck to flesh, and will evaporate instead of adhering if not in contact with a warm body. (This makes it impossible for cold-blooded species and some vampires to use suitspray.) Most people prefer to put it on while in a bathroom with a mirror; this ensures full body coverage. Otherwise, embarrassing patches may be overlooked, although these can be easily fixed with an extra squirt or two.

Suitspray will not adhere to hair or to eyes, only to skin. Suitspray takes about twenty seconds to spray on, half that if someone else is helping. Suitspray does not wash off in ordinary water, but rinsing with a special soap or a sonic shower (p. UT27) will remove it within 30 seconds. (So will 10 seconds of stunner fire or any hit by a screamer.) Suitspray enjoys popularity with those who don't mind showing off their bodies and who prefer not to carry bulky clothes when they travel; it also makes a good thermal undergarment. In some hotels, a shower may have a "suitspray" setting that dispenses a spraysuit for a small fee ($4 added to the bill). A can holding enough suitspray to cover an adult human weighs 0.25 pounds and costs $4.

Bioplas Contact Lenses (TL10+)

These can correct vision problems (if genetic engineering hasn't done away with those already) and change eye color. (IR, anti-glare and light-intensification contacts - see p. 23 and UT20 - come in bioplas at no extra cost at TL10+.) Normal scanners cannot detect them. Bioplas contacts can be worn indefinitely, due to bioplastic's ability to "breathe" and eat bacteria. Price is $20 for a pair of corrective or color-changing contact lenses.

Buzz Fabric (TL10+)

Clothes, furniture covers or other rough fabric surfaces can be engineered as "smart fabric" with self-cleaning capability. Buzz-fabric fibers contain microscopic circuitry that controls microscopic, motorized brushes that eject dirt and grime. A buzz-fabric wearer could even fall down in a mud puddle and a quick brush later be totally clean. Note that the dirt is simply ejected, not destroyed: buzz fabric on a horizontal surface like a rug or mat would be a lot easier to clean - since grime would not be ground into it - but you would still have to go over it every so often with a vacuum cleaner to remove the residual dirt and dust!

Buzz fabric also sheds water much more rapidly than usual, and can dry in one-fifth normal times. This makes it very popular for rainwear.

Despite its nickname, buzz fabric doesn't make an audible noise. Solar cells or static-electricity collectors in the fabric provide the very small amounts of power needed.

Buzz fabric costs twice as much as normal clothing or fabric. Versions for flexible armor made of materials such as Kevlar, monocrys, bioplastic or energy cloth and most types of vacc suits are available. Double the armor's basic cost in most cases; for bioplastic, add only 20% to cost.

Cyberclothes (TL10+)

"Smart material" can make clothing (including footwear and imitation-leather goods) that automatically tightens or loosens to produce a more comfortable fit in accordance with the intended style.

Microscopic sensors and motors in the fabric adjust it as needed. While cyberclothing by no means counts as one-size-fits-all apparel, it offers more tolerance than ordinary "dumb" clothing.

Cyberclothes also can change porosity, to adjust to temperature and humidity, and absorb sweat stains.

Cyberclothes cost three times as much as ordinary clothing. If they incorporate buzz fabric (p. 29) or varicloth (p. UT27), cost is four times as much. If they incorporate both, the cost is five times as much. TL10+ bioplastic suits such as the biosuit, bioplas bodysuit and reflex armor already incorporate Cyberclothes technology.

Domestic Nanocleanser (TL10+)

This "smart soap" is a solution of microscopic cleaning robots that work to remove stains, grime, dirt, dandruff, loose skin flakes, etc. from surfaces (organic or inorganic). Domestic nanocleanser can serve as a shampoo, soap or detergent. A teaspoon of nanocleanser powder poured into water will clean anything immersed in it in 10-60 seconds. It also comes in premixed liquid-detergent form, useful if water is unavailable.

Washing in nanocleanser slightly unsettles those unused to it with its tingling or tickling sensation. The robots themselves are biodegradable and non-toxic, smart enough not to scrub hard enough to scratch, and programmed to break down into harmless sub-components if exposed to ultraviolet light or the interior of a living body.

Domestic nanocleanser also can remove forensic evidence such as blood stains, skin flakes and other organic residue. While it doesn't work as well as the specially designed Mask spray (p. 86), treating an area with it imposes a -3 penalty on any Forensics, bioscanner or biohound rolls made to locate or analyze such evidence. TL10+ Forensics will be able to identify the exact brand of nanocleanser used, which may itself be a useful clue!

A bottle of nanocleanser lasts for about a week of routine domestic cleaning or one major cleaning job, such as thoroughly wiping down an apartment to remove evidence. It weighs 1/2 pound and costs $10.

Gourmet Food Processor (TL10+)

This works exactly like the survival food processor (p. 27) except that it produces much more palatable "simulated" food and drink that looks and tastes far better (about equivalent to a meal prepared with Cooking-12). For people who still like to cook, it also can create "raw" ingredients instead of finished food. A gourmet food processor weighs 40 pounds and costs $10,000, and is available in kitchen or vehicular units, or in a backpack mount at TL11+. It runs on a D cell for 1,200 hours.

Grooming Gun (TL10+)

This device looks like a deodorant stick with a small control dial at the base and a recessed trigger on the side. It actually is an applicator-programmer for a miniature swarm of microscopic machines ("groomers").

The user sets the gun's dial to "mark," then sprays out boundary-marker machines that delineate the area to be groomed; the spray nozzle adjusts to cover an area from a square inch to a square foot. Then the user resets the gun to one of a dozen "groom" settings and releases groomers into the bounded area, which they won't leave.

The groomers will trim body, facial or head hair or fur down to the setting-specified minimum length in millimeters (a setting of zero will depilate). They also can be set to remove dirt or dandruff, or to apply dye. The job takes about 30 seconds. The grooming gun is then applied to the boundary area again and held down for 10 seconds, sending out a signal that tells the groomers to return to it. Any that were missed will self-destruct within an hour or two: they are non-toxic and will degrade harmlessly if exposed to ultraviolet light or intestinal flora. A grooming gun weighs one-quarter pound, costs $100 and comes preloaded with a month's supply of groomers. A new groomer cartridge is one ounce and $10.

Cleaning Curtain (TL11+)

This invisible curtain of cleaner nanostats (see *Domestic Nanocleanser,* this page) comes equipped with small brushes and dirt-removing arms. Anyone passing through the curtain will feel a crawling sensation, and will be cleaner when they leave. The cleansing curtain also keeps out dust. They are popular installations in doorways, bathrooms, etc. A residue of grime usually will accumulate along the edge of a cleansing curtain. Thus, some sort of grime-eating floor (see *The House That Lives,* p. UT7) is a good idea. A one-hex-wide, 6'-high "curtain" suitable for a doorway costs $1,000.

Industrial Nanocleanser (TL11+)

This stronger, industrial-strength version of domestic nanocleanser (p. 29) eliminates bacteriological spills, rotten food, medical waste and the like.

It also rapidly disposes of corpses. It does an excellent job of cleaning up: a human body carefully sprayed with or dropped into a vat of industrial nanocleanser will be reduced to powder within a minute. Spraying down evidence with industrial nanocleanser will impose a -10 on any forensic-type examination, although it also will destroy natural fiber or leather clothing, plastics, plants and other organic material.

If used as a weapon, treat it as dissembler glop (see *Biochemical Weapons* on p. 70} except it won't damage anything inorganic.

A container of industrial nanocleanser weighs 1/2 pound and costs $100.

Programmable Biosuit (TL11+)

This is a late-TL11 development of the standard biosuit (p. UT26).

The programmable biosuit has the same characteristics as the biosuit: it is a flexible "living" vacc suit made of bioplastic that resembles a skintight jumpsuit (expanding slightly when pressurized). Its skin absorbs sunlight and recycles waste, giving it an extended air supply (some wastage occurs, but the suit is effective for six weeks). A small belt pack contains enough air to pressurize the suit and provide power and life support. The suit is self-sealing for punctures up to an inch in diameter, and more extensive damage is slowly repaired. It is powered by the user's body heat and lives off his waste products. The suit also includes flexible bioplas gloves and a transparent helmet, which are stored in its belt pack when not in use. No clothing or armor can be worn under a biosuit. The suit has PD 2, DR 15.

The programmable biosuit differs from the ordinary model in its ability to run various special "programs" (these aren't computer programs) that make full use of the mutable capabilities of bioplastic. Some of the possible suit programs are:

Interphase: This "biosuit-built-for-two" program allows two or more programmable biosuits in physical contact to slowly merge, effectively becoming a single, larger suit (like a big, tight bioplastic sleeping bag) that contains all original occupants.

Aside from allowing people to sleep together without leaving their suits, this is useful for a variety of purposes, e.g., performing first aid on another person without breaching life support. The interphase process takes about 10 seconds, and requires that all parties be cooperative, restrained or unconscious. Interphased suits are clumsy, especially in a gravity field; basically, you can hop or roll at Move 1. Separating the suits takes 10 seconds; any suit wearer can initiate his suit's separation. The Interphase program adds $1,000 to suit cost.

Rainbow: The suit can change its color and hue on request, or even become transparent (though not invisible). This is not as effective as an actual chameleon suit, but does allow the user to don a camouflage pattern (-2 to be spotted) if desired. It can also give the suit a chrome pattern, for the equivalent of a reflec armor surface (p. UT74). The rainbow program also can control the transparency of the suit's helmet; if desired, it can make the helmet totally opaque except for a transarent eye slit. This program costs $400.

Smartcloak: If the user removes the life-support and power belt, the suit can split open, then re-configure itself into a cloak-with-hood style. This takes simply one second. It can be used in combat exactly like a heavy cloak (p. B242), with the single exception that it weighs three pounds rather than five pounds and it has DR 15. The cloak will also provide PD 2, DR 15 against any attack from the rear against the torso or legs. If a person is nude but wearing a biosuit in smartcloak mode, it can be commanded to flow around the wearer and enclose him in the biosuit. This takes one second. To pressurize the suit, the user should then don the belt pack. The smartcloak program costs $2,000.

A programmable biosuit costs $6,000 plus the cost of its programs, and weighs three pounds.


MESSAGE DATA
chapter THREE
STATUS
ACTIVE
CHASE TRANSMISSION: XX334249-247/23 GURPS ULTRA-TECH 2
ENCRYPTION LEVEL 12 //SLIP ENCRYPTION DECODING... HEADER FOLLOWS
: COMPUTERS
WARNING: ACCESS UNAUTHORIZED COUNTERMEASURES FOLLOW...
//BURST DOWNLOAD PRIORITY: ALPHA ..... SCRAM... SCRAM...
VIDEO TRANSMISSION ENGAGED PREPARE TO RECEIVE VIDEO
MESSAGE BODY FOLLOWS — CUT HERE — CUT HERE —
VIDEO TRANSMISSION SCREEN
ALERT
SJC-23
CHANNEL
SECURE
Computers come in all shapes and sizes. This chapter expands the options available to customize systems, and adds guidelines for virtual-reality environments.
ZONY
::Computers::
31

Unless specifically noted, any new rules for computers also can be applied to robot brains from ***GURPS Robots.***

Using Computers

Operation of computers is described on p. UT29; these rules describe additional features or options.

COMPUTER HARDWARE

Generic Peripherals (TL8+)

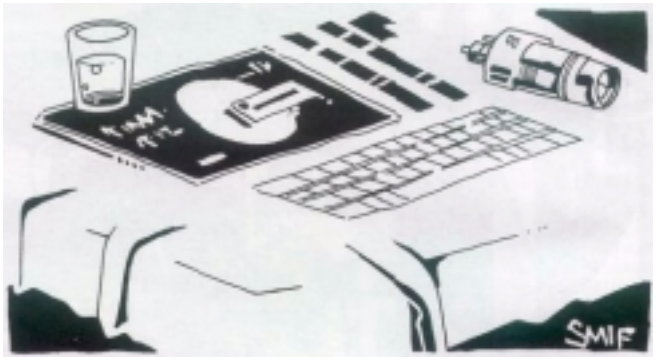
Most TL8+ sensors and communicators incorporate built-in software to enable them to be plugged into a computer as peripherals - see *Plug-In Gadgets* on p. 16.

RDM Slots (TL7+)

ROM stands for "read only memory." Software can be burned onto a chip and encased in a plastic cartridge that plugs into a computer. A ROM cartridge is about the size of a pack of playing cards, hence the term "ROM deck."

Buying a program or database on a ROM deck costs 50% more than buying it on a disk. The information in the deck can't be changed - buy a new deck. On the plus side, programs and databases in ROM run twice as fast as their equivalent on disk. This mainly benefits analysis programs.

All normal computers come with a number of ROM slots equal to their Complexity at no additional charge. Specialized computers can boast more - see *Modifying Computers* on p. 33.



Parallel Computing (TL7+)

Identical, low-Complexity computers can form a *parallel computer* of higher Complexity by being linked together. Using 10 computers will create a parallel computer with Complexity equal to that of the component computers +1, using 100 gives +2, etc. - each additional factor of 10 increases Complexity by +1. The cost, weight and volume of a parallel computer equals the total of all the component computers, plus $50 and 0.1 lb. times the number of component computers *squared*, regardless of Complexity, for the additional connections. The most efficient parallel computers use the highest-Complexity component computers available at the TL.

COMPUTER SYSTEMS

This section adds new types of computers to the basic models described on pp. UT30-31.

Datacloth (TL8+)

A datacloth looks like a sheet of fabric (e.g., a tablecloth or handkerchief, depending on its size), but is actually a flexible computer system, terminal and monitor rolled into one. Datacloth may have a blank or patterned surface, but always has an infrared-sensitive icon on it somewhere. When a warm finger or infrared remote triggers the icon, the cloth turns into an LCD screen with a touch-sensitive, icon-based menu running along the top or bottom of the cloth.

A datacloth functions as a Complexity 1 computer at TL8; complexity increases by one per additional TL. Datacloth lacks some of the peripheral systems standard in other TL8+ computers. Voice recognition and synthesis don't appear until TL10+. It never features a built-in modem, minidisk drive or ROM slots.

Even without a modem or disk drive, datacloth can transfer programs and data. Normally, an infrared communicator (p. 41), IR remote (p. 41) or *dataclip* is used. The latter device looks like a paperclip with a cable attached to it. It plugs into an ordinary computer and clips onto a datacloth. When attached, a dataclip allows direct datalink between the two systems, or allows the datacloth to function as a large-screen monitor for another system (even displaying digital movies and the like). The price of a datacloth includes one dataclip; extras are $8 each.

Datacloth has DR 2, HT 2. It can't be sliced, pierced or cut without destroying the computer. It comes in a variety of sizes. Most common are handkerchief-size ($200, one square foot, negligible weight) and tablecloth-size ($1,800, nine square feet, about one pound). They can be folded into a pocket- or backpack-sized bundle respectively. Solar-powered, datacloth operates indefinitely in any lighted area. It can store enough energy to operate for an hour or so in darkness.

Tiny Computer (TL8+)

This very small computer lacks a keyboard and screen. It typifies systems that are added to vacc-suit or combat helmets and electronic devices, relying on a HUD (p. UT65), voice or neural interface to input commands and convey information. It is Complexity 1 at TL8; its complexity increases by one per TL over 8.

The tiny computer weighs 1/2 pound and costs $200; this does not include any interface devices such as a HUD or neural socket.

Macroframe (TL8+)

A macroframe lies between a mainframe and a megacomputer in sophistication. It is a Complexity 6 computer (increased by 1 per TL over TL8). Major corporations, government agencies, research establishments and large vehicles use them. A macroframe weighs 4,000 pounds. Without any terminals or peripherals it takes up 80 cubic feet and costs $2,000,000. It runs off building power.

A megacomputer (see p. UT31) is actually a TL9 macroframe that has been given the neural-net option (p. 34).

Gestalt Computer (TL10+)

This computer relies on linked human brains for its computing power. At some tech levels it can be more efficient than an ordinary computer. Physically, it looks like a normal computer except one or more people are connected to it by neural-induction helmets (or some other form of neural interface).

The gestalt computer is *used just* like any other computer: it can store and manipulate data, run programs, etc. A normal computer terminal controls it via standard voice, keyboard or neural-interface options.

The gestalt "components" must be sentient beings with IQ 8 or better and no significant brain damage. Each component must wear a neural-induction helmet (three pounds, $10,000 -p. UT37) or some other form of neural interface. When interfaced with the computer's gestalt processor, the components are effectively asleep (though the time spent as a component does not count as sleep for the individual to recover fatigue, etc.). They cannot use the computer system, and afterward will have no conscious recollection of what the gestalt computer is doing. At the GM's option, some of the component minds *may* retain some subconscious residue of the work or data they are handling. This could come out in dreams or hypnosis, or only through special mind-probing equipment.

The components of the gestalt can be "employees," who simply plug into the machine for part of the day. Sometimes gestalt computers operate with slave labor: people are hooked to life support and never removed. The ultimate version of gestalt computing removes the bodies entirely and uses cyborged brains.

The number of people in the gestalt array determines the computer's effective storage capacity and Complexity. The computer can store one gigabyte per mind in the array. One linked mind gives it a base Complexity 5; for each ten-fold increase in the number of minds in the gestalt, add one to its Complexity.

For instance, 10 minds are Complexity 6, 100 minds are Complexity 7, 1,000 minds are Complexity 8 and so on. Individuals with Eidetic Memory or IQ 15+ count as two minds for the purposes of the array (four if Eidetic Memory *and* IQ 15+). Those with Compartmentalized Mind (p. CI52) multiply by the number of compartments. Note that the Complexity of a gestalt computer *does not* increase at higher TLs.

A gestalt computer capable of handling a single mind weighs 500 pounds and costs $100,000; add 50 pounds and $10,000 per extra mind it can handle. More hardware to handle extra minds can be added later. Neural-interface equipment (and any life-support systems) are extra.

MODIFYING COMPUTERS

Computer systems can possess a wider range of modifications than those listed on p. UT120 (dedicated, optical, ghost comp and sentient). The effects of all computer modifications on the basic system's cost or weight always are multiplied together. For example, if one modification doubles cost and another multiplies cost by 1.5, the final cost is 2 x 1.5: 3 times normal.

Compact System (TL7+)

A compact computer system halves weight and volume, but doubles cost. Some specialized computers can't be made compact - see the individual descriptions.

Dumb (TL7+)

A computer may be *less* sophisticated than others of the same size and type. This subtracts 1 from Complexity but makes it much cheaper. Divide the cost by 20 for dumb tiny or personal computers (p. UT30), or by five for other computers.

Extra Rom Slots (TL7+)

The number of ROM slots (p. 32) in a computer can be multiplied by 1.5 for 1.5 times cost.

Genius System (TL7+)

A computer with this option uses state-of-the-art processing technology. This adds +1 to Complexity but greatly increases the price. Multiply cost by seven for most computers, multiply by 20 for tiny, personal, mainframe, macroframe and megacomputers.

Optimized Computers (TL8+)

Computers can excel in a particular function, usually by optimizing processors and dedicating built-in peripherals. Programs within that field count as one Complexity level lower for determining if they can run on the computer, and how many such programs can operate at once. Out-of-field programs count as one Complexity level higher. Example:

Multi-Mediaframe (TL7+): This is a computer optimized for creating and running virtual realities, movies, television shows and other multi-media applications. It incorporates an ultrahigh-resolution monitor, a fleet of input/output sockets and specialized video- and audio-signal processors, and editors and utilities all dedicated to creating or controlling motion pictures and special effects. Any size of computer large enough to have its own screen can be a mediaframe. Digital multi-media programs (notably virtual-reality programs, computer games and software for designing them) gain the optimization bonus described above.

Other suitable categories for optimization can be based on the various skill categories in the ***Basic** Set* e.g., scientific, medical, and so on, or on specific sets of programs, e.g., expert systems. Computers may not be specially optimized for running robot brain programs! For game balance, GMs may prohibit combat-skill optimization, but play-balance issues aside, it represents a reasonably realistic category.

EMESCAT-Hardened (TL7+)

This equips the computer with a Faraday cage or similar device that prevents monitoring by EMESCAT scanners (p. 84). EMESCAT-harden ing computer equipment multiplies the computer's weight and cost by 1.2. Governments usually harden most of their equipment. GMs may assume shielded computers (see *optical systems* on p. UT32) and hardened-robot brains are EMESCAT-hardened at no extra cost.

Biocomputer (TL8+)

A biocomputer's processing capabilities increase through the use of organic systems, either scavenged from living brains or vat-grown, and kept alive with a built-in life-support system. Biocomputers *must* also have the neural-net or sentient options. Their additional processing power adds +1 to the computer's Complexity. Any repairs require Electronics Operation (Medical) *and* Electronics Operation (Computers). Biocomputer systems weigh and cost more due to the life support needed for the organic components. Multiply weight and volume of a biocomputer by 1.5 and cost by five. (This doesn't include the price increase for a neural-net.)

Neural-Net (TL8+)

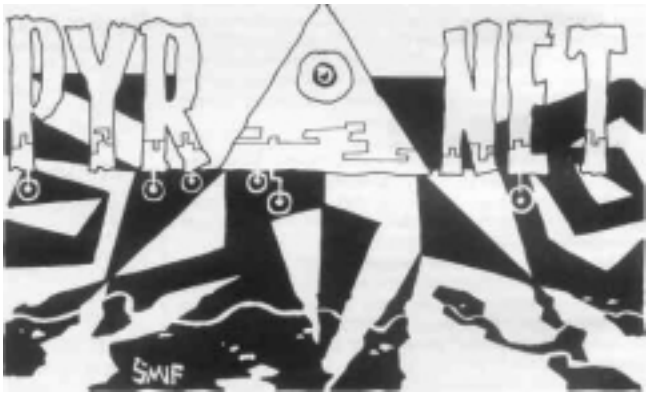
The computer's operations simulate the way an animal (e.g., human) brain works. This makes it self-programming and semi-sentient, with limited self-initiative. In game terms, the computer can learn new skills in the same way a character does, and will sometimes act based on what its experience suggests its current mission is without being explicitly told to do something, within the limits of its intelligence. Unlike a sentient computer, it does not have its own goals or motivations.

A neural-net has an effective IQ of Complexity+4. All megacomputers are neural-net systems. Before TL-10, any Complexity 7+ neural-net brain can spontaneously "awaken" into a sentient computer in the same way that a megacomputer can (on a 6 or less each year). At TL10+ this can't happen accidentally; see p. UT31 and p. RO57 for sentient computers. A neural-net costs twice as much as a regular computer.

DATA NETWORKS

Computers connected to a phone can access planetary or space-habitat data networks by dialing up a network service provider at which an account has been established. Many TL8+ networks allow contact via vidphone or TV. Data networks consist of numerous "nodes" - particular computers that are connected on a permanent or semi-permanent basis, forming large data networks such as the Internet.

If a solar systems hosts multiple inhabited bodies, data networks may extend throughout it. These networks will suffer communication delays, *each way*, caused by the speed-of-light limitation ranging from a couple of seconds (a close moon) to hours (across the solar system). If faster-than-light communications exist, interstellar data networks may become possible.



NET SERVICE PROVIDERS

A service provider maintains a large database containing a wide variety of information (news, knowledge, personal mail, discussion groups, etc.) that is passed around, plus the hardware and software needed to transmit high volumes of information to and from other service providers.

Service providers may be private or public. A private service provider is usually a corporation, university or government department providing services to its members. A public provider offers its services for free or to paying subscribers; it may range from a local bulletin board or chat service to a huge corporation with millions or billions of users. The key distinction is how many users can be handled simultaneously (number and transmission speed of phone lines or other channels) and how much database information the system can store.

In some societies, a public service provider may be a business or state monopoly. In theory, this makes access easier

since everyone uses the same software on the same network. In practice, it gives the owner immense control over information distribution, since with enough computer power it could theoretically monitor the on-line actions of every user and wield considerable power to censor communication it didn't want on the net.

A subscriber's account lets him access databases or other services. He also can use his account to contact other service providers. Accounts include an e-mail address, at which the subscriber can be reached via electronic mail and from which he can send mail to other accounts. Service providers also may maintain personal public-access sites for their account holders, making them accessible to the global data network. A current example is the World Wide Web. At TL8+, some personal sites may incorporate personalized virtual-reality environments.

Service Costs

The cost of subscribing to a service provider varies greatly, depending on speed and quality of service. A monthly fee is usual, e.g., $20/month. This may provide unlimited access, an hourly rate, or a number of free hours per month followed by a charge (e.g., $1) per extra hour. Providers often charge extra for various services: downloading some types of information, accessing virtual-reality simulations, special high-speed service, etc. Storage of a few megabytes of information on the provider's system (e.g., e-mail) usually is included. Storing *lots* of information (backed-up mail, personal virtual realities, etc.) in a provider's system usually will cost extra, e.g., $10 per gigabyte per month. The amount of data that can be stored for this fee may go up exponentially at higher TLs.

Costs for *running* a net service are basically the cost of maintaining the computer systems on which the data and user-access programs operate and renting the necessary phone or satellite transmission bandwidth to handle the number of users, as well as paying for on-line support and customer-service personnel. (Unless the service provider is also the phone or satellite company, in which case it has to worry about maintaining the communication channels and setting up new ones if they become overloaded!) Rental costs for lines capable of real-time, high-speed access to a global network will vary greatly depending on the state and sophistication of the net. Continuing costs may be about $60 per line per month. If the number of *regular* users exceeds more than 20 times the number of lines, the system likely will become clogged.

FREEWARE AND SHAREWARE

Free programs, or cheap "shareware" versions of some *Ultra-Tech* computer programs, are usually available on the net or from vendors at discount prices.

Programs with Complexity greater than current TL-6 almost never appear as free or shareware. Thus, at TL10 you may be able to get a shareware Complexity 4 program for minimal cost, but finding a higher-skill version that was Complexity 5 would require commercial purchase.

Shareware offerings normally include only legal, common programs such as Accounting, Datalink, Desktop Publishing, Electronics Repair, News Daemon and various VR programs. These usually cost about 0-10% of existing prices, depending on their capabilities - usually limited-function demo copies are freeware, with full versions for a cheap registration fee.

Less common programs can be found, but this requires considerable computer time (roll each hour at -1 per $1,000 that the program would cost to purchase new). The less-common shareware programs usually cost 10-60% as much as a commercial version. A critical failure may result in being scammed by criminals selling pirated or buggy software. Illegal and pirated software also exists; use the rules for *Black Market Software* on p. 16.

All shareware programs *may* have additional problems. While no more likely to have bugs then commercial software, shareware may lack documentation and technical support in the event of a problem. If a program crashes or malfunctions, the GM could impose a penalty on the Computer Operation or Programming roll to find and fix the fault. Using cheap shareware in combat robots is not recommended, but cleaning up afterward can be interesting.

VIRTUAL REALITY (VR)

This is the most complex form of computer interface before true neural interfaces are developed. The computer simulates the sensory input of a computerized environment and transmits it to the user through a virtual-reality rig of some sort.

The simplest form of virtual reality is a visual display. The user dons goggles or a helmet that blocks out the real world and replaces it with a wrap-around view of computer-generated imagery. VR displays are popular means of receiving sensor input from computer games or simulations, from scientific and other sensors, and from sensors and instruments on vehicles or robots. Most TL8-9 remote-control drones use some form of VR display as part of their control system - see p. RO64 for examples.

VR often serves as a symbolic interface between a user and a set of controls or instruments, "superimposing" itself on normal reality. For instance, a computer operator can use a VR rig to dispense with a physical keyboard. By wearing a VR rig consisting of goggles and gloves plugged into a computer, the computer generates the virtual image of a keyboard in front of the user. The user moves his fingers as if typing, the gloves sense the finger movements and keystroke input is generated in the computer. The same can apply to control of other electronic systems.

MULTI-USER VR

Virtual reality also can allow social interaction over a distance. If a computer user has a VR suit, he can see, hear and touch people and objects in a virtual-reality environment as if they were real. At TL8+, phone conversations and face-to-face

meetings often give way to encounters in shared virtual realities on computer networks.

When someone enters a VR environment of this sort, what their character looks like will depend on the nature of the environment program and their own interface program. Service providers have a library of icons on line that the user can choose from, if he hasn't taken the time to design his own customized one.

Typical multi-user VR environments resemble a computer-generated version of reality. People with proper VR gear can move about it and interact with the other denizens as they would in the real world. People icons encountered in VR may be controlled by other VR users, or a computer program may be operating them. Depending on the setting, character icons may be insubstantial or react as if solid. Everything is only as real as the program makes it. This includes physical laws: while most environments are designed so that physics mirrors the real world, nothing prevents creating one with different laws where everyone is weightless, or people have "magical" powers, or water is solid, or whatever. Depending on the level of access granted by the system's operator, some users may be able to do things others cannot, or even control the overall VR program from within the simulation. In a large simulation, different sites within it may have different rules.

Most service providers have a mix of open public forums such as virtual parks, bars, shopping malls or streets and private VR spaces. Areas may include virtual malls where physical goods and services are displayed and sold by credcard. Rather than being limited to graphic images of goods (as on computer shopping networks and ad pages today), they can incorporate VR simulations that allow the user to try out the goods in question - test drive a virtual car or try on virtual clothes, for instance. (Caveat emptor: what looks good in VR may not be as good in reality.) If the goods are software, they can be delivered immediately; if they are hardware, they come by courier. At high TLs, a purchase order may signal a local minifac or nanofac to manufacture the goods; no inventory may actually be kept.

Travel speed in a virtual reality may be limited to walking, but some users may be granted the ability to teleport, fly, etc., or board virtual public or private transportation.

Many service providers allow subscribers to design and rent their own personalized locations, either in public VR forums or in private-access areas. Corporations may have entire VR offices. Individuals should take care before using VR for confidential meetings or secret rendezvous. A system operator can design software to monitor or record events in "private" VR spaces.

Access to large "public" VR environments may be free (perhaps sponsored by corporations or treated as the equivalent of public parks). Other VR sites may have dues ranging from $l-$2 per hour to as high as $2 per minute, although the latter charge is likely only for sophisticated game sites or private clubs. Price may depend on how congested communications bandwidth is.

How a user interacts with a virtual reality depends on the kind of VR rig or suit he possesses. To function, all VR rigs must be linked to a computer that is running a virtual-reality program.

VR RIGS AND SUITS

Basic VR Rig (TL7+)

This simple set of VR goggles and gloves allows a user to operate a computer as a virtual keyboard and to access virtual-reality programs that do not require a VR suit. The user has no "body" in the VR environment, but can manipulate virtual objects using the gloves. A basic VR rig weighs 2 pounds and costs $1,000. The goggles in a basic VR rig can be replaced by the goggles in a HUD or holographic HUD; if so, the gloves alone weigh 1 pound and cost $500. For $500 and 1/2 pound, the gloves can be incorporated into any set of armor, vacc suit or other environ mental-suit gloves. It requires a Complexity 2 or higher computer to use this system.

Basic VR Suit (TL7+)

As above, but the user also attaches small movement "tracers" to various points on the body. This lets him physically

move around a virtual reality and have a "body" there, but he can only experience full tactile stimulation in his hands. A partial VR suit takes only 10 seconds to put on, or five seconds to remove. It weighs 5 pounds and costs $1,200. It requires a Complexity 2 or higher computer to use this system.

Full VR Suit (TL7+)

This consists of a goggle-equipped helmet, gloves and a sensor-equipped bodystocking. The helmet blocks out the real world, isolating the wearer from light, smells and sound. The goggles display 3-D images constructed by the computer program, while the earplugs transmit sound. The bodystocking and gloves house feedback sensors and pressure devices.

A full VR suit allows the user to move about a virtual reality and manipulate objects as if they were real, solid things, within any constraints imposed by the program. The suit will sense the user's movements and give gross tactile feedback. It does this by holding the user's body rigid while sensing his movements and translating them into computer commands. Likewise, if something in the virtual reality touches the user's VR analog, the suit transmits pressure to the user. Subtle tactile sensations are not transmitted; you can't really feel a virtual breeze, nor sense heat or cold. A kiss doesn't feel any more sensual then a light touch.

Similarly, the suit won't "push back" hard enough for the user to take any damage. You could fence or wrestle or box in VR and be pinned or thrown or knocked back by an impact, but being hacked or choked or punched won't tighten the suit enough to hurt! But in a virtual reality set up for combat simulation the program may keep track of "damage" and adjust your virtual image to reflect this, or kick you off line if you are "killed." Some public multi-user virtual environments allow this sort of fighting anywhere; most restrict it to designated gaming areas.

A VR suit must be calibrated and adjusted to properly fit a specific user, which takes about two hours. After this has been done, it takes about a minute to put on, half that to take off.

A full VR suit weighs 30 pounds and costs $2,500. VR suits will reduce in weight and cost normally at higher TLs: at TL10+ they often are made of lightweight bioplastic, though by that TL, most people prefer to use various forms of neural interface. It requires a Complexity 3 or higher computer to use this system.

Deluxe *VR* Suit (TL8+)

This full VR suit offers a far-higher degree of sensory discrimination. The suit can transmit olfactory sensations and allows more sensual discrimination than a full VR suit. If the virtual reality is so programmed, it can transmit subtle tactile and temperature sensations. The suit also is equipped to stimulate erogenous zones, allowing virtual sex. A deluxe VR suit weighs 32 pounds and costs $10,000. It requires a Complexity 4 or higher computer to use this system.

Neural Interface VR Programs and Total VR (TL10+)

Any form of neural-interface technology (see p. UT37) can access a TL10+ virtual reality by running appropriate software: a "basic VR" program (Complexity 2, $10) gives the same effect as a basic VR suit, a "full VR" program (Complexity 3, $100) gives the same effect as a full VR suit, while a "deluxe VR" program (Complexity 4, $500) acts as a deluxe VR suit.

A "total VR" program (Complexity 5, $4,000) acts as a deluxe VR suit with the difference that all the user's senses are engaged, the only limit being whatever safety factors are programmed into the system. If safety interlocks are engaged, the user may feel discomfort or dislocation, but not actual pain. If they are not engaged, a person in a total VR simulation can feel real pain. He won't suffer injury, but psychological damage can result if he is hurt, killed or tortured in VR. This is best simulated by requiring one or more Fright Checks.

Some total VR systems include a variety of "consent-level" protocols limiting how much "reality" (in terms of discomfort or pain) the user is willing to take. Another standard feature is a "safeword" function - if the user speaks a specific codeword he is immediately pulled out. Sabotage (e.g., hacking into the system) or system-operator connivance might neutralize such features.

VR SOFTWARE

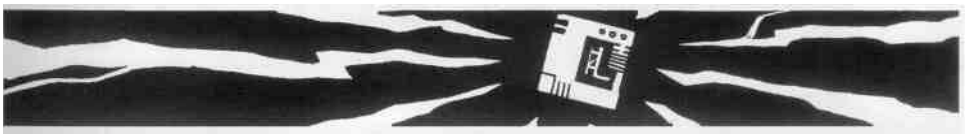
Much TL8+ software (e.g., Electronics Repair, Medical, computer games) supports a VR interface, if the user has the proper VR rig, suit or neural-interface program.

More specialized programs that are needed to run or maintain multi-user interactive virtual realities include:

VR Manager (TL7+)

If multiple users expect to interact within a shared virtual reality, this program must manage it, creating characters and programming simulations. The VR manager must be run on whatever computer is maintaining the virtual environment. Each program can handle about 10 users. For more people, run more programs. The manager can grant varying degrees of access to individual users to design characters or places within the environment. The Complexity and cost of the VR manager depends on the most complex type of virtual-reality interface it can support:

Complexity 2: Supports basic VR. $100, TL7.
Complexity 3: Supports up to full VR. $400, TL7.
Complexity 4: Supports up to deluxe VR. $2,000, TL8.
Complexity 5+: Supports up to total VR. $4,000, TL10.



The level of "reality" experienced is the *lower* of the VR interface or the VR manager. Thus, someone with a deluxe VR rig running in an environment maintained by a Complexity 3 VR manager would participate as if they only had a full VR rig - the software can't handle the full capabilities. On the other hand, a user with a basic VR rig who connects to a Complexity 5 simulation misses most of the detail, experiencing it as if it were only Complexity 2.

VR Environmental Database (TL7+)

This stores a virtual environment of some kind, to be accessed by a VR manager. Users of interactive networks might also store their own environmental databases (e.g., personal character icons) on their own systems, to be uploaded to the VR manager.

Memory requirements vary widely depending on the number of different objects stored in it and their level of detail. A forest of identical trees is much smaller than a small room with a hundred different knickknacks. Some typical database sizes, assuming about the same level of fidelity as high-resolution computer graphics, are:

Virtual character	0.1 gig
Virtual room	0.1 gig
Outdoors (per square mile, *excluding* intelligent inhabitants and dwellings)	0.5 gigs
Virtual apartment	1 gig
Virtual house or park	10 gigs
Virtual mansion	100 gigs
Virtual street or mall	1,000 gigs
Virtual neighborhood	10,000 gigs
Virtual city	100,000 gigs
Virtual world	100 million gigs

Virtual wilds, streets, malls, cities and worlds include computer simulations of animals or people as well as live users, but they are not really "alive" until someone else encounters them. Similarly, large areas may use some "generic scenery" to fill in background. A virtual city may only have a few thousand specific building interiors, but may assemble others only as individuals visit them from "cut and paste" programs.

Divide the required database space by 10 for a "cartoon" level of imagery; upgrade by 10 for "lifelike" imagery with far fewer generic details, and which, with a neural interface or deluxe VR suit, is indistinguishable from reality.

Packaged Characters and Settings: Prices are about $ 100 per gig for off-the-shelf realities or standard character icons at TL8 (drop by a factor of 10 per TL over 8); customized ones may cost 10 times as much. Many system managers prefer to program their own characters and environments.

PRIVATE REALITIES

Some commercial computer networks will allow users to construct (or rent) private VRs on the network that only they are allowed to access. See *Service Costs* on p. 35 for a price per gig per month.


MESSAGE DATA
chapter FOUR
STATUS
ACTIVE
GURPS ULTRA-TECH 2si NX
//// INTERRUPT //SLIP PASSWORD ... DECODING ... HEADER FOLLOWS
: COMM & INFO
WARNING: ACCESS UNAUTHORIZED LEVEL II COUNTERMEASURES FOLLOW ...
//DEICE DECRYPTION MODE: MANUAL KEY:***** DECRYPTING BODY ...
VIDEO TRANSMISSION ENGAGED PREPARE TO RECEIVE VIDEO
MESSAGE BODY FOLLOWS – CUT HERE – CUT HERE –
VIDEO TRANSMISSION SCREEN
ALERT
SJC-23
CHANNEL
SECURE
TRUTH MAY NOT BE ANY STRANGER THAN FICTION IN THE FUTURE – BUT THE TWO WILL BE HARDER TO TELL APART.
SMIF
::COMM & INFO::
39

This chapter describes communicators, information-recording and entertainment technology.

COMMUNICATORS

Datacable (TL7+)

A fiber-optic cable with a plug on both ends, this costs $0.1 and weighs 0.01 pounds per yard, and comes in various lengths. Optical datacable links computers and other electronic gadgets, transferring 1,000 gigs per second. Most communicators at TL8+ are equipped for datacable transmission, allowing them to become impromptu (and private) phone lines by linking one com to the other.

Bio-Beacon (TL8+)

The bio-beacon is a small radio-beacon transmitter designed to be swallowed by a human. Its coating will attach the device to the stomach lining until the user drinks a tailored enzyme. The enzyme will dissolve the bonds, allowing the beacon to drop off and be flushed by normal bodily functions.

If left in place for long periods, roll one die every month. On a 1, the beacon drops off anyway. On a 6, it permanently bonds with the stomach; only surgery can remove it.

The bio-beacon functions exactly like a homing beacon. Only a chemscanner of a higher TL or medical instruments can detect a bio-beacon, and a physician likely would not recognize the faint shadow on a X-ray as a beacon. A radscanner or directional transceiver can detect an operating beacon, however. The bio-beacon is too big to be swallowed by accident unless the user doesn't chew properly. Its applications include monitoring of children, prisoners, undercover police and interstellar scouts infiltrating low-tech worlds.

Bio-beacons have negligible weight and cost $40. They incorporate a built-in AA cell.

Cosmetic Filter (TL8+)

This can upgrade any communicator or phone that has a video or holographic display. When activated, the video uplink picks up the user's image as usual, but adjusts it to better match a preprogrammed "ideal" of beauty before transmitting it to the receiver. The user still looks like himself, but the filter erases minor blemishes and tones down major ones - tightening sagging jowls, erasing crow's feet and wrinkles, etc.

In game terms, the user's Appearance over the phone rises by one level (up to the maximum possible). Cosmetic filters designed for one species often produce very strange results for another species! A cosmetic filter costs $400.

Directional Transceiver (TL8+)

This hand-held device gives the direction (not distance) of a radio signal to within one degree. Taking samples at different locations can triangulate the approximate location and distance of a stationary radio transmitter. No skill roll is required to track a continuous radio beacon, such as used by tracer needles, bio-beacons and homing bracelets. Electronics Operation (Communications) skill rolls can be required to get a fix on other transmissions. If the subject deliberately tries to avoid detection by using short-burst transmissions, a Quick Contest of Skills is required.

The device also can send coded radio pulses to activate the homing function of bio-beacons, tracer needles (p. UT91), homing beacons and similar devices operating in passive mode (provided that the user has the correct radio code to do so).

The directional transceiver weighs 1/2 pound and costs $100. It operates for a year on a single A cell.

Homing Beacon (TL8+)

This small, insect-sized tracer beacon can be set for passive or active mode. In passive mode it broadcasts a return signal if it detects a properly coded radio signal (maximum reception range is 10 miles). In active mode it broadcasts a continuous signal. Each beacon has its own unique code; in either case, someone with a radio-direction finder such as the directional transceiver can find the beacon.

The beacon has negligible weight and costs $40 including an electronic lock. Its lock can be picked with an electronic lockpick, or the band can be sliced through (DR 12, HP 2). If swallowed, it will usually be excreted within 10 hours or so.

Homing beacons can be built into other devices (e.g., handcuffs, equipment, etc.) for +$40 to cost and no extra weight. An AA cell operates it for a year in passive mode or week in active mode.

Infrared Communicator (TL8+)

This directional communicator uses an infrared beam to carry voice transmissions. Maximum range is only about 50 yards. Only other infrared corns within line of sight can intercept IR beams, but the beam will scatter somewhat and can bounce off solid objects. This makes it less secure than a laser communicator but easier to aim, while its short range increases the difficulty of eavesdropping.

Many electronic systems accept signals from infrared communicators. Infrared vision can see the infrared beams at twice the IR corn's range.

A hand-held infrared com weighs one-half pound and costs $260. An A cell powers it for a month of normal use.

IR Receiver (TL8+)

This device allows an electronic system to receive control signals from an infrared communicator or remote. At the GM's discretion, many devices can include this system for free. More sinister applications include using it as a remote detonator for explosives or other booby traps. It has negligible weight and costs $10.

IR Remote (TL8+)

This palm-sized infrared communicator simply controls electronic devices fitted with an IR receiver; it cannot carry voice transmissions. Basically, it resembles a TL7 VCR remote except its smart keypad reconfigures to act as a keyboard for a variety of systems. Most computers and simple electronic gadgets incorporate or accept IR receivers; the IR remote will control these at up to 10 yards. (Some functions won't work remotely. Being able to turn on a communicator at a distance doesn't mean it will pick up your voice more than a yard away!) The IR remote weighs one-quarter pound and costs $20. An AA cell runs it for a month.

Laser Communicator (TL8+)

A man-portable laser communicator ("lasercom") slightly resembles a rifle-styled weapon with a plug-in handset or earphones set attached to it. The system is actually a tight-beam communicator/receiver. The beam usually is invisible (unless hitting someone in the eye).

A laser communicator can reach low or medium orbit (200 miles at TL8, 2,000 miles at TL9, 10,000 at TL10+). On the ground, line of sight limits range - terrain and the horizon block the laser beam. The horizon is about 2.5 miles from the shoulder height of a standing man on Earth. Smaller planets have a closer horizon, bigger ones a farther one.

Line of sight to the horizon will increase dramatically as the transmitter's height increases. For instance, for a transmitter 100 feet up on a hill or building, the horizon on Earth reaches 13 miles. To evade line-of-sight restrictions, the operator can bounce the laser beam off a reflective surface or use a relay station to increase range. A lasercom cannot be jammed or intercepted, but can be blocked by anything that would normally block a laser beam: smoke, thick clouds, etc. If the lasercom has a blue-green frequency ($200 extra) it can transmit through water at one percent of normal range.

Ordinary lasercoms must be attached to a computerized tripod-mounted tracking system ("TTS") to communicate with fast-moving vehicles or spacecraft. The GM may assume that the lasercom's built-in microprocessor handles this. Or, the GM can require an Electronics Operation (Communications) roll to initially align the laser with modifiers based on relative speeds and one attempt allowed every 10 seconds.

The lasercom weighs 10 pounds and costs $5,000. A C cell allows 10 hours continuous use. The TTS weighs the same as the lasercom but costs 20% as much. It takes 30 seconds to set up. Similar but less-effective systems may be available at late TL7.

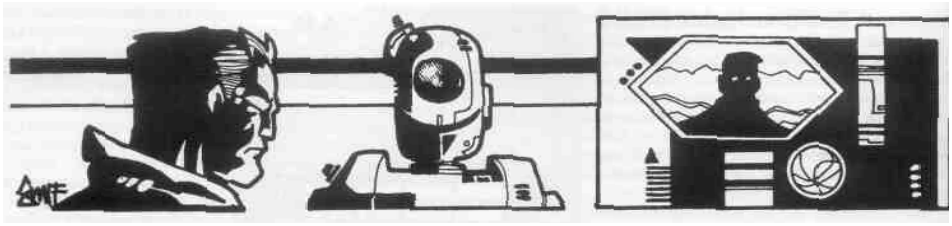
Laser Receiver (TL8+)

This device consists of a reception sensor that can be built into any helmet. It allows the user to receive laser-communicator transmissions (but not to send them). If the helmet incorporates a HUD or neural interface, the user also can receive text, data and video transmissions. Military and police units often use laser receivers if they cannot afford to equip an entire force with tactical lasercoms (p. 42). The team usually will communicate by radio; if radio silence is called for, the laser receivers allow some command control. Each is two pounds and $250.

Laser-Retinal Imaging (TL8+)

Any laser communicator may incorporate this optional hardware upgrade. It allows the laser to beam visual images directly into the retina of a single eye. The lasercom must be datalinked or plugged into a computer to do this, and the images must be text or graphics files stored in the computer.

The laser may prove difficult to properly aim - treat as a ranged-weapon attack aimed at the eye (-9 to hit), but assume the laser has Acc 15. Use either Electronics Operation (Communications) or Beam Weapons (Laser). If the laser is attached to a TTS, add +5 to Acc, and if the target is standing still or walking slowly, the laser can continue to track once a hit is achieved (i.e., no further rolls are required).



An advantage of laser-retinal imaging is that the subject doesn't need a communicator to receive a signal, making this a good way to send covert messages (e.g., you are a mile up on a skyscraper across the street beaming information to someone). Someone can interrupt a retina message by simply closing their eyes or turning their head to move out of line of sight of the laser. Anti-glare goggles, contacts, bionics, etc. also will filter out a message.

The disadvantage of using laser-retinal imaging is that it can send images only, not voice or data. Also, while a laser can flicker several-hundred images a second, the subject will see only a blur - the subject's comprehension limits the data-transfer rate. Sending text, for instance, limits the transmission to the subject's reading speed (which the sender often will have to estimate!). Also, since the transmission is one-way, the sender may have no idea whether the subject actually read the information.

Fitting any kind of laser communicator for laser-retinal imaging costs $1,000. There is no extra weight; it's mostly a matter of adding extra computer chips to the laser's circuitry.

Laser-Retinal Scanner: A laser communicator (or a ladar) also can *scan* a retina at a distance (provided the target isn't wearing anti-glare goggles, faceplate, etc.). Use the same rule for "hitting" the eye as above. If the laser is plugged into a computer, the information can be rapidly uploaded and compared with files to identify the target.

Micro-Communicator (TL8+)

This extremely small radio communicator - too small for a human to use as a hand-held communicator - allows very small robots or other electronic devices to communicate. For instance, it could replace the cable links connecting a HUD to a HUD sight with a radio link. The disadvantage of this is that the radio traffic could be jammed, though the short range makes detection of little threat. Also, data transfers much more slowly via radio - typically 0.1 gig per second compared to 1,000 via an optical cable or lasercom. The communicator is less than 1/100 of an inch across with totally negligible weight and costs $20. Its range is 10 yards (doubling at TL9, and again at TL 10 and 11), while its built-in power supply lasts a decade.

Remote Datalink Transceiver (TL8+)

This transceiver can be built or plugged into an electronic device to let a remote datalink implant (p. 104) communicate with it as if neurally interfaced, but over a distance. See *remote datalink* for ranges.

It weighs one pound and costs $5,000, with negligible power requirements (it operates off the device's power).

Tactical Lasercom (TL8+)

Designed for hands-free operation, this small, half-sized backpack features an over-the-shoulder periscope equipped with a lasercom transmitter/receiver that automatically follows the wearer's head movements. The backpack must have a cable attaching it to a helmet- or goggles-mounted HUD or neural interface.

The tactical lasercom functions exactly as the larger lasercom, but range is only one-tenth as great. It is also easier to aim (+4 to any skill rolls to align it), since the user simply looks at whomever he wants to talk to (assuming they have a lasercom) and uses the HUD to aim.

The communicator can receive voice, data or video transmissions and can display any video signals through the HUD or interface.

The tactical lasercom weighs six pounds and costs $2,000. A pair of C cells provides 20 hours of continuous communication.

Video Masking (TL8+)

This works like a cosmetic filter (p. 40) except that it also can give the user the features and voice of someone else (or create a wholly fictional appearance and voice). It costs $800.

Downgraded Neural Interfaces (TL9+/TL10+)

Neural interfaces, as described in ***Ultra-Tech,*** offer more speed and precision than manual control, giving a +4 bonus to relevant tasks. But at the GM's option, cheaper or lower-tech interfaces may allow mental control of gadgets that isn't much faster than manual control.

An interface implant, helmet, induction field or induction pad that gives a reduced bonus is 2/3 cost for +3 skill, 1/2 costfor +2, 1/3 cost for +1 or 1/4 cost if +0 skill. This also applies to the point cost of an interface implant.

Optionally, interfaces that give no bonus to skill also may appear at TL9 rather than TL10 at full dollar (but 1/4 character-point) cost. In worlds where neural tech is less common (or just less effective) these may be the only types of interface available!

Dream Net (TL10+)

See p. 80.

Datastring (TL10+)

These smart, string-thin datacables (p. 40) consist of threads of reconfigurable optical circuitry. Just attach a datastring to another datastring, to a port on a TL 10+ electronic device or to a datacable and it will fuse with it, forming a reliable data connection that can carry vast quantities of information. Datastrings are small enough that hundreds can be connected to a single device. A datastring can "tap" a cable, but often the information carried will include encryption.

A spool of datastring weighs one ounce per 100 yards and costs $16.

Datastring Socket: This is a "universal" reconfigurable datastring socket that can be attached to ports in lower-TL computers or other electronic gadgets. It allows datastrings to connect TL9-or-less gadgets. $20, 2 ounces.

Neural-Induction Fields (TL10+)

These are an alternative to neural-induction helmets or interface implants. A field generator is built into the floor, a seat, etc. Anyone in the area becomes neural-interfaced with all devices hooked up to the generator, exactly as if using a neural-induction helmet (p. UT37) - giving mental control of the devices and +4 bonus to skill whenever precision or speed matter. The fields usually are found in control rooms, offices and so on, using vehicle or building power.

An induction field the size of a chair weighs 25 pounds and costs $50,000, with negligible power requirements. Larger fields weigh 100 pounds and cost $200,000, plus 100 pounds and 0.1 kW per hex the field covers, usually built into a floor.

For $5,000 more, a field may include a "brainlock" option that recognizes specific brain patterns and operates only for authorized users. If attached gadgets have multiple functions, only some might be brainlocked. The brainlock also can grant partial access to items such as computerized records, perhaps limited as per the user's Security Clearance (p. CI29).

Neural-Induction Pad (TL10+)

These miniaturized, *dedicated* induction-field devices work through skin contact and replace or supplement normal controls, but only allow interface with the one gadget they are built into. They come in various sizes and shapes: a mousepad for a computer that interfaces the user when he rests his hand on it, a handgrip, a depression into which a finger can be inserted and so on.

With this technology, a computer for public usage could become a featureless cube with no keyboard or display; a simple touch operates it. A weapon might have no trigger, instead operating via an induction pad built into its grip. An elevator might have an induction pad instead of using voice control or a conventional keypad.

Anyone touching a pad-equipped device instantly enters into a direct mental link with the device, similar to a standard neural interface. If the item is a communicator, the user can communicate silently by subvocalizing. Any data displays or other readouts feed directly into the user's brain and optic nerve. The system gives +4 to skill to operate that device in situations where precision and speed matter, e.g., firing a gun. If built into a weapon, the pad also functions like a HUD/HUD Sight combination, displaying targeting and other weapon data (shots remaining, etc.), reducing SS number by 5. The effects of neural-induction pads aren't cumulative with HUDs or any of the other interface systems.

A neural-induction pad has negligible weight and costs $6,000. Pads built into devices such as elevators are usually "downgraded neural interfaces" (p. 42) at 1/4 cost with no skill bonus.

For $4,000, an induction pad may include a brainlock option similar to that available for a neural-induction field. For instance, an elevator operated by induction pad may allow anyone to travel to floors 1-9, but the brainlock restricts access to the executive suite on floor 10 to certain users.

Mental Translator (TL13+)

This device picks up and translates brainwave patterns to spoken (or some other form of) language. It is only effective at short distances (a mile or so) unless all participants have computers in contact via communicator and the Datalink program; then the translators can dump their hosts' brainwave patterns into their computers, which relay the data to the other units.

As well as being a handy interpreter, the translator enables aliens who normally could not produce or understand human speech to do so. Most handle only a single function, translating a single species' brainwaves into one language.

The translator is worn as a headband or in a helmet. It uses an A cell, which operates it for a year. It weighs one pound and costs $2,000, plus an extra $1,000 per additional species-to-language option it has.

ENTERTAINMENT, RECORDING AND PLAYBACK EQUIPMENT

Cybervox (TL8+)

This compact sound-studio-in-a-box acts as a sound mixer, synthesizer and digital recorder (using standard computer media disks). A cybervox can analyze, record, duplicate and modify any sound (short of dangerous ultrasonic or subsonic frequencies), including music and speech. It can be used as an electronic musical instrument. A cybervox usually is worn on a shoulder strap; most models look pretty much like a portable computer, but some are built into guitars or other instruments. It weighs two pounds and costs $4,000. A B cell powers it for 100 hours.

Digital Mini-Camera (TL8+)

This miniaturized auto-focusing digital camera is about the size of a pistol bullet. Controls are simple: "on/off and "download." It stores images in its own 100-megabyte internal memory. This holds up to 2,000 standard color pictures, or 5,000 with the quality (though a smaller image size) of a TL7 television image, in standard digital-graphics format. Unlike the digital camera (p. UT38), the mini-camera doesn't use

computer disks. To upload or erase the images stored in it, the camera must be plugged into a computer. The mini-cam comes with a small cable plug on the back to connect it to a computer's dataport.

The digital mini-camera has negligible weight and costs $100. For an extra $100, infrared or night-vision versions are available ($300 for both options). At double cost, digital mini-cameras disguised as other small items (such as pens) are available. Data storage increases by a factor of 10 for every TL after TL8.

Digital Gun Camera (TL8+)

This device is designed to be fitted to a weapon. It functions exactly like a digital camera, except it takes a picture of whoever is being shot at whenever the trigger is pulled. (If the weapon's safety is on, the camera will take pictures without the weapon firing.) A digital gun camera costs twice as much as a digital mini-camera: $200 for a normal version, $400 with night vision or Infravision, $600 with both. It adds negligible weight to a weapon.

Walkvid (TL8+)

One step up from an ordinary cellular phone, this consists of a direct-TV satellite receiver and audio/video disk player housed in a single lightweight unit the size of a cigarette pack. The TV receiver can pick up satellite television broadcasts. The disk player can run audio-visual recordings on standard computer disks. The device comes with a strap for attaching to a belt or wearing around the neck.

A walkvid does not include its own monitor screen or earphones. It's designed to be used with HUD goggles (p. UT65), a neural HUD (p. 111) or a neural interface (p. UT37). It includes a short cable for plugging into either the goggles or a neural socket. Even without neural interface, the walkvid's controls can be operated by one hand, using a trackball to scroll up or down option menus displayed onto the HUD.

If the user wishes to see normally while watching videos or TV, the walkvid controls can reduce the size of the video picture to a window in the corner of his vision, as described for vid glasses. A walkvid weighs 1/2 pound and costs $200. A single A cell powers it for a month of regular use.

Holographies Studio (TL9+)

This equipment develops the TL9 holographic film described in ***Ultra-Tech*** and ***Space.*** On a successful Electronics Operation (Holographies) roll, the film pack has been developed at a material cost of $100. Failure indicates one or two pictures were spoiled or fuzzy. Critical failure indicates the whole batch was spoiled.

The studio also can be used to produce computerized holographic animation, special effects, etc. with the help of any Complexity 4 or higher computer.

Weight is 200 pounds, volume is 10 cubic feet and the studio costs $12,000 without computer.

Vid Glasses (TL9+)

These look like thick sunglasses, but actually house bifocal monitor terminals that can display information. They also include a cellular modem that can connect to a nearby or distant computer and a digital continuous-feed TV camera mounted between the eyes.

Vid glasses can function like a fancy, high-resolution holographic HUD (p. UT65). The user also can download visual information from a computer or other gadget linked to the glasses by radio or cable.

If he's using a computer himself, he can dispense with the screen and have the information appear on the vid glasses; if the computer contains digital media, he can even watch a movie on the glasses. The vid glasses also can reduce the video image to a small window in the corner of the wearer's vision. This is distracting (-2 on all Vision rolls), but better than being blind!

The built-in camera makes the vid glasses two-way. When activated, it continuously transmits digital imagery to a remote monitor screen; a computer can monitor the imagery, and record it if it's important and there's enough storage.

If the computer is using database-retrieval and real-time optical-recognition programs at once, it can examine the video feed, look for matches in the database, then transmit that information back to the wearer's glasses. For instance, a bounty hunter or cop might have a computer back at base (or on his belt) running a database of "Earth's Most Wanted." If he happened to look at someone on that list, the computer would make a match and instantly send him the file, which would appear on his eyes. The computer also might be instructed to start recording the video when a match occurs. (It's probably just been monitoring the signal until then, to save on disk space.) Similar applications are possible if running other forms of database, e.g., vehicle recognition, fashions, an objects, etc.

This sort of procedure can be performed without vid glasses; the glasses simply combine the modem, display and camera into one handy miniaturized unit. For example, someone wearing a helmet with both a HUD (p. UT65) and helmet camera (p. UT38) could do it. The camera also could be replaced with a handheld newscam (p. UT38). A cyborg with bionic eyes, a neural HUD and an implant communicator also could duplicate vid glasses. If he had a computer implant that was running optical-recognition and database programs, he could keep everything in his skull. Vid glasses weigh one-quarter pound and cost $1,000. An A cell powers them for a month.

Holocube (TL10+)

This small (fist-sized) holographic projector (p. UT38) and sound system can project a 3-D image around the cube with the apparent diameter of a modern television set - that is, it differs from the more expensive holographic projector in that it has no range. A holocube is voice-activated and can fast forward, reverse or search for specific information. It accepts standard computer disks.

The holocube weighs one-quarter pound and costs $100. An A cell powers it for a week of constant use.

SENSIE TECHNOLOGY

Sensies (also called "trips") are full sensory simulations. Unlike a movie, you do not simply watch a trip: you experience the action from the viewpoint of one of the main characters in it. Sensies are the technological precursor to dreamgames (p. UT40), differing from a dreamgame in that they are not interactive. Like a 20th-century movie, the user cannot influence the action, instead remaining locked into a story line.

To make a sensie, the actor uses a specialized device that records his or her every sensory experience. This sensory recording can then be replayed by anyone, who will share all the sensations of the original experience. The user sees what his viewpoint character sees, feels what he feels, and so on.

Sensies come in many varieties. The most popular give the user strong sensory experiences: sunbathing, eating exotic food, scuba diving, skiing, skydiving, zero-gee free-fall, sex and so on. Pornography, drama, and travel and sports shows are all very popular. Some sensies allow the user to experience non-human perspectives - to "become" a cat or a bird, for example. (It may prove difficult, though not impossible, to wire anything much smaller than a mouse with a sensie recorder!) Unlike dream games, sensies operate at real-time speed. That is, one second experienced in a sensie is a second in the real world.

Some sensie programs come with multiple viewpoints so that you can try out the show or story line from the perspective of more than one character in it. Often, the option limits users to either the male or female lead character.

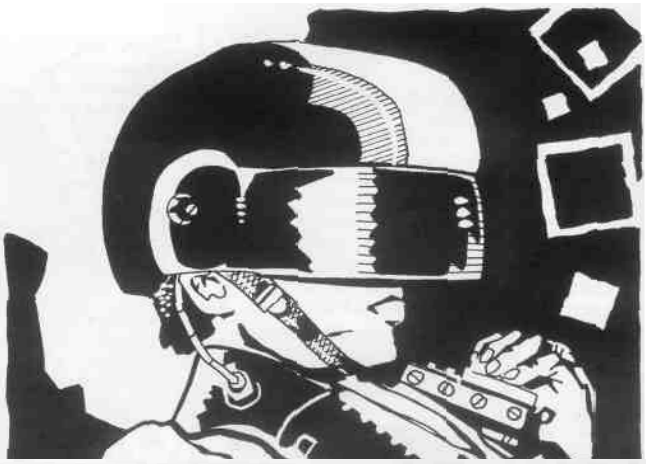
Commercial sensies are edited carefully with filters that dampen any unpleasant sensations the viewpoint character may experience (such as sunburn, pain, hunger, cold, etc.). Some black-market sensies feature unedited real injury, painful death, rape or torture *of the viewpoint character*. These find a market with jaded masochists - or as torture devices. Normally these are illegal, since the actor making the sensie also was harmed or killed. (Violence against other actors in the sensie can be simulated, but what the viewpoint character experiences must be real.) A sensie of this sort will impose a Fright Check (or series of checks) on the user, at a penalty determined by the GM.

Sensies are created using sensory-experience recorders (p. 46) and sensie editors (p. 46). By TL10, sensies combine with neural interface and virtual-reality technology to produce the interactive dreamgames described in ***Ultra-Tech.***

Sensie Cartridge (TL9+)

This hardwired memory cartridge runs on a sensie player. It contains a single prerecorded sensie up to ten hours long. Cost is about $100/hour for a typical entertainment, educational or travel sim; blank cartridges are $20 per hour. A sensie cartridge weighs one-quarter pound and is approximately the size of a pistol magazine.

At TL10 sensie cartridges cost one-tenth as much, but they are often replaced by sensie chips and programs, or by true dreamgames. Sensies may be available for rent; common ones cost approximately $5 a day.



(TL9+) Sensie

This device runs a sensie cartridge. It consists of a player into which the cartridge is inserted plus a headset that must be worn to activate the system. The user dons the headset, activates the system and within 1d seconds is plunged into the sensie.

While in the sensie, the user is effectively asleep and cannot be awakened without removing the headset or turning off the power on the player. When the sensie finishes, the user wakes up. As the user could sleep through almost anything that didn't wreck the player, a common safety measure is to hook the sensie player up to a home or vehicle computer that is also programmed to turn off the sensie in the event of an emergency such as a fire or burglar alarm.

A sensie player can run off a B cell for a month of continuous use, or use building power. It weighs 10 pounds and costs $2,000. Each extra headset (allowing multiple people to experience the same sensie at the same time) weighs two pounds and costs $500.

Sensie Recorder Deck (TL9+)

This device externally resembles a sensie player, but it's internal workings are far more sophisticated. The user wears a special headset that records everything that its wearer touches, tastes, smells, hears and sees. It does *not* record thoughts or emotions. The presence of the headset and cable is usually "edited out" in commercial recordings.

Anyone with a sensory-experience recorder can make a recording, but not everyone is capable of the same quality of experience. Some people simply have a gift for recording a really satisfying sensory experience, and these individuals make good sensie "sim stars." A prospective simstar usually will have the Sensie Talent advantage (p. CI30); aside from acting ability, excellent HT and acute senses also are considered assets.

TL9 sensie recorders make their recordings on sensie cartridges (p. 45).

TL10+ sensie recorders use standard minidisks, which can hold about ten hours at TL10, 100 hours at TL 11 and so on.

For exotic applications (e.g., making a sensory recording of a small animal), various special sizes or types of miniaturized or oversized headsets that plug into a regular deck can be purchased at about 10 times the normal cost. A sensie recorder deck weighs two pounds and costs $10,000. It can run off an A cell for 100 hours of recording, or use building power.

Sensie-Recorder Implant (TL9+)

This device is a much more discrete form of sensie recorder than the headset. Professional sensie stars often have one. It is a specialized brain implant (p. 111) that can record sensies from the user. It differs from a recorder implant (p. UT107) in that it records the full panoply of sensory experiences - but the user cannot access it. To download it, he must plug a cable into his skull and connect himself to a sensory recorder or editor (or at TL10+, a computer). Recorded experiences left in the system will fade after one month unless downloaded, although the user will retain his normal memories of them.

A sensie-recorder implant can be designed as either a "voluntary" model, with the implantee deciding whether or not to turn its recording function or playback on or off, or a "remote" model that is switched on or off after receiving a coded communicator signal. The latter models are useful if someone has been implanted against their will (and possibly without their knowledge). A sensie-recorder implant costs $8,000 with four hours of recording capacity; additional capacity is $2,000 per hour. It is powered by an AA cell, which operates it for about a year of normal use. It costs one character point per hour of recording capacity.

Sensie Editor (TL9+)

This specialized module must be linked to a Complexity 6+ computer in order to function. A sensie editor allows the user to edit raw sensory recordings. It functions as a sensie player, and in addition the user can use it to wipe portions of a recorded sensie; compress time with smooth jumps, fadeouts or transitions; deliberately tone down sensory experiences, or splice several recordings together. It also can be used to analyze a sensie recording to tell whether it is "raw" or edited, what kind of equipment was used, etc.

Sensie editors are necessary to make commercial-quality sensies from raw recordings. For instance, if sensie superstar Selena Usagi was recording her latest travel sim "Beautiful in Bali" and took an hour-long walk down a moonlit beach before skinny-dipping in the warm tropical ocean with her co-star, the editor might condense it to the most sense-stimulating ten minutes.

A sensie editor can copy material from one sensie cartridge to another, or at TL10+ between sensie cartridges, sensie chips and sensie programs.

The quality of the sensie-editing job matters as much as the actual experience that generated the sensie; experiencing a poorly edited sensie can be very disorienting and unpleasant!

The skill Video Production (with the optional specialization of Sensie Editing) is used to operate a sensie editor.

A sensie editor weighs 20 pounds and costs $20,000. It runs off a B cell for 100 hours of editing, or uses building power.

Sensie Chip ("Trip," TL10+)

Sometimes called a "trip," this device acts as a sensie cartridge (p. 45) except that it is much smaller and can be accessed by being plugged into a chip slot (p. 111) brain implant. A sensie chip is expensive, typically at least $500. Some places may rent them out for about $10 per day.

Sensie Program (TL10+)

At TL10+, a sensie can be stored on standard computer media (e.g., on disk) and can then be run on any Complexity 5+ computer equipped with a neural interface of some kind. A typical sensie program takes up about 100 gigs/hour. Cost is about $10 per hour for mass-market entertainment sensies, but may be considerably more for specialized ones such as tutorials. Sensie-rental fees are usually about 20% of the purchase price.


MESSAGE DATA
chapter FIVE
STATUS
ACTIVE
ALERT
SJC-23
CHANNEL
SECURE
: ARMORY
VIDEO TRANSMISSION SCREEN
THIS CHAPTER DETAILS AN ARRAY OF RANGED WEAPONS, MELEE WEAPONS, BIOCHEMICAL WEAPONS AND WEAPON ACCESSORIES.
::ARMORY::
47

Unless otherwise noted, all weights in this chapter are for the loaded weapon, including ammunition and power cells. Prices, however, *do not* include power cells or ammunition.

CHEMICAL SLUGTHROWERS

These are improved versions of modern-day pistols and rifles. Most TL8+ chemical slugthrowers use caseless ammunition: a solid block of propellant replaces the traditional cartridge containing the loose propellant. Losing the cartridge reduces ammunition weight and bulk, and eliminates the need for ejection ports (which can allow dirt into the weapon), making the weapon's action more reliable.

Precise calibers have been given for guns - a 5.5mm gun fires a bullet of that diameter, for example. GMs should feel free to modify these numbers to fit a particular setting - if it sounds better to have a 6mm or a 5mm gun, change the name.

CHEMICAL SLUGTHROWER OPTIONS

Caseless ammunition isn't the only choice for an ultra-tech gun. Other possible propellants include old-style cased ammo and the more advanced liquid or electrothermal options. Propellant types cannot be combined.

Cased Ammunition

TL8+ guns also are available in versions that fire old-style *cased* ammunition, like 20th-century guns. The weapon is half as expensive. A magazine, belt or cassette holds only half as many shots while retaining the same weight and cost. Also, reliability drops from Ver.(Crit.) to Ver., or from Ver. to Crit. (TL8+ shotguns already use cased ammo; their statistics don't change in any way.)

Liquid Propellant (TL8+)

Toward the end of the TL8 period, liquid-propellant (LP) smallarms appear. Propellant and oxidizer are no longer a solid cake packaged with the bullet. Instead, they are kept in liquid form in a separate bottle. The action works much like a fuel-injection engine: propellant is squirted into the firing chamber and ignited electrically when the trigger is pulled. Use of liquid propellant allows somewhat more powerful or more compact ammunition with the tradeoff of a more complicated weapon design. The liquid-propellant bottle itself may be stored as a part of each weapon's magazine or separately installed in the weapon.

Liquid-propellant guns can include *one* of these options:

High Capacity: Each magazine holds 20% more shots than an ordinary caseless slugthrower (round up) without increasing ammunition weight or cost. Add 50% to the weapon's cost over that of ordinary caseless weapons.

Hyper Velocity: The weapon dumps more propellant behind the round, increasing its velocity, range and damage. Add +1 to Accuracy, multiply ranges and crushing damage (but not damage for explosive ammunition) by 1.5, and double recoil. A half-die of damage becomes a +2. Add 50% to cost over that of ordinary caseless weapons.

Smartgun: The weapon incorporates a computer chip that varies the amount of propellant used and thus the velocity. The options are normal, hyper velocity or low velocity. A selector switch allows the velocity to be changed at the start of any turn; weapons equipped with neural interfaces can change the setting instantly. The normal setting yields no special effect. Hyper-velocity setting gives the bonuses and recoil penalty of a hyper-velocity gun (see above). Low-velocity setting makes the rounds fired subsonic (and thus silent) but Accuracy is -2 and range, crushing damage and recoil are all halved (round down). Smartguns cost twice as much as ordinary caseless weapons.

At TL8, liquid-propellant weapons don't match the reliability of caseless weapons, due to the complexity of the propellant-injection mechanism. Reliability will drop by one step: a Malf. number of Ver. (crit.) becomes Ver., while Ver. becomes Crit.

Electrothermal Slugthrowers (TL8+)

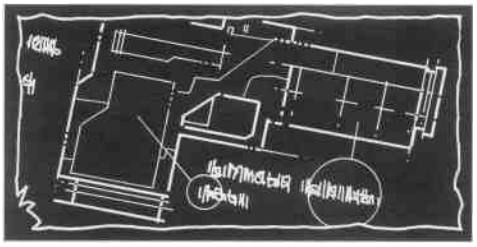
These weapons become available late in TL8. They resemble liquid-propellant slugthrowers, but instead of relying on the chemical energy of the propellant, they use an electrical charge to vaporize it into an expanding plasma that accelerates the round. The result is a "softer" launch that reaches a very high velocity without significant increase in recoil.

All TL8+ chemical slugthrowers are available in hyper-velocity electrothermal versions. Treat them exactly like hyper-velocity liquid-propellant weapons (+1 Accuracy, xl.5 to range and crushing damage) except that recoil *is not* doubled and price *is* doubled rather than multiplied by 1.5. Reduce reliability of electrothermal weapons by one step at TL8, e.g., Ver. drops to Crit. This, and the extra cost, encourages some military units to stick with caseless ammunition until TL9, when electrothermal weapons compete with Gauss slugthrowers.

The butt or stock of an electrothermal (ET) slugthrower incorporates a removable A cell (for pistols) or B cell (for rifles and larger weapons) to provide the needed electrical pulse. Each provides enough power to fire 10 magazines.

CHEMICAL SLUGTHROWERS: PISTOLS

These ultra-tech versions of 20th-century handguns feature advanced composite construction and caseless ammunition.



They can be fired by either one or both hands, and are small enough to be carried holstered. Use Guns (Pistol) skill. Machine pistols also can fire bursts; when doing so, use Guns (Machine Pistol) skill instead. See p. CI121.

Light Auto Pistol, 7mmCP (TL8)

This is a small, easily concealed semi-automatic pistol. Its 7mm CP (caseless pistol) round boasts significantly higher velocity than many TL7 pistol rounds of the same caliber, so it (and the other weapons that fire the same round) *does not* suffer the "halved damage" penalty described for low-velocity small-caliber pistols on p. HT6. The weapon costs $610 and weighs 1.2 pounds.

Medium Auto Pistol, 9mmCP (TL8)

This is a perfectly ordinary TL8 semi-automatic pistol, with a sturdy plastic and alloy frame and a high-capacity magazine. It costs $680 and weighs 2.25 pounds.

Auto Pistol, 10mmCP (TL8)

This powerful pistol uses the same 0.40-caliber round as the machine pistol (p. UT44). It costs $720 and weighs 2.75 pounds.

Magnum auto Pistol, 12.7mmCP (TL8)

This big, semi-automatic pistol fires a powerful 0.50-caliber round. Its size makes it hard to conceal, and it requires a strong person to shoot accurately. The magnum auto pistol costs $860 and weighs 4.25 pounds.

Machine Pistols, 7&9mmCP (TL8)

The 7mm is a very compact machine pistol the size and shape of an ordinary handgun, but capable of firing either single shots or bursts. It enjoys popularity in covert operations. The weapon costs $680 and weighs 2.2 pounds.

The 9mm version is a big pistol with a folding front foregrip. With its high rate of fire and large magazine capacity, it serves as an alternative to the .40-caliber machine pistol on p. UT44. The weapon costs $790 and weighs 3.85 pounds.

CHEMICAL SLUGTHROWERS: SMGS & RIFLES

These weapons incorporate shoulder stocks and are designed to be used two-handed. Too large to holster, they come with carrying slings. Use Guns (Rifle) to fire them. Many are fully automatic: if so, Use Guns (Light Automatic) if firing bursts.

Assault Rifle, 5.5mmCR (TL8+)

This alternative to the assault carbine on p. UT49 fires a smaller 5.5mmCR (caseless rifle) bullet at a higher rate of fire. Its other advantages include greater ammunition capacity and a slightly lower cost. This model suffers from a bit less range and punch than the 0.27-caliber (6.85mm) weapon in ***Ultra-Tech,*** and also lacks the latter's complex double-feed magazine. The weapon costs $950 and weighs 7 pounds.

Battle Rifle, 7.7mmCR (TL8+)

Sometimes you need better punch than an assault carbine. This caseless battle rifle fires a more powerful (if slightly lower velocity) 7.7mm caseless rifle round, making it popular with troops who expect to face armored opponents. Its drawbacks include heavier ammunition and noticeably higher recoil. The 7.7mm battle rifle costs $1,200 and weighs 10 pounds.

Claw, 5.7mmCL (TL8+)

The submachine gun-sized CLAW fires a high-velocity caseless bullet that resembles a small rifle round. It usually is issued to combat-vehicle crews and special forces. The CLAW fires bullets with better accuracy and range than the pistol ammunition used in conventional SMGs and machine pistols, while retaining a generous magazine capacity. Its configuration features optimization for accurate snap-shooting using one or both hands, with a specially molded ergonomic handgrip that completely encloses the firing hand. To further streamline the weapon, its magazine runs horizontally alongside the weapon rather than extending vertically from it. The CLAW costs $1,100 and weighs 4.5 pounds.

Gatling Carbine, 5.7mmCL (TL8+)

This triple-barrelled, electric-motor-driven chaingun boasts a carbine format no larger than an ordinary assault rifle. It fires the same 5.7mm round as the CLAW. Its long magazine slides and locks into the back of the weapon. A separately loaded A cell provides power (good for firing 19,500 shots). The gatling carbine costs $1,500 and weighs 8.5 pounds.

Heavy Sniper Rifle, 12.7mmCR (TL8+)

This is a big "anti-materiel rifle" - a large-caliber sniper weapon powerful enough to damage or cripple light vehicles more than a mile away. These weapons typically equip special forces and recon units, and are used to pin down or neutralize high-value targets such as command posts, guided-missile teams and combat robots. This gun becomes especially fearsome when upgraded with electrothermal or liquid propellant! The rifle's Accuracy assumes an integral 8x telescopic sight (+3 bonus). A heavy sniper rifle costs $4,000 and weighs 31 pounds.

Hunting Rifle, 7.7mmCR (TL8+)

This light, plastic-and-alloy semi-automatic rifle fires the same ammunition as the battle rifle. It retains popularity as a sporting or colonial weapon even at higher TLs. Some armed forces upgrade these weapons to improve accuracy (see *Ranged Weapon Quality* on p. 61) and issue them as sniper rifles. The weapon costs $1,200 and weighs 7.4 pounds.

Storm Carbine, 10mmCR (TL8+)

This bullpup-configuration caseless assault weapon reverses the TL7 trend toward smaller, high-velocity cartridges in assault rifles. The storm carbine fires a large-caliber, medium-velocity bullet with greater wounding potential. These weapons become increasingly popular at TL9+, as their 10mm rounds can be armed with potent shaped-charge-explosive warheads (p. 51). The storm carbine costs $1,400 and weighs eight pounds.

Storm Rifle, 10mmCLR (TL8+)

A heavier version of the storm carbine, this fires a higher-velocity, full-sized ("10mm Caseless Long Rifle") bullet. The weapon costs $1,900 and weighs 11.5 pounds.

SMGs, 9mmCP and. 10mmCP (TL8+)

Submachine guns are fully automatic weapons that fire pistol-caliber ammunition. These models feature a folding stock, pistol grip and extra foregrip for better controllability. Due to their combination of firepower and concealability, SMGs find favor with special forces and terrorists. Police SWAT teams also like them, since the ammunition's relatively low damage means that errant rounds are unlikely to pass through walls (or victims) and injure bystanders or property. The 9mm SMG costs $790 and weighs 4.6 pounds. The 10mm version costs $870 and weighs 5.9 pounds.

CHEMICAL SLUGTHROWERS: MACHINE GUNS

These full-automatic weapons are designed to be fired in long bursts from a bipod (or in some cases, tripod) mount, using an ammunition belt (sometimes contained within a cassette).

For firing on the move, machine guns often are carried using either an articulated weapon harness (p. UT64) or the gyrostabilized weapon harness (p. 62).

These weapons use Gunner (Machine Gun) if fired from a tripod. Otherwise, they are fired using Guns (Light Automatic) skill.

Assault Chaingun, 5.5mmCR (TL8+)

An electric-motor-driven light machine gun, this comes equipped with a folding bipod. It fires the same round as the 5.5mm assault rifle (p. 49). Its large 400-shot ammo cassette and extremely reliable action make it excel in suppressive fire. A separately loaded A cell powers the motor for 14,000 rounds. The chaingun costs $1,800 and weighs 15 pounds.

Caseless Minigun, 6.85mmCR (TL8+)

This portable, tripod-mounted gatling gun boasts six barrels and an electric action firing up to 100 rounds per second. A separately loaded A cell (good for 9,000 shots) powers it. It costs $3,600 (plus an extra $160 for the tripod mount). It weighs 42 pounds with tripod, 26 pounds without.

LSW, 6.85mmCR (TL8+)

This is a squad automatic weapon - basically a light machine gun. It comes with a folding bipod for accurate prone firing. The LSW normally employs a belt feed, but it fires the same 0.27-caliber bullet as the assault carbine (p. UT44) and can use its magazines if necessary. It costs $1,900 and weighs 18 pounds.

Storm Chaingun, 10mmCLR (TL8+)

This is an electric-motor-driven, machine-gun version of the storm rifle (p. 50). The storm chaingun feeds from a 100-shot belt contained within an ammo cassette. It also can use the same 30-shot 10mmCLR magazines as the storm rifle, but it cannot fire the smaller and lower-powered storm-carbine ammunition. The storm chaingun incorporates a folding bipod for accurate prone firing. A separately loaded A cell provides enough power to fire 3,600 rounds. The storm chaingun costs $3,800 and weighs 22 pounds.

Heavy Chaingun. 12.7mmCR (TL8+)

The TL8 equivalent of a 0.50-caliber MG, this electric-motor-driven, single-barrel machine gun fires the same round as the heavy sniper rifle from a tripod mount. It usually serves in perimeter defense or as a vehicular weapon. Normal humans can't handle its weight while firing off the tripod mount, but cyborgs and powered infantry sometimes use it as a hand-held weapon. A separately loaded B cell provides power to fire 12,000 rounds. It costs $8,100 (plus $360 for the tripod). It weighs 87 pounds with tripod, or 51 pounds with tripod removed.

SPECIAL SLUGTHROWER AMMUNITION

This ammunition can be used by any TL8+ bullet-firing guns (except shotguns - see *Shotgun Ammunition* on p. 52) of less than 20mm bore size. For armor piercing saboted (APS), explosive and plastic bullets, see p. UT44.

Special ammunition's cost is expressed as a multiplier to the caliber's "normal cost." Normal costs for all slugthrower and shotgun ammunition can be found on the *Ammunition Table* on p. 126.

Duplex Cartridges (TL7+)

This option can be added to any type of chemical slugthrower ammunition. A duplex round contains two smaller bullets. This doubles effective RoF without doubling ammunition expenditure, e.g., if a shooter fires three shots, his fire is effectively treated as a 6-shot burst of automatic fire. Minimum RoF is 2 (a single shot), treated like a two-round burst of automatic fire rather than two, individual shots.

The smaller bullets have less damage and range: *halve* the weapon's 1/2D and Max ranges and reduce damage by 1d per 8d or fraction of damage the weapon normally inflicts. Thus, a weapon that normally does 5d damage would do 4d damage with duplex cartridges; one that did 12d damage would do l0d.

Duplex cartridges are experimental at TL7. This makes them somewhat unreliable, occasionally causing jams or malfunctions (reduce Malf. one level). By TL8 they are fully perfected. Duplex ammunition is twice as expensive as normal rounds.

Armor Piercing Hollow Point (TL8+)

This dual-purpose "APHP" round consists of a needle-like penetrator of high-density tungsten or depleted uranium housed within a hollow-point bullet.

The effects depend on the target's DR. Roll damage normally. If the damage rolled before any modification is triple the target's DR or higher, treat the weapon as a hollow-point round: subtract twice the DR from damage and multiply the remaining damage by 1.5. Otherwise, treat the weapon as an armor-piercing bullet: halve DR, then halve any remaining damage. APHP rounds cost six times as much as ordinary bullets.

Shaped-Charge Rounds (TL9+)

At TL9+, shaped-charge-explosive rounds become available for 10mm or larger smallarms. DR protects at one-tenth value against these rounds. Instead of the caliber's normal damage, shaped-charge bullets inflict the damage shown on the table below:

Size	*Damage*
10mm (0.40 caliber)	3d(10), ld-4
12.7mm (0.50 caliber)	4d(10), ld-3
18.5mm (12 gauge)	5d+2(10), ld-1

The first damage applies against the target hit. The second damage is explosive concussion damage inflicted on anyone nearby (see p. B121). Shaped-charge damage is not reduced beyond 1/2D range, but accuracy declines normally.

A shaped-charge fired at a lightly armored target may not go off: roll 3d vs. the target's DR (DR+3 for ridgid armor, DR/2 for flexible armor). Failure means the round only does cr. damage (up to a maximum 4d) instead of Exp.

Shaped-charge rounds for smallarms are three times normal cost and are Legality Class 0.

AP Saboted Hyperdense (TL11+)

Sometimes nicknamed "hypercore," these rounds contain a super-dense needle-like core of collapsed matter encased in a larger peel-away sheath that drops off as the round leaves the barrel. Increase 1/2D and Max ranges by 50% and add +1 damage per die when firing APSHD rounds. In addition, DR protects at one-fifth normal, but wounding damage after DR is halved. APSHD rounds are 20 times normal price!

CHEMICAL SLUGTHROWERS: SHOTGUNS

Shotguns are a special category of slugthrower: they are low-powered, short-barrelled smoothbores firing large rounds. A typical 12-gauge shotgun shell is 18.5mm in diameter.

The usual shotgun ammunition is *shot*, a cartridge containing multiple small pellets, but the large size of shotgun shells allows many different kinds of multiple projectile, chemical or explosive fillers. For this reason, shotguns enjoy popularity

with police, since the same weapon can fire both lethal and non-lethal loads. Unless otherwise noted, Guns (Shotgun) skill is used when firing them.

Shotguns are not available in caseless, liquid-propellant or ET versions, but Gauss shotguns come into wide use at TL9+. These are lighter and more powerful than ordinary chemical-propellant shotguns. They boast almost totally silent operation, given their noiseless firing system and subsonic rounds.

Assault Shotgun (TL8+)

This heavy, bullpup-configuration shotgun can fire fully automatic. A telescoping stock reduces recoil. The assault shotgun looks much like a large, short-barrelled assault rifle. Use Guns (Light Automatic) when firing bursts or Guns (Shotgun) when firing single shots. The weapon costs $570 and weighs 12 pounds.

Civ Shotgun (TL8+)

The civ shotgun is a typical semi-automatic shotgun commonly used as a hunting and police weapon, although it also finds its way into the hands of criminals who can't get anything better. It's fitted with a pistol grip and shoulder stock, costs $430 and weighs eight pounds.

Shotgun Pistol (TL8+)

This is a big wide-bore pistol that fires shotgun ammunition. It is ideal for house-to-house work or for firing from a vehicle. It's also a favorite police undercover weapon, although its substantial recoil requires a strong shooter for accurate fire. The pistol costs $360 and weighs 4.4 pounds.

Urban Assault Weapon (TL8+)

This double-barrelled assault weapon is intended for use by SWAT teams and special operations, especially in buildings. The top barrel is a l0mmCP submachine gun similar to the weapon on p. 50, while the lower barrel is an 18.5mm pump-action shotgun. Each has its own trigger. A laser sight is mounted between them.

A four-shot internal magazine feeds the shotgun; the 30-round SMG magazine sits bullpup-fashion behind the trigger grip. The shotgun magazine takes two seconds per shell to reload; the SMG magazine takes three seconds to reload. The two magazines allow a wide variety of ammunition to be carried depending on the mission's needs. Usually the SMG carries regular ammunition while the shotgun carries specialized rounds such as gas or shaped-charge shells.

Use Guns (Light Automatic) when firing the submachine gun in bursts, Guns (Rifle) when firing it single-shot and Guns (Shotgun) for the shotgun. Normally, only one barrel is used at a time, but the selector switch allows a single trigger to fire both weapons simultaneously (as long as they are fired at the same target). When this is done, roll to hit individually for each weapon's shots, but add the two recoil numbers together. The urban assault weapon costs $1,200 and weighs 10 pounds.

Shotgun Ammunition

Shotguns do not use the same types of normal or special ammunition as other guns. The ammunition that can be fired by shotguns includes:

Shot Shells: The basic load for shotguns, firing several small pellets per round. Shot does the listed damage for the weapon and gives a +1 bonus to hit at all ranges. Each die of damage is rolled individually and applied separately against DR; each die also counts separately for blowthrough purposes, so shot can inflict major damage on unarmored individuals! Legality Class 5, normal cost.

Shotgun Slugs: These load a single, *big* bullet per round. They are used for hunting large game or smashing men and vehicles. Slug shells do the listed damage, but have a x2 wounding modifier after DR is penetrated due to their size. Triple the 1/2D and multiply Max range by five. Legality Class 4, normal cost.

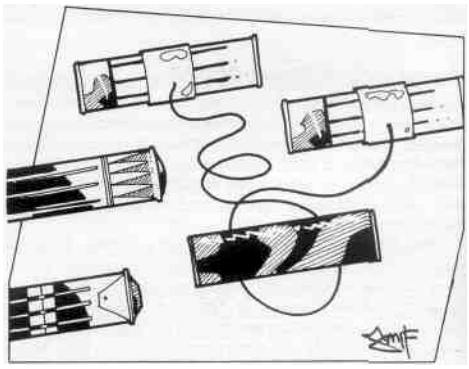
Dragon (TL7+): This shell contains an incendiary powder such as phosphorus. It transforms the shotgun into an instant short-ranged flamethrower. Damage is 4d at TL7 or 5d at TL8+ in an area two hexes wide and six long starting at the gun muzzle. The shooter rolls once for each target, hitting or missing each independently of whether others are hit. Legality Class 2, double cost.

Flechette (TL7+): This shell contains several finned darts instead of pellets. Treat it as shot, except that 1/2D and Max ranges drop by 10 yards, damage becomes impaling and the flechette rounds cannot penetrate the DR of rigid armor (e.g., anything with DR 3+ except Kevlar, monocrys or chainmail). Legality Class 1, double cost.

Chemical (TL7+): This shotgun shell contains three doses of a biochemical agent (see ***GURPS Bio-Tech*** and p. UT70). It does only 1d crushing damage but bursts. This releases the biochemical agent, which fills one hex for three seconds. Add the cost of three doses of the chosen agent to the cost of each shot. When loaded with something very lethal like nano disassembler rounds (p. 69), even a low-tech shotgun can be *extremely* deadly. Legality Class varies with filler.

Stun (TL7+): These are baton (rubber) or gel rounds. Damage halves after DR except for knockback purposes. Legality Class 5, normal cost.

Armor Piercing (AP) Shot or Slugs (TL8+): These are high-density pellets or slugs formed from depleted uranium. Treat them as slugs or shot, except that they halve DR, then halve



any remaining damage. This is cumulative with other wounding modifiers, meaning normal damage is done after DR if using slugs. Legality Class 1, triple cost.

Shaped Charge (TL9+): A shaped-charge-explosive shell - use the rules on p. 51.

Monochain (TL9+): This duplex-type round consists of two slugs with a foot-long strand of monowire slung between them. The slugs spread apart after leaving the barrel, creating a high-speed flying garrote that slices anything in its path. Monochain

does half the listed damage, but is +1 to hit. If it hits a head, neck or limb its damage is *cutting* and DR protects at one-tenth value! Legality Class 1, five times cost.

GAUSS WEAPONS

These use electromagnetic impulses to propel projectiles. All operate silently, except that most fire rounds that crack the sound barrier. They require both a magazine of ammo and a power cell. Gauss needlers, battle rifles, submachine guns and electromag grenade launchers are described in ***Ultra-Tech,*** but other electromag weapons also exist. Unless otherwise indicated, Guns (Needier) skill is used for all these weapons.

Most smaller Gauss weapons are effectively recoilless (their recoil is too small to be significant in game terms). A few more-powerful Gauss guns have significant felt recoil.

Gauss NEEDLERS

These weapons fire tiny (2mm or smaller diameter) needles, doing impaling damage. For full details, see p. UT45.

Gauss Catling Needler, 1.5mm (TL8+)

This six-barrel, machine-gun version of the Gauss needle rifle utilizes a more powerful magnetic accelerator to fire hypervelocity 0.06-caliber needles. The cryogenic cooling jacket surrounding the barrel and huge 40,000-shot ammo cassette with built-in D cell allow sustained automatic fire. It has a tripod mount, and can be disassembled into three parts: tripod (14 lbs.), ammo cassette/power cell (12 lbs.) and gun (14 lbs.). The combined gun, mounted and loaded, weighs 40 pounds. It costs $17,000, plus an extra $140 for the tripod.

Gauss Minineedler (TL10+)

Extremely small, this holdout needier usually becomes a bionic implant. It can include a small device (such as a pen or large ring) as a disguise at double cost. Reloading it takes six seconds (half that on a DX roll) due to the inconveniently small size of the magazine, which an AA cell powers. It costs $400 and weighs 0.1 pounds.

GAUSS BULLET WEAPONS

These electromag guns fire actual bullets rather than tiny needles, generally doing crushing damage. Their listed statistics assume solid rounds, but they also can use any special slugthrower ammunition described on p. UT44 or p. 51, as well as high-density dart ammunition.

GAUSS Dragonslayer, 3.8mm (TL9+)

This very long-barrelled, semi-automatic Gauss rifle fires 3.8mm slugs at hypersonic velocities. It usually is used as a military anti-materiel rifle, its big advantage over weapons such as the heavy sniper rifle (p. 49) being its large ammunition capacity and somewhat lighter weight, especially when loaded. In such a role, it is usually loaded with HD or APS rounds with a dramatic increase in performance. It includes a folding bipod for accurate prone firing. Firing a magazine drains a C cell. The dragonslayer costs $10,000 and weighs 27.5 pounds.

GAUSS HMG, 3.8mm (TL9+)

This tripod-mounted 3.8mm Gauss machine gun fires the same round as the Gauss dragonslayer from a 4,000-round ammo cassette. Firing each cassette drains a D cell. The weapon costs $16,000 (plus $260 for the tripod). It weighs 67 pounds with tripod attached, 41 pounds without.

Gauss Pistol, 2.5mm (TL9+)

This compact, automatic Gauss gun fires a 3.5mm bullet. Its compactness and power make it popular with military officers, special forces and terrorists. It uses a 250-shot magazine. Its B cell loads into the side of the weapon separately, and provides power for 1,080 rounds (four magazines). It costs $2,400 and weighs 1.4 pounds.

The semi-automatic version of the Gauss pistol has RoF 3 and Legality Class 3, but otherwise is identical. A gunsmith can convert it to full automatic with four hours work and $100 in parts on an Armoury-4 or Electronics (Weapons)-4 roll. Failure requires another try; critical failure breaks the gun.

Gauss AMMUNITION

High-Density Dart (HD)

Any Gauss (or grav) gun up to 5mm bore can fire this streamlined dart tipped with tungsten or depleted uranium.

HD's damage is *both* armor piercing and impaling. This makes it *effectively* crushing - the doubling for impaling and halving for armor piercing of damage that penetrates DR leaves *no* net wounding modifier. HD has a (2) armor divisor: armor protects at half value. There is no extra cost for HD rounds.

The printed statistics for the Gauss bullet weapons in ***Ultra-Tech*** assume HD ammunition. High-density needles also are available for all Gauss needlers; they have the same effect as high-density darts.

OTHER Gauss WEAPONS

Gauss CAW 18.5mm (TL9+)

The Gauss close-assault weapon (G-CAW) is an electromagnetic 18.5mm auto shotgun. It can fire shotgun shells, or any of the other shotgun ammunition types on p. 52. The weapons table assumes it is firing shot shells. **It** costs $4,400 and weighs 10 pounds.

Gauss Shotgun Pistol, 18.5mm (TL9+)

Similar to the Gauss CAW, but in pistol format. This big-bore, snubnosed semi-automatic is a favorite police sidearm. It costs $ 1,600 and weighs three pounds.

Gauss assault Cannon, 20mm (TL10+)

This is a rifle-sized, bullpup-configuration minicannon - TL10 materials technology results in a high-velocity, semi-automatic Gauss weapon little heavier than a TL7 automatic rifle. To keep weight down, it has a relatively short barrel, which reduces its range and punch compared to some Gauss guns. It still outranges the TL8 electromag grenade launcher and with proper ammunition (see the Loose Ammunition table, p. 126) can defeat most combat robots, battlesuits and light armored vehicles.

The usual load is either:

20mm APFSDSDU: An armor-piercing, fin-stabilized, discarding-sabot, depleted-uranium round, this gives 1.5x normal range, +1 Acc and double damage. DR protects with one-third normal value!

20mm (Warhead): Other 20mm assault-cannon rounds are available in the same types (and effects) as mini-grenades (p. 67).

Each magazine contains an integral B cell. The weapon costs $3,000 and weighs 13.4 pounds.

GRENADE LAUNCHERS

The electromag and mini-electromag grenade launchers in ***Ultra-Tech*** are only two of many GL types. All described below are fired using Guns (Grenade Launcher) skill.

CHEMICAL GRENADE LAUNCHER WEAPONS

These use a chemical propellant rather than a magnetic impulse, making them much cheaper than electromag launchers, but shorter-ranged. Their grenades can't be used as hand grenades or fired by electromag launchers, and vice versa.

Conventional GL, 20mm (TL8+)

This pistol-sized, single-shot grenade launcher fires mini-grenades (p. 67). It can be mounted under the barrel of any ranged weapon weighing four pounds or more (it takes five seconds to attach or remove) or fired separately as a pistol. If mounted, add the launcher's weight to the host weapon's; duo to the extra bulk, increase the host weapon's SS by 1 and use it for *both* weapons.

It costs $300 and weighs one pound.

Conventional Grenade Pistol, 40mm (TL8+)

This grenade-launcher pistol breaks open to load chemically propelled single shots. It can fire the full range of standard grenades. It also can mount under the barrel of other weapons as per the 20mm grenade launcher.

It costs $400 and weighs 2.7 pounds.

GYROCS

Gyroc weapons fire rocket-propelled ordinance without recoil - see p. UT46 for a full description. While ***Ultra-Tech*** describes the standard gyroc weapons and ammunition, several other types are available for special purposes. The combat statistics on the table assume use of APEX ammunition.

All gyroc weapons use Guns (Gyroc) skill to fire.

GYROC WEAPONS

Holdout Gyroc (TL8+)

This derringer-sized gun breaks open to fire single shots. For double cost, these can be disguised as drug inhalers, pneu-

mo-hypos, pens, wallets and so on. In some areas, cheap "street" holdout gyrocs are very popular (see *Ranged Weapon Quality* on p. 61). The holdout gyroc costs $200 and weighs 0.25 pounds.

Underbarrel Gyroc (TL8+)

An alternative to grenade launchers, this pump-action gyroc launcher (RoF 2) must be attached under the barrel of any reasonably large gun or beam weapon (weight four pounds or more). The gyroc launcher is fired using that weapon's SS number but otherwise uses its own statistics. All rounds must be reloaded individually (three seconds each).

Adding an underbarrel gyroc launcher to a weapon increases the host weapon's SS by 1 due to the extra bulk. The gyroc's trigger is located next to the slide action for the pump. In a given turn a shooter can fire either the gyroc or the host weapon, but not both. The underbarrel gyroc costs $600 and weighs two pounds.

NEW GYROC AMMUNITION

Flare (TL8+)

These burn brightly, even underwater, and release a pillar of smoke (various colors available). They do one point of crushing damage to one yard, ld-3 to two yards and 1d to 1/2D range *plus 1*d burn damage to anyone directly hit. Anyone within five yards looking at the impact point without anti-glare goggles or the equivalent will be blinded for (20-HT) seconds if a HT roll fails (roll at +3 if 3-5 yards away, at -3 at night, modifiers are cumulative). Flare gyrocs burn for one minute and are visible to the horizon if fired at ground level or out to five miles if shot into the air at night. They are Legality Class 2, and cost $150 per 100 rounds.

Salvo (TL8+)

After leaving the barrel and reaching maximum velocity, the salvo rocket releases a cluster of eight small (4mm) flechette darts. Divide the 1/2D and Max. ranges by five. Use the autofire table and multiply the number of salvo rounds fired by eight to get the effective RoF. Each flechette does 2d impaling damage. If fired at someone up to two yards away, the salvo round will not have time to release its darts: do not multiply RoF by 8, and inflict only 3d crushing damage. Price is $300 per 100 rounds. Legality Class 2.

Shaped-Charge (TL9+)

A small shaped-charge projectile, like a miniature anti-tank rocket, this round resembles the HEAT (high-explosive anti-tank) projectiles used on larger anti-tank missiles and shaped-charge grenades. The round has the same effect as the 12.7mm shaped-charge bullet (p. 51). There is no significant fragmentation damage. Price is $400 per 100 rounds. Legality Class 0.

LASERS

Standard weapon lasers are detailed thoroughly on p. UT47-50. This section discusses additional types and options.

LASER WEAPONS

All of these weapons require Beam Weapons (Laser) skill.

Infantry Support Laser (TL8+)

With a 256-kilojoule output, this laser is smaller than a gatling laser but more powerful than a military laser rifle. It includes a folding bipod. While the laser is heavy, its lack of recoil makes it relatively easy for even an average-strength soldier to hip-fire. It may not be hotshotted. The weapon costs $9,600 and weighs 29 pounds.

Infantry Support **X-Laser** (TL10+)

This X-ray laser outputs 385 kilojoules and features special modifications for fire at very long ranges. It costs $13,000 and weighs 29 pounds.

Infantry Support Graser (TL14+)

A gamma-ray laser with a 685-kJ output, this also incorporates modifications for fire at very long ranges. It costs $26.000 and weighs 29 pounds.

LASER OPTIONS & VARIANTS

Chemical Laser Weapons

In the early half of TL8, laser weapons directly powered by electrical energy sources such as power cells (technically, free-electron lasers) may be unavailable, due to limitations in beam-weapon or power-cell technology. Instead, weapons could rely on energetic binary chemical reactions to provide the population inversion needed to generate a laser beam.

The chemicals that fuel a laser often are very poisonous and corrosive, and produce a caustic exhaust as they burn to generate the beam. Lasers normally store the fumes within their magazine or tank. Some lasers' designs vent the exhaust forward - if so, anyone one yard in front of the laser will take one point of burn damage per turn, or 1d damage if they are not wearing an air mask and sealed helmet. If a breeze blows the wrong way or if the user generates a wind by running while shooting, the fumes also will blow into the firer's face. For this reason, a normal chemical laser should only be used by someone who is wearing a sealed suit and helmet!

Chemical lasers always fire in a single, fixed frequency - generally using an infrared or sometimes visible light beam. More advanced laser types (e.g., X-ray) are not available.

Chemical laser weapons can draw power from either a chemical tank (often worn on a belt or backpack) or chemical power cartridges.

Chemical Tanks: This "early TL8" approach uses the *Raygun Control* rule for powerpack beam weapons (p. 12). Instead of representing a fast-discharge battery, each power slug represents: a self-contained storage tank of reactive chemicals, a coolant system, a fume evacuator and a battery used for ignition. The whole "slug" can be replaced like an ammo magazine. Reconditioning a slug (refilling the tank, venting trapped fumes if so designed, etc.) at a chemical-storage depot costs 10% of the base price and takes 10 minutes. If the chemical tank is damaged, roll 3d. On a 10 or less, the tank springs a leak and inflicts burn damage on the firer equal to half the damage of one laser shot (treat l/2d as ld-2). Thus, a 3d laser would burn for 2d-2; only sealed armor protects.

Chemical Power Cartridges: These self-contained cartridges contain hydrogen-fluoride or other energetic chemicals. They are ejected once fired. This "mid-TL8" approach uses the rules for *Power Cartridges* on p. 60; the only difference is that the laser's cartridges cannot be used to power other types of beam weapons.

Modified Hotshots

The hotshot rules for laser, X-ray laser and graser weapons are very powerful - combined with the rules that allow automatic-fire lasers to add damage from a burst together, they mean that only very heavy armor can withstand a hotshotted laser beam. Optionally, GMs may wish to reduce the power of hotshots. To do this, try reducing the damage from x2 to xl.5, or even to a damage add of +l/die, while retaining the same power consumption.

Modified Laser Autofire

The rules for laser automatic weapons (see p. UT47 and *Damage from a Burst* on p. B120) combine dice of damage from a single hit, making lasers something of an all-or-nothing weapon. This represents the amount of time a continuous beam burning away armor can be held on target.

Some GMs may prefer a different approach to lasers. Those who want an alternative can try these optional "pulse laser" rules: "Pulse laser" automatic lasers, X-ray lasers and grasers act as normal automatic weapons in all respects. Pulse lasers, X-ray lasers and grasers with RoF 4+ have double their base damage (doubling again in hotshots). Number of shots remains the same.

This means that a TL8 laser pistol (RoF 4, 1d) does 2d damage, while a TL8 military laser rifle (RoF 8, 2d) now does 4d impaling per shot or 8d if it fires a hotshot. In game terms, this rule reduces the armor-piercing capability of lasers while increasing their effectiveness when used against multiple lightly armored targets.

This can be applied to vehicle weapons designed using ***GURPS Vehicles.*** Design the laser normally, then double the damage if it has RoF 4 or more.

Dazzle Lasers

Any laser weapon with a variable beam (p. UT48) can be used on a low-power setting that will *only* blind rather than inflict damage. Use the rules for laser blinding on p. UT47: to summarize, a laser hit to the eye that does no damage (thanks to a visor or using a dazzle setting) requires a HT roll to avoid being blinded, at +5 if using anti-glare goggles. A failed roll indicates blindness; recovery is as for crippling injuries.

Cheap "dazzle lasers" can be purchased that do no damage except blinding. These weapons cost one-quarter as much as an existing laser weapon of the same size, do *no* damage (only blinding), and have 10 times the number of shots in their power cell. Use the existing legality class of the laser weapon or LC 4, whichever is *higher.* Dazzle lasers also may be available at TL7: treat them exactly as normal TL8 lasers for cost and shots (since they use modern batteries instead of power cells); they are only effective for blinding opponents.

Assassinations represent one sinister use for dazzle lasers: the beam blinds the driver of a fast-moving car or other vehicle, so that he loses control. If the "accident" kills him, most autopsies likely will not notice the tiny damage to the victim's corneas amid the other injuries.

Any laser, whether set to dazzle or not, also can blind sensors or IR sensors such as television cameras or IR goggles; assume a sensor has HT 15 for these purposes unless otherwise indicated. Dazzle lasers generally are used as hostage-rescue or sniper weapons.

NEEDLERS

These spring or gas-operated weapons are silent and flash less, making them very useful for covert operations

SPECIALIZED NEEDLERS

These weapons are tired using Guns (Needler) skill

Minineedler (TL8+)

This low velocity needle pistol is no larger than a thimble it can fire tiny needles (or at TL10+, burrow darts), or drugged darts that do no damage other than delivering their payload, but which cannot penetrate armor with DR 2+ vs impaling damage It uses a four-round needler magazine powered by a tiny pellet of compressed gas The weapon contains no metal Reloading takes six seconds (half that on a DX roll) due to the inconveniently small size of the magazine It can be disguised in a small item, such as a pen or large ring, at double cost The minineedler costs $200 and weighs 0 1 pounds

Partisan Needler (TL9+)

This spring rifle weapon is designed tor low-tech guerilla fighters, or for use by people planning a long stay in cultures that can't produce sophisticated ammo The very small solar-powered flywheel foundry in the stock makes its own ammunition In an hour, it can produce 140 needles from a 2x3xl-mch metal block ($1), which can be made by any village blacksmith with access to ore After that, it must recharge for 10 hours in the sun It costs $1,500 and weighs 12 pounds

NEEDLER AMMUNITION

This special type of ammunition is available for needlers as well as for Gauss needlers, Gyroc salvo or flechette grenades

Needler Burrow Darts (TL10+)

Burrow darts are composed of 'smart" memory metal They flex and change shape once they enter flesh, in order to enlarge the wound channel and burrow their way deeper into the body

They do normal impaling damage If a burrow dart penetrates DR and does one point or more of damage, it has entered the body For the next three turns, it will continue to burrow, doing ld-1 impaling damage (minimum one hit) each turn If using hit location, the continuing damage applies to the location struck A person can try to dig a burrow dart out with a knife or scalpel This requires a First Aid roll with a -2 for every turn the dart has burrowed after the first turn Success 01 failure does one hit of damage - success also removes the dart a critical failure does ld+1 damage and fails to remove it If a person tries to remove a dart from his own body, remember to apply the shock penalty (p B126) from its damage to his First Aid roll Burrow darts cost five times as much as ordinary ammo, but weigh the same They are Legality Class 2

ROCKET LAUNCHERS

Guided missiles (see ***GURPS Ultra-Tech*** and ***Vehicles)*** very accurate, but expensive, and vulnerable to electronic countermeasures The unguided rocket is a cheaper alternative Without the need to carry a guidance system rockets can have a larger warhead, and be built cheaply enough to issue to every soldier

These use Guns (Light Antitank) skill

Disposable RL, 120mm (TL8+)

The DRL-120 is a shoulder-tired anti-tank rocket with a shaped-charge warhead, designed to give an infantryman a chance vs a tank at short range Preloaded in a launcher that forms its own carrying case, the rocket is a one-shot, disposable weapon The price includes both rocket and launcher Its soft launch motor lets it be fired in an enclosed space, and a "dumb" microchip autopilot holds the weapon steady in crosswinds but does not provide actual guidance It costs $230 and weighs 13 pounds

For an extra $ 1,000, it can use a "top-attack' option This has a downward-angled warhead and laser-proximity fuse If fired at a ground vehicle the weapon is programmed to pop up at the last moment overflying the target When over the center of the target, the weapon fires the warhead downward This strikes the top armor which is usually much thinner The top-attack variant does less damage, since a smaller warhead must be fitted - 6dx13 (10) at TL8, 6dx20 (10) at TL9+

ROCKET LAUNCHERS

Rocket Grenade Launcher (TL8+)

The RGL is a shoulder fired one use rocket booster designed to be used with standard TL8+ hand grenades It consists of a launch tube and rocket booster The launch tube is not reusable To use it, any grenade is screwed onto the rocket booster as a warhead The weapon's effect depends on which grenade is used Mounting a grenade takes 10 seconds the RGL is then ready to fire Lethal backblast occurs in firing The firer is safe, but anyone in a 60-degree cone behind him takes 3d damage with in one yard, or 1d damage within two yards Anything flammable within two yards catches fire on a roll of 10 or less There is no effect past two yards The RGL costs $50 (plus the grenade's cost) and weighs three pounds with a grenade attached

BLASTERS

Blasters are particle-beam weapons, fully described on p. UT51. The electron pistol and rifle (p. UT57-58) are also blasters. Regardless of their name, TL9+ blasters generally will fire charged-particle beams (e.g., electrons, alpha particles or protons) in atmosphere and neutral-particle beams in vacuum.

BLASTER WEAPONS

Blaster Carbine (TL9+)

This carbine-formal weapon incorporates a pistol grip, shoulder stock and double-magazine housing two C cells. Vehicle crews often carry blaster carbines due to their handier size. Their simple, rugged design also makes them popular as mass-produced infantry energy weapons for conscripts or guerrillas. The carbine costs $5,000 and weighs 5.2 pounds.

Semi-Portable Blaster (TL9+)

This semi-portable, tripod-mounted, particle-beam cannon is considerably more powerful than a gatling laser, although its rate of fire is rather low (only one shot every second).

The semi-portable blaster can be removed from the tripod and fired like a rifle, using its pistol grip and shoulder stock. This requires a strong gunner, powered armor or a weapon harness. Attaching or detaching the weapon from the tripod takes three turns.

The blaster costs $23,000 (plus $230 for the tripod). With power cell, it weighs 66 pounds with tripod, 43 pounds without.

Holdout Blaster (TL10+)

This small blaster pistol (+2 to Holdout) is somewhat larger than a holdout laser - it can be hidden in a pocket or ankle holster - but is not small enough to build into a pen or other trinket. It costs $800 and weighs one pound.

BLASTER VARIANTS

The term "blaster" is a fairly generic one in science fiction, and can apply to a variety of weapon types besides the *GURPS* interpretation of them as particle-beam weapons. Here are a few alternative versions of the "blaster." It's up to the GM which, if any, of these options are available.

Plasma Blasters (TL9+)

Instead of projecting a continuous wash of relatively low-density plasma like a flamer, these weapons fire a tight bolt of hotter plasma down a path burned by a laser beam. They are precursors to the more powerful and much hotter TL12 fusion guns.

Plasma blasters are available in the same varieties as blasters, but cost 1.5 times as much. They function *exactly* like blasters (not like flamers!) with two exceptions: instead of impaling damage, a hit does both burn damage (no multiple after subtracting armor) and knockback, and will splatter plasma over the target area. Anyone within two yards takes 1/4 the blaster's damage. Plasma blasters set fire to anything flammable (wood, paper, etc.) within two yards of a hit.

Tactically, plasma blasters offer a greater area effect than ordinary blasters at the expense of reduced wounding. They are work well for equipping NPC agents in *Supers* campaigns, since their burn damage is somewhat less fatal to PCs than the impaling damage of lasers and blasters! Plasma blasters use the same skill as blasters.

Tight-Beam Blasters (TL9+)

A tight-beam blaster fires a much narrower particle beam. It does one-third normal damage (round fractions of 0.5 or more up), and its energy pulse is treated as a projectile rather than a beam for blow-through purposes. But DR protects at one-quarter normal! Example: A blaster pistol does 6d imp. normally, while a tight-beam version of the blaster pistol does 2d(4) imp. damage.

A blaster that can be hotshotted also has a tight-beam hotshot setting. Instead of doing one-third more damage, it adds + 1 damage per die.

A blaster that *only* has a tight-beam setting is identical in cost and weight to a normal blaster. A "variable" blaster that uses normal or tight-beam settings (one turn to change) costs 1.5 times as much as an ordinary blaster. If the variable blaster can be hotshotted, it will also have hotshots and tight-beam hotshots, for a total of four possible settings.

GMs may want to create a universe where tight-beam-only blasters are the standard energy weapon. Their lack of overkill combined with superior armor-piercing capacity makes them a good choice for simulating settings (such as many SF movies) where a hero can survive a blaster hit or two even if unarmored, but a few well-aimed shots can still bring down a combat-armored foe.

Tight-beam blasters use the same skill as other blasters.

Neural Blaster (TL10+)

This weapon fires an electromagnetic bolt related to paralysis and nerve-gun beams. A hit causes shock and muscle spasms that progressively weaken the victim. Unlike some lower-TL stun weapons, it will affect people in vacuum or sealed armor.

A neural blaster has identical statistics to an ordinary blaster, except it is one LC more legal, does Special rather than impaling damage, and has Rcl 0. If a neural-blaster hit penetrates DR, the subject takes Fatigue rather than real damage. Shock, knockout, knockdown and stunning effects apply normally, as if the character had lost HT. Thus, taking Fatigue of more than one-half HT (one-third if a brain hit) from a neural blaster stuns the character. Lost Fatigue recovers normally; as usual, Fatigue cannot go below 0, which means that anyone knocked out by a neural blaster will always recover in 10 minutes or so.

Example: A neural blaster hits Terri. It does 21 hits minus her DR 15 bioplas armor, leaving 6 hits. Terri takes 6 Fatigue. Since she has HT 11, she also is physically stunned.

If a specific make of blaster can fire hotshots, so can the

neural-blaster version; the effect is the same (4 charges/shot, one-third more damage).

When firing a neural blaster, use Beam Weapons (Neural) A normal blaster can be given a neural-blaster setting for +50% to cost.

Omniblasters (TL10+)

Omni blasters are multi-purpose energy-beam weapons that can fire using either normal blaster, tight-beam blaster, plasma blaster or neural blaster settings; if equipped for hotshots, they will have eight possible settings! Omniblasters are available in the same makes as ordinary blasters, but are three times as expensive. Changing settings on an omniblaster takes one turn. Omniblaster pistols also may include an electrolaser setting at extra cost and weight, as described on p. UT51.

NAUSEATORS (TL9+)

Any sonic stunner (e.g., a stunner, stun rifle, a screamer modified to fire as a stunner, etc.) can be designed to fire a beam using a frequency that disrupts the inner ear and causes nausea rather than simple unconsciousness. A nauseator beam uses less power than an ordinary stunner beam, but the effects are less decisive. Instead of being knocked out, the victim will be able to function (and will usually try to flee!).

A nauseator weapon is identical to a stunner except that it fires a wider beam that will affect the entire body (don't aim at a specific location). It is +1 to hit, and -2 on HT rolls to resist. Use only sealed-helmet or force-screen DR when calculating the effects of armor on the HT roll.

Rather than being knocked out, a victim who fails the HT roll remains conscious but is sick and dizzy. A nauseated victim has his Move cut in half and suffers a -5 on all skill, DX and IQ rolls. The nausea lasts for 60 - (3xHT) seconds, after which a HT roll is allowed each turn to recover. Most people will immediately run for cover and be messily sick. The GM can require a Will roll for NPCs to do something other than this while nauseated.

A weapon with a nauseator-only setting has the same weight, cost and legality as the equivalent stunner (or sonic stun grenade). A nauseator setting also can be built into a stunner (as well as a screamer or screamer grenade with a stunner setting): just add 50% to the cost. It takes one turn to change settings.

Nauseator weapons often are used for riot control. Unlike paralysis guns, tanglers or ordinary stunners, victims of nauseators will tend to flee the area under their own power. The effect is more demoralizing than simply passing out, more precise than using gas or water cannon and less "inhumane" than nerve guns.

ELECTROMAGNETIC PULSE GUNS (TL10+)

This hand-held weapon can be mistaken for a heavy blaster pistol or electrolaser. A refinement of paralysis-gun technology, the EMPG generates a powerful but short-ranged electromagnetic pulse that is totally harmless to living beings but disables electronic systems, including computers, battlesuits, powered armor and robots. It also will neutralize cybernetics and brain implants, and erase software stored on magnetic media. It does no damage against organic beings, but could kill someone who depends on an electronic implant to keep his body functioning. It has no effect on hardened or optical systems.

A successful hit neutralizes the target's electronics on a dice roll of 16 or less on 3d, causing a surge that runs through the entire target. Subtract one from the chance of knocking out electronics per 20 points of combined DR and hit points that the electronics possess; roll once for a single integrated system (such as a robot, battlesuit or person with bionics) or individually for separate subsystems carried by the same target. For every point the roll succeeds by, the target's electronics are disabled for two turns. Success by 10 or more, or any critical success, permanently fries the target's electronics.

The EMPG is fired using Beam Weapons (Blaster) skill.

GRAVITY BEAMERS (TL13+)

Offshoots of contragrav and force-field technology, these weapons fire focused beams of gravity particles. A gravitic beam weapon can use one of two settings:

Vibro Beam: This setting creates an oscillating tractor/pressor gravity beam. The beam causes the inside of a target - or part of the target - to vibrate itself to pieces. No knockback is inflicted, but armor PD does not protect and DR gives only 1/100 normal value!

Force Beam: This high-impact pressor beam does crushing damage. The full damage only applies when calculating knockback, however - actual damage is halved.

For example, if 16 points of damage are rolled, a man would suffer two hexes of knockback, but only take 8 hits damage. This setting's damage usually leaves a wide bruise covering much of the target's body!

GRAVITY BEAM WEAPONS

Beam Weapons (Force Beams) skill is used unless noted.

Grav Reamer (TL12+)

This compact grav-beam pistol is about the size of a laser pistol. It costs $2,000 and weighs one pound.

Assault Gravbeam (TL12+)

A rifle-sized shoulder arm, this costs $4,000 and weighs nine pounds.

Tripod Gravbeam (TL12+)

A heavy, tripod-mounted gravity-beam weapon, this is fired using Gunner (Force Beams) skill. It costs $40,000. It weighs 75 pounds, or 47.5 pounds with tripod removed.

MINDRIPPERS (TL14+)

Mindrippers are advanced neural-disruptor weapons that brutally interrogate the target's mind and nervous system, instantly making a *ghost-program* copy of the subject (see *Ghostcomps* on p. UT31) at the cost of irreparable damage to the subject's mind.

The subject gets a HT-5 roll at +1 per 10 points of DR protecting the brain. If the HT roll succeeds, the subject is unharmed, but has a mild headache. If the HT roll is only just successful (made exactly or by one point), he's also mentally stunned. If the HT roll fails, the subject's brain and nervous system are ripped apart, permanently reducing DX and IQ to 1 and leaving the victim a mindless vegetable - and storing a ghost-program copy of the subject in the mindripper.

Mindrippers are useful because they simultaneously destroy *and* capture an opponent. Mindripper beams are silent and invisible, and unaffected by atmosphere, but require a line of sight to operate. They don't work through force screens.

Less invasive ways of making a ghost program exist, but they take several minutes and special medical equipment, and don't work in combat; p. UT31 covers these.

Short-Range Mindripper

This compact, rifle-sized weapon is fired using Beam Weapons (Neural) skill. It costs $50,000 and weighs 10 pounds.

Long-Range Mindripper

This heavy, semi-portable model mounts on a tripod and is fired using Gunner (Neural) skill. It costs $100,000 and weighs 75 pounds, or 48 pounds with tripod removed.

WEAPON ACCESSORIES & MODIFICATIONS

Most of the standard modifications for weapons already are described on pp. UT64-65.

A few additional ones in common or uncommon use include:

POWER CARTRIDGES (TL8+)

Instead of using conventional power cells, beam weapons can be designed to use individual *power cartridges*. A power

cartridge is a self-contained energy unit that detonates to produce a powerful energy discharge lasting less than a second. The hot, half-melted cartridge casing is then ejected from the weapon. Every power-cartridge weapon incorporates a built-in battery that provides power to electrically eject spent cartridges or trigger the firing of existing ones. It recharges by tapping a small portion of the energy produced when firing.

A beam weapon that uses power cartridges cannot use power cells, and vice versa. The main advantage of power cartridges is that a person can carry individual cartridges separately. They also cost less than power cells. On the other hand, a power cell offers greater utility because it can power any device, not just a weapon, and rechargeable versions exist. Power cartridges cannot be recharged.

Each power cartridge provides power for a single shot. A weapon usually will use as many power cartridges as it had shots. For instance, a blaster pistol with 20 shots uses 20 power cartridges. The cartridges are held in a box or drum magazine just like those of a conventional slugthrower.

Unlike power cells, which come in standardized sizes, power cartridges usually are customized to individual weapons. An individual power cartridge's weight and cost are determined as follows:

W:C/S, where:

W is the weight of the cartridge in pounds.

C depends on the size of power cell normally required: 0.036 if a B cell, 0.36 if a C cell, 3.6 if a D cell, 14.4 if an E cell. If the weapon uses multiple cells, multiply C by the number it uses.

S is the number of shots the weapon gets at the current TL.

The cost of the power cartridge is $100 times its weight.

To find the weight of a loaded power-cartridge magazine, multiply the weight of the cartridges by 1.4 (round to two places). The magazine's cost is negligible compared to the cartridge cost. In general, the weight of a loaded magazine will roughly match the weight of a power cell, so loaded weight will not change for a cartridge-using weapon that retains the same number of shots.

Example: A TL8 heavy laser pistol normally gets 12 shots off a C cell. If the same weapon used power cartridges, each power cartridge for the laser would weigh 0.36 (C cell) divided by 12 shots: 0.03 lbs. Each would cost 0.03 x $100 = $3. The loaded magazine would weigh 0.03 x 12 shots x 1.4 = 0.504 pounds, rounded to 0.5 pounds - the same as a C cell.

A magazine can be loaded with fewer than its maximum number of cartridges. Cartridges of the same TL that weigh the same can be designed to interchange in different weapons.

Hotshots and Hotloads

Beam weapons that normally can fire hotshots may still do so if designed to use power cartridges, but only if special "hotload" cartridges are used. Hotload cartridges cost five times as much, and only work in certain lasers, blasters and disrupters. Different rules apply for power-cartridge weapons:

A laser or blaster that normally can fire hotshots without penalty or modification (such as a military laser rifle) can fire a hotload, but for that shot its mail drops by one step (thus, Ver. would drop to Crit., or Crit. to 16).

"Civilian" lasers, blasters or disrupters modified to fire hotshots can fire hotloads. When doing so, they suffer an even greater chance of malfunction and burn-out; see p. UT48.

If fired by a beam weapon that was not modified to fire hotshots, the hotload may still work. Roll 3d. On a roll of 6 or less, the weapon fires as if hotshotted. On a roll of 7-11 the power cartridge jams in the weapon, requiring one turn and a successful Armoury roll to clear. On a roll of 12+, a backflash occurs: the user takes 1d damage for every 6d or fraction the weapon normally inflicts, and he must make a HT roll (at +5 if using anti-glare goggles or visor) to avoid blindness for 1d seconds. The weapon is wrecked.

OTHER ACCESSORIES

These options can be used with ranged weapons.

Weapon Quality

Most ranged weapons simply qualify as average quality, but superior and inferior versions can be bought.

"Fine" and "Very Fine" ranged weapons cost 5 and 30 times the design price respectively. A weapon can be Fine or Very Fine (Accurate) or Fine (Reliable). A weapon cannot be Very Fine (Reliable) nor can it be both Accurate and Reliable. A Fine (Accurate) weapon gets +1 Acc; a Very Fine one gets +2. A Fine (Reliable) weapon has its Malf. increased one step, to a maximum of Ver. (Crit.).

"Cheap" ranged weapons cost 50% of the listed price, but have a greater chance of malfunction and -1 to Accuracy. Cheap ammunition also can be purchased with the same penalties: the effects are cumulative. When Malf. is dropped one step. Ver. (Crit.) becomes Ver., Ver. becomes Crit., Crit. becomes 16, and if Malf. is 16 or less one is subtracted from it. Often cheap weapons are illegal pirate or third-generation copies: "A Thai copy of a Chinese version of a Russian assault carbine," for example. A poorer nation (or planet) sometimes will import cheap versions of higher-tech weapons to equip the local military or police.

Extended Magazines and Belts (TL6+)

Extended magazines or extra-long ammo belts or cassettes may be available, usually in versions offering 1.5x or 2x normal capacity. Beam weapons with power cartridges (p. 60) also can use extended magazines. Multiply the weight and cost of a loaded magazine or belt by (new number of shots/old number of shots). The difference between the old and new magazines' weights increases the weapon's loaded weight.

The gain in weight can increase the minimum ST to use the weapon. This can be ignored for most ordinary-sized pistols and rifles, but for heavier weapons it may be significant. Divide (new weight+5) by (original weight+5) and multiply the result by the original minimum ST. The result is the new

minimum ST. A pistol or machine pistol with a 1.5x or more extended magazine is too big to holster, and -1 to Holdout.

Folding Stock (TL6+)

Added to a weapon that doesn't have a shoulder stock (such as a pistol or machine pistol), this increases weight by 20% (use the empty weight, which subtracts the weight of the loaded magazine). Unfolding the stock adds 2 to SS and 3 to Acc, multiplies Rcl by 2/3 (round up) and gives -2 to Holdout. On a weapon already using a shoulder stock (e.g., a shotgun, submachine gun, carbine or rifle), weight remains the same. Folding the stock lowers SS by 2 and Acc by 3; it also multiplies Rcl by 1.5 (round up), adds 1 to ST required and gives +2 to Holdout. In either case, this option adds $10 to cost.

Folding Weapon (TL7+)

See p. 85.

Recoil Reduction (TL7+)

Available for any projectile weapon, this gives it additional features to reduce recoil to manageable proportions, such as extra gas venting or a telescoping stock. The extra cost is 50% of the base cost of the weapon. This reduces Rcl by 1 and divides ST requirement by 1.2. If Rcl is already 1 it won't reduce to 0, but the ST requirement will lower. (The 12.7mm sniper rifle and assault shotgun already include this option.)

Gyrostabilized Weapon Harness (TL8+)

This advanced version of the articulated weapon harness (p. UT64) also is a strap-on harness with a chest plate in front and supporting arms to hold the weapon steady - but a "gyro-harness" also features gyroscopic stabilization and *motors,* with a microprocessor built into its frame.

A gyrostabilized weapon harness performs exactly like an articulated weapon harness, reducing an attached weapon's ST requirement by 3. Also, the gyrostabilization gives a +2 bonus to hit that is usable only to cancel attack penalties for walking or running. (In most circumstances, this means movement does not cause a penalty.) In addition, if the weapon features a HUD sight and the gunner is wearing a helmet or goggles with any sort of HUD (p. UT65) or has a neural HUD implant (p. 111), the weapon can use the much more effective "gyroslave mode." The gyroslaved harness will move the weapon to unerringly track whatever target on which the user's eyes are focused. This allows ultra-rapid accurate target engagement: an extra -2 to SS, cumulative with the normal modifiers for using a HUD sight, for a net -4 to SS number if using a HUD or -7 with a holographic or neural HUD.

If the user has a neural interface or spends an extra $200 for a voice-control gyroslave, the user can not just operate in gyroslave mode but do so "hands free." The motor moves the weapon onto the focused-upon target, then the user simply says (or thinks) "fire" and the weapon does the job. The main advantage of this is - thanks to the weapon being braced in the harness - the user can be holding something else in his hands at the time. Since the user must focus on the target, he can't attack while doing something else, but he could be carrying a different ready weapon.

A C cell powers a gyrostabilized weapon harness for 100 hours of normal use. It costs $2,000 and weighs 10 pounds.

Smartsight (TL8+)

For an extra $1,000, a weapon can be built with a dedicated "smartsight" computer chip, which enhances opportunity fire.

This adds an extra control on the weapon that turns on or off the smartsight's "autonomous mode." Turning it on or off must be done at the start of a turn and takes a Ready maneuver. A neural interface with the weapon makes this a free action.

The smartsight has no effect unless the weapon features a laser sight or receives data from a targeting sensor (e.g., a radar). When activated, the smartsight causes the weapon to shoot automatically if the sensor detects movement within the weapon's firing arc and range. When firing in this mode, the chip corrects for firer movement; only target movement incurs a penalty.

Primarily, autonomous mode allows instantaneous reaction while covering someone. When using opportunity fire (p. B118) of either the "shoot the first person who enters area *x*" or "shoot person *x* if he so much as twitches" type, the sensor gives an additional +2 bonus to hit, only to reduce the penalty for covering. (If the firer is covering more than one hex, he may need to wave the sensor beam back and forth waiting for it to sense and shoot a moving object!)

The user must fire at the first person to enter the area being covered - while the smartsight is operating he cannot take the option of not firing automatically.

When making non-covering snap shots or aimed shots in autonomous mode, the smartsight does not cancel firer-movement penalties, but gives an extra +1 bonus to hit that can only be used to cancel penalties for target speed and movement.

As a drawback, the smartsight makes it easier to hit the wrong target using motion-detector mode: add 2 to the penalties for firing through an occupied hex (p. Bl17), and the firer's maximum skill when hitting the wrong target (p. Bl17) is 10, not 9.

Tripod Motor (TL8+)

For an extra $1,000 and four pounds, any weapon tripod can have an electric motor built into it.

This reduces SS by 2 when firing the weapon while on the tripod. In addition, if the weapon has a sensor such as a radar or motion detector plugged into it (see *Plug-in Gadgets* on p. 16) it could be remotely controlled (assuming it also had a cable or communicator connecting it) via computer.

Or, if the mounted weapon incorporates a smartsight chip (p. 62), it can be preset to not only fire on moving targets (picking the nearest one first) in its sensor's vision, but also to swivel to aim at them, firing without need of a gunner. It will aim at the nearest moving target, and then fire with default skill 9 for as long as the target remains in range for the sensor and weapon. For more skill and discrimination, connect up a computer running the Gunner program (p. UT33).

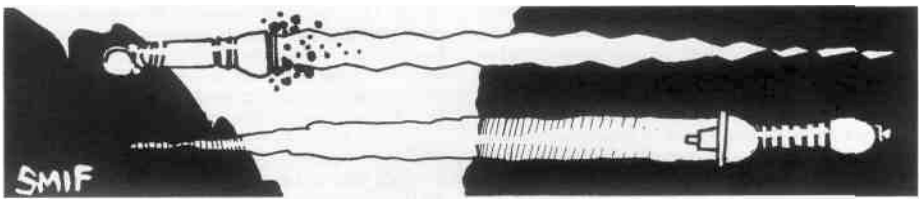
A B cell powers the tripod motor for a week of operation.

Memory Gun (TL9+)

See *Memory Blade* (p. 86).

Inertia Damper (TL13+)

This accessory uses an inertia-damping field generator to reduce the felt kick of a weapon's recoil. It can be added to any gun or beam weapon that has recoil. An inertial damper halves the recoil penalty of the weapon (round down). It runs on its own power supply, requiring one B cell for every 10 pounds or fraction thereof that the weapon weighs (an A cell for any weapon weighing less than a pound). This powers a month of continuous use. An inertia damper weighs 20% of the weapon's weight. It costs $200 for every pound the unmodified weapon weighed.



THROWING AND MELEE WEAPONS

Even at high TLs, close-range combat remains important!

SMART SHURIKEN (TL11+)

This monowire-edged disc an inch or so across incorporates a small vectored-thrust reactionless drive, an A cell and an internal optical seeker. A neural-induction pad (p. 43) also built into the device allows the user to mentally program the gadget with targeting information. The shuriken's power cell contains only enough power to operate the thruster for a single turn, but during that time the smart shuriken can zip around at high speeds, hacking and slashing through multiple targets, then returning to the thrower's hand.

The device is thrown exactly like an ordinary thrown weapon except that the user *must* aim before throwing to get any special benefits (if he doesn't, it's treated just like an ordinary monowire-edged throwing weapon).

If the thrower aims, the device's electronic seeker can select up to five targets to attack as long as they are all in front of the user. The user picks the targets in any order; the device will attack each in turn, all in the same turn. Any target after the first must not only be within range of the device, but also within three yards of the previous target.

When the shuriken is thrown, the user rolls to hit for each target he has selected in turn, but instead of rolling against his own skill, he rolls against the shuriken's TL+2. All normal modifiers to hit apply, with all rolls taking an additional -1 for each target after the first (e.g., if four targets are selected, all are at -3 to be hit).

If the device misses a target or is dodged, it goes on to the next target. If the shuriken hits, it will bounce away after striking (or slicing through) and proceed to the next target.

If the device ever scores a critical miss, it selects a target the user did not plan on within three yards of its last target and attacks that one instead. If no viable target is available, it gets confused, stuck in a body etc., and stops working.

Otherwise, after hitting or missing all programmed targets, it turns about and returns to the thrower's hand. The thrower should make a skill roll: if he succeeds, he catches it. If he fails, he drops it. On a critical failure, it slices into his hand, doing normal damage.

While the smart shuriken normally takes the form of a razor-edged throwing star, it also can come in disguised forms: a monowire-edged coin, credit card or playing card, for instance. Disguised versions cost twice as much. As long as the razor-sharp rim is not touched, the shuriken looks totally innocuous: a TL11+ reactionless drive requires no external thruster exhausts.

Replacing the A cell requires peeling off a plastic covering in the center of the device and inserting a new cell. This is a delicate maneuver due to the small size of the power cell, and takes five turns. A smart shuriken costs $1,000 and weighs one-eighth pound.

Smart Sonic Shuriken (TL12)

At TL12+, a sonic shuriken (see p. UT57) can feature the same smart guidance and reactionless thruster as a smart shuriken. Use the damage of a sonic shuriken, but the other statistics of a smart shuriken. It costs $1,100, or $1,150 for the version that sprays poison down the blades, and weighs one-eighth pound.

MELEE WEAPONS

Zap Glove (TL8+)

A zap glove looks like a heavy glove, but it contains electrical insulation (for the wearer) and a high-voltage generator. A person can attack with a zap glove by touching the victim (in combat, Boxing, Brawling or Karate allow the zap and normal damage simultaneously; Judo, Wrestling or a normal grapple would apply the zap before any other effect, but usually prevent the target from applying PD to any defense roll). In social situations (e.g., shaking hands, etc.) no attack roll is needed.

A zap glove has two settings: "stun" and "kill." Changing settings takes a Ready Weapon maneuver.

On "Stun," no damage is inflicted. Instead, the victim must

make a HT-4 roll (+3 if High Pain Threshold, -4 if Low Pain Threshold). Other modifiers: +1 per 10 DR of nonmetallic armor. Failure means the glove physically stuns him for 20-HT seconds (minimum one), after which regular recovery rolls are required. Critical failure indicates the victim's heart has stopped (see below).

On "Kill," the zap glove does 2d damage. If no damage penetrated, check for stun as above. If any damage penetrates DR (metal armor has a maximum PD 0, DR 1), the victim must roll against HT, minus half the electrical damage that penetrated DR (round up), to avoid being physically stunned for (20-HT) minutes (minimum one minute) and at DX-2 for another 20-HT minutes. DR does not affect this roll, but High or Low Pain Threshold give +3 and -4 respectively. In addition, the target must roll vs. HT (a second time) minus half the penetrating damage. If the roll fails, his heart stops: he goes to 0 HT and death occurs in HT/3 minutes (round down) unless he receives CPR. This requires a TL7+ First Aid-4 or Physician roll and takes one minute per attempt.

A B cell housed in the lining powers the zap glove, providing sufficient power for 10 zaps (each zap on "kill" setting counts as two). The glove protects the hand with PD 2, DR 5. It also can be built into existing armor or vacc suit gauntlets. The glove costs $400 and weighs one pound. If built into armor, increase the armor's cost and weight by that amount.

Monowire Switchblade (TL10+)

This monomolecular melee weapon features elements of both a normal monowire blade and whip (p. UT62).

A "monomole" or "mollywire" switchblade consists of a weighted monomolecular *memory wire* attached to a powered knife hilt. As long as the hilt feeds an electric current into the "smart" wire, the wire remains rigid like a sword. A toggle switch in the hilt allows the user to play out more wire to vary the blade length from 0 inches (retracting the blade into the hilt) to 15 feet with a Ready maneuver, or turn on or off the current. If the current is cut off, the wire becomes a flexible razor-sharp monowire whip.

As a rigid weapon, the monowire switchblade's reach may vary from C to 5. It does swing/cutting damage + 1d + R, where R is its current reach (treat C as 0). DR protects at one-tenth normal value. It cannot thrust and has no ST minimum. The switchblade requires Force Sword skill when it is rigid. It can parry normally. Note that the user must have enough room to swing the weapon: reach 3 to 5 isn't possible without that many yards vertical or horizontal space around the user.

As a flexible weapon, the monowire switchblade's reach may vary from 1 to 5 yards. It performs exactly like a whip (p. B52), but requires Monowire Whip skill to use (defaults to Whip-2). Damage is swing-2 cutting + 1d, regardless of length; DR protects at one-tenth normal. If used as a lasso or to snare a weapon, it will act as a wire garrotte instead, cutting into the target and doing its normal damage each turn it is pulled taut until the target escapes or is cut through.

An A cell powers about a year of casual use. If it runs out of power, the memory wire no longer will stay rigid, and the weapon will function only as a whip. A monowire switchblade costs $2,000 and weighs one-half pound.

Neuroglove (TL10+)

As the name suggests, the neuroglove delivers a neural shock, applied in combat as for the zap glove (p. 63). Nicknamed the "palm of pain," it functions like a neural lash - but the larger contact area of the glove makes it even more effective! It can be used to strike with, or to ambush unsuspecting victims by shaking hands with them, etc. It is also a favorite interrogation tool.

A victim who is hit must roll vs. HT-5 with any Strong or Weak Will modifiers. The High Pain Threshold advantage gives a +3 bonus; Low Pain Threshold gives a -4 penalty. If the HT roll succeeds, the victim can still function, but will suffer -2 to ST, DX and IQ and all skills based on these attributes for 15-Will turns (minimum one turn). If struck on a limb, the victim won't be able to use it for the same length of time.

If the HT roll fails, agony overwhelms the victim - he may do nothing for 15-Will minutes (at least one minute).

Each extra hit lowers the resisting HT roll by one, and with each successive hit the recovery time starts over again (but penalties to attributes do not accumulate). Victims with Low Pain Threshold take double effects.

Any armor with DR 5 or more, or reflec armor, totally protects against the glove. The neuroglove also gives a +3 bonus to interrogation through torture.

A neuroglove can strike only 20 times on a B cell. It provides PD 2, DR 5 to the hand, and resembles an ordinary winter glove. Any damage to the hand that penetrates its DR has a one-in-six chance of wrecking it as a weapon. The glove costs $800 and weighs two pounds. At TL11+, ecstasy versions (or settings) become available (p. UT57) for the same extra cost and weight as ecstasy neurolashes.

Heat Gauntlet (TL9+)

This heavily insulated glove has high-powered heating coils built into the fingers and palm; roll against Boxing, Brawling or Karate to hit. The glove can be set to reach red- or white-hot temperatures. It inflicts 1d (red hot) or 2d (white hot) damage with a touch. If the user actually grapples someone, rather than

simply slapping or punching, damage doubles. The activated glove also will ignite any flammable objects it touches, If deactivated, the glove takes two seconds to cool from white to red hot, and three more seconds to cool down enough to be touched without taking damage.

Heat gauntlets are most useful for intimidation, torture and street fighting: threatening someone with a heat gauntlet may give a +1 on Intimidation or Interrogation rolls.

A heat gauntlet can be built into any combat-armor or vacc-suit gloves as well as used independently. A C cell powers it for two minutes of continuous use (add 60 seconds per TL over TL9); if only on "red-hot" setting, quadruple operating time. It costs $1,000 and weighs two pounds.

Hyperdense Blades (TL11+)

A bladed (cutting/impaling) weapon can be designed with an edge composed of gravitationally collapsed matter tapering to single-molecule width. The weapon does +2d damage and armor protects against it at one-tenth normal DR, but this adds 50% to the weapon's weight and ST requirement. Hyperdense blades cost $500 times the weight of the original weapon (before the modification).

Hyperdense blades already incorporate the equivalent of a monowire blade. They can be made into vibroblades for double cost, but this just adds + ld to damage - it doesn't improve armor penetration.

EXPLOSIVES AND GRENADES

GRENADES (TL8+)

A wide range of grenades are described in ***GURPS Ultra-Tech,*** but that by no means exhausts the types available!

At TL9+ a variety of energy grenades are developed. They represent an increasingly attractive alternative to conventional explosives, especially for commando units, terrorists, etc. B cells or power cartridges charge them, by discharging their energy in a single burst. Most energy grenades are not reusable; those that are must have the power cell replaced before reuse. All grenades using power cartridges burn out on detonation.

All grenades weigh one pound at TL8-9, half a pound at TL10+. Cost varies.

Most of the grenades described below can function as hand grenades; the exceptions include flechette, stun-baton and HESH grenades, which require a grenade launcher. Launchers can fire all grenades described below.

Throwing skill (p. B49) governs tossing a hand grenade. A miss may scatter (p. B119). Launched grenades use Guns (Grenade Launcher) skill.

A TL8+ grenade can be set to go off on impact or after a delay of 1-30 seconds. It takes one turn to change the delay or fusing on a hand grenade, and another to press the activator and throw the grenade. If set to impact or one-second delay, it explodes immediately. Launched grenades usually are loaded with impact fusing; changing the delay takes one turn at TL8-12, no time if the firer uses a neural interface or at TL13+.

A typical grenade is +0 to Holdout at TL8-9, +1 at TL10+.

Aerodynamic Grenades (TL8+)

These grenades come in a flat, aerodynamic saucer shape, and are sheathed in rubberized plastic rather than the metal of ordinary grenades. They won't work in a grenade launcher or rocket grenade launcher. Aerodynamic grenades have the same weight as ordinary grenades, but are a lot bulkier: only one can fit in a large pocket.

Aerodynamic grenades don't use the normal rules for throwing things (p. B90). Instead, treat them as thrown weapons with SS 10, Acc 2, 1/2D (for Accuracy purposes only) of 3xST and a Max of 5xST. This allows them to be thrown on average 1.5 times as far as an ordinary grenade. Throwing skill is used to hurl them. The rubberized sheath allows them to be more easily bounced around corners: doing so requires a roll at -3, with a scatter roll of 1-3 (use the scatter rules on p. B119) indicating the grenade hit the wall (or other bouncing surface) and scattered randomly from there instead of bouncing around the corner as desired.

Aerodynamic grenades cost $5 more than normal grenades.

Chemical Grenade (TL7+)

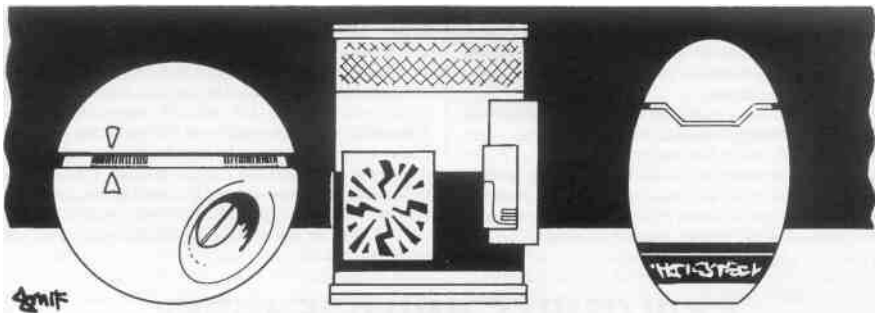
This grenade, already described in ***Ultra-Tech,*** also can discharge the numerous new types of chemicals in this book. For those without *Ultratech:* a chemical grenade releases a cloud of gas, chemicals or nanomachines - see *Chemical Weapons* on p. 69. A typical cloud covers a six-yard radius and lingers for 300 seconds/(wind speed in mph - treat wind speeds under 1 mph as 1 mph). The grenade costs the same as ten doses of whatever chemical or nanoagent it contains. Legality Class depends on the filler.

Flash-Bang Grenade (TL7+)

These "stun grenades" were invented in the late 20th century for use in counter-terrorist operations. Still popular at TL8, they have become safer (no longer starting fires). They produce a 2 million+ candela flash and a 200+ decibel "bang" (compared to 120 decibels for a jet engine!). Unless victims are wearing ear protection or a sealed helmet and heavily darkened lenses (anti-glare goggles, for instance), the flash-bang should incapacitate them for several seconds. Anyone in the 10-yard radius of effect must make a HT roll at -5 to avoid being physically stunned. This becomes unmodified HT if wearing ear *and* eye protection, or HT-2 if just eye or ear protection. The victim must continue rolling with the same modifiers each turn to recover from the stun. On a critical failure, the victim remains stunned for five turns before he can roll again. $20 each.

Stun Baton Grenade (TL7+)

This non-exploding round fires a large, plastic projectile that spreads into an X shape upon hitting its target. It does 4d cr. damage, inflicting full knockback but halving any damage that penetrates DR. Range when firing stun batons drops to 20% of normal. $20 each.



Flechette Grenade (TL8+)

This warhead filled with steel darts bursts like a shotgun shell. It does impaling damage - 6d at TL7, 8d+8 at TL8+. Use the shotgun rules (p. B119): DR is applied separately to each die (or ld+1 at TL8+). When firing flechette rounds, the weapon has 1/2D and Max ranges of 8% and 20% of its normal maximum range respectively. They are $30 each.

High Explosive Squash Head (TL8+)

This soft-plastic explosive round functions like a concussion round unless it hits armor too strong to penetrate. Then it flattens out and explodes, creating a shock wave that can be felt even through armor. If a HESH round scores a direct hit and fails to penetrate armor, it may damage the target anyhow. Apply 10% of the damage rolled to 1% of DR. Drop all fractions, so DR less than 100 gives no protection. $40 each.

Tangler Grenade (TL8+)

Tangler rounds (p. UT51) also are available as both hand and launched grenades. The effect matches that of a normal tangler round, but range, etc., alter to conform to the method of throwing or firing. $25 each.

Ripsaw Grenade (TL9+)

This anti-personnel grenade does 6dx2 concussion damage while scattering shards of lethal monowire-edged fragments that do 2d(10) fragmentation damage. $30 each.

Screamer Grenades (TL9+)

These grenades contain a high-power sonic generator that produces a pulse of concentrated sound that liquefies flesh and bone, doing 6d damage (+l/die per TL after TL9) to anyone within four yards of the target hex. This damage continues every turn for three turns, after which the grenade burns out. Any armor in the area of effect loses 3 DR per turn unless protected by a force screen. Each turn, anyone in the area of effect must roll against HT or his eardrums will rupture, deafening him until they are replaced. Wearing a sealed helmet protects totally unless the damage rolled exceeds the helmet's DR - then a HT roll is needed. Screamer grenades cost $100. For an extra $50, a screamer grenade can have a "stun" setting that lets it function as a sonic stun grenade instead.

Sonic Stun Grenade (TL9+)

This energy grenade emits a brief sonic pulse with the same effect as a hit by a stun rifle in a two-yard radius around the grenade and same effect as a stun pistol within 3-4 yards. See *Stunners,* p. B119 for stunner effects. The pulse continues for three turns, affecting those entering or remaining in the area. $40 each; the grenade includes a small power cell which burns out when the otherwise reusable grenade is detonated.

EMP Grenade (TL10+)

These reusable grenades create a powerful, short-lived magnetic pulse, which can permanently short out computers within a 10-yard radius; effects are exactly as if hit by an EMP gun shot (p. 59). EMP grenades cost $100.

Plasma Grenade (TL11+)

When armed, this grenade's internal power-cell-operated plasma generator magnetically compresses a pellet of hydrogen fuel into a hot plasma state, then releases it as an omni-directional blast of ionized plasma. The effect is a heat pulse inflicting 6dx4 damage (TL11) or 6dx6 (at TL12+) in a two-yard radius. Damage is quartered for anything three or four yards away, and it has no effect on targets five or more yards distant. The wash of superhot plasma means that non-sealed armor gets only 1/2 DR against the damage. It also *melts* armor. For every 10 points of damage done before subtracting DR, armor loses 1 DR on all locations facing the blast. A sealed suit or machine becomes unsealed after losing 20% or more of its original DR on a location. Paper, cloth and wood automatically ignite if within four yards of a plasma grenade. Flammable plastics and such catch fire if the damage exceeds their DR. $40 each.

Force Grenade (TL12+)

This reusable grenade emits a gravitic pulse doing 6d (at TL12) or 6dx2 (at TL13+) crushing damage, but damage is five times greater for knockback purposes. $40.

Dial-a-Grenade (TL13+)

This multi-function energy grenade has a neutral ("off) setting plus any two of these settings: EMP, force, plasma, sonic stun. Changing settings takes a one-second Ready maneuver. When detonated, it will explode just as if it were the type of grenade it is currently set to be. A dial-a-grenade's cost equals

the combined costs of the two grenades it can emulate. LC of dial-a-grenades is based on the lowest LC of the two functions. For all uses other than plasma, the grenade can be reused by replacing the power cell.

Vortex Grenade (TL15+)

These grenades contain tiny hyperspace generators designed to detonate within an atmosphere and gravity field to lethal effect. An activated vortex grenade sucks everything within a two-yard radius into hyperspace. It won't affect creatures four or more hexes in size or vehicles with volumes over 80 cf, since they won't usually fit through the vortex. $200.

MINI-GRENADES (TL8+)

These small grenades have half the diameter and one-eighth the weight of normal grenades. Easily concealed, they can even be hidden in a body cavity (with some discomfort)! There are two versions of each mini-grenade: one can be thrown, the other is for use with the Conventional GL, 20mm (p. 54).

The Gauss assault cannon (p. 54) fires rounds with warheads identical in effect to mini-grenades, though it cannot fire actual mini-grenades. The mini-grenade launcher (p. UT45), despite its name, does not fire mini-grenades.

Mini-grenades operate like normal grenades, as described above and on p. UT67, except their weight, cost, damage and area of effect are reduced:

Concussion, Fragmentation, HESH and *Ripsaw* mini-grenades do only ld+2 concussion damage at TL8 or 2d+l damage at TL9+. Fragment damage for frag grenades drops to 1d cutting - for ripsaw grenades ld(10) cutting.

Chemical mini-grenades affect only a 2-hex radius.

EMP, Flash-Bang, Flare, Sonic Stun and *Warbler* rnini-grenades have 1/4 the radius of effect.

Screamer mini-grenades do half damage and affect a one-hex radius.

Flechette, Stun Baton and *Shaped-Charge* mini-grenades inflict half damage. Also, the concussive blast from shaped-charge mini-grenades is much less than the damage: anyone not directly hit takes only 1d damage at TL8 or ld+2 at TL9+.

Force mini-grenades inflict only ld+2 damage at TL12 or 2d+l at TL 13+.

Plasma mini-grenades inflict 3d damage at TL11 or 4d+2 at TL 12+.

Tangier, Implosion, Hell, Stasis and *Vortex* mini-grenades are not available.

Mini-grenades cost only one-eighth as much as a normal grenade of the same type, and have the same legality class. They weigh one-eighth pound at TL8-9, half that at TL 10+. A mini-grenade is +3 to Holdout at TL8-9, +4 at TL10+.

DIRECTIONAL MINES

Mines often are linked to sensors, data cables or communicators to enable remote detonation. In addition to the mines described in ***Ultra-Tech,*** these types may be available:

Tangier Mine (TL8+)

This small, plastic mine contains a vertical-firing tangler round. It can be triggered by foot pressure or electronically. A Dodge-2 roll and jumping to an adjacent hex will allow escape when it goes off. A hit mimics being hit by a tangler round (p. UT51). Each mine costs $10 and weighs two pounds. Smart-mine (p. UT69) versions of tangler mines also are available.

Plasma Claymore (TL11+)

This boobytrap is a directional, single-shot plasma projector. Most models look a bit like a small plastic lunchbox with a retractable stand. It takes three turns to set up. It has a short range, but its wide arc of fire makes it very difficult to avoid.

A plasma claymore's blast covers a 30-degree cone directly in front of it (use the diagram on p. B121) with a length of 15 yards. The plasma toasts everyone within the arc of fire and line of sight of the mine - it requires no attack roll. Those in the arc of fire can only dodge the blast if there is cover to move behind, or if they make an Acrobatic Dodge (leaping upward!).

Those behind cover only take any damage penetrating the cover. The blast does 20d damage out to five yards, l0d from six to 10 yards and 5d damage out to 15 yards. The plasma has the special effects of a plasma grenade (p. 66): melting armor and setting fires. Unsealed armor protects at 1/2 DR.

A plasma claymore produces backblast when fired, inflicting 3d plasma damage in a two-yard radius around it. The mine comes with 100' (33 hexes) of thin optical cable and a remote detonator. It costs $200 and weighs four pounds.

SPRAY WEAPONS

These weapons spray jets of liquid or gas. They usually are used for non-lethal self-defense, or for special purposes. They use Guns (Flamethrower) skill.

Pocket Aerosol (TL7+)

This palm-sized gas dispenser holds one dose. At high TLs, these can become deadly when filled with nanomachine clouds! Very easy to use, they default to DX rather than DX-4. Respiratory agents must be sprayed into the face, but there's no location penalty to hit due to the size of the cloud. Contact agents can be sprayed onto the body. Versions disguised as pens, briefcase locks, etc. are available at double cost. It costs $50 and weighs one-quarter pound.

Spray Gun (TL7+)

This spray gun, the size of a can of bug spray, holds 10 doses of gas and can spray one or two doses at a time (one dose suffices to hit a target's face; two will fill an entire hex).

A single-dose shot has a range of two hexes; treat as a pocket aerosol. Two-dose shots automatically hit (but can still be Dodged). The cloud lasts 10 seconds indoors, less in a strong wind. The gun costs $50 and weighs one pound.

Spray Tank (TL7+)

A larger spray dispenser consisting of a spray gun attached by a short hose to a strap-on tank, this has a range of 10 yards,

creating a cloud up to three-hexes across. (The cloud is cone shaped: one hex wide for the first three hexes of range, two hexes wide from four to six hexes out and three hexes wide to 10 yards away.) No roll to hit is required, but someone can Dodge to avoid the cloud. The cloud lasts for two minutes outdoors, less in a strong wind. Its tank holds 100 doses. An attack from the side or rear can be targeted against the spray tank (-3 to hit). The tank has DR 10, but is under pressure: any penetrating damage ruptures it (1d explosion and ld-1 fragmentation) and releases the entire store of chemicals, with the same effect as a chemical grenade. The spray tank costs $100 and weighs eight pounds.

SQUIRT GUNS (TL7+)

Basically, these are water pistols. Unlike a full-size water cannon, they aren't powerful enough to knock down a human-sized target. Normally made of plastics or other non-metallic materials, squirt guns will pass most metal detectors. An ordinary squirt gun *will* show up on X-rays and imaging radar. The main usefulness of squirt guns stems from their ease of purchase in most jurisdictions.

A typical "toy" squirt gun leaks a little, so sealed gloves should be worn if using any exotic and dangerous substance such as DMSO. If he fails to wear gloves, the user almost certainly will expose his firing hand to the agent. Squirt guns are fired using Guns (Flamethrower) skill.

Squirt Pistol and Carbine (TL7+)

These pump-action squirt guns are available in pistol and more powerful carbine-format versions. Filling the reservoir takes five seconds, or the entire reservoir can be detached and a new one inserted in two seconds. Spare loaded reservoirs are one-quarter the cost and weight of the gun, plus the cost of the ammunition. Squirt pistols and carbines can be bought at toy shops and the like. A squirt pistol costs $10 and weighs one pound; a squirt carbine costs $40 and weighs four pounds. For double price, they may be accurate-appearing replicas of "real" beam or projectile weapons of similar size (although they usually will have a different weight and balance).

Acid can't be loaded into a normal squirt gun without destroying it, while DMSO and some paints contain solvents that gradually dissolve a squirt gun, or at least the washers in it (malf. drops one level every 10 minutes carried loaded and afterward until washed). "Combat" squirt guns that don't leak and whose interiors can handle DMSO or paint solvents are 10 times cost (and -1 LC). For 100 times cost (and -2 LC) they can also be acid-proof.

Squirt Gun Loads

The effect of a squirt gun depends on what it is filled with.

Water: Getting hit in the face distracts the target (-1 on DX, IQ and skill rolls on the next turn), but otherwise all it will do is make someone soggy. Thick goggles or a lowered helmet visor or face plate will protect against a face hit.

Paint: Like water, above, but makes more of a mess. Paint in the eyes distracts more (-2 on skill rolls, etc., on the next turn). Paint on goggles or a faceplate blinds the victim until the goggles are removed or faceplate is opened, or until they are wiped off. Wiping them off takes at least three turns. A paint hit may have other effects; it can prevent someone using a chameleon suit from blending into the background. A load of paint costs about $0.05 per shot.

Acid: A specially designed squirt gun can load industrial-strength hydrochloric, hydrofluoric or sulphuric acid. These do ld-3 damage. DR protects normally. If the acid hits an unprotected face (or penetrates armor on the face), the victim must make a HT roll to avoid getting acid in his eyes. If the eyes were targeted and hit, this occurs automatically.

If acid splashes into the eyes, more than two points of damage causes blindness. Use the rules for crippling injuries on p. B129 to determine if it is permanent or temporary. Reloads are $10 per shot; acids are available from industrial and chemical suppliers. If acid is loaded into a normal squirt gun, it will eat through the gun within a few moments, burning the firer's hand.

DMSO (TL7+); This is dimethyl sulfoxide. It is miscible in

an aqueous solution such as water or alcohol; when mixed with another chemical that has been dissolved in it, the DMSO solution acts as a molecular "key" that enables the dissolved chemical to be absorbed through skin cells. If used in a squirt gun with another drug or poison, any hit to an unarmored location will soak through non-waterproofed clothing and deliver the drug into the subject's bloodstream (effects as per an injection). Cost is the cost of one dose of the desired drug or poison plus the cost of the DMSO ($5 a dose) *per shot* the squirt-gun reservoir carries.

Musk (TL8+): This malodorous fluid boasts a chemical formula similar to skunk oil. Highly persistent and almost impossible to wash away, it is used by police to mark demonstrators or fleeing suspects; it also has its uses as a self-defense weapon! Anyone sprayed in the eyes will be blinded for at least five minutes if they fail a HT-4 roll. The person sprayed cannot use Stealth to approach closer than 10 yards to anyone with a sense of smell without being noticed, and anyone with a sense of smell will react to him at -3. The effects wear off after two weeks. Each hour of washing with high-tech detergents can reduce the duration of the stench by one day! A sealed suit protects the wearer but not the suit. Costs $2 per dose.

Other liquids are possible, with the effects up to the GM. Note that filling a squirt gun with napalm or some other flammable liquid won't turn it into a flamethrower, since the squirt gun lacks an ignition mechanism.

CHEMICAL WEAPONS

Chemical agents are measured in doses. In addition to those weapons described on pp. UT70-71, many other types also are available.

TYPES OF gases

These are delivered by spray guns or chemical shells. Grenade, mini-grenade, mortar, gyroc and shotgun weapons all can deliver gas rounds. At high TLs, "gasses" may actually be clouds of nanomachines. Unless noted in the description of the gas or delivery system, all clouds persist for 300/(wind speed in mph), with a maximum persistence of 300 seconds.

Pesticides (TL6+)

Designed to kill insects, fungi, weeds, plant diseases, etc. Some are toxic if breathed, others are not. $0.50 per dose. Legality Class 6.

Tear Gas (TL6+)

See p. B132 for effects. Price is $0.50 per dose. Legality Class 5.

Riot Gas (TL8+)

An advanced, non-lethal incapacitating gas often used for crowd control. Any living being within the cloud with a terrestrial-type metabolism who is not wearing a gas mask or airtight armor must make a HT-4 roll every second. If the roll fails, he will become violently ill. Treat as if stunned, but the effects last as long as he remains in the cloud, plus (20-HT) minutes. Even if he succeeds, he will be at -4 on any DX, IQ or skill rolls while within the cloud, and must continue to roll to avoid incapacitation each turn until he leaves it. $2 per dose. Legality Class 5.

Nanoburn Gas (TL9+)

This ultra-tech "nerve gas" actually consists of a suspension of cellular automatons rather than ordinary chemicals. It is designed to invade the body and break down bodily functions. Nanoburn affects all carbon-based lifeforms, and can be delivered in a gaseous form within a chemical grenade or other chem round.

A HT-6 roll is required to avoid being paralyzed for (30-HT) minutes. If paralyzed, ld-1 damage is done every three minutes over the next 30 minutes. Normal nerve poison antidotes are ineffective, but the drug Torpine (p. UT100) stops the damage once taken. A character with Osiris Treatment (p. 93) is at +6 to resist nanoburn. If he fails and is paralyzed, he gets an additional resistance (against his basic HT) every three minutes, with success negating any further damage and ending the paralysis. Nanoburn costs $5 per dose at TL9; cost halves at TL10, and again at TL11+. Legality Class 1.

Hunter Clouds (TL10+)

These nanomachines will destroy other nanomachine clouds or nano glop in, or passing through, their area of effect. For each hex in contact, roll a Quick Contest between the TLs of the two types of nano to see which wins out; if the hunter nano lose, they remain intact and can try again unless facing disassembler nano. Roll each minute - the battle takes time!

As more expensive nanostats (p. 71) or smart nanostats (p. 71), clouds of Hunter nano can function as a permanent barrier around an installation or settlement, keeping out hostile nanomachines: three doses of nano cover a hex. Cost is $200 per dose, more for nanostat clouds.

Disassembler Cloud (TL11+)

This cloud of nanomachines is programmed to break down matter; the nanobots stick to anything in the area of effect and begin to eat, reducing the target to powder or goo.

Unlike other chemical weapons, after being sprayed or released from a warhead the cloud remains in the air for only *one* turn; then (if in a gravity field) it falls to the ground like rain and begins eating away at the ground. (But see also *Nanostat Clouds* on p. 71).

Thus, objects will only be affected if they are in the area of effect when the disassemblers are released. Anything the disassemblers fall upon takes (TL-9) dice of damage per second; if damage fails to penetrate DR, (TL-9) points of DR are lost instead as they eat through armor. The disassemblers remain potent for 30 seconds; after that, they burn out. Used as a digging tool, disassemblers can turn packed earth or stone into fine powder, digging (TL-9) inches within the radius of the cloud every second.

Specialized disassembler nano can be manufactured *not* to eat certain chemical compounds, or to only eat certain compounds, or to last for shorter or longer times than the standard 30 seconds. It's possible to design disassemblers that won't touch organic materials, that will only eat organics ("kill the people but leave the buildings standing") or that will eat anything except a certain complex polymer or alloy being used to line the container in which they are stored.

Disassembler costs $40 per dose for standard types, possibly more for custom models. The cost halves at TL12 and again at TL13+. Legality Class is 0 for most types of dangerous disassembler.

Gremlins (TL11+)

These are sabotage nanobots, similar to disassemblers but larger and more specific in their destruction. They are equipped with tiny drills, cutters and the like and are programmed to crawl inside electronic or mechanical devices and jam up the works, slice through wires, eat circuits and otherwise inflict damage.

Only sealed machinery or electronics, or devices that have no small moving parts, are safe. For non-weapon mechanical or electronic devices, check for malfunction each time they are turned on, or each minute they are in use. Assume a device gains a malfunction number of 16 (or one less than its actual Malf. number, if 16 or less) after half an hour. This malfunction chance drops by one every additional 10 minutes they work (15 after 10 minutes, 14 after 20, etc.). After an hour's worth of sabotage, the gremlins burn out and cease to function.

If a cyborg lacks an airtight seal he can breathe them in! They can sabotage all complex implants and bionics - roll for each device. Hunter clouds can stop (but not reverse) damage.

Gremlins normally are available as a gas, with the same dispersion properties as disassembler nano, for $500/dose. They will affect all non-sealed equipment in the area of effect; a single dose sprayed into a mechanism is usually enough to sabotage a hand-held device, computer, etc. Sabotage inflicted by gremlins occurs on the microscopic (but not molecular) level, is not immediately obvious and is hard to fix - rolls to do so are at -4. Gremlins cannot harm living-metal devices.

Gremlins also are available as an equipment package for ***GURPS Robots*** cyberswarms (p. RO68) costing $2,000: as a cyberswarm, they will affect all non-sealed gadgets in the swarm's area of effect as above, and will not burn out. Repair cyberswarms (p. RO69) can be used to fix their depredations.

Dominator Nano (TL13+)

See p. 71. These are available as a respiratory agent at TL 13+ (HT-6 to avoid infection if breathed), or as a contact gas at TL 14+ (HT-6 to avoid infection if breathed, HT-3 otherwise). They cost 10 times as much per dose as injected dominator nano.

OTHER NANOCHEMICALS

Disassembler Nanoglop (TL11+)

This consists of a swarm of disassembler nanomachines in the form of a viscous *slime* rather than a diffuse cloud. At TL11+, disassembler nanoglop fills much the same role as napalm.

Disassembler glop has half the burst radius of normal chemical rounds; if that reduces burst radius to less than a hex (e.g., in the case of a gyroc or shotgun round), it means that it only affects a target that was directly hit. Anyone in the affected area is covered with sticky nanoglop. The effect is the same as a disassembler nanocloud, but the greater density of the nanoglop doubles damage! The glop persists for only 15 seconds. If it misses it splatters on the ground and begins eating through that. Disassembler nanoglop costs the same as disassembler clouds.

Replicating Disassemblers (TL12+)

Disassembler nano can be designed to self-replicate, containing the necessary assembler machines that transform whatever it devours into more nano. As long as it has solid or liquid matter to feed it, the gaseous cloud or glop (or any portion of it that becomes separated) will gradually expand, doubling in size every hour as it turns the "gray goo" it leaves behind into more nanomachines. If insufficient matter is available, the rate of growth will slow. The disassemblers may be programmed with a maximum number of replications, or may be designed to allow unlimited growth.

Replicating disassemblers are 100 times as expensive, and unless they are fairly benign (e.g., eating only waste products, for instance) are always Legality Class -1.

Nanostat Clouds (TL11+)

Nanomachines can be designed to be lighter than air (simply by filling them with hard vacuum and adding a tiny air turbine for station-keeping). A nanostat cloud can remain in one place indefinitely rather than dispersing. They cost 10 times as much as an ordinary cloud; cost per hex or door (if a stationary barrier) is 30 times the cost of a dose. Several "hexes" can be stacked to make a vertical barrier; each is 6' high.

Smart Nano stats (TL13+) contain sophisticated volitional computers. They scan their targets with a radar or ladar signal: if the target has a transponder ($100, TL8+), bio-beacon, homing implant or implant communicator that will give off a pre-programmed "friendly" ID code, they will not attack. Nanostat clouds can receive code updates via laser communicator if the update includes a proper command code. This is not the same as the transponder code, and usually is highly classified. Smart nanostat clouds cost 20 times as much as an ordinary nanocloud (60 times as much for a barrier hex, doorway, etc.).

INJECTED NAN0-WEAPONS

Nanomachines can be injected into the bloodstream via hypos, dragged needles (p. UT50), etc. to wreak havoc. All but splatter also are available as contact poisons at five times cost.

Nanoburn (TL9+)

See p. 69; effects of injection match those of the gas.

Shrike Nano (TL10+)

Shrike nanomachines track down and eliminate defending guardian nano (p. 93), clearing the way for other intruder nanomachines.

Each minute that shrike nanomachines are in the body, roll a contest of skill between shrike nano and the guardians. If the guardian nano win, one dose of shrike nano is killed. If the shrike nano wins, one dose of guardian nano in the target's body is killed. Otherwise, they are still fighting.

Shrike nano have a skill equal to their TL. Skill can be effectively upgraded by doubling the number of doses the subject is injected with. Each doubling adds +1 to skill.

If a user is impatient, shrike can be used simultaneously with other forms of invasive nano. Just hope the shrike kills the guardian nano before they destroy the invaders.

Shrike nano cost $500 per dose and are Legality Class 1.

Splatter (TL10+)

This can be loaded into drugged needle or hypos, but not into chemical rounds. Each "dose" contains myriads of cell-sized robot microbombs. After entering the body of a living being, they will circulate through the blood stream. Upon command, they will explode. The result rips apart the victim's arterial system. Damage is 1d for every minute they had to spread through the body before they exploded, to a maximum of 30d. Multiple doses will increase the damage, e.g., three doses do 3d per minute to a maximum of 90d.

Splatter comes in either pre-set timed or remote-control versions. Remote versions are triggered by receiving a specific coded radio pulse; frequency varies by the model number.

Guardian nano (p. 93) may be able to hunt down the splatter nanomachines before they detonate. Roll a Quick Contest of Skill each minute. Splatter and guardian skills are equal to their TL. Each time the guardian nano win a contest, detonation damage reduces by -1 per die. If they win six contests, the splatter nano are exterminated. The splatter may detonate before the guardian nano get a chance to extinguish them. For instance, suppose a dose of splatter is set to go off after five minutes. The guardian nano get five contests of skill. They win three and lose or draw two. That means that damage becomes -3 per die, or 5d-15 instead of 5d.

Splatter costs $500 per dose and is Legality Class 1.

Dominator Nano (TL13+)

These are invader nanomachines that reconfigure the deep structures in the subject's brain, altering his personality.

A dose of dominator nano must be designed to deliver (or erase) a specific mental disadvantage or set of disadvantages.

The victim must make a HT-6 roll (for a countermeasure, see *Guardian Nano* on p. 93) to resist. If the roll fails, within six hours he will gain (or lose) the programmed disadvantages. Nano with a longer time delay can also be designed. Effects are permanent (but can be cancelled by other nano, psych implants, etc.). The attack has no effect if the user already has that disadvantage (or if he doesn't have a disadvantage that is to be erased).

Dominator nano costs $1,000 times the combined value of the disadvantages (a -5 point disadvantage would cost $5,000). At double cost, dominator nano can reverse the changes they have wrought after a specified duration has passed.

Dominator nano designed to *erase* disadvantages society finds offensive or add those it considers desirable (this may vary depending on the society) are Legality Class 3, and may be available to licensed physicians. Other types of dominator nano are LC 1.


MESSAGE DATA
chapter SIX
STATUS
ACTIVE
//SLIP TR-XX334301-234/90 ... GURPS ULTRA-TECH 2
USER ID QUERY ... DENIED ... //ALIAS //FORCE TRANSMISSION
: DEFENSE
PROCESSOR 1K34 DISABLED PROCESSOR 2X20 DISABLED PROCESSOR 2K21 DISABLED //BYPASS //BYPASS //BYPASS //FULL METAL JACKET
RECEIVING RAW VIDEO ... VERITY CHECK: GURPS ULTRA-TECH 2 .....
USER ID QUERY ... ALIAS SHUT DOWN ... //JOHN DOE //SCRAM
VIDEO TRANSMISSION SCREEN
ALERT
SJG-23
CHANNEL
SECURE
THROUGHOUT HISTORY, WEAPONS AND DEFENSES HAVE CONTINUOUSLY STRUGGLED FOR SUPREMACY. THAT TREND WILL CONTINUE INTO THE FUTURE . . .
SMIF

UNIFORMS

Battledress Uniform (TL8+)

These baggy, two-piece fatigues are designed to be worn by soldiers. Hunters, scouts, SWAT teams and paramilitary units also favor them. They come in a variety of sizes and camouflage patterns (forest, snow, desert, etc.) and are covered with dozens of pockets. Soldiers often wear body armor over them, such as a monocrys vest or clamshell cuirass.

The material used is a fire-resistant, water-repellent synthetic fiber that is reasonably tough (PD 0, DR 1).

A protective coating repels chemical agents and breaks up the wearer's infrared signature. While not as good as a sealed suit, the coating provides a +1 bonus to HT rolls to resist chemical attacks that rely on skin contact and gives a -1 on any rolls to spot the wearer using infrared or thermographs.

Most battledress uniforms cost $200 and weigh two pounds. Insulated and hooded winter uniforms increase cost by $40 and weight by two pounds, but give a +5 to HT to resist cold weather.

Any full suit of flexible armor can come in a camo pattern with lots of pockets at no extra cost; making it an improved battledress uniform with chemical/infrared protective coating (CIRP) costs an extra $100.

Protective Coveralls (TL8+)

These outfits incorporate the same damage-resistant and chemical-retardant qualities as battledress uniforms, but lack the ability to break up infrared signature. Cargo handlers, hangar-bay crews, mechanics and industrial workers often wear them, but usually in white or a bright color such as orange or yellow. They cost $160 and weigh two pounds, or $200 and four pounds if winterized.

FLEXIBLE ARMOR

Some armor types - such as Kevlar, bioplas, monocrys and energy cloth - are "flexible" rather than rigid. If a crushing, explosive or cutting attack strikes flexible armor, blunt-trauma injury can still occur even if the damage failed to penetrate DR. Every "5-6" rolled on damage (if TL7 armor like Kevlar) or "6" (if TL8+ armor) will do a minimum of one point of crushing damage.

New types of flexible armor include . . .

Bioplas Bodysuit (TL10+)

Bioplastic is a strong, pseudo-alive smart material (see p. UT17) that is very light and comfortable to wear. In addition to the special-purpose bioplastic outfits described in ***Ultra-Tech,*** other flexible armored suits and clothing are made out of the material. As with other equipment made of bioplastic, bioplas armor that has access to moisture and heat (e.g., from sweat and body heat) can regrow itself, healing rips and tears. A bioplas bodysuit has PD 2, DR 15, covers the entire body except for the head, weighs three pounds and costs $2,000. A bioplas vest that only protects the torso (locations 9-11 and 17-18) costs $800 and weighs 1.5 pounds.

Transparent Bioplas (TL10+)

This body stocking of *transparent* bioplas covers the entire body except the head. It does not protect against laser fire, but otherwise functions exactly like a bioplas bodysuit. The suit adjusts around the user's body, and is effectively invisible when worn, unless examined closely (from within a yard or so, and on an IQ roll). Someone touching the wearer will notice it, however! Transparent bioplas also comes in various translucent colors; by covering up strategic areas, a wearer of a tinted bodysuit can look as if he or she is wearing a swimsuit (for instance) while the entire body actually is protected. Transparent bioplas costs twice as much as ordinary bioplas.

TAILORED FLEXIBLE ARMOR

Individuals as concerned with fashion sense as personal safety may wear flexible armor in styles other than the basic vest and full suit. Executives, politicians, secret agents, celebrities and body guards may need discreet protection while appearing to be unarmored; this option also works well for armored super costumes. At TL8+, specialty shops may design tailored armor to order using computerized systems such as the clothing fabricator (p. 18).

Flexible armor such as Kevlar (unless reinforced with rigid plates or the like), monocrys (p. UT74), reflec (p. UT74), reflex armor (p. UT76), bioplas and energy cloth (p. UT77) can all be made into discreet armored clothing.

Example: *Synthia is ordered to infiltrate the Martian Embassy Ball, where she is to assassinate the Ilshani ambassador. She'd like some protection for her getaway, but her monocrys jumpsuit just won't cut it. What to wear?*

Begin by selecting the basic armor type. Select the "full bodysuit" version of the armor. If the armor comes in light, medium or heavy versions, use the medium version.

Example: *Synthia selects medium monocrys as the armor material. A full suit costs $1,500 and weighs 12 pounds, with PD 2, DR 16.*

Next, choose the locations covered. A full suit is assumed to cover the torso, arms and legs. Many garments only offer partial protection, covering one-third, one-half or two-thirds of a location. For example, a halter top would protect the upper third of the torso (including vitals). Also, some garments only protect a location from the front or back.

Each location has its own cost/weight multiplier. Add up the multipliers for all locations covered, then multiply weight and cost by that sum.

Cost/weight ***multiplier***	*Location(s)*
0.0625	both hands or both feet
0.125	head
0.25	both arms
0.375	torso (including vitals) or both legs

Divide multiplier by 1.5, 2 or 3 for two-thirds, half or one-third coverage. Divide by 2 if it only protects front or back.

If a partially protected location is hit, roll 1d: PD and DR will protect it on a 1-2 (one-third coverage), 1-3 (half coverage) or 1-4 (two-thirds coverage). Also, armor on the upper half or third of the torso always protects the vitals and heart; armor on the lower half or third of the torso protects the groin.

Example: *Synthia considers monocrys evening dresses. Her selection fully covers the torso, but only from the front (0.375 X 0.5 = 0.1875); on the back, it protects the lower torso (0.375 X 0.5 / 3 = 0.0625). Its skirt covers the upper half of her legs (0.375 xO.5 = 0.1875). This is 0.1875 + 0.0625 + 0.1875 = 0.4375. We multiply this by the weight and cost of the monocrys and get 12 pounds X 0.4375 = 5.25 pounds and $1,500 x 0.4375 = $656.25. Her outfit will protect her fully against front torso hits; if she's shot in the back, it works on a roll of 7-2 on 1d; if she's hit in the legs, its PD and DR count on a roll of 1-3.*

Now that the coverage has been selected, decide whether the clothing is heavy, normal, light or diaphanous. This will multiply cost, weight and DR, and possibly PD:

Heavy clothes include trenchcoats, winter clothing, etc. Multiply cost, weight and DR by 1.5, and reduce LC by 1.

Normal clothes include typical attire such as shirts, jackets, skirts and pants. Leave cost, weight and DR unchanged.

Light clothing is typical of some evening wear, t-shirts, summer wear and most undergarments. Halve cost, weight and DR, and increase LC by 1 (maximum 6).

Diaphanous clothing, like swimwear and wispy lingerie, barely qualifies as clothing, but rarely is going to be suspected of being armor either! Divide cost by three, weight and DR by four, reduce PD by 1 (minimum PD 0), and increase LC by 2 (maximum 6).

Example: *Synthia's evening dress is Light, so that halves the cost, weight and DR: it is now 5.25/2 = 2.625 pounds and $656.25/2 = $328.125, and has DR 16/2 = DR 8.*

Finally, decide whether the clothing is of *average cut* (no extra cost), *stylish* (four times cost) or *a fashion original* (10 times cost). These multipliers are cumulative with all others.

Example: *Synthia figures an original gown would be too easy to trace, so she settles for a stylish cut: $328.125 x4 = $1,312.50. She is now dressed to kill, with an evening gown that has PD 2, DR 8, weighs 2.625 pounds and cost her $1,312.50.*

RIGID ARMOR

Clamshell Cuirass (TL8+)

This two-piece hinged cuirass consists of sloped, molded carbon composites and armorplas over an inner layer of impact-absorbing ballistic fiber. It is favored by soldiers who don't want to carry around the weight of a full suit of armor but *do* want tough, fully rigid protection where it counts.

A clamshell cuirass can be worn over any flexible armor. It takes 10 seconds to put on or remove. It protects the torso (location 9-11 and 17-18) only. Three grades are available:

The *light clamshell cuirass* has PD 4, DR 20, weighs seven pounds and costs $280. Add +5 to DR per TL over TL8.

The *medium clamshell cuirass* has PD 6, DR 30, weighs 12 pounds and costs $400. Add +8 to DR per TL over TL8.

The *heavy clamshell cuirass* has PD 6, DR 45, weighs 18 pounds and costs $600. Add +10 to DR per TL over TL8.

Ceramet Inserts (TL8+)

These ceramic/metal/epoxide plates fit in torso pockets in medium or heavy monocrys (p. UT74) or the TL10 exploration suit (p. UT26).

They do not increase PD, but do give the armor a higher DR on locations 9-11 and 17-18. The inserts increase torso DR on medium monocrys or an exploration suit to DR 24, and increase heavy monocrys to DR 36. Add DR 8 per TL after TL8. Since the inserts are rigid armor, impaling attacks to the torso no longer reduce PD and DR, and crushing hits to the torso do not inflict one point of minimum damage for each "6" rolled. Ceramet inserts cost $500 and weigh 16 pounds for both front and back inserts, half that for inserts that only protect one side.

Light Infantry Helmet (LIH, TL8+)

This infantry helmet resembles that used by 20th-century soldiers, but its space-age composite materials significantly increase toughness compared to any TL7 helmet. It can stop fragments and pistol or long-range smallarms fire, but cannot stand up to a direct hit by most military rifles.

The LIH is completely unsealed and has no built-in electronics. Accessories such as night vision, HUD goggles, communicator headsets or gas masks must be purchased separately.

It protects the top of the head only (brain, locations 3-4) with PD 4, DR 15; this DR increases by +5 per TL over TL8. The LIH costs $30 and weighs 1.5 pounds.

Light, Medium & Heavy Body *Armor* (TL8+)

These multi-piece suits of articulated plastic and carbon-composite armor cover the entire body. The suits *do not* have airtight seals on joints, etc.

Other than the military, police, vehicle crews and even civilians such as race-car drivers often wear light or medium body armor.

These non-metallic body armors have better protection/weight ratio than combat infantry dress, thanks to more-expensive materials and more careful shaping. It takes 60 seconds to don the entire outfit and 40 seconds to remove, or half as long on a successful DX roll. The usual range of armor accessories can be added to the suits.

A gas mask or CBR filter can be worn with the helmet. This provides full protection against respiratory agents (see p. B132), but only gives a +2 to HT to resist contact agents such as nerve gas, as they can penetrate the unsealed joints.

Light Body Armor: LBA has PD 4, DR 20 on the torso; PD 2, DR 12 on the limbs, and PD 2, DR 10 on hands and feet. The LBA helmet protects the head with PD 4, DR 15, except for the face (location 5 from the front), which is PD 2, DR 10. The armor gains +DR 5 per TL after TL8. LBA costs $800 and weighs 20 pounds.

Medium Body Armor: MBA has PD 6, DR 30 on the torso; PD 4, DR 20 on the limbs, and PD 4, DR 12 on hands and feet. The MBA helmet protects the head with PD 4, DR 18, except for the face (location 5 from the front), which is PD 2, DR 10. The armor gains +DR 8 per TL after TL8. MBA costs $1,200 and weighs 30 pounds.

Heavy Body Armor: HBA has PD 6, DR 45 on the torso; PD 4, DR 30 on the limbs, and PD 4, DR 15 on hands and feet. The HBA helmet protects the head with PD 5, DR 25, except for the face (location 5 from the front), which is PD 2, DR 15. The armor gains +DR 10 per TL after TL8. HBA costs $1,800 and weighs 45 pounds.

The prices and weights do not include any special helmet accessories. The standard combat-helmet accessory sets described on p. UT75 can be added at extra weight and cost.

Light Medium & Heavy Combat Armor [TL8+)

These offer the same protection as LBA, MBA and CBA except for being fully sealed suits of "space armor." This makes them somewhat heavier and more expensive. With the helmet visor closed and its integral CBR filter (see p. UT79) locked into place, the suit is completely airtight, providing complete protection against contaminated atmospheres, pressure loss, or chemical and biological threats. Operations in the absence of breathable air require the addition of a set of air tanks (p. UT 24) and life-support pack ($750, 2.5 pounds). In addition to armor accessories, the entire range of vacc-suit accessories (p. UT25) can be used.

Light Combat Armor: $1,000 and 24 pounds. Otherwise, treat as LBA.

Medium Combat Armor: $1,500 and 36 pounds. Otherwise, treat as MBA.

Heavy Combat Armor: $2,250 and 54 pounds. Otherwise, treat as HBA.

Cerablate Armor (TL9+)

This full suit of rigid armor consists of lightweight foamed plastic-ceramic plates designed to chip or melt away ("ablate") in a manner that carries away part of the energy of the attack. This ceramic-ablative armor is much tougher then the flexible ablative armor described in ***GURPS Space*** and ***Ultra-Tech,*** but repeated attacks will still wear it away. Cerablate-armor versions of light combat armor and infantry combat armor (see p. UT74) exist. The basic suits (excluding helmet gadgets) are only half as heavy and expensive. Their drawback is that every full 10 points of damage (before modifications for armor piercing or the like), regardless of whether it penetrated DR or not, destroys one point of DR. This applies to the DR on the attacked location *after* damage is applied.

Example: *Four rifle bullets strike a soldier wearing TL9 cerablate medium body armor (DR 38) on the torso, doing 25, 31, 27 and 26 points of damage. Its DR 38 drops to DR 36, 33, 31 and finally 29 DR, The armor is holding - but lost 9 DR in the attack. A few more bursts and the wearer's in deep trouble!*

A tube of cerablate resin can repair five points of lost DR (taking 30 seconds to paint the resin on per point of DR, but requiring no skill roll); it costs $100 and weighs two pounds.

FORCE FIELDS

ALTERNATIVE FORCE SCREENS (TL11+)

The force screens described on p. UT77 are only one way to handle force fields that resist personal damage. In some universes, force screens will work differently. At the GM's ruling, some of these modifications can be options for force screens. Or, they may be the *only* way force screens work:

Fragile: Treat as a normal screen, except that *if any* damage penetrates DR, the screen generator burns out! Repairs will take at least an hour. Fragile screens get 1.2 times the DR of normal force screens (1.8 times if velocity-limited).

Rigid: A force screen simply works like normal DR that can be turned on or off. It will not overload like the screens on p. UT77. Rigid screens have only 50% of the DR that normal screens possess (75% if also velocity-limited).

Velocity-Limited: These screens work best against higher-velocity attacks: they only get half DR vs. projectile attacks, sonic beams and explosions, and no DR against thrown or melee weapons. They have 1.5 times more DR than normal screens. V-limited screens also can be rigid or fragile.

Energy-Absorbing: Instead of having DR, the field has hit points. Damage goes to the field's hit points. When those are exhausted, damage goes to the user. The field's hit points regenerate at (1% of original total) per second, radiating out absorbed energy as neutrinos. The field cannot be turned off until all damage has been radiated. Fields of this sort have as many hit points as normal screens have DR. If the field's hit points drop to zero, the generator doesn't burn out - it will continue to regenerate the field. This can't be combined with other options (except the Swashbuckler Option, p. UT78).

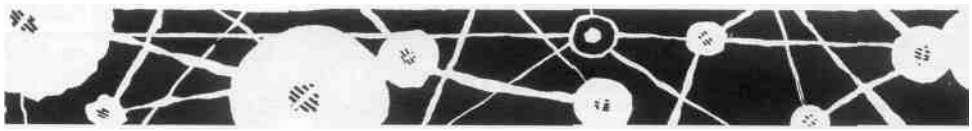
Radiant: As energy-absorbing, except it can rechannel damage up to 10% of the screen's original hit points as an attack! For instance, a personal force screen can radiate away up to 20 points of damage per turn as a coherent beam of gamma rays or gravitons. This is a good way to shed excess energy!

A *graser* beam has Snap Shot 0, Accuracy 15 and RoF 4. Per shot, it does ld(5) damage per five full damage points radiated. Use the laser autofire rules. 1/2D is 200 per die, Max is 400 per die.

A *gravitic* beam has SS 0, Acc 10, RoF 1, and does 1d cr. damage per five damage points radiated. It inflicts normal knockback damage, but actual damage is halved after DR. 1/2D is 5 per die, Max. is 10 per die.

The wearer fires the beams normally, using Beam Weapons (Laser) or (Force) respectively.

A radiant field becomes available at one TL higher than a normal force screen (minimum TL14). It has the same number of hit points as an energy-absorbing field, but costs twice as much.



OTHER DEFENSES

CBW Coating (TL8+)

This special coating repels chemical agents. It can be added to any full-body suit of armor. On a non-sealed suit, it gives a +1 bonus to HT rolls to resist chemical or biological attacks that rely on skin contact, as it lowers the chance of agents (including DMSO) penetrating the suit's weave. On any full-body suit, sealed or not, it also reduces the time and amount of decontamination aerosol (p. UT79) needed to clean off a suit by 50%. The coating costs $100.

Laminate Battle *Armor* (TL8+)

Light, medium and heavy body armor and combat armor (p. 75), as well as infantry combat armor (p. UT74) and the clamshell cuirass (p. 74), can incorporate this option. Powered combat armor and cybersuits are assumed to do so.

Laminate armor uses a special multilayer array of ceramics, plastics and metals to defeat shaped-charge warheads. It provides no extra protection against normal attacks, but any attack employing an explosive shaped charge (referred to in ***Vehicles*** as HEDP or HEAT) doubles the suit's effective DR against its damage. Laminate doubles armor cost.

Example; *Corporal S is wearing TL10 laminate heavy com-hat armor (DR 65). A 3d(10) shaped-charge bullet from a 10mm storm rifle hits her. Her armor has 65 x 2 (for laminate) /10 (the shaped-charge armor divisor) = DR 13, The damage roll is II and the shaped-charge bullet fails to penetrate. If she had been wearing normal armor, she would have taken damage,*

Optionally, the GM may treat any armor described as partially or wholly constructed of BPC (biphase carbide) as laminate, without requiring extra cost.

Nasal Filter Plugs (TL8+)

This pair of small chemical-biological filter plugs fits in the wearer's nostrils. As long as the wearer keeps his mouth closed and breathes only through his nose, the filter plugs add a +4 bonus to HT to protect against breathed gas (such as sleep gas) and avoid infection from airborne microorganisms. They provide no protection against agents absorbed through skin.

Inserting the plugs takes three seconds if in hand; a DX roll can cut this to two seconds, but critical failure means the user drops one of the plugs instead of inserting it.

In a surprise gas attack, the user must make an IQ roll to close his mouth and quickly insert the plugs before breathing a whiff of gas. Combat Reflexes adds +6 to IQ for this purpose, and Nuclear-Biological-Chemical Warfare skill (p. CI151) can substitute for IQ if higher.

The filters only work perfectly for about four hours of continuous use. The HT bonus then declines by -1 every two hours; after eight hours the plugs offer no protection at all. A pair of nasal filters costs $ 100; weight is negligible.

Near Miss Indicator (NMI, TL8+)

This miniature scanner can attach to any combat helmet. It only works in conjunction with a HUD or neural interface. The NMI detects the flight path of projectiles (but not energy beams) as they pass across the user's field of vision, and displays them as visible traces. This gives a +2 to Vision rolls to locate the source of enemy fire. An A cell powers the NMI for two months. It costs $1,000 and has negligible weight.

Portable Heat Sink (TL8+)

Infrared cloaking (p. UT79), holobelts (p. UT86) and holodistort fields (p. 86) have a limited duration before they

start to vent waste heat, making the wearer show up like a beacon on infrared sensors. This backpack-mounted cooling device can be connected by cable to any such device. It triples the duration that these devices can operate before they need to vent heat. A portable heat sink costs $400 and weighs six pounds.

RAM Coating (TL8+)

Ultra-tech battlefield radars are accurate and portable enough that many suits of personal armor incorporate the same radar-absorbent material (RAM) used by stealth vehicles.

Any full-body personal armor can incorporate the RAM coating. It subtracts the surface's TL-6 (e.g., -3 at TL9) from the chance of detection by radar or imaging radar.

Reflective armor cannot utilize a RAM coating. RAM can combine with stealth systems such as chameleon, intruder or IR cloaking. A RAM coating does not require power. It costs $1.500 and adds five pounds to the armor's weight.

Riot Shield (TL8+)

Police on riot-control duty often use this large, rectangular shield of transparent armorplas. It gives PD 4. When using the optional rules for damaging shields, it has DR 10 and 10/60 hit points. Being transparent, it does not impair the user's vision, but lasers ignore its PD and DR. It costs $100 and weighs four pounds.

Guardian, Osiris & Pharmophage Nano (TL10+)

See p. 93.

Dimensional Infiltration Armor (TL15+)

This modification can be made to any sealed, full-body suit of armor to increase effectiveness in covert operations. A dimensional infiltration armor suit consists of two elements: the first is a modified suit of body armor equipped with a built-in "dimensional phase unit." The second is a "dimensional phase anchor" - a tiny cybernetic implant inserted into the base of the user's spine.

A dimensional infiltration suit functions normally, except that any wearer with the phase-anchor implant can order the armor to "phase out." The suit then rotates out of phase into a parallel dimension, while remaining bonded with the user through the dimensional anchor. The armor no longer is visible, nor does it provide any protection, encumber the user, etc.; for all intents and purposes it has vanished. The armor will remain phased out for as long as the user desires.

At a second mental command, the user can order the armor to "phase in." A safety interlock prevents the armor from reappearing if the user is wearing anything (clothing, armor, manacles, etc.) that normally could not be worn under that type of armor. Otherwise, the armor reappears instantly around the user.

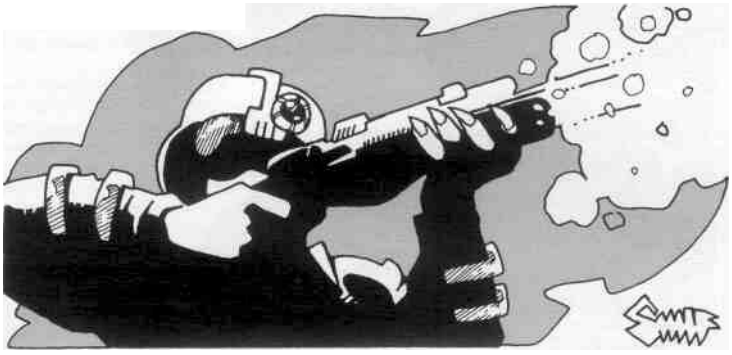
A C cell powers the dimensional phase unit for 20 phase-outs; phasing in does not drain the cell. The dimensional-transfer equipment costs $100,000 per pound it weighs. It makes up 10% of the armor's weight (including the weight of all accessories) with a minimum weight of two pounds.

Tail-Shield (TL16)

This circuitry can be incorporated into any sealed full-body armor or vacc suit, or into a force screen. It generates a personal "chronowarp" with two settings, "tactical" and "infinity." The user can change the setting at the start of his turn.

On "tactical" setting, the tau-shield speeds up the wearer as if he had up to nine levels of Accelerated Reflexes (p. 104) with the exception that it costs no fatigue. While the suit is on this setting, the wearer seems to shimmer, as if covered in liquid crystal.

On "infinity" setting, the tau-shield functions much like a stasis belt (see p. UT81): it freezes the wearer in space-time. He becomes an invulnerable mirror statue for whatever duration he preset before activating this function (anything from a second to several billion years). While in this state, the user enjoys total immunity to everything but a stasis key or tachyonic disruptor, but he cannot do anything until the duration runs out, since he is frozen in time.



The tau-shield's C cell can maintain the "tactical" setting for up to 180 minutes divided by (levels of Accelerated Reflexes). Each use of "infinity" consumes 18 minutes' worth of power. A tau-shield costs $500,000 and weighs two pounds, added to the weight of the system it is built into.


MESSAGE DATA
chapter SEVEN
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WARNING: ACCESS UNAUTHORIZED LEVEL IV COUNTERMEASURES FOLLOW
WARNING: LEVEL IV COUNTERMEASURES ENSURE SYSTEM/USER DAMAGE
//RATHOLE . . . //RAW RECEIVING RAW VIDEO . . . . .
MESSAGE BODY FOLLOWS — CUT HERE — CUT HERE —
VIDEO TRANSMISSION SCREEN
ALERT
SJG-23
CHANNEL
SECURE
THIS CHAPTER COVERS GADGETS INTENDED FOR USE BY LAW ENFORCEMENT, SECRET AGENTS, INTELLIGENCE OPERATIVES AND BURGLARS.
SMIF
78
::COVERT OPS & SECURITY::

Many of these items will be hard to come by legitimately. At the GM's option, some could be limited to a particular agency rather than generally available.

SECURITY EQUIPMENT

Armored Safe (TL7+)

This heavily armored vault features 2.5 cubic feet of interior space and a combination lock. It has DR 60, + 40 per TL after TL7, and 60 hit points; it also can use any kind of standard ultra-tech lock. It costs $1,000, excluding any special lock, and weighs 200 pounds. For locks, see p. UT88.

Concertina Wire (TL7+)

Concertina wire is coiled and nastily barbed wire. The coiling allows it to be compressed tightly for easy transport, or stretched out to defend an area against intruders. A single strand of concertina wire stretches up to 15 hexes and stands 3' to 4' tall, depending on how far the strand is extended. Concertina wire is free-standing, and can be easily curved to form an enclosure or defend an odd-shaped area. The strand usually is held in place by wiring it to tent stakes driven into the ground. It also can be nailed or staple-gunned to fence posts for a more permanent obstacle. Armored gloves (DR 2+) are required to deploy concertina wire

It takes one man-minute per hex to deploy concertina wire. If protective gloves are not available, it takes five man-minutes per hex to deploy the wire, and each person working on the wire will take ld-3 points of damage per strand deployed. To secure an area, concertina wire usually is deployed in a triple strand - two adjacent strands on the ground and a third on top of them.

A single strand can be walked through safely, given minimal care (make a successful unmodified DX roll), but it is difficult and dangerous to cross a triple strand. If anyone tries to crawl through, the GM should roll 1d per strand being crossed, and require him to make that many rolls vs. DX-5 to get through. Double-Jointed characters roll vs. DX-2; the GM should apply additional penalties for bulky clothes or haste.

Each roll represents one second of progress through the wire. If the crawler fails by less than 3, he's caught in the wire for 1d seconds. If he fails the roll by 3 or more, he takes ld-2 crushing. If he fails by 5 or more, he takes ld-2 crushing and is caught for Id seconds. On a critical failure he's caught and the damage is cutting. If he's trying to get through the wire silently and takes damage, he must make a Will roll to avoid making some sort of audible sound, unless he has the High Pain Threshold advantage.

If the intruder has a lot of time, he can roll 1d per strand being crossed, and make each roll represent one *minute* of crossing time - in such cases, make the rolls against unmodified DX.

The easiest way to cross concertina wire is to simply lay something on top of it - a log, a sheet of metal or thick plastic, a body - and climb over atop that object.

Due to its flexibility, concertina wire has no PD or DR. It can be cut by any pair of professional-quality wire cutters or any enhanced blade (such as superfine, vibro, sonic, monomolecular or force blades), snapped by an application of ST 120 or more, or crushed by any object heavier than 1,000 lbs. Concertina wire provides no PD or DR against missile fire or area-effect weapons, but it gives a -1 per strand to any to-hit roll for someone firing through it from more than 5 hexes away, due to the obscuring effect of the wire on vision.

A 15-yard coil of concertina wire costs $100 and weighs 30 pounds.

Concertina fragwire (TL8+)

This looks like ordinary concertina wire, but the core is a tightly coiled memory-metal spring. When cut, the wire explodes outward with a loud ping! The burst of sharp fragments does ld-1 cutting damage over a 2-yard radius.

Use the fragmentation rules in the ***Basic*** *Set* to determine whether or not anyone is hit. While fragwire usually proves ineffective against armored troops, it does make an effective deterrent against civilian trespassers.

A 15-yard coil of fragwire costs $200 and weighs 30 pounds.

Concertina Sensor Wire (TL8+)

This concertina wire includes an optical-fiber core. Each end of a strand terminates in a short wire plug that can be connected to a (usually buried or disguised) transmitter, such as a short-range communicator. If the wire is cut or snapped, the signal running between the two emitters is interrupted and they send a brief burst-transmission alarm on a pre-set frequency. A coil of sensor wire costs $150 and weighs 30 pounds per 15-yard length; *very* long continuous coils are most common (150 yards+), since this makes it hard for someone to discover and disable the transmitter to which each end of the coil is attached.

Concertina Monowire (TL9+)

By TL9, concertina wire, fragwire and sensor wire normally are replaced by far more deadly strands of nearly invisible monomolecular wire. Monowire is described on p. UT16. As stumbling into it can easily kill or maim, people who prefer less lethal defenses continue to use fragwire or sensor wire. A popular compromise mixes an outer perimeter of ordinary wire to scare off casual trespassers with an inner perimeter of mono wire.

Electrified Fencing (TL7+)

This portable, collapsible electric fence consists of one fence post per three yards connected by a triple-strand row of pre-attached concertina wire. One of the fence posts has a socket for a power and control cable (and at TL8+, a C-cell). Setting up the fence requires hammering the posts into the ground - assuming ordinary grass and soil and a rifle butt, shovel or hammer, this takes about 30 seconds per post.

On touch, an electrified fence does the same damage as a zap glove (p. 63); it may be set to stun or kill. The current runs through all three strands; cutting one leaves the other two electrified. If the fence is cut, the interruption in current can signal a break-in - see below.

Passing safely through an electrified wire fence uses the same die rolls as concertina wire, but with an extra -4 penalty.

Failure by 1-4 means the intruder was not cut or caught by the wire, but did touch it.

The control box has a switch with three settings (off, stun and kill) and a signal light to show any interruption in current in each strand. At TL8+, the power cable can be replaced with a triple C-cell set, which powers the wire for 12 hours.

An electrified wire fence is $500 and 60 pounds per 15 yards. The control box is a further $200 and two pounds.

Executive Security Desk (TL8+)

Senior corporate executives or political figures sometimes face the risk of attacks during working hours. This is especially true when subordinates cannot be trusted. This solid, U-shaped desk has several built-in security features intended to allay such fears.

The manufacturer recommends setting up the desk about 3 feet from a solid wall in a room with a ceiling no more than 9' high.

The desk contains a EMESCAT-shielded personal computer (complexity TL-6), multi-channel vidphone, medium-range communicator and laser copier-printer. All are concealed within the desk and arise on voice command. The desk's computer normally is linked to more powerful computers and surveillance systems in the building, such as cameras that allow the user to see who is waiting in the outer secretary's office, coming up the elevator, etc.

To ensure document security, a small paper-shredder is built into the lower drawer of the desk. It can shred one page per second. The desk also possesses a built-in bug-stomper field (p. UT90) that when turned on prevents audio surveillance devices, including parabolic microphones, from picking up anything within 3 yards of the desk. A bug of higher TL can filter out the field, however.

The desk's elegant veneer conceals DR 40 composite laminate armor, making it good cover if the user wishes to duck behind it to avoid an assassin's attack. The desk also is securely bolted to the floor so that it won't be moved by an explosion and crush the owner. Add DR 20 per TL over TL8 to the desk's armor. For instances when the user doesn't have time to get off his chair and duck down behind the desk, a keyboard or voice command causes a bulletproof, one-way armorglass shield to slide up from a hidden recess in the desk. The screen is 3' high and provides cover from a frontal attack. It has DR 30 (+15 per TL after TL8). The U shape of the desk means that, if properly positioned with screen up, the user has good protection on three sides with a wall behind him.

Since building smoke and chemical detectors can be tampered with, the desk incorporates its own integral biochemical-hazard sensor that will sound the alarm if it detects dense smoke or traces of dangerous biochemicals. This works on a roll of 15 or less on 3d against known hazards; an exotic new threat may not set it off. On the other hand, smoking tobacco in the room just might if it isn't correctly adjusted. The computer controls the sensor and can be programmed with new software updates if new biochemical threats are discovered. When the hazard alarm sounds, a slot opens in the desk and a respirator/gas mask pops out, containing a two-hour portable oxygen supply complete with a CBR filter that protects against inhaled gasses.

The desk contains one springloaded drawer opened by a hidden foot pedal near the base of the desk. No one standing on the other side of the desk can see it open, and it often conceals a small weapon, such as a pistol or gas spray.

At TL13+, the desk incorporates a force screen that can be turned on to surround it and the user's chair, providing DR 200 (+100 per TL after TL13) protection. See p. UT78 and p. 75 for more on force screens.

The desk normally uses building power, but its integral D cell can power everything for up to 24 hours in the event of power failure (any operating force screens cause it to drain power six times more rapidly). The desk costs $10,000, weighs 400 pounds and takes up 80 cubic feet.

Laser-Opaque Glass (TL8+)

A window can include a special coating that opaques or silvers a split-second after a laser beam contacts it. This will not block the first shot (or burst of automatic fire) of a combat laser - the window can't react fast enough. But it does ensure laser-listening devices or laser sights that depend on a continuous beam cannot work through the window. The window returns to normal 10 seconds after it quits detecting contact.

Once the window has opaqued, it renders further attacks blind and resists laser fire with PD 6, DR 10 (+5 per TL after TL8).

If a firer is using a laser sight with any weapon, and this darkens the window an instant before he fires, anyone who sees the window darken and knows what that means (GMs can require an IQ roll, if uncertain) will get a +1 to Dodge the laser-sighted weapon's attack. Laser-opaque glass costs $8 per square foot.

Watchdog (TL8+)

This passive infrared sensor provides warning against animals or unsophisticated intruders. It sets off an alarm if any moving heat source larger than a mouse approaches within 3 to 20 yards (distance set by the user). It will not react to movement *inside* that perimeter, so that it may function properly in a campsite.

The system is not totally infallible - roll against its skill 16 to see if it detects someone; armor with infrared cloaking (see ***Ultra-Tech*** and ***Robots)*** will subtract from its effective skill. Someone moving *very* slowly (no more than a yard per 10 seconds) occasionally can cross the perimeter without alerting it: make a contest of Stealth skill vs. its modified skill.

For added security, a chain of watchdogs can be set up in a picket line around a campsite, or one may be set near a doorway. A B cell powers a watchdog for up to six months. The unit costs $600 and weighs three pounds.

Dream Net (TL11+)

This development of paralysis-grid (p. UT90) technology features an invasive neural-induction field generator that can be built into an area of floor or ceiling, or sometimes into a doorway or furniture such as a chair or bed. The induction field extends out to a range of one foot from the grid.

Anyone moving into an activated dream-net grid must roll against HT-1 (+1 per full 25 DR of sealed armor or force

screen) each turn. Failure means the individual's body becomes paralyzed, while his mind plunges into a computer-controlled sensie (p. 45) or dreamgame program (p. UT40), or into a neural-interface-controlled virtual reality (p. 35).

Someone passing through a dream net feels a sense of dislocation even if he makes the HT roll to resist; if he wants to interface, he can simply remain in the net grid until he fails the roll.

A computer running a sensie or dreamgame program must control the dream net; the same computer also turns the net on and off. Since most dream nets are built into buildings or vehicles, the net usually is connected to the computer via the same data cables that connect other appliances. A net also could be linked via a communicator.

If several people become trapped in the same dream net, they will experience the same sensie or dreamgame program and usually will be able to interrelate. Dream nets used for security usually use nightmarish simulations - or a virtual-reality prison complete with a live or computerized interrogator. On the other hand, a dream net may simply send the user to someone's private virtual-reality coffeehouse where they can have a nice chat with the owner or anyone else there. A dream net may be set to cycle the program continuously or release the user after any period of time. For instance, a benign dream-net program running a dreamgame or virtual reality could allow the user to voluntarily log out of the program by saying something like "program off."

Physically removing an occupant from the area of the dream-net grid before it has run its course will end the sim or dream game, but doing so *without* shutting off the computer may cause shock and disorientation. The subject must make a Will roll or go into a coma for 1d hours on a critical failure. Any other result mentally stuns him; he may roll to recover normally.

Some dream nets may be placed just inside doors or other portals. If it uses a fully interactive and skillfully constructed dreamgame or neural virtual reality, the subject may not even realize he was trapped by a dream net! For example, a character who steps through a door into a hallway may find himself in a dreamgame simulation of the same hallway and building. The GM can allow an IQ-4 roll to notice any sense of dislocation under such circumstances. People intending to engage in mind games or brainwashing often use these techniques.

A dream net costs $45,000 to install, plus $18,000 and 18 pounds per hex (or doorway) it covers. It runs off building or vehicle power. The virtual-reality, sensie or dreamgame software costs extra - see the descriptions of these systems.

Barrier Nanostats (TL12+)

Hovering nanomachine clouds can be sprayed from tanks to form a defensive wall, doorway, etc. Multiple layers in the same hex will make a higher wall! See *nanostats* on p. 71.

LAW-ENFORCEMENT EQUIPMENT

Handheld ID Scanners (TL7+)

Handheld versions of the voice-print-analyzer, facial-scanner, genetic-scanner, palm-scanner and retina-scanner scan-locks (p. UT89) help security guards and police check identities. Instead of refusing to open a lock if someone's ID does not match, these plug into a computer and download the scanned voice/face/genetic/palm/retina print. The print can then be compared to lists of authorized personnel or criminals, matched against forensic evidence or entered into a database for future reference. Hand-held identity scanners otherwise possess identical statistics to the scanlocks on p. UT89.

Bio-Beacons (TL8+)

These often are used to mark prisoners. See p. 40.

Cufftape (TL8+)

Don't want to carry heavy handcuffs? Use cufftape. It looks like duct tape, but one side consists of a powerful adhesive memory polymer, similar to that used in tangler ammunition. Not just sticky, the polymer makes the tape contract tighter if a person struggles against it.

Cufftape comes in spools of 100' (a 2' strip will make a good set of handcuffs). A glue-free "hinge" is placed every few feet on the tape, so that the user doesn't tangle himself up while wrapping something.

Cufftape has ST 20. A contest of ST or roll against Escape skill at -5 allows the character to break or peel out of the strands. One initial try is allowed, taking one second; if that fails, each further try requires 10 minutes of struggling. Any failed attempt results in the tape contracting, doing 1 hit of damage to the taped area. The tape can be cut or burned (DR 3, six points of damage will sever it), or removed using the same anti-tangler aerosol used against tangler strands (p. UT79). A spool of cufftape costs $20 and weighs one-half pound.

Cufftape, Razor (TL8+)

This cufftape has a thin strand of razor wire embedded in it. Normally, the tape protects the wearer from the wire - but if he successfully escapes using Strength (rather than Escape skill), the wire slices through the tape, inflicting thrust/cutting damage on the escapee based on his own ST. Escape rolls suffer a -7 penalty; the wire complicates the process of getting out without injury. Razor cufftape costs $40 and weighs one-half pound per spool.

Drug Analyzer (TL8+)

See p. 88.

Explosive Collar (TL8+)

This locked, plastic-alloy collar attaches around a prisoner's neck. It contains a radio transceiver and a plastic-explosive lining. The collar functions as a homing beacon (p. 40). A coded radio signal also can detonate the explosive liner, decapitating the wearer.

Cutting off the DR 5, HT 2 collar or picking its electronic lock first requires that a Traps-4 or Electronics Operation (Security)-4 roll be made to disarm the explo sive. Use the penalties for repealed failures on p. B92; failure by 3 or more, or critical failure, sets it off. Otherwise, the disarm attempt failed but didn't set off the charge. Once disarmed, the collar can be cut or its lock picked normally.

If the collar detonates, it does 4d damage to the throat of the wearer and 1d damage to anyone else within 1 yard. The shape of the explosive makes its damage effectively count as a cutting attack to the neck (p. CII53 or B248): damage after Toughness or innate DR is doubled; damage exceeding HT requires a successful HT roll to avoid decapitation and death.

An explosive collar costs $200 and weighs 0.25 pounds.

Homing Beacon (TL8+)

Often used to keep track of prisoners. See p. 40.

Riot Shield (TL8+)

See p. 77.

Nauseators (TL9+) Nauseators (TL9+)

Riot police favor these stunner modifications. See p. 59.

Sonic Pacifier (TL9+)

Used legally by police, prison guards and hospitals, this sonic-restraint band projects a soothing ultrasonic field into the wearer's brain, keeping him sedated without risking drugs or injury. An IR remote (p. 41) usually controls the device. A single remote can control a dozen headbands.

The sonic pacifier has two settings: sleep and control. On "sleep," it places the wearer into a deep slumber from which he cannot be awakened until the device is removed or turned off. On "control," the headband projects frequencies that allow the user to retain consciousness while suppressing aggressive tendencies, making the subject easily led. It effectively gives him the Slave Mentality disadvantage (p. CI94).

The device can be resisted - after it is activated, the wearer gets a HT-3 roll (modified by Will) each turn to avoid succumbing to the effects. Once a roll is failed, the effects persist for as long as the device remains on. It runs for 24 hours on an A cell. A sonic pacifier costs $400 and weighs one-half pound.

Verifier (TL9+)

Most lie detectors suffer from a common disadvantage. Being aware of the monitoring, the subject may either clam up or try to fool the sensor, or his own nervousness may skew results. These modifiers require a trained technician or expensive computer program to factor out.

The verifier can avoid these problems because it uses a passive sensor suite to monitor the subject's physiological state (heartbeat, EKG, respiration, voice stress, facial heat pattern and sweat) from a distance. As a result, the subject may not even be aware that he is being scanned.

A verifier has a range of five yards and is no larger than a pocket calculator. The user can conceal it up a sleeve or disguise it as another device such as a communicator, notebook computer, etc. If the user makes a successful Electronics Operation (Sensor) roll, it gives +5 to Detect Lies or Interrogation skill to spot deliberate lies or misinformation; this drops to +2 if the subject becomes aware or guesses that a verifier is in use. If the user fails the roll, it gives no bonus. On a critical failure the user drastically misinterprets the verifier to the extent that he automatically critically fails his Detect Lies or Interrogation roll - this represents the danger that the unaware subject's

thoughts wander to some other emotionally charged topic and the verifier user doesn't recognize the "contaminated" reading. The GM makes all rolls secretly. Usually, only one Electronics Operation roll should be made for a single conversation.

Verifiers normally are designed for use on humans - they must be recalibrated to work on other races (or significantly variant species) without a major penalty (-2 to -10, GM's option). Re-calibrating a verifier requires knowledge of the race's psychobiology and an Electronics Operation (Medical) roll. The device normally displays its readout on a small screen on its back, but for added concealment the device often will be programmed to transmit its data to HUD goggles or a neural interface (if the user has either of these devices). The device runs for three months on a B cell. A verifier costs $1,200 and weighs one pound.

Forensic Nano (TL10+)

These microscopic machines physically examine an area for clues. They can provide the data needed for complete computerized forensic analysis of a room-sized investigation site, providing detailed information on the room's occupants and visitors for the past several years by analyzing the buildup of organic and inorganic detritus: skin flakes, blood, clothing fibers, food residue, presence of other nano, etc.

Data on people or animals will reveal their sex, race, blood type, genetic pattern and approximate age. It can form the basis of a computer simulation of what they might look like, but will not in itself identify someone unless they (or their clones) are in a database available to the investigator. Forensic nano also can perform pathological analysis without the need of an autopsy.

It takes an hour to scan each hex of evidence (or each body). The nano can operate for TL-6 hours before requiring time to recharge (half an hour for each hour of use). A packet of forensic nano costs $2,000. Giving them orders requires using a laser or infrared communicator with a computer running a Datalink program (p. UT33). Analyzing their data requires Forensics (or Genetics) skill or an appropriate expert-system program.

Power Damper (TL12+)

This exotic energy-field generator totally prevents use of super abilities or psi powers within it, although powers used from outside the field on targets within it will operate normally. It also may affect some super advantages, at the GM's option; also at the GM's option, some powers may not be affected by it, depending on their definition - e.g., the field might affect "mutant psi powers" but not "magical powers." It will not affect advantages or powers that are completely physical, such as built-in claws, armored skin or winged flight.

The field generator is built into a grid under the floor or ceiling and connected by cable to a damper machine. The machine weighs 200 pounds plus 20 pounds per hex affected. Cost is $100,000/hex being "damped." If connected to a computer, individual hexes in a grid can be damped, which is useful if adding dampers to cells. Alternatively, several power dampers can be used. The field runs off building power, requiring 500 kW per hex.

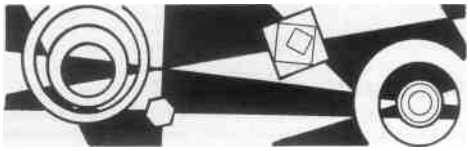
CRIMINAL EQUIPMENT & BURGLARY TOOLS

Thermal Lockpick (TL7+)

This device consists of an adhesive contact disk and a remote detonator (range 5 yards). The disk is attached to a lock and triggered. On a successful Lockpicking roll it burns through any lock; on a failure, the lock fuses and won't open at all.

A disadvantage of using a thermal lockpick is that the lock always is ruined and entry can't be covered up. It also burns a 3-inch hole in doors or walls up to DR 10. A critical failure with a thermal lockpick can be risky: it may indicate the user set off the detonator by accident while still in contact with the device (3d damage!) or started a fire (e.g., from hot metal or plastic dripping on a carpet) that may set off smoke alarms.

The lockpick detonator gets five uses from an A cell. The set comes with five contact disks. Cost is $500 and weight is one pound. Extra disks are $100 and one-eighth pound apiece.



Electronic Thumb (TL8+)

An electronic thumb attempts to defeat retina and fingerprint scanners. The pocket-sized gadget has the size and shape of an eyeball, and lights from within to display a retina pattern. The other end has the shape of a thumb and warms to body temperature. Its easily changeable memory plastic pad can be reconfigured to match any thumbprint in the device's memory. New thumb and retina prints can be downloaded into it. by connecting it via cable to an appropriate database. Getting a thumb or retina print for the database may not be easy - high-quality photos of the target's eye and an actual thumb impression are needed. An A cell powers it for a year. It costs $5,000 and one-quarter pound.

Slipspray (TL8+)

This polymer spray produces a nearly frictionless surface when sprayed on smooth ground like a floor or road. The formula may have originally been a commercial lubricant, but "the street finds its own uses." Anyone who enters a slipsprayed hex moving at more than one yard per second must make a DX roll (at +3 if crawling, -3 if sprinting) or slip and fall. Against vehicles, slipspray functions exactly like an oil slick (see ***GURPS Vehicles)*** but requires a control roll at -5 rather than -3 to avoid losing control. Slipspray breaks down rapidly in air: under terrestrial conditions, it loses effectiveness in about an hour.

A can of slipspray covers up to 10 hexes, spraying one per turn, with a range of *2* yards, It costs $30 and weighs one-half

pound. Slipspray grenades can be bought for $40; they cover a two-yard radius. Slipspray cans can be loaded into ***GURPS Vehicles*** oil-spray devices at 10 times the cost of normal oil.

Paratronic Key (TL10+)

This cigarette-pack-sized device projects a short-ranged (eight inches) electromagnetic pulse similar to that of a paralysis gun (see p. UT73), but intended to open electronic locks either by disrupting the locking mechanism or projecting a coded series of electro-magnetic pulses.

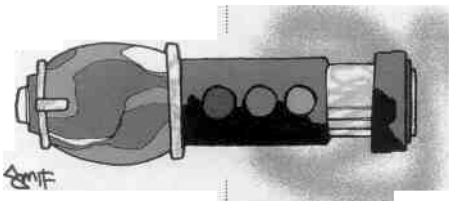
It gives a +3 on Lockpicking or Electronics Operation (Security Systems) skill to open any lock of TL10 or lower. The beam also can be used to disrupt other electronic systems, erase low-tech magnetic tapes, etc.

If set on "high" (this exhausts the power cell after one shot) it can be used as a short-range (close combat only) paralysis weapon, with SS 5 and Acc 0. The victim must make a HT+2 roll; if he succeeds, he is at -2 DX and -1 IQ for (20-HT) minutes. If he fails, he is paralyzed for the same duration. The attack is made against Beam Weapons (Neural), or on default (DX-4). The weapon will not penetrate a sealed suit. Electronic devices are shorted out on a roll of 1-2 on 1d. A paratronic key uses a B cell, which lasts for 20 uses. It costs $400 and weighs one-quarter pound.

Cannibal Nanokits (TL11+)

A cannibal nanokit appears to be a tube or can (depending on how much is carried) of gooey paste. The paste actually contains countless microscopic robots programmed to cannibalize other objects to build a single, specific gadget. To use it, the nanokit is squeezed onto a suitable object that has similar raw materials to whatever is being built. Building mechanical devices (guns, engines) generally requires cannibalizing objects made of metal. Plastics often are broken down to make gas, propellants, etc. Building electronic devices or energy weapons requires cannibalizing other electronic systems. Few other restrictions apply - a cannibal nanokit can turn a toaster into a gyroc launch pistol or a motorcycle into a suit of powered armor.

It takes the nanokit one minute to build the object per pound of weight it has; the nanokit usually will eat the objects in close proximity. Whether it works or not depends on whether it has enough suitable material. In doubtful cases, the GM can roll 3d against the kit's TL, with modifiers for availability. Whatever is cannibalized is, of course, destroyed (or rather, transformed). The process also produces residual heat, so it's best to employ it on a non-flammable surface (such as a concrete floor) and turn off smoke detectors.



Each cannibal nanokit is specific to one gadget or weapon (although a single kit may build several, closely related gadgets as long as they can all be fused into one object, e.g., a gun with a laser sight, or a helmet with built-in infrared goggles).

A tube or can of cannibal nano costs 300% of the intended gadget's cost, and can only build devices that appear at least a TL before the nano's own TL. Weight (and volume) is 1 % of normal. Legality class of cannibal nano generally equals that of the equipment it builds. The exceptions are any weapons or armor nano, which have half (round down) the weapon's LC.

A small container of cannibal nano can be disguised easily. For instance, cannibal nano designed to build a laser pistol (2 pounds) weighs only 0.02 pounds and could be disguised as a tube of something innocuous - lip gloss, domestic nanocleanser or whatever. A cannibal nanokit that builds a suit of combat armor would weigh less than a pound, and could be hidden in a bottle of shampoo. Also, since TL11+ lip gloss or shampoo may well use microscopic robots, a cursory scan or inspection probably wouldn't turn up anything strange.

Gravitic Screwdriver (TL12+)

See p. 20.

SURVEILLANCE EQUIPMENT

EMESCAT Gear (TL7+)

This is an ElectroMagnetic Emission Scanning Technology (EMESCAT) surveillance device that reads unshielded radio frequency emissions from computer terminals or monitors. It can detect whatever data is being typed or displayed on a screen at a distance, allowing someone to eavesdrop on computer activity. It cannot read what is stored inside the computer. It can scan through walls, provided they are not specially shielded.

EMESCAT Suite (TL7+): This is a large surveillance system usually carried in a vehicle. It has a range of 100 yards. It weighs 75 pounds and costs $500,000 including its terminal, monitor and processing unit. It uses either vehicle power, or at TL8+, a B cell which can operate it for 24 hours.

EMESCAT Scanner (TL8+): This is a much smaller, man-portable scanner that plugs into a peripheral port on any Complexity 3+ computer. Its range is only 20 yards. It costs $5,000, weighs two pounds and runs off a B cell for 48 hours.

Keyboard Bug (TL8+)

This is a pinhead-sized adhesive bug that can be stuck to the bottom of a terminal's keyboard. It then uses induction to read the keystrokes and records this information in its memory, effectively making a record of everything typed. It can record up to a megabyte at TL8, increasing by a factor of 10 per TL after TL8. It can be retrieved manually, or can be programmed to send out the data as a coded burst transmission with a range of one mile after a specified time or after receiving an activating transmission. One of the main uses of this device is to gain access to a user's passwords if and when he logs onto a computer network. This device is less useful at very high tech levels, where voice

command and neural interfaces are increasingly common. A keyboard bug runs on an AA cell for up to a year. It costs $200; weight is negligible.

STEALTH TECHNOLOGY

Folding Weapon (TL7+)

This designs a gun or beam weapon to fold up into a compact, rectangular box shape. This allows the weapon to pass for an item of non-military equipment in its integral carrying case, e.g., a notebook computer (for pistols) or a tool box (for larger weapons). The weapon simply has a boxy body with a hollow slot in its underside into which a hinged grip, stock and magazine all retract. An example of a real TL7 fold-up weapon that does this is the Ares FMG, a fold-up 9mm submachine gun. A folded weapon is effectively +2 to Holdout skill. While it is no less likely to show up on metal detectors or X-rays, it may not be *recognized* as a weapon - assume this requires an additional unmodified roll against Electronics Operation (Security), Holdout or Armoury skill, or IQ-5, equivalent to a default roll.

A fold-up weapon cannot be fired while folded. It takes two seconds to fold or unfold; if the weapon weighs more pounds than the user's ST, it takes twice as long. To fold up a belt-fed machine gun or weapon with a backpack power unit, the belt or pack must first be removed. Add 100% to cost and 20% to weight of a weapon to make it folding, and add +1 to SS due to its slightly increased bulk. Legality Class halves (round up).

Blackout Paint (TL8+)

This spray paint absorbs infrared radiation, though not as well as a true infrared-cloaking system (p. UT79). Subtract 2 from any rolls to spot something covered in blackout paint if using infrared or thermograph vision or sensors. The penalty is ignored if the object is emitting a great deal of heat (like a rocket engine or a vehicle that is on fire) and is *not* cumulative with other, superior infrared- or emission-cloaking systems. Blackout paint comes in any matte finish or as a transparent spray for use over camouflage, and safely applies to flesh. The paint is not water-soluble but can be removed by scrubbing with standard soaps or detergents. A tube of blackout paint ($10, one-quarter pound) covers two people (or 50 square feet). A blackout spray can ($200, four pounds) contains 20 times as much spray, enough for a tank or four or five autos. Application takes about three turns per person or 10 square feet.

Ghillie Suit (TL8+)

This specialized suit designed for forest, swamp or jungle camouflage covers the entire body, with a mask (with eyeslits) and hood. It is covered with imitation greenery made from natural fibers so that the user looks like some kind of shaggy monster. While not practical issue for most ordinary soldiers due to its bulk, it is often worn by snipers. The ghillie suit offers a cheaper alternative to chamosuits and chameleon armor, albeit at considerable extra weight.

A ghillie suit gives +5 to any Camouflage skill roll, provided that the wearer is already amid vegetation that is a reasonably close match to the color and hue of the suit's disguise. If the user doesn't match the local vegetation, he may draw the eye for a -2 penalty on any Camouflage rolls.

In addition to the visual-camouflage effect, the fibers incorporate infrared-absorbent dyes to break up the wearer's thermal signature (-2 on infrared detection, not cumulative with the effects of infrared cloaking or blackout paint).

The suit can be worn on its own, or over ordinary clothing or armor. On its own, it is lined with light monocrys that provides PD 2, DR 8 vs. crushing or cutting attacks but only PD 1, DR 2 against impaling attacks. The suit is flexible, so a crushing attack does a minimum of one hit for each "6" rolled for damage.

The main disadvantage of a ghillie suit is that it is very hot and heavy. The user will be at -1 DX in it, and the suit weighs a full 20 pounds. It costs $1,000.

A ghillie suit also can be equipped with more advanced systems, e.g., infrared cloaking (p. UT79). This will increase its weight, but make it more effective.

Memory Blade (TL8+)

Available in small or large knife and dagger sizes, this memory-plastic device can be shaped to resemble practicably anything of the same mass and volume (e.g. a toy, hairbrush, etc.). When rapidly tapped for 10 seconds on a hard surface, it becomes a knife (average quality), resuming its disguised shape when heated in a microwave for 30 seconds. It may not incorporate any kind of enhanced blade, such as vibro or monowire. As many different types of memory plastic are known and have numerous innocent applications, a chemscanner search is made at a -4 penalty to notice hidden memory blades. It costs five times as much as a normal knife or dagger.

The memory blade principle can be applied to other items. For instance, a beam weapon or slugthrower can be built out of several memory plastic and metal parts, each of which is memory-treated to seem like something innocuous. An agent can then "shake them out" and reassemble them into a weapon.

Cost of such a weapon or other complex memory device is 20 times normal. Note that ammunition for slugthrowers and power cells for beam weapons must be carried and loaded separately.

Slow Chamosuits (TL8+)

Slow chamosuits are made of mimetic polycarbon fibers designed to alter their coloration to blend in with the surrounding terrain. They react much more slowly than the TL10 chameleon suits and armor described on p. UT85 and so only give a moving wearer a -1 to be hit or visually spotted. If a wearer remains stationary for at least 2 seconds, the suit has time to fully blend into the background, for a -2 penalty after two seconds and a -3 after three or more seconds. A chamosuit covers the entire body; a hood with small eyeslits is attached to cover the head. It has large side and back pockets for equipment.

A slow chamosuit provides PD 2, DR 8 protection against most attacks, but only PD 1, DR 2 against impaling attacks. It counts as flexible, non-rigid armor: in the event of a crushing attack, damage inflicted is a minimum of 1 hit for every 6 rolled on a damage regardless of whether the damage penetrates DR. A slow chamosuit costs $2,000, weighs 10 pounds and works for 24 hours on three A cells.

Slow Chamoarmor (TL8+)

A slow chamosuit surface can be added to any full-body suit that does not incorporate a chameleon suit or variable camouflage. It works like a slow chamosuit except that it weighs 6 pounds and does not provide any extra PD or DR.

Stealth Luggage (TL8+)

Perfect for the professional courier or smuggler, these elegant items of personal luggage use the latest in electronic countermeasures and stealth materials to spoof scanners and sniffers. Stealth luggage is made entirely of lightweight monocrys and high-strength polymers, and available in different sizes and styles. It also features voice-controlled mimetic polycarbon sheathing that can alter surface color and pattern within six seconds.

A hidden liner compartment provides safety for small packages, while a palmprint lock provides good security. An integral stealth suite gives a penalty of (luggage's TL-4) on sensor rolls to detect the liner pocket's contents.

Two models of stealth luggage are commonly available. The attache case holds up to 20 lbs. (or 2 cubic feet) of equipment and looks like a normal briefcase. The travel bag holds 100 lbs. (or 5 cubic feet). Each type's hidden liner compartment has one-tenth the full capacity and is +4 to Holdout. An empty stealth attache case costs $8,000 and weighs two pounds; an empty stealth travel bag costs $12,000 and weighs six pounds. Both items have DR 8 (+4 per TL over 8).

Distortion Module (TL10+)

This clamp-on sensor distortion projector is the size of a cigarette pack. It disguises items of basketball size or smaller (generally, anything of 10 pounds or less weight). Radar or scanners receive a -5 penalty to detect the shielded device. On a failed roll, the sensors either fail to register the device or mistake it for something else of similar size (as preset by the user). Resetting the module to give a new reading takes five minutes and an Electronics Operation (Security) skill roll. A distortion module has no effect on visual searches. The A cell in the module operates it for 12 hours. The module costs $1,600 and weighs one-half pound.

Holodistort Field (TL10+)

A larger model of the holodistort belt (p. S47), the field will cover a radius of up to 10 yards with a visual holographic illusion that also distorts sensors; radar or scanners attempting to pierce it roll at -5, with any failure meaning they are fooled. It can be loaded with computer disks containing a variety of images. New images can be captured via a holographic camera or synthesized with a computer and Video Production skill. An E cell powers the field for 72 hours. It costs $50,000 and weighs 50 pounds.

Mask (TL10+)

This aerosol selectively neutralizes the chemical traces left by life forms. The spray covers a two-hex radius. Any attempt to use Forensics skill to detect traces left by a person or to track a person with a biohound (p. UT91) through a masked area is at -4. Bioscanners also suffer -4 to detect anyone in the masked area, although the presence of the spray will be detected easily.

It also is effective against bloodhounds, sniffer dogs or other beings (or robots) with Discriminatory Smell, and imposes the same -4 penalty on anyone attempting to track by scent.

If Mask is sprayed on a person, it will disguise *him*, but if a chemscanner, bioscanner or biohound is set to follow the Mask chemical it will make him easy to track (+4 instead of -4). A tracker still could be decoyed if the chemical also is sprayed elsewhere, or is sprayed onto a bodysuit that is later removed.

Mask remains active for 24 hours. A standard canister holds five sprays. Cost is $400 and weight is one-half pound.


MESSAGE DATA
chapter EIGHT
STATUS
ACTIVE
PROCESSOR 1X1 DISABLED PROCESSOR 1X2 DISABLED PROCESSOR 1X3 DISABLED
PROCESSOR 1X4 DISABLED PROCESSOR 1X6 DISABLED PROCESSOR 1X7 DISABLED
: MEDICAL
PROCESSOR 1X9 DISABLED PROCESSOR 1X10 DISABLED PROCESSOR 1X11 DISABLED
PROCESSOR 1X12 DISABLED PROCESSOR 1X14 DISABLED PROCESSOR 1X15 DISABLED
PROCESSOR 1X19 DISABLED PROCESSOR 1X21 DISABLED PROCESSOR 1X22 DISABLED
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VIDEO TRANSMISSION SCREEN
ALERT
SJC-23
CHANNEL
SECURE
DONOR BRAIN
AT THE HIGHEST TECH LEVELS, MEDICAL NANOTECHNOLOGY DELIVERS NEW WONDERS - AND TERRORS.
WIRES AND STUFF
MR. KENNETH WILSON
BIO-DEATH 2053/4/28
NEW-BIRTH 2133/4/6
SQUISHY AREA
::MEDICAL::
87

This chapter describes medical and biological equipment, technology and techniques.

MEDICAL EQUIPMENT

Drug Analyzer (TL8+)

This computerized chemical scanner has a small pop-up display and integral database of common drug formulae. Police, customs officials, drug pushers and drug users often carry these handy, pocket-sized devices; it allows an unskilled layman to quickly analyze the type and purity of any drug sample.

To use it, a sample of the drug is placed within the analyzer's sensor. Within 2d seconds it will identify by name and chemical formula any standard drug in wide use at its TL or lower and also indicate its degree of purity; the sample is not harmed. When analyzing known drugs, it is better than 98% accurate: roll 3d, and on a roll of 17 or 18 or more it makes a mistake.

If the analyzer finds an unknown drug, it will provide a molecular readout of its composition. That won't tell what the drug does, though. A Biochemistry skill roll is required to do this, with success giving some idea of the effects of the drug on a living being.

If the user doesn't have Biochemistry skill, the drug analyzer includes a dataport that lets it hook up to any computer. If the computer is running a Biochemistry expert system, then it can perform the analysis instead.

A B cell powers the analyzer for two months of regular use. It costs $400 and weighs one-half pound.

Drug Patch (TL8+)

Any drug deliverable by injection or pill also is available in a drug patch. A TL8+ drug patch resembles a two-inch-square adhesive plastic-strip bandage with a peel-off cover. The bandage contains a solution of a particular drug. When the patch is applied to bare skin or thin clothing and pressure exerted on it, a dose of the drug will soak through the skin and into the subject. The effect is exactly the same as an injection of the drug. (If the drug is only available in pill form, treat it as an ingested dose.)

A drug patch can be used in combat - simply unpeel the patch's protective cover and stick it onto the target using DX or Brawling skill. Slapping a bandage onto someone is a bit slower and more awkward than punching them, though: -2 to skill. A drug patch costs $10 more than an ordinary single dose of the drug and weighs about an ounce.

Emergency Support Unit (TL8+)

The ESU is a semi-portable life-support system. If an injured patient is hooked up to it, the ESU maintains the patient's biological functions even if his organs are not functioning. In game terms, the ESU can save someone who has failed a HT roll and "died," as long as he is not at or below -5xHT, or dead for more than five minutes.

Attaching the ESU's life support system takes (20 minus its TL) seconds and requires a Physician roll, at -1 for every multiple of negative HT the patient is at below 0 HT, at -1 per 30 seconds dead before placet! in the machine and at -2 per failed

attempt. Success means the person is in a coma rather than dead, but will die if taken off life support; critical failure means the patient is dead. Revival from the coma is possible if the patient is ever healed back to above fully negative HT.

The ESU can perform less critical tasks, such as blood transfusions (it includes enough generic blood substitute for two whole transfusions) and revival of people in suspended animation. An E cell powers it for 500 hours. An ESU costs $30,000 and weighs 120 pounds (with power cell). Weight does not drop at higher TLs, but cost is reduced normally.

Portable Microsurgery (TL8+)

This semi-portable micro-surgical operating theatre is optimized for modifying, repairing, removing and installing bionics and implants and performing brain surgery. It is small enough to fit in a trailer or van, and contains enough tools to allow two medics to work at the same time. It adds +3 to Surgery, Diagnosis, Electronics or Electronics Operation rolls that require working on the brain, bionics or implants.

This sort of setup is favored by "street docs," since it can be packed up if the law comes calling (it takes half an hour to pack or unpack it).

Security and intelligence agencies and military units that use a lot of cybernetics also will have a few of these installed in vehicles (or safe houses), both for treating their own agents and for removing or inserting implants into defectors or prisoners.

The portable microsurgery costs $30,000 and weighs 500 pounds. It requires about 25 cubic feet of space, or 10 cubic feet when packed up.

Brain Seed (TL11+)

This tiny, dedicated robotic factory - about the size of an apple seed - can be delivered by pneumatic hypo or inhaler, or by a needle from a needler, Gauss-needler or grav-needler shot. This requires an injection or shot to the back of the neck. The subject may not notice injection, especially if asleep, or mistake it for an ordinary insect bite.

A brain seed *grows* a pseudo-organic brain implant (see *Brain Implants* on p. 111 and p. UT109) that coils up into the brain, using self-replicating nanomachines and natural proteins as building materials. The time required for the implant to grow is the implant's dollar cost/1,000, in hours. A seed-grown implant functions exactly like an ordinary brain implant. It costs twice as much as an ordinary implant.

Brain seeds offer a way to install brain implants without the need for complex operations. A subject injected with a brain seed may be covertly monitored or controlled without even realizing the implant is present!

WONDER DRUGS

Some wonder drugs give individuals advantages or disadvantages for the duration of their effect. If person who already has one of these advantages or disadvantages takes the drug, there is no extra effect unless noted in the description.

Averzine (TL8+)

This family of drugs primarily offers aversion therapy for mild psychological drug addiction and alcohol abuse. Averzine comes in several versions, each targeted against a specific, addictive recreational or performance-enhancing drug, or against alcohol.

A dose of Averzine lasts two days; if the user takes the substance that type of Averzine is targeted against during that period, within 1d minutes the user will experience nausea for the duration of the drug's effects plus at least 1 hour afterward. This will result in the user feeling very unpleasant: a -2 on any DX or IQ rolls.

Averzine does not alter the effects of the substance it targets; it just makes the user feel awful immediately after he takes it. Thanks to this aversion therapy, an addict or alcoholic is using Averzine gets a +2 to HT for daily rolls to resist temptation. This isn't much use against a highly or totally addictive drug (those with the -5 or -10 on their withdrawal rolls) but can be enough to help kick a mild habit.

Averzine costs $20 per dose and is available in pill or hypo form. It may not be available for all addictive drugs.

Castazine (TL8+)

This drug suppresses the user's sex drive. Authorities running prisons, schools, religious retreats or military units sometimes use it to enforce abstinence. Individuals also may voluntarily take it to avoid distractions while engaged in study or important projects. It is available in pill form and can also be dissolved into a water supply.

The effects occur within an hour of use. While under its influence, a user cannot become sexually excited. He cannot be seduced, and any attempt to influence via Sex Appeal or pheromones will fail. "Opposite sex" reaction modifiers for Appearance have no effect. The user suffers a -1 on his own Sex Appeal skill. The drug does *not* render him sterile.

Taking Castazine will neutralize the Lecherousness disadvantage, but a Lecherous user will be depressed: -1 on IQ including all IQ-based skills as long as the drug is in effect. A single dose lasts for 24 hours. Multiple doses can be taken without ill effect, but if Castazine is taken for more than HT days in succession, the effects may linger even after the user goes off the drug. When the user stops taking the drug, make a HT-3 roll. Failure means the user still suffers the effects of the drug. The user gets an additional roll to shake off the effects each time an interval passes equal to the number of days he took the drug for. For example, if a user took Castazine for 22 days straight, he gets a HT-3 roll every 22 days to shake off the effects after quitting. Each dose costs $10.

Dryad (TL8+)

This powerful but relatively safe street drug comes in powder and pill form. It takes three minutes to begin working in powder form when inhaled, or 15 minutes for a swallowed pill. The effects of Dryad last for 30+5d minutes. During this time, the user has the Overconfidence and Paranoia disadvantages.

The drug also raises Speed by 1, but decreases DX and all DX based skills by 1. If taken infrequently, it is non-addictive, but at the end of each week that someone uses Dryad more than once per day, he must make a Will roll to avoid addiction. Addiction to Dryad is a -5-poinl disadvantage. Each dose costs $10.

Lethe (TL8+)

This drug induces total amnesia. The user loses conscious memory of everything that occurred before the dose was administered. He retains all skills and abilities. The base duration of this memory loss is four weeks. At the end of this period, the user must make a roll against HT-5 each week to regain memory. On a success, the user's lost memories return in a flood. On a critical failure, the loss has become permanent, giving the user the Total Amnesia disadvantage (p. C186). A dose of Lethe costs $100 and is administered by injection.

Lotus (TL8+)

This endorphin derivative makes the user very happy - so much so that he doesn't want to do anything while on it!

Two seconds after injection, or a minute after taking a pill, Lotus gives the user High Pain Threshold, reduces effective IQ and DX by 2 and cuts Speed (and thus Move) in half. The user also must make a Will roll (not modified by his reduced IQ). If he fails the roll, he is caught in a Lotus trance, and will simply sit still and smile, thinking blissful thoughts for a number of hours equal to the amount the HT roll failed by.

A person in a Lotus trance is aware of the world but simply ignores all stimuli - he would continue to sit and smile if his house were on fire. He is not unconscious and *may* remember events around him afterward, though only as fragmentary impressions.

If it is important to know whether a Lotus-user remembers a specific event, make a roll against the user's IQ when he recovers. If he makes the roll, he has a vague dreamlike memory of it. On a critical success, he has a clear memory.

Lotus is extremely addictive: a HT roll is needed after each dose to avoid becoming an addict. Addiction to Lotus is worth -25 points ($40/dose, totally incapacitating, highly addictive). Multiple doses of Lotus give a cumulative -2 on the Will roll to avoid a trance for each extra dose taken, and mean that multiple rolls also are needed to avoid addiction. Lotus is available only in pill or injection form.

Oblivio (TL8+)

This drug induces temporary amnesia. Each dose wipes out 3d weeks of the user's recollections, starting at the moment the drug was injected and counting back. For example, if the subject is given two doses, he forgets everything that happened in the last 6d weeks. The drug also renders the subject unconscious for l0d minutes. Oblivio's amnesia has an active duration of ld+6 days since the last dose was administered. If more than four doses are administered while the drug is active, a fifth or subsequent dose requires the user to make a HT-4 roll or go into a coma lasting 20-HT hours and take 3d damage. This damage is increased by 1d per additional dose taken after the fifth.

After the drug's active duration ends, the user gets a HT-1 roll each day to regain his lost memory. A normal success regains all lost memory except for the hour or so before the drug was administered. (This means the user often does not know who administered the drug or why!) On a critical success, even that memory is restored. If the subject rolls a critical failure, the memory loss becomes permanent. Oblivio costs $100 per dose and is administered by injection.

Rush Hour (TL8+)

This powerful methamphetamine derivative often is sold as a recreational stimulant or cheap combat drug. While on the drug, a user feels full of enthusiasm and high energy. In fact, he feels so energetic it is nearly impossible to stay still or sit down. Even when not going somewhere, he will prefer to jog in place; when talking, he speaks quickly, gesticulates wildly or jumps up and down.

A Rush Hour user regains one point of lost fatigue (if he has lost any) and gets a +2 bonus to Basic Speed. He also takes a -1 to IQ and DX, and acquires the Impulsiveness disadvantage (those already Impulsive gain a -2 on rolls to avoid acting on impulse). Any impulsive action he takes must be physical in nature.

Rush Hour's effects last for an hour. After they wear off, the user is exhausted and depressed, losing 1d fatigue and suffering the disadvantages Absent-Mindedness and Laziness for the next 1d hours, plus a -5 penalty on any skill. DX or IQ rolls if forced to do something.

Taking multiple doses increases the duration of the effects by an extra hour per dose, but also adds +1 to the fatigue loss and extends the depression by an hour as well. If the fatigue loss is greater than remaining ST, the extra loss is instead taken by HT: taking too many doses, or using Rush Hour while already exhausted, can prove fatal.

The drug is available in either pill or injectable form. A pill takes 30 seconds to take effect, while an injection is instant. Rush Hour is addictive: roll vs. HT+2 to avoid addiction if more than one dose is taken in a 24-hour period. Addiction is worth -5 points ($20/dose).

Sin *(TL8+)*

Sin is a hot designer drug, popular with barflies and party goers. It acts as an antidepressant, aphrodisiac and uninhibitor without causing a hangover. While under the influence of Sin, a user adds the Compulsive Carousing, Lecherousness and Overconfidence disadvantages. However, taking more doses than HTx3 in a two-week period results in severe mental instability. After this threshold is crossed, the GM rolls 3d for each dose taken. On a 6 or less, the user not only experiences the effects of the above disadvantages but also gets Bloodlust, Sadism and Paranoia.

Sin comes in pill or injectable form. Each dose requires 15 minutes to take effect as a pill or 10 seconds if injected. Its effects last 1d hours. A dose costs $25. Sin is highly addictive (-5 on withdrawal rolls) and counts as a -15-point addiction.

Slammer (TL8+)

Slammer is a violent, psychoactive combat drug. It is generally an illegal street drug, but some military or security forces make limited use of it. Slammer comes in inhaled powder, injected or pill form. A pill takes 15 minutes to take effect, injection takes 10 seconds, while the powder takes three minutes.

For 10 minutes, a Slammer user gains the advantages of High Pain Threshold and Combat Reflexes but suffers from a -2 IQ and Bloodlust. Each dose costs $4. Slammer is totally addictive (-10 to withdrawal). It is a -15-point addiction.

Synthetic Endorphins (TL8+)

This is a *very* powerful synthetic version of a natural brain opiate; other drugs, like Sin and Lotus, are often derived from synthetic endorphins - but this is the raw stuff.

It is used as a pleasure drug and painkiller. Synthetic endorphins are psychologically addictive but have few harmful side effects unless an overdose is taken. A dose takes effect in 2 seconds. It sends a massive jolt of pleasure into the brain and acts as a super painkiller, eliminating all penalties for low HT, fatigue or shock. The dreamy bliss the user feels also gives him a -2 on IQ and -1 on DX (which also applies to all DX-based skills). The effects last for 30-HT minutes.

Multiple doses of synthetic endorphins add an extra 30-HT minutes to the duration. The drug is extremely addictive. After each use, a Will+2 roll is required (at -1 per dose taken). Failure means the user must spend the next 1d hours trying to find a second dose; if he does, he'll become an addict.

If more than HT/3 doses are taken at any one time (i.e., before previous doses have worn off), the user must make a HT roll. Failure means he falls into a coma, and will die in HTx5 minutes. At TL7+, a First Aid-4 or Physician roll (one attempt per 5 minutes) can revive the patient. An endorphin addict has a penalty of -5 on withdrawal rolls; the drug is a -20-point addiction. Synthetic endorphins are $20 per dose.

Ursaline (TL8+)

This drug prevents atrophy of bone tissue and muscles in low gravity. It is safe and relatively inexpensive. A dose provides 2 weeks of protection and costs $50.

Wideawake (TL8+)

This drug time-releases carefully controlled doses of stimulants that prevent sleep, without causing many side effects.

A dose of the drug prevents the user from falling asleep for 60+3d hours and eliminates all fatigue accumulated due to lack of sleep. After that period wears off, the user suffers 2d+3 fatigue that can only be eliminated by sleeping for a long period (recover one fatigue per two hours of sleep). If the fatigue suffered would reduce ST to less than 0, ignore the excess, but the user *will* sleep immediately and cannot be awakened until *all* accumulated fatigue wears off.

Taking more doses extends the wakefulness by 2d hours, but adds 5 to the final fatigue loss, per dose. A Wideawake user is at +3 to HT resist sleep gas, sleep poison, Morphazine or any sleep-based spells or psionics. Anyone who has been awake for more than 48 hours thanks to Wideawake will be at -I to IQ and all IQ-based skills due to its cumulative effects. The penalty increases by a further -1 every 24 hours: -2 after 72 hours, -3 after 96 hours, and so on. This non-addictive drug only comes in pill form, and costs $20 per dose.

Zen (TL8+)

Zen is a neurotransmitter that enhances the ability of the human mind to concentrate on a specific task. The user is so focused that pain, fatigue and other distractions don't register at all. A user on Zen has a +3 bonus when working on lengthy and tedious tasks, which may be anything from research to tracking prey through a jungle. The user may ignore other important tasks while so obsessed: -5 to notice distractions while the user is busy. Zen comes in pill form and takes a minute to take effect. Its effects last an hour. It costs $100 a dose. It is moderately addictive; if more than four doses are taken in the same week, roll vs. HT+2 to avoid addiction. Addiction to Zen is a -10-point disadvantage.

Brainpop (TL9+)

This mind-expanding psychochemical enhances the creative faculties. This gives a +1 bonus on any imaginative or creative task, such as artistic composition or invention.

Users risk becoming lost in a dream world: a failed Will roll causes an incapacitating "bad trip," nightmarish hallucinations (Fright Check at -5) and delusions. If attempting creative work while under the influence, he might produce something (make a second Will roll to do so), but if so, it will be tainted or twisted by his visions, which may be good or bad.

Brainpop's effects last for two hours per dose taken; multiple doses extend the duration but give a cumulative -2 on the Will roll. It is available in pill (takes effect in 1 minute) or injection form (takes effect immediately). It is easy to become addicted to Brainpop: a Will+3 roll is required to avoid this after taking each dose, with multiple doses requiring multiple rolls. Addiction is worth -5 points. Brainpop costs $20 per dose in pill or injectable form.

Sobriety Pill (TL9+)

This drug nullifies the effects of alcohol within 20-HT minutes of use. The user must make a HT roll or suffer one fatigue. It comes in pill form only, and costs $2 per dose.

BIOMEDICAL TECHNIQUES

REJUVENATION (TL10+)

The rejuvenation process ("rejuve") is a medical treatment (using genetic surgery, nanomachines or perhaps even rejuvenating energy fields) in which the entire body's cells (including brain cells) are regenerated, making the subject physiologically younger. It is a fast alternative to brain transplants (or braintaping) into cloned bodies. Many people also find it more philosophically acceptable, since the user's own body is restored rather than his mind being transferred into another body.

Rejuvenation will only work on someone whose current physiological age is over the age of maturity (18 for humans). Rejuvenation succeeds on a roll of HT+4 or less, with a -1 per additional treatment after the first on that body or any clones later made from its cells. It "turns back the clock," making the user as young and vigorous as if he were eighteen (or whatever) again. It also will restore all attribute points lost due to aging; if rejuve exists, GMs should keep track of such losses.

A failed rejuvenation roll means that rejuvenation has failed and any future attempts may be dangerous. A critical failure, or any failure after one regeneration has failed, results in cellular damage (permanent -1 ST, DX, IQ and HT) and makes it clear that no further rejuve is possible.

A common side effect of either a successful or failed rejuvenation is a chance of memory loss when brain cells are regenerated. Roll against IQ for every rejuvenation attempt; on a failed roll, the subject has suffered a minor memory loss, and forgotten some event from his past which he rarely thinks about, along with one of his least-used skills. People with Eidetic Memory get a +2 (+4 for second-level memory) to IQ on this roll. On a critical failure, more serious loss has occurred; GMs may wish to apply the Amnesia disadvantage (p. CI86).

Some variations of rejuvenation may leave lingering side effects - e.g., restoring the body's vigor, but leaving hair white or retaining wrinkles; if so, the user will *feel* youthful (and his cells, organs, etc. will be young again) but his appearance may resemble someone part-way between his "physiological" and actual age. (Cosmetic treatments, hair dyes, etc. could deal with this.) This is entirely up to the GM.

In some societies, rejuve may be controlled by (or limited to) a powerful, ruling elite, or be the secret of a particular individual or organization (who could jack up its price to almost any level). In other settings, it might be free to members of specific organizations or subsidized by the government.

Rejuve costs $200,000 at TL10, halving in price at TL11 and again at TL 12. The process requires a complete medical scan of the user, taking two days, followed by five days of treatment. At TL13+, the process can be performed through a two-day stay in a chrysalis machine (p. UT96) instead.

NANO-SYMBIOTES

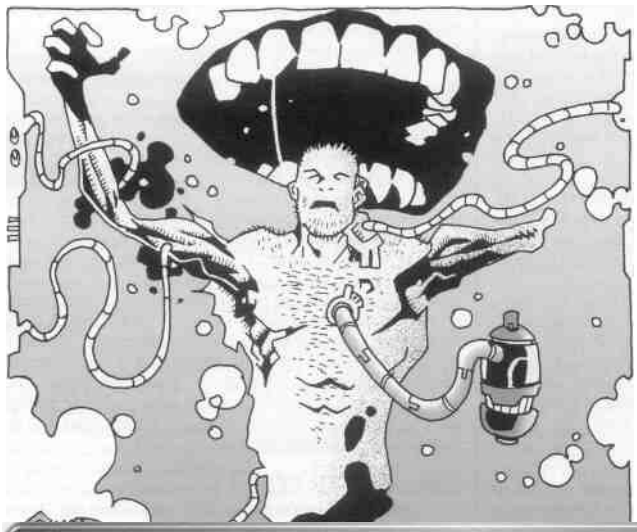
These are artificial cell-sized or smaller nanobots which enter the body and perform specific medical or protective tasks.

Cognophage Nano (TL10+)

This selective neuro-chemical mindwipe uses special "cognophage" nano machines. It is more precise than brainwipe (p. UT103) or memory-erasing wonder drugs such as Lethe and Oblivio, although still not as useful as telepathic forms of mindwipe.

A dose of cognophage nanomachines comes in pill or injectable form. The user must make a HT-6 roll. If he fails, he goes into a trance within 1d minutes if pill or instantly if injected; if he succeeds, the dose has no effect.

While in the trance, the subject is effectively unconscious (and will not remember anything afterward). He can still hear and see, and his brain can still process information on a subconscious level. If he is asked a question, his *brain* automatically begins to think about the answer, and the cognophage nanomachines follow the electrochemical signals to the places in the brain that store that particular memory association - then manufacture enzymes that erase it. In effect, any questions that are asked a person in a cognophage-induced trance will erase the information associated with the question.



Use of cognophage nano is a lot less precise than (for instance) telepathic mindwipe, and properly using cognophage nanomachines requires considerable skill; roll vs. Interrogation or Psychology skill to ask a set of questions that will trigger the appropriate chain of memory associations and erase the desired information. Additional memories may be erased as well. The best way to check is to follow a cognophage treatment with conventional drug interrogation.

A dose of cognophage nanomachines costs $1,000 and will sustain the trance for 30 minutes. Multiple doses extend the duration of the trance, allowing more extensive questioning and memory erasure, but have no other side effects.

Guardian Nano (TL10+)

These symbiotic hunter-killer nanomachines patrol the bloodstream looking for intruder nanomachines and eliminating them, and are effective against both organic and inorganic nanomachines. Guardian nanomachines tell benevolent nano (e.g., medical machines, each other) from malevolent nano using a mix of active sensors and observation. If the nano appears to be doing something that it shouldn't, or isn't a recognized type, it is attacked.

Against nanomachines that allow a HT roll to resist, guardian nano bestow a +6. This includes brain seeds (p. 89), cognophage nano (p. 92), dominator nano (p. 71), nanoburn (p. 69), parasite seeds (p. RO73), and proteus virus or nanomachines (p. RO71 and p. P81). GMs should also apply this bonus against any other nanomachines of a similar sort. The HT bonus reduces by 2 for every TL by which the intruders exceed the guardian TL (to a minimum of 0), or increases by 2 per TL if the reverse is true.

Against invading nano that do not allow a HT roll to resist, guardian nano usually get a contest of their TL against the invader's TL to destroy it or reduce the effect. See the description of Splatter (p. 71) and Shrike (p. 71) invasive nanomachines for examples of how this may work. If making up new nano, the GM should decide what effect, if any, guardian nano will have on it.

Guardians do not protect against nano that does not rove the bloodstream, such as disassemblers, groomers or nanocleanser.

A dose of guardian nano costs $ 1,000 and protects the body for a month. Multiple doses raise the effective TL of the guardians by +1 for each doubling in the number of doses. Thus eight doses add +3 to the effective TL of the guardian nano.

Osiris Treatment (TL10+)

This treatment implants the subject with a permanent colony of symbiotic nanomachines. Circulating through the body like white blood cells, these benign molecular robots perform cellular repairs, replace blood cells, neutralize aging toxins, and seek out and destroy disease organisms. The result is rapid regeneration of nearly any damage, virtual immunity to illness and successful retardation of aging.

Implanting the Osiris symbiotes requires a six-hour hospital stay at a clinic in which the machines are prepared and injected, followed by a period of 17-TL days during which the machines acclimatize themselves to the user's body. During this time the user may fill occasional chills or sweats; after that he will feel better than he ever has before.

Someone injected with Osiris nanomachines can regenerate one hit point per hour and heals crippled limbs at five times normal speed. The user also gets the Longevity and Immunity to Disease advantages.

Osiris has one disadvantage: exposure to strong radiation may result in the colony mutating. Roll 3d when the PC suffers 100 or more rads. On a roll of 15 or less, nothing happens. On a 16 the nanoids die; on a 17-18, they mutate. If this happens, the effects are up to the GM (e.g., losing HT at the listed rate instead of regenerating or loss of Appearance as they begin to eat the body's flesh away).

Osiris treatments cost $500,000 (and optionally 40 points).

Pharmophage Nano (TL10+)

These nanomachines find and neutralize a single kind of drug, disease organism or poison. For instance, a pharmophage may be targeted against alcohol or Slammer, or against a type of cancer.

Pharmophages are injected into the body (taking effect in 1dx5 minutes) or swallowed in pill form (taking effect in twice as long), just like drugs. If someone has appropriate pharmophages in his bloodstream, roll 3d vs. their TL. If the roll is successful, they neutralize any dose of the drug, organism or toxin they are designed to affect, or cure a specific disease. If they fail, they still add +3 to HT to resist that drug or toxin's effects. They negate both good and bad effects. Pharmophage nanomachines are effective for a month.

Pharmophages have no effect on nanomachines, only on ordinary drugs, disease-causing organisms (bacteria, viruses, parasites, etc.) and poisons. Pharmophages can only be created if the toxin, drug or organism they are designed to counteract has been thoroughly analyzed by their designer. They are ineffective against unknown drugs, diseases or poisons - they are extremely specific in their targeting! Cost of a pharmophage treatment is usually about $500, although treatments for new or rare drugs, diseases or poisons may be more expensive. Multiple doses raise the effective TL by +1 for each doubling in the number of doses (however, any roll of 17 or 18 is still a failure). Thus, eight doses add +3 to the effective TL of the pharmophages.

MESSAGE DATA

chapter NINE

STATUS ACTIVE

NOTICE: NEW SHELLED FILES DISCOVERED INTERROGATE? [Y/N] Y

: CYBERWEAR

WARNING: ACCESS UNAUTHORIZED BLACK COUNTERMEASURES ENABLED
** LAST CHANCE, BUB //MUZZLE //SCRAM [SOURCE MUZZLED]
:: HOME MAINTENANCE SUBPROGRAM DETECTS VISITORS ::
:: SECURITY SUBPROGRAM BYPASSED :: //ROCK N ROLL //TEFLON

VIDEO TRANSMISSION SCREEN

ALERT

SJG-23

CHANNEL SECURE

Futuristic cybernetics can make someone more than human. Or less . . .

Bionics replace body parts with machines that perform similar or enhanced functions. *Implants* are completely new cybernetic systems that have been grafted to the body.

This chapter also covers cybernetics that were originally presented in ***GURPS Cyberpunk.*** Some point costs have been adjusted to conform with ***GURPS Compendium I.*** GMs with ***GURPS Cyberpunk*** should feel free to retain the original costs in existing campaigns.

Cybernetics have both a dollar and point cost listed for them - see the *Point Costs and Cash* sidebar on p. 10.

DEFECTIVE CYBERWEAR

Any cybernetic device may malfunction at the GM's option, but some are more capricious. If a device is *known* to be cheaply or shoddily made, it may be available at a fraction of the normal price. If charging points for cyberwear, it will cost fewer points as well. If a piece of cyberwear is not recognized as bad. the GM may keep the fact that it cost fewer points secret until after it has malfunctioned a few times . . .

Round fractional dollar or point costs up.

Unreliable Cyberwear

Antique, experimental, cheap and black-market cybernetics may not always function properly. In a stress situation (combat or another circumstance determined by the GM), an unreliable cybernetic system may fail to operate for 1d minutes. The GM should decide whether "stress" means stress on the system or simply a dangerous, stressful situation. Either can be a good time for a system to malfunction!

Some systems may never be "unreliable." For instance, systems that provide extra hit points are not usually available with this option. Implanted armor, however, could be unreliable - when it is hit, roll to see if it really works!

The cost savings (dollars and points) depend on how often the equipment fails:

Savings	***Failure Roll*** *(3d)*
-10%	15 or higher
-20%	13 or higher

Only check for a malfunction once per encounter - maximum, once every 10 minutes. Note: the Unreliable Cyberwear limitation is a distinct limitation from Unreliable (p. CII12).

Breakdown-Prone

This is treated like Unreliable Cyberwear, but is worse: the cybernetics stop working until they can actually be repaired. Even after being repaired, the system remains temperamental and subject to periodic breakdown if subjected to later stress.

Savings	***Failure Roll*** *(3d)*
-10%	16 or higher
-20%	14 or higher

Rejected

This represents cybernetics that have been poorly installed, or whose installation produces toxic byproducts (in much the same way that leaking breast implants may cause illness). In all cases, the cybernetic system will eventually be rejected by the body.

Each week, the cyborg must make a roll against Health (the roll always fails on a 15 or higher). If the roll fails, his body begins to reject the cybernetics.

Each day thereafter, the user must make another roll against Health (again, 15 or higher always fails). A failed roll means he takes 1 point of damage to the organic body part that the cyberwear is joined with. He will feel pain, aches or irritation associated with the cybernetic part or the living body part to which it is attached. First Aid will not cure this damage, but it can be treated using Physician skill or natural day-to-day healing. The condition itself cannot be cured until the cybernetic part is removed and repairs are made (and the extra points paid to buy off the limitation, if the repaired part is reattached). The repairs always cost at least as much as the original cost savings. This limitation is worth -20%.

Sometimes rejection is more subtle. In this case the rolls to avoid it are against HT+1 (with the same maximum), but the condition can only be detected by a Diagnosis-6 roll, and will usually manifest as an overall feeling of malaise rather than something associated with the cyberwear. This is most likely if the cybernetics are leaking toxic chemicals, for example. The GM should keep the source and amount of damage secret; the victim may attribute the malaise to disease. It cannot be treated by a Physician or natural healing, nor can it be cured until the cybernetics are removed, which may not be easy! Again, the cost of doing so is always *at least* equal to the cost savings. This "subtle rejection" is a -40% limitation.

BIONICS

The basic models of bionic limbs, eyes and ears are described in ***Ultra-Tech*** (pp. UT104-106) and *Space* (p. S67), along with rules for their installation and operation. This section describes additional options for bionics.

There is no extra "operation" cost for options added to bionics as long as the option comes with the original limb, eye or ear installation. To upgrade a bionic limb or organ *after* it has been installed, there is an extra cost of $20,000 ($30,000 for an eye) in order to cover the cost of removing the part, modifying it and reinstalling it.

BIONIC OPTIONS

artificial vs. Realistic Bionics

Bionic options or enhancements for a limb or eye (but not an ear) that can be seen to be artificial up close (requiring an IQ roll) and *that feel* artificial to the touch are half cost, while options for *obviously* artificial bionics (gleaming silver limbs, glowing eyes, etc.) are available for 1/5 normal. Note: Normally, this reduction only applies to the dollar price, not

point cost! Some campaigns may apply the reduction to the point cost as well, at the GM's option. To give users of artificial-looking bionics a more balanced point break, assume that in some societies visible bionics or implanted armor are seen as unnatural - this can be taken as a reduced Appearance, Social Stigma or Unnatural Feature (p. CI85) that will partially offset paying full points for the bionics.

Detachable Bionics (TL8+)

A bionic eye, ear or limb can be designed to be easily removed from the body, leaving only a modular socket with the cybernetic interface for it. This is useful for easy repair and maintenance, and it also allows the creation of a modular cyborg whose parts have many different options which he exchanges depending on the situation. There are two levels of "detachability":

Detachable without tools: For +10% to dollar and point cost, the limb or sense organ simply snaps into or out of its housing. It can be removed in five seconds and attached just as easily.

Detachable with tools: For +5% to dollar and point cost, the limb or sense organ requires electronics tools or a mini-tool kit to remove, but is still relatively simple. Removable takes 10 minutes and requires an Electronics Operation+3 (cybernetics or medical) skill roll. Failure means another try and more time are required. Critical failure disables the limb, requiring repairs before it can function.

If bionics aren't detachable, the same type of operation used to install them must be performed to remove them.

If a cyborg owns more than one bionic part that can fit in a particular socket, he only pays points for the most expensive one, since he can only use one at a time.

Living Metal Bionics (TL13+)

At double normal dollar cost, any bionic limb, or a full cyborg body, can be composed of living metal (see p. UT18). Living metal components regenerate 1 hit point or 10% of original hit points (whichever is higher) per hour. This is a 25-point advantage if the full cyborg body regenerates, or an 8-point advantage per limb (to a maximum of 25 points).

BIONIC ARM & HAND OPTIONS

P. UT106 describes standard bionic arms and hands.

Extra DX and ST (TL8+)

A bionic arm can be made stronger or faster than the normal limits on p. UT106. Each extra +1 to manual DX or ST above the normal limit (DX+2 and ST 15) doubles cost, e.g., a bionic arm with manual DX+2 and ST 16 would be 100 times normal.

A bionic hand can be made stronger or faster than the normal bionic hand limit of ST 13 or DX+2. Each additional +1 to the hand's DX (above DX+2) or +1 to ST multiplies cost by 1.5.

Note that costs can rapidly escalate dramatically, due to the limitations of working with "meat" in conjunction with metal. For super-cyborgs, a full cyborg body can be cheaper!

Gripper Hand (TL8+)

This substitutes a simple mechanical gripper for the complex human hand. The user will be at -4 to both DX and DX-based skills when using it for tasks requiring fine manipulation. The simplified nerve connections and motors required greatly reduce the cost of the arm or hand: it is only 10% of the normal cost of a bionic hand. A gripper hand is *always* obviously artificial; the price break for that is included in the cost. (A gripper hand is a -10 point disadvantage.)

Micromanipulators (TL8+)

A bionic hand or arm can be equipped with extendable probes in the wrist or fingers designed to manipulate very small objects. If the cyborg is equipped with eyes with Microscopic Vision, he can even manipulate microscopic objects! The micromanipulator hand gives a +2 bonus to any Surgery, Mechanic or Electronics skill rolls requiring very fine control, such as fixing a watch or repairing a microbot. It also allows doing things like painting a picture on the head of a pin. Note that one micromanipulator hand only allows the same dexterity as a one-handed person - two hands are needed for most tasks.

Equipping a bionic hand or arm with micromanipulators multiplies the arm's cost by five (or the hand's cost by eight). Micromanipulators can be combined with a striker or gripper arm - this is an arm that has tiny manipulators that can precisely manipulate microscopic objects, but lacks any capability to dexterously handle larger objects. Possessing one or more micromanipulators is an advantage worth 15 points.

Striker *Arm* (TL8+)

This is an alternative to a normal bionic arm - it lacks elbow and wrist joints (rotating only at the shoulder). The arm has ST 14 and costs $12,500. For 10 times the cost, ST 15 is available; each extra +1 ST doubles the cost.

If the arm's ST is greater than the cyborg's original ST, its point cost is equal to 25% of what the increase in ST would normally cost. However, the cyborg's arm ends in a stump, so he lacks fine manipulatory or grasping ability with that arm.

A person with a bionic striker instead of an arm has the One Fine Manipulator disadvantage (-15 points, p. CI103) if one arm is replaced, or No Fine Manipulators (-30 points, p. CI103) if both are removed.

Aside from cheapness, a striker has one advantage over an ordinary arm. If it contains a weapon mount (p. UTI06), the integral weapon that is installed can be up to 25 pounds in weight, rather than the usual limit of five pounds; the arm ends in the weapon's barrel. If installing heavy weapons, omit the tripod's weight when calculating how big of a weapon will fit.

Telescoping *Arm* (TL8+)

This modification allows a bionic arm to telescope out to increase its reach by one or two yards, depending on the arm's design. When extended, each hex of reach also adds +1 to the normal swing damage and +2 on any attempt to grapple. Note that longer arms can be attacked in other hexes as if they were long weapons (p. B110). Retracting one or more arms takes a

Ready Weapon maneuver. Extending the arm also takes a Ready Weapon action, but can also be combined with a punch - if so, the sudden extension adds +1 to punching damage (or +1 to the damage of any impaling claws, blades or spikes built into the hand).

For each hex of reach, add $25,000 to the arm's cost unless the arm is a tentacle; then add only $10,000 per hex.

A telescoping arm also costs 15 points for a one-hex reach or 22 points for a two-hex reach.

Sensitive Touch (TL8+)

A bionic hand's fingertips can be modified with enhanced tactile receptors, making them extremely sensitive. For instance, an individual could use this enhancement to sense the heat in a chair that someone recently sat upon, tell the difference between two similar kinds of fabrics, read ink print with his fingers or easily identify a person by feeling his face. The GM can require an IQ roll to use this advantage properly. It costs $10,000 to add this to a bionic arm or hand (and 10 points; the point cost is the same no matter how many hands are equipped with sensitive touch.)

Tentacle *Arm* (TL8+)

A bionic arm can be built as an extra-flexible tentacle. A tentacle can work together with any other arm, regardless of body position, general layout or right or left. It gives a +1 bonus when strangling or grappling. A tentacle arm is twice as expensive (in dollars) as a normal arm (and costs 5 points more).

A tentacle arm normally is assumed to terminate in a conventional bionic hand, although the fingers will also be long and tendril-like. A tentacle arm may instead be a bionic striker (p. 96) with no hand, or terminate in a gripper (p. 96) - modify the arm's cost and adjust its point value appropriately.

BIONIC EAR OPTIONS

A set of two ordinary bionic ears (p. UT105) is $20,000 plus a $20,000 operation. All of the hearing modifications below assume that the subject has a basic set of bionic ears as well.

Gyrobalance (TL8+)

This miniature electronic gyroscope is implanted in the inner ear. It grants Perfect Balance (p. CI63 or p. B237). $25,000 (and 15 points).

Parabolic Hearing (TL8+)

Bionic ears can be given this modification: the equivalent of a parabolic microphone, enabling the user to zoom in on a particular sound or area. The ear includes a filter to sort out background noise from the desired sounds. This grants a number of levels of parabolic hearing (see the *tactical sensor array* on p. 24 or the Parabolic Hearing advantage on p. CI62); maximum allowed level is the TL. $5,000 (and 4 points) per level.

Radio Reception (TL8+)

This small radio *receiver* (not transmitter) is built into a bionic ear. The user can hear radio signals from AM broadcasts to shortwave or police signals and beyond. Strong signals are easy to pick up; weaker signals such as long-distance AM and shortwave stations may require an extendable antenna. A metal helmet of any kind that covers the ear may affect reception (GM's option). Radio reception is $10,000 (and 10 points). At TL9+, it becomes much cheaper ($500), as technology used in the TL9 advanced implant communicator (p. UT107) is adapted to it.

Radio Reception and Broadcast (TL8+)

This has the same features as radio reception, but also allows broadcasting on AM, FM or CB frequencies at a few miles range (usually one, more on higher ground). $25,000 (15 points). At TL9+, this upgrade is no longer used - instead, an advanced implant communicator (p. UT107) is spliced into the optic and auditory nerves, providing both visual and audio signals.

Subsonic and Ultrasonic Reception (TL8+)

These options allow the cyborg to hear sounds below (subsonic) or above (ultrasonic) the normal range of human frequencies. Ultrasonic hearing also lets the user detect nearby sonars that are in operation, at up to twice the sonar's range. These bionic ear options are $10,000 (and 5 points) each.

Volume Cutout (TL8+)

This option allows a bionic ear to automatically reduce the volume of any loud noise. The user can never be deafened or stunned by any loud noise (although sonic stunners can still affect him). $10,000 (and 5 points).

BIONIC EYE OPTIONS

Normal bionic eyes possessing the capability of a normal human eye are described on p. UT105 ($35,000 plus a $30,000 operation each). All eye options except the Argus Sensor (p. 99) assume the subject already has them. Any number of improvements can be built into the same eye. If a person has two dissimilar eyes (a regular bionic eye is the same as a natural one) a patch must be worn over one or conflicting signals give a -2 to Vision rolls. If the other eye is bionic, conflicting modes can be "turned off instead; someone with a patch-covered eye suffers the same penalties to vision as a person with One Eye (p. B29).

Bug Detector (TL8+)

This option allows a bionic eye to "see" electromagnetic signal emitters such as bugs or radios. They appear as faintly glowing spots, with the colors depending on the frequency; the GM may require a Vision roll to spot bugs, or for more detail, use the bug detector rules on p. UT90. This won't detect passive recording devices, though. It costs $20,000 (and 5 points).

Downgraded Optics (TL8+)

These bionic eyes are inferior to normal human vision; they are usually used by people who can't afford transplants or human-grade replacements. They may also represent early TL8 eyes.

Color Blind Eyes are just that, seeing only in black-and-white. This reduces the amount of image processing required, and thus makes the eye somewhat cheaper. Instead of costing $35,000, the base cost drops to only $30,000 per eye. The user gains the Color Blindness (-10 points) disadvantage.

Low-Res Eyes have the same effects as the uncorrectable *Bad Sight (-25* point) disadvantage; decide if the eye is near-sighted or farsighted. This drops base cost to $25,000 per eye.

Color Blind Low-Res Eyes combine both downgrades, reducing the cost per eye to a mere $20,000 each.

Being color blind or having bad sight in only one eye is annoying, but worth no points.

Independent Focus (TL8+)

This bionic modification can only be added if the user has *two* bionic eyes. It allows the user to track two things at once, giving him the Independently Focusable Eyes advantage (p. CI58) for $40,000 for both eyes (and 15 points).

Microscopic Vision (TL8+)

This option can be added to a bionic eye to let the cyborg see small objects. Each level doubles the magnification, starting at 2X, only for observing objects at one foot or closer range. Cost is $10,000 (and 4 points) per level.

Optic Readout (TL8+)

This option can be added to a bionic eye to give the cyborg a head-up display on the edge of his field of vision; effects are identical to the TL9 neural HUD on p. 111, except that they only apply to built-in bionics and implants (which may include built-in weaponry). For instance, an implanted weapon can use the HUD display for targeting and to show ammunition/power status, while an internal oxygen supply (p. 100) could show how much air remained. This system also allows implanted or bionic ear-mounted communicators to display text. $5,000 (and 5 points).

Optic Remote (TL8)

An infrared remote (p. 41) can be implanted in an eye, allowing the user to control electronic devices fitted with an IR receiver just by looking at them. This does not allow downloading of data or high-speed neural interface - it's basically a VCR remote built into the head. The user must also have an optic readout in order to display control menu options. $500 (and 1 point).

Retinaprint (TL8+)

This modification allows a bionic eye to store the retina prints of up to 20 different people for later retrieval and use in fooling retina scanners (p. UT89). Retina patterns can be obtained by looking into the eye of the person to be copied, at a range of up to two yards (which can be increased if using telescopic vision). If the user has a neural interface, they can also be downloaded via computer link or copied from a Thumb (p. 83). Retinaprint costs $50,000 (and 5 points).

Telescopic Vision (TL8+)

This allows a bionic eye to zoom in on distant objects. Magnification power starts at 2x, and may be increased by buying extra levels. Each extra level increases magnification by 2x. This extra detail resolution is limited to objects that would be visible with normal eyes from a foot away, i.e., it can't be used for microscopic vision. This option costs $15,000 (and 6 points) per level.

Ultraviolet Vision (TL8+)

This option modifies a bionic eye to emit and detect ultraviolet (UV) light. The user can see in pitch dark while using it. Vision within eight yards is normal; it is at -1 for every three yards further away, unless there is a powerful, separate source of ultraviolet light available. UV eyes appear to "glow" to anyone seeing them through ultraviolet vision, and are visible at up to 100 yards.

The user can also switch to passive ultraviolet vision. This allows the user to see objects illuminated by a strong UV light source; this includes anyone emitting UV light from their eyes.

Ultraviolet vision is $20,000 (and 20 points); in ***GURPS Cyberpunk*** it is called "Night Sight."

Video Reception (TL8+)

Allows reception of broadcast television/holovision signals relayed into the bionic eye. Must be combined with radio reception ear option (p. 97). $25,000 (and five points). At TL9+, this is subsumed by the cheaper advanced implant communicator (p. UT107).

Argus Sensor (TL9+)

This is a bionic "eye in the back of the head," giving the user the 360-Degree Vision advantage (p. CI68). The user's visual field normally becomes a split screen. It costs the same as an ordinary bionic eye ($35,000, if it has no other modifications) plus twice the normal operation cost ($60,000) for the additional neural modifications (and 25 points).

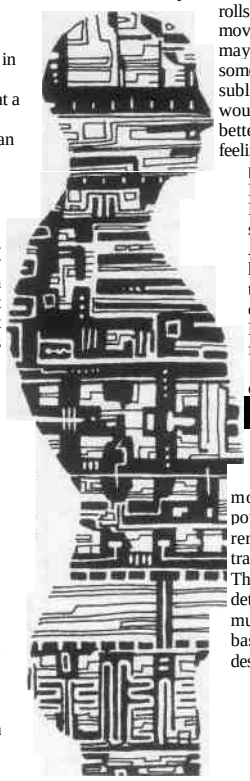
Hypervision (TL9+)

This option can be added to any bionic eye. It increases the number of impressions the eye perceives each second. Instead of seeing a hummingbird's wings as a blur, for example, the user would actually see the wings fluttering. The user could see the actual scan lines on a TL7 low-definition TV.

Hypervision gives a +3 bonus that can only be used to cancel penalties for target *speed* when making vision rolls or attempting to hit or spot fast-moving objects. With practice, the cyborg may find other uses for it. If watching someone's face, it allows him to see the subliminal details of expressions that would normally be lost, helping him better judge what a person is really feeling or how his own words are being perceived. This adds +1 to any Body Language, Detect Lies, Fast Talk, Psychology or Sex Appeal rolls in such situations.

A cyborg whose eyes are switched to hypervision for an extended period of time may get a headache due to the density of sense impressions; roll vs. HT for each minute it is used, with failure resulting in one fatigue.

The hypervision eye option costs $20,000 (and 10 points).



TOTAL CYBORGS

Much more extensive cybernetic modifications - and extremely powerful cyborgs - are possible by removing the human brain, then transferring the brain to a robotic body. This sort of total cyborg is discussed in detail in ***GURPS Robots.*** It provides a much more detailed exploration of the basic "full cyborg body" option described on p. UT106.

IMPLANTS

Implants are devices surgically inserted into the user's body. They supplement rather than replace existing limbs or organs and are built into flesh rather than into a bionic limb.

Since implants, in general, are implanted within the body, there is no alteration in cost for "artificial-seeming" implants. Exceptions (e.g., the bodyshell) are noted in the description.

DETECTING & REMOVING IMPLANTS

Unless otherwise noted, implants are not visible. A diagnostic table, medscanner or X-ray scanner can detect them on a successful Electronics Operation (Sensors or Medical) or Diagnosis roll. Implants can be removed in the same fashion in which they are installed. Some illegal "black implants" are booby-trapped, designed to cause unpleasant effects (explosions, or something more subtle) if the Surgery roll is failed. A successful Diagnosis roll, usually at a -5, is required to discover if a given implant has been booby-trapped.

SIMPLE IMPLANTS

Simple implants may be inert, operated by an internal microprocessor, voice-activated or remote-controlled. They require a roll against Surgery+3 for the operation. This takes 30 minutes, and requires two hours to heal afterward before the implant can be used. Any automedic can easily insert a simple implant. Hiring someone to perform the operation costs 10% of the implant's cost.

Biomonitor (TL8+)

This implant monitors vital signs: pulse, heartbeat, blood pressure, respiration, brainwaves, blood sugar and alcohol levels, as well as the overall condition of the user's other cybernetics (if any). It includes a small display somewhere on the body (often a wrist); if the cyborg has an optic readout (p. 99) this may be used instead. The biomonitor gives a +2 bonus to any First Aid, Diagnosis or Physician rolls on the cyborg, as the long as the medic can see the display (halve the bonus if the user can see it but has to describe it to the medic). If the medic has a neural interface or computer, he can jack it into a port beside the visual readout and monitor the cyborg directly. A biomonitor costs $5,000 (and 3 points).

Cellular Link (TL8+)

This implant is a built-in, voice-activated cellular phone link usually implanted into the mastoid or throat. It allows audio communication only, but can call anywhere in the world by connecting to a standard cell-phone relay network. It only works in areas that are part of a cellular net. On Earth, this will probably include all urban and most rural regions by the time this implant is available. On colony planets cellular nets may be less widespread. In very foreign or alien jurisdictions, the cellular link may not be compatible with local networks.

The user will hear the caller's voice in his head, and can answer by subvocalizing; speaking aloud is not required. The user should keep his number secret: nuisance phone calls in one's head are no fun (-2 or more to mental activity). "Dialling," hanging up, etc. are handled by subvocalizing a code to activate the phone, followed by the number. Depending on local practice, the user may be charged a monthly or per-call fee for using the cellular net (e.g., $20/month -see *Planetary Communications* on p. UT36), or it may be free. By paying a phone company whatever extra it charges (say, $10 a month), the user can avail himself of services like unlisted numbers, caller number identification and so on. Perhaps the most useful service is the ability to turn off the ringer and route calls to an answering service; when the user reactivates the phone, he can check for messages.

A cellular link is $500 (and 5 points), and represents a cheaper alternative to the advanced implant communicator (p. UT107). Someone with an advanced implant communicator *can* subscribe to a cell-phone network, also gaining the features above in addition to his implant's other abilities.

Cyberfangs (TL8+)

These metal or plastic fangs implanted in the gums give the user the ability to do cutting damage based on ST as per p. B140. The fangs are visible when he opens his mouth. They cost $1,000 (and 5 points). *Retractable Cyberfangs* which can retract into the gums (making them invisible) cost $3,000 (same point cost). Either type can be combined with stinger (p. UT108)-type poison/drug reservoirs.

Extra Joints (TL8+)

Extra artificial joints and tendons can be added to natural (or bionic) limbs, making them much more flexible without altering their appearance. Someone with extra joints gets a +1 bonus to their Escape skill for each augmented limb. For every limb used during a successful Grapple maneuver, add +1 to prevent a foe breaking free (p. B112). There are plenty of additional uses: getting in and out of clothing (halve time to put on suits of armor or vacc suits), reaching deep inside machinery, etc. The GM should give the cyborg bonuses to skill or attribute rolls as necessary. This modification is not the same as being Double-Jointed, which involves somewhat less flexibility, but applies to the entire body. Extra joints cost $3,000 (and 3 points) per limb.

Filter Implant (TL8+)

This is an implanted, self-regenerating filter that protects the lungs from contaminated atmospheres. It gives +3 to HT to resist the effects of gas that must be inhaled to work. The filter implant has no effect on agents that can enter through the skin. $20,000 (and 5 points).

Internal Oxygen Supply (TL8+)

This is an internal supply of heavily compressed oxygen which allows the cyborg to function without breathable air. It

has one disadvantage: the micromodules explode dramatically if punctured. If impaling damage is taken to the vital organs, roll 3d: on an 8 or less, the supply has been penetrated and explodes for 3d crushing damage per hour of air remaining. DR doesn't protect. The modules recharge via normal breathing. Each three hours of rest in an air-filled environment restores one hour of internal oxygen supply. The user can also recharge more rapidly by breathing pure oxygen from a mask and air tank (each hour doing so restores one hour of internal air supply). An internal oxygen supply costs $7,000 (and 2 points) per hour. Maximum oxygen storage is TL-2 hours.

Glue Pads (TL9+)

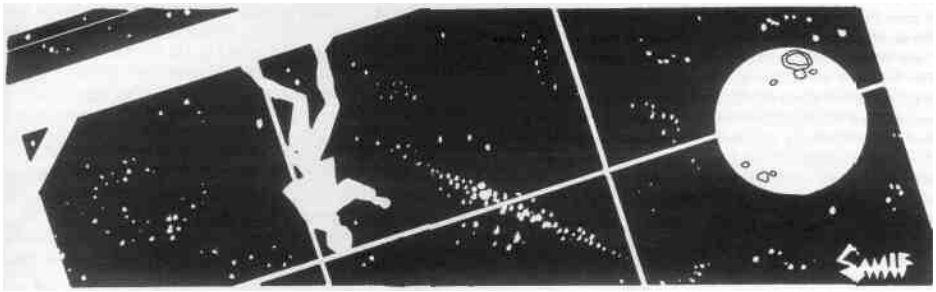
Glue pads are sub-dermal binary reservoirs containing a complex gene-engineered protein that acts as a powerful glue and an enzyme that dissolves it. The palms and fingertips on the hands and the toes and balls of the feet are also reinforced so as not to tear when supporting the user's entire weight. Thanks to these modifications, if the user's hands and feet are bare he can use the glue pads to assist himself while climbing.

If total weight, including encumbrance, is no greater than 150 lbs., the user can stick to walls or ceilings. He is limited to crawling speeds when doing so. If he falls and tries to grab a wall within reach to keep from hitting the ground, a successful DX roll means he has done so. If the DX roll succeeded, roll vs. ST at -1 per five yards fallen (maximum -10). If the ST roll succeeds, he sticks to the wall; otherwise, he still slows himself: subtract five yards from the distance fallen.

If the user's total weight, including what he is carrying, exceeds 150 pounds, his body weight is too great to be supported by the glue pads. The glue pads can support him for a moment or two and allow him to scale inclined surfaces or assist him in climbing where he has a toe or finger hold. Add +3 to Climbing skill if total weight is 150-200 pounds, +2 if 201-250 pounds and +1 if 251 pounds or more.

The glue reservoir contains enough protein and enzyme for 300 seconds (five minutes) of climbing; refill capsules are $30 from the glue pads' manufacturer. Simply sticking to a wall or ceiling uses up one second's worth for every five seconds; more glue needs to be secreted occasionally as it begins to come loose.

Glue pad implants cost $10,000. The point cost depends on how much the user weighs: if 150 pounds or less, 12 points. If 151-200 pounds, 4 points. If 201-250 pounds, 2 points. And if 251+ pounds, only 1 point.



Laser Reflective Exterior (TL8+)

A person's *skin* can be given a chromed polymer coating that reflects laser weapons, For each level, add +1 PD and DR versus laser attacks only (up to a maximum PD and DR 6). Cost is $20,000 (and 5 points) per level. The cost assumes an unusual appearance! Reflective skin that looks normal but can *become* laser-reflective on the user's mental command is a TL9 complex implant costing $24,000 per level.

Cyberliver (TL9+)

This augments the normal liver with an enhanced mechanical organ that does a better job of filtering out toxins, giving a +3 HT bonus to resist poisons that enter through the bloodstream. It also prevents alcohol poisoning. It has no effect on nanomachines, acids, etc. It costs $20,000 (and 5 points).

Damage Control (TL9+)

These cyborg emergency systems allow the body to function after taking more damage than a normal human. These include cardiac stabilizers, blood reoxygenators, etc. This gives the Extra Hit Points and/or Hard to Kill advantages.

Extra Hit Points cost $10,000 (and 5 points) per added hit point - see pp. B236 or CI24 for the effects; the user has a split HT with more hit points than his basic Health. Maximum extra hit points is the cyborg's TL.

Hard to Kill costs $5,000 (and 5 points) per level of the advantage - see pp. B236 or CI25 for effects; the user gets a +1 on HT rolls made to avoid death per level. Maximum level is the cyborg's TL-5.

Intestinal Recycler (TL9+)

The human digestive system is imperfect, so waste matter always contains useful chemicals that could have been metabolized and used by the body. This cybernetic device collects waste matter and reprocesses it to draw out the last vestiges of value via a second pass through the digestive system. Someone

with an intestinal recycler needs only one meal daily instead of the usual three at TL9-10, or only one meal every two days at TL 11+. (Excretion also reduces proportionately.) See p. B128 for details on food requirements. $20,000 (and 10 points).

Hypertough Skeleton (TL11+)

Nanomachines are used to impregnate and reinforce the user's skeleton with carbon fibers, transforming his bones into structures with the strength of metal. The nanomachines also permanently take over the function of the cyborg's bone marrow in producing blood cells.

The brain is protected at DR 60 against all attacks, unless they pass through the eye socket. On attacks to the torso or limbs, he takes half damage from any cutting or crushing blow (but not from bullets), rounding damage taken up.

The cyborg's limbs, hands and feet can no longer be crippled by any other form of "blunt" crushing attack, such as a punch, club or fall. They can still be crippled by bullets, cuts, beams or other damage that tears, burns or otherwise mangles flesh and muscle, but it's more difficult. The damage required to cripple a limb, hand or foot is doubled: a hand or foot requires more than 2/3 HT and an arm or leg more than HT.

The cyborg's weight does not increase. While the hypertough bones do not show up on metal detectors, X-rays and other advanced sensors likely will detect them. A hypertough skeleton costs $ 100,000 (and 75 points).

COMPLEX IMPLANTS

These are spliced into the user's nervous system, and can usually be mentally controlled. They require a successful Surgery *and* Electronics (Bionics) roll. The operation takes three hours, plus a day in bed to recuperate. Failure destroys the implant; critical failure causes neurological injury, resulting in a loss of one point of DX; other effects (such as physical disadvantages, or an unreliable, breakdown prone or rejected implant) may be substituted at GM discretion. Hiring someone to do the operation costs 20% of the implant's cost.

Bodyshell (TL8+)

Someone with this modification has his entire body covered with composite armor. It incorporates pressure and temperature receptors to allow the character to continue to feel even through the armor - the nerve work required is why it counts as a complex implant.

A bodyshell is normally unnatural: it does not resemble ordinary skin in the slightest. To make the armor concealable, it can be coated with realistic-seeming synthetic flesh at triple cost, or plastiflesh that looks real but feels false at two times cost. Bodyshell DR is cumulative with other bionic or implant DR.

TL	*Max DR*	*Cost per DR*
8	15	$30,000 $18,000
9	25	$12,000 $7,500 $4,500
10	40	$3,000
11	60	
12	100	
13+	150	

Max DR: This is the maximum DR that a body shell can give the character. The shell replaces fat tissue and so does not increase weight. Add 10% to max DR for Fat or 5% for Overweight characters; subtract 10% for Skinny characters! Those with full cyborg bodies can have double the max DR.

Passive Defense: A bodyshell adds to passive defense: PD 1 per 3 DR, up to a maximum of PD 6. PD is not cumulative with other armor or implants: use that of the outer layer only.

Cost per DR: This is per point of DR. At double cost, the user can have a *laminate* bodyshell, made of carefully designed layers of special composites, synthetics and metals. This provides doubled DR against shaped-charge explosion attacks. Halve the cost to armor a full cyborg body!

Points: A body shell costs 3 character points per point of DR and 25 character points per point of PD. Add +33% to point cost of DR (that is, 4 per point) if it is laminate. There is no point-cost reduction *per se* for armor that appears unnatural. Depending on society's attitude and the shape of the armor, it can justify a Social Stigma or reduced Appearance, or count as an Unnatural Feature (p. CI85).

Partial Armor: To armor an arm, divide cost by nine. To armor a leg or the head, divide cost by six. To armor the torso only, divide by three. Round to the nearest whole number.

See *Bioplastic Dermal Armor* (p. 107) for an alternative form of bodyshell.

Contact Lens Implants (TL8+)

Electronic contact lenses containing microcircuitry can be surgically implanted. The lenses are powered by body heat and chipped into the optic nerve.

They usually resemble mirrored or dark contact lenses; they are too thick to look "normal," but are not unattractive. A modification to the tear duct allows it to clean the lens; the lens material absorbs the tears.

The thick, microcircuitry-impregnated lenses give PD 1, DR 1 to the eyes, but any hit penetrating DR will shatter the material; the resulting plastic shards do ld-3 damage directly to the *brain* (damage quadrupled as usual), bypassing all DR.

Cost is for a *pair* of implanted contact lenses.

Anti-Glare: Automatically adjusts for bright light, provides +4 to HT to resist bright light. Costs $300 (and 5 points).

Clock: This is a digital clock in the upper corner of the eye. It can be reset with a pattern of blinks and squints (useful if changing time zones), or wake the wearer up as a visual alarm clock (by using light pulses). It gives the user the advantage Absolute Timing. Costs $200 (and 5 points).

Infrared: Gives the user the Infravision advantage (p. B237 and CI58). Costs $600 (and 15 points).

Light Amp.: Amplifies light levels, giving the user the Night Vision advantage. This costs $600 (and 10 points).

An implant lens can have more than one function, but cannot combine infrared and light intensifier until TL9+. Switching on or off infrared requires a specific pattern of blinks and takes one second to adjust.

Surgically implanted contacts are about twice as expensive as ordinary contacts, thanks to the neural connections. Surgically implanted lenses that do nothing except correct vision and protect the eyes are $100 simple implants.

Enhanced **Claws *(TL8+)***

A set of implanted claws or finger talons (see p. UT108) can be made out of stronger or sharper material than described for finger talons in ***Ultra-Tech.*** Dollar costs are *per hand* or *per foot* that is so equipped.

Superalloy Claws (TL8+) do not increase damage, but armor protects against them at 1/2 DR. Cost is +$1,000. Add 65% to the point cost of the claws.

Monomolecular Claws (TL9+) are constructed slightly differently than a monomolecular blade, usually from engineered diamond tapered to a molecule-fine edge. Add +1d to damage and armor protects against them at 1/10 normal DR. Cost is +$2,000. Add 185% to the point cost of the claws.

Hyperdense Claws (TL 11+) add +2d to damage and armor protects against them with 1/10 normal DR. Cost is +$5,000. Add 250% to the point cost of the claws.

Finger **Implants (TL8+)**

This implant replaces a finger (or a thumb) with a realistic functional prothesis that contains some form of device. Only one function per digit is allowed. If built into a bionic hand, no additional operation is required.

The finger mount on p. UT108 is one example of a finger implant. Other types of finger implant are described below. Bionic fingers and thumbs may be equipped with the *detachable* bionic option (p. 96) to allow modular replacement with other types of finger implants.

Bomb (TL8+): The digit contains a mini-grenade (p. 67). The user can set the grenade's timer mentally. This implant comes in all standard grenade options. Buying the detachable option is a good idea! The bomb implant costs $2,000, making it an expensive way to dispose of someone! 2 points.

Burglar (TL8+): The burglar finger contains an electromechanical lockpick. This gives a +2 bonus on picking locks not cumulative with other lockpicks if built into the index finger, + 1 if built into a different digit. It costs $3,000 (and 2 points).

Heater (TL8+): The digit's tip contains a small electric heating coil that can glow white hot after a turn of concentration. It can be used like a lighter, and will ignite flammable material or make a pot of water boil in a minute. If touched against bare skin, it does 1 point of burn damage per turn. It costs $3,000 (and 1 point).

Chiller (TL8+): The digit becomes very cold after a turn of concentration. It can turn water to ice in one minute, or cause one hit of freezing damage per five seconds if it is in contact with flesh. The chiller digit is powered by a small cryogenic liquid-nitrogen capsule, and will only function for 10 minutes at a time. Replacing the capsule costs $10 and takes a minute. This implant costs $3,000 (and 1 point).

Flasher (TL8+): The digit contains a small but powerful flashlight. An intense narrow beam of light shines out of the digit's tip, with a 10-yard range. It is powered by an A cell for up to a month. It costs $3,000 (and 1 point).

Rocket (TL8+): The digit houses a single gyroc rocket (of whatever type is desired). If the gyroc is built into the index finger, its statistics are SS 3, Ace 3, 1/2D 180, Max 1,250, RoF 1 and 1 shot. Its damage depends on the type of gyroc. If built into the middle finger it is SS 6, Acc 2. If built into another finger or thumb, it is SS 12, Acc 1. The rocket finger costs $2,000 (and 3 points). Reloading the finger takes three seconds.

Scalpel (TL8+): The digit houses a small, very sharp blade. Damage is thrust-5/cutting or thrust-7/impaling, with a +1 to damage per digit modified (so all five digits would do thrust/cutting). Scalpel blades cannot be installed on a hand that already has claws or a finger talons implant. Cost is $1,600 (and 3 points) per digit.

Scissors (TL8+): A set of *two* digits on the same hand (either the thumb and index finger, or the index and middle finger) can have sharp inner edges mounted so that they function exactly like wire cutters or scissors. Used as a weapon, they can snip for ld-2 cutting damage. This is an external modification, so each digit can also have another finger implant. Costs $500 (and 2 points) for both digits.

Sprayer (TL8+): The digit functions like a pocket aerosol (p. 67), but holding only one dose of gas. Reloading the sprayer requires unscrewing the finger and inserting a new pellet, taking at least 30 seconds. Cost is $500 (and 3 points).

Standard (TL8+): This ordinary bionic finger or thumb has no special function. It is included for cyborgs who need to replace a destroyed digit. $500.

Combat Wire (TL8+): This implant can only be installed in the thumb or middle finger. The finger tip is removable and is connected to a miniature spool containing six feet of thin but strong wire. The wire spool can reel in or out on mental command, with the finger tip serving as a weight at the end. It can be used two-handed as a garotte, or swung as a 1- to 2-yard-long whip (use Whip skill). At TL9+, monowire may also be used: add + ld to damage and DR protects at one-tenth value, but if used as a whip any "drop weapon" critical miss means the user struck himself or a friend. Cost is $200 (and 5 points) for ordinary wire or $1,000 (and 25 points) for monowire.

Tapper (TL8+) The digit generates a low-powered electrical zap. The effects are the same as a zap glove (p. 63) but with no "kill" setting. Moreover, it does only 1d-2 rather than 2d damage. Multiple fingers multiply the effect, so four zap fingers and a zap thumb allow a touch that does 5d-10 damage. (If a single finger is inserted in a brain implant skull socket, such as a neural-interface socket or chip slot, it functions as a zap glove set to "kill," all damage is doubled, and it has a 4 in 6 chance of shorting the implant.) An AA cell provides power for 5 zaps. It costs $1,000 per finger. Point cost is 15, + 5 per extra finger.

Interface (TL10+): The finger contains a neural interface device allowing the character to directly interface with any interface jack-equipped (p. UT37) gadget by sticking his finger in its socket. When interfaced, the user can mentally operate the gadget without using its normal controls. He gets a +2 bonus to skill level in situations where reaction speed is important (note that this +2 bonus is only half what a more expensive neural interface implant socket that is connected directly to the skull receives). Costs $15,000 (and 5 points).

Digits that do not require power cells run off hand or arm power. If a power cell is used, replacing it requires 20 seconds. If digits are detached or severed (e.g., to detonate a bomb finger) reduce DX when using that hand by 5 if a thumb (-5 points) or 1 for a finger (-2 points). See the Missing Digit disadvantage (p. CI82) for more detail.

Heel Spikes (TL8+)

This modification installs a retractable, cybernetically controlled spike in the heel of a foot. Heel spikes are best installed in pairs, one spike per leg.

Retracting or extending one or both heel spikes takes a Ready maneuver. If the character is not barefoot, the spikes will only be able to slide out of footwear with DR 4 or less. Footwear can be modified with a flap for heel spikes for an extra $20 ($200 if part of sealed armor).

An extended heel spike allows a kick to do normal kicking damage, except that damage becomes *impaling*. Kick damage is, of course, based on the leg's ST.

Heel spikes cost $8,000 (and 10 points) for a single spike or $16,000 (and 15 points) for one on each foot. For an extra $2,000 each (and 5 more points), the spikes may be *armor piercing:* DR protects at half normal value. *Fixed* heel spikes that are permanent have only half the dollar price, and are simple implants.

Joy Buzzer (TL8+)

This is a zap glove (TL8+, p. 63) or neuroglove (TL10+, p. 64) surgically implanted in the hand. Cost is $8,000 *plus* the normal cost of the weapon. A port for adding or ejecting power cells is located under the wrist. The hand may not contain other weapon implants. This implant can also be built into a bionic hand, at a cost of only $2,000 plus weapon cost. Either way, it costs 5 points.

Remote Datalink (TL8+)

This high-frequency computer link lets the user connect to any standard neural- or data-interface physical link - provided that device has a similar transmitter ($5,000, one pound) on the same frequency - at a range of 100 yards. If the user has a neural interface, he can interface with devices over a distance. If transmitting text only, its range is a mile; it can't communicate with neural interfaces at that range, however. $150,000 (and 20 points); dollar cost is only $15,000 at TL9 or $7,500 at TL 10+ due to advanced implant communicator technology.

Accelerated Reflexes (TL9+)

This vastly improves reaction speed and temporal perception by augmenting the user's nervous system, supplementing many nerves with optical wires, adding hardwired reflex boosters and so on. Accelerated reflexes are rated in levels. The maximum level that can be bought depends on TL: one at TL9, two at TL10-11, 3 at TL12-13, 4 at TL14-15 or 5 at TL16+.

Switching on or off accelerated reflexes can be done at the start of any turn. When activated, each level gives these benefits: + 1 to any Active Defenses in combat, +2 to Fast-Draw skill, and one additional maneuver every turn, provided the maneuver does not depend on the reaction of another person

(e.g., Feint). Thus, someone with three levels would have three extra maneuvers, +6 to Fast-Draw and +3 to Active Defenses. Using accelerated reflexes is stressful: activating them costs one fatigue, plus an additional one fatigue every six seconds. This cost covers using any level of Accelerated Reflexes; do not assess it *per level.*

All bonuses from accelerated reflexes are cumulative with other similar bonuses, such as those from Combat Reflexes.

The extensive neurological operations needed for this implant mean the length of the operation and the recovery time are doubled and there is a -2 penalty on rolls to install it.

Cost is $200,000 (and 85 points) for one level. Extra levels double the dollar cost; point cost is a further 85 points/level. Thus, level three is $800,000 and 255 points.

Accelerated reflexes can be built into people with a full cyborg body, or robots or total cyborgs created using *GURPS Robots,* for only half the dollar cost (but the same point cost) required to add it to a human - it's cheaper to add the upgrades since the "nerves" are already electronic. Since robots do not suffer fatigue, increase the point cost to 115 points per level.

Adjustable Heart (TL9+)

This is a cybernetic pacemaker and adrenaline pump that allows a character to manually override his natural heart rate, causing his heart to beat at a constant rapid or constant slow rate. In addition to the "normal" setting (in which the heart operates normally), there are two override settings:

High. While on this setting, the user has the Impulsiveness disadvantage (or is -3 on rolls to avoid impulsive behavior, if he already has it). His Basic Speed (and thus Dodge and Move) increase by one. The effects of toxins (including alcohol) take half as long to take effect but last half as long. It is impossible to sleep; failed Fright Check results (p. B94) add +2. Having an adjustable heart set on "high" costs 1 fatigue every ten minutes, and the user cannot regain fatigue while the heart is on "high." If the user is rendered unconscious while on this setting, his heart automatically returns to a normal setting. Every 10 minutes, roll 3d vs. HT+5. A failed roll results in a heart attack. A heart attack reduces HT to 0, and causes death in original HT/3 minutes unless CPR is provided. CPR requires TL7+ medical training and a First Aid-4 or Physician roll, with one attempt allowed per minute.

Low. While on this setting, the user has the Absent-Mindedness disadvantage (or is -3 on rolls to avoid absent-minded behavior, if he already has it). His Basic Speed, Dodge and Move decrease by two. He sleeps as if affected by the Sleep spell (p. B164). Toxins and drugs take twice as long to take effect, but last twice as long. Required air, water and food consumption are halved. He gets +2 to any HT roll made to avoid losing hit points when bleeding (p. B130).

The cyborg can switch between "high," "low," and "normal" with a turn of concentration. An adjustable heart costs $10,000 (and 15 points). At extra cost, three *optional* settings available for $5,000 (and 5 points) each:

Steady: Allows the user to selectively moderate his heartbeat (divorcing it from glandular control), regardless of current mental state. This will give a -4 on rolls to "read" him using Body Language, Detect Lies and Muscle Reading, or via lie-detection equipment such as a polygraph or verifier (p. 82). The user gets +2 to resist Fright Checks in this mode, as well as a +2 bonus on HT rolls to resist cardiac arrest caused by drugs or electricity. He only gets half the usual benefit (round bonuses down) from Combat Reflexes or Hyper- Reflexes as his heart does not respond so rapidly to emergencies.

Very High: While on this setting, the user has the Impulsiveness and Overconfidence disadvantages. His Basic Speed (and thus Dodge and Move) increase by two. The effects of toxins (including alcohol) take one-quarter as long to take effect but last one-quarter as long. It is impossible to sleep; failed Fright Check results (p. B94) add +2. The price of this is one fatigue every minute, and the user cannot regain fatigue while the heart is on "very high." If the user is rendered unconscious while on this setting, his heart returns to a normal setting. Every minute, roll 3d vs. HT+4. A failed roll results in a heart attack, as above.

Very Low: The user goes into a death-like coma that can be preset with any duration from seconds to 48 hours. His heart beats very slowly; a casual examiner may mistake him for being dead. (Roll against Physician-2; success reveals the subject is in a coma of some sort.) Any careful examination will reveal slow but regular breathing and heartbeat. While at a very low heart rate, the user needs only one-fifth as much as food, water, and oxygen as normal, and regains fatigue twice as quickly as usual. Nothing short of a Superstim injection will awaken him before his time!

Cranial Weapon Implants

The conventional places to put bionic weapons are in the limbs, as described on p. UT106 and UTI08. However, putting a gun in the head is also possible - but if a cranial weapon has any recoil, the character will feel it! The user suffers fatigue equal to the recoil whenever the weapon fires.

Eyebite: This is a small cyberweapon mount in the pupil of a bionic eye. It may house a weapon weighing no more than an ounce. It is triggered by neural impulse. An eyebite weapon's SS is -2, Acc is unaffected, making it handier than a normal weapon. The implant costs $10,000.

Deadeye: This is a larger implant that fully replaces an eye with a weapon, making the user One-Eyed (or Blind if he has two of them). The weapon fires out of the pupil of a false eye, which clicks open just before firing. A weapon up to one-quarter pound weight can be installed in a Deadeye, such as a holdout laser. The implant costs $8,000. SS is -1 but Acc is -2.

Headbanger: A headbanger is like the Deadeye but carefully squeezed into the skull or the jaw, firing from a gun port that opens on mental command. There is only room for one in a given head; again, any weapon up to one -quarter pound weight can be fitted. The implant costs $12,000. SS is -1 but Acc is -3.

All cranial weapons cost 5 points. Legality class is based on the weapon installed.

Cyberhair (TL9+)

Sometimes nicknamed "medusa locks" on the streets, this baroque fashion implant replaces ordinary hair with cybernetic tendrils operated by tiny myoelectric motors. The user's scalp is strengthened to support the hair and a small A cell is implanted in the skull to operate it. The user can move his hair as if it were a single, extra-flexible limb, like a prehensile tail

attached to his head. (Individual strands cannot move in different directions). Cyberhair is not capable of fine manipulation: -5 to DX to do anything that would require fingers and thumb.

The cost and capabilities of cyberhair depend on its length:

Short cyberhair (less than shoulder-length) is cosmetic only. It can wave about, but doesn't do anything else. This costs $1,000 (and 0 points).

Medium cyberhair is shoulder-length. It can function as a prehensile limb. It can reach objects in the same hex (or be used in close combat) but isn't strong enough to attack physically. Still, it could be used to pick up and manipulate something - this is useful if the character were tied up, for instance. It costs $5,000 (and 2 points).

Long cyberhair is waist-length. It is treated as shoulder-length hair, but can be used to grapple in close combat as if the user had an extra arm. It costs $10,000 (and 5 points).

Very long cyberhair is knee- or ankle-length. It has a reach of one yard, and is so long that the user will be unable to wear an enclosed helmet! It costs $15,000 (and 10 points).

Cyberhair does not grow and cannot be cut by an ordinary razor or scissors - use wirecutters or a monomolecular-edged blade! If cut, it won't grow back. At TL10+, cyberhair made of bioplastic is available at double cost. It *will* grow back to the original length it was purchased at if shorn, increasing its length by one stage per day.

This implant is more of a cyberpunk fashion statement then a practical modification, but it does offer a discreet extra limb which could be useful for spacers (who might otherwise shave their hair to keep it out of the way in zero-gee). Cyberhair may also be useful to covert operatives, who might use it to untie themselves or draw a gun if their other limbs were restrained.

Cybernose (TL9+)

This implant includes chemical receptors that give the user a sense of smell almost as acute as a bloodhound's.

A cybernose implant can detect distinctive odors at a distance of a mile or more, track by scent, recognize individuals by their scent, and sniff out drugs, poisons or explosives. The GM may require an IQ roll to identify a particular odor or memorize one. The character gets a +4 to any roll to use his sense of smell *in addition* to Acute Sense of Smell and Taste bonuses. The user also gets +4 to Tracking skill.

The user of a cybernose suffers a -3 penalty to IQ and all normal IQ-based skills when this implant is activated and for ten seconds after it is deactivated, as the implant takes over much of his normal cognitive process. This penalty does *not* apply to rolls to detect things or track by scent. A cybernose costs $20,000 (and 12 points).

Cyberspeakers (TL9+)

Called "boomer" on the streets, this implant is a built-in, high-volume sound system cybernetically connected to the user's voicebox. It is generally installed in the chest near the lungs. The user is insulated from deleterious effects (if he wants to be), as is anyone with the volume cutout (p. 98) bionic ear option. There are several possible applications.

Loud Voice: The user can project his voice like a megaphone. This is useful for singing or orating. A sudden, unexpected shout can distract foes: enemies within 50 yards must make an IQ roll, with a +2 bonus for Hard of Hearing and bonuses for any other form of ear protection. Anyone who fails is Mentally Stunned (p. B122).

White Noise: The sound system can generate random, multi-frequency noise. All Hearing rolls within 10 yards are at -3; from 11-20 yards, the penalty is -1. This also can jam simple audio bugging devices.

Music: If the user has a chip slot (p. 111), computer implant (p. UT110) or dataplay socket he can plug in a music disk and turn himself into a living CD player.

Cyberspeakers cost $5,000 (and 3 points).

Dataplex Socket (TL9+)

This implant is a skull socket with a cheap digital reader that will accept minidisks containing digital or audio files. It is spliced to the user's auditory and optic nerves. The socket is a simple model that will only run basic video and audio recordings (like movies and music), not an actual implant computer that can run interactive systems like CD-ROMs. It's commands are limited to "play," "stop," "fast forward" or "rewind." It costs $800 (and 1 point).

Elastic Face (TL9+)

This implant inserts micromachines under the facial skin that allow subtle changes in bone structure and skin tension and voluntary simulation or removal of wrinkles, dimples and scars. New glands under the skin can also alter its color, moisture and general tone. As a result, the user can adjust his facial appearance dramatically. It takes only five minutes to make a simple change, but up to three hours to specifically imitate someone else. An Elastic Face adds +5 to Disguise skill. It may also be used to make oneself slightly more attractive (an extra +1 reaction modifier). $100,000 (and 15 points).

Eyesnake (TL9+)

This baroque implant attaches a bionic eye to a slim cybernetic tentacle that is normally concealed down the throat, though other body orifices can also be used - as can an empty eye socket. The user controls the eyesnake tentacle. It has a reach of one yard and can see around corners without exposing the head, see into confined spaces, or look in any direction including to the rear. If looking backward, the cyborg can see in that direction as if One-Eyed. The user cannot speak if the tentacle is extended from the mouth, but can do anything else. An eyesnake is not strong enough to lift things or strike in combat. The eyeball can be attacked or grabbed while extended - see *Ripsnake* (p. 107) for the procedure and effects. The bionic eye itself has its normal hit points; the tentacle has DR 1 and 1 hit point. In most cultures, eyesnakes are unlikely to be commonplace. If rare, the sight of one emerging from the user's mouth (or wherever) may call for a Fright Check!

A cyborg may not have both an eyesnake *and* a ripsnake that emerge from the same place, but a combination eye/ripsnake (an eye-tipped tentacle with ripping spines that extend after leaving the body) is possible: add the costs together.

An eyesnake costs the same as a bionic eye plus an additional $5,000, so the base cost is $40,000 (and 10 points). The implant operation costs the same ($40,000). The bionic eye on the tentacle can have any eye options at extra cost.

Radar Implant (TL9+)

This is an implanted high-res *imaging* radar unit that provides a 360-degree radar picture of the user vicinity. The antenna is embedded in various subcutaneous microtransmitters around the body. Vision or Electronics Operation (Sensors) roll is required to recognize faces, spot hidden things, etc. This is an active radar so when switched on, the cyborg will shine like a beacon to other radar receivers (including rad scanners), which detect him at out to twice his own range. This implant costs $100,000. The maximum range that the set can be designed for is 25 yards at TL8, 50 at TL9, 100 at TL10 and 200 at TL11+. The user also can select a lower powered radar; this will be detectable at a shorter range and cost fewer points. (Point cost is 50 points plus I point per yard of range).

Ripsnake (TL9+)

This is a cybernetic assassin's weapon. It consists of a polymer-coated, worm-like bionic limb, cybernetically linked to the user's nervous system. It is concealed in the user's torso, behind a natural body opening (usually the mouth). The owner can activate the ripsnake at will. It extends out of his body (with a 1-hex reach) and can bite or sting for ld+1 cutting damage, using Karate or Brawling skill to attack. It can also have a poison reservoir of up to five doses. It is most dangerous if it can somehow enter the body of a victim. (A cyborg with a mouth-mounted ripsnake can do this by kissing the victim on the mouth.) If the ripsnake enters the body, it can do ld+1 impaling damage and neither DR nor Toughness protect, while poisons injected in this way are -3 to HT to resist.

Extending or retracting a ripsnake doesn't take a maneuver, but the user should decide whether it is "in" or "out" at the start of any turn. A foe can try to grab an extended snake by making a bare-handed attack at -5 (the snake is slippery). If the snake's owner fails to dodge (and he can have the snake perform a retreating dodge by retracting it into his body!) this is just like grappling a limb in close combat. A person who has successfully grabbed a ripsnake can also try to yank it out of the owner's throat. This is a contest of ST vs. the owner's HT. Success damages the owner, inflicting hits equal to twice the margin of victory, ignoring armor; success by five or more does 10 points of damage and also yanks the snake right out of the owner (an *additional* ld+2 damage), disabling the snake and probably giving the owner a horrible stomach ache. An extended ripsnake can also be attacked by any swinging melee attack at -3 to hit; it takes the same damage to sever as a bionic hand, though doing so will not damage the user.

A ripsnake costs $10,000 (and 40 points). The operation is more expensive than usual for a complex implant ($30,000) due to the sophisticated cybernetic controls needed for it.

Whistler Implant (TL9+)

This implant alters the frequency of the user's voice on mental command, allowing him to generate subsonic or ultrasonic sounds. Agents with bionic ears fitted with subsonic or ultrasonic reception options can use this implant for covert communication. Some animals (such as dogs or bats) may also be able to pick up ultrasonic speech, whistling or other noises the whistler makes. $10.000 (and 20 points).

Airtight Seal (TL10+)

This airtight, clear polymer seals the entire body and extends into the lungs. It protects from vacuum, gas, disease and up to 60 degrees of extreme temperature. The user can decide whether it is open or closed using an implanted reflex. The seal maintains body temperature at its normal level and valves are provided for disposing of body waste.

If the seal is closed, the user will suffocate unless he has the internal oxygen supply implant. Note that this type of seal is unnecessary for a total cyborg, who doesn't breathe anyway! As a side effect, when closed the seal prevents any skin cells, hair or other residue from escaping. $50,000 (and 20 points).

If a bodyshell (p. 102) is combined with an airtight seal, subtract half the dollars paid for the bodyshell's DR from the cost of the seal, up to a maximum 50% savings on the seal.

Audio Damping (TL10+)

Implanted microspeakers scattered about the body can be used to create an audio diffraction pattern which helps eliminate all sound in the immediate vicinity of the character. This gives +2 to Stealth for each level of this implant advantage as long as the listener is depending on hearing rather than sight; maximum level is 5. The benefit is halved if the character is moving at all. $15,000 (and 5 points) per level.

Bioplas Dermal Armor (TL10+)

This modification covers the body with a sheath of living bioplastic. The armor is thin and sensitive enough that it looks and behaves like normal skin, and even heals itself. Bioplas dermal armor acts as invisible armor covering the entire body. It has DR 15, but is flexible; each "6" rolled on a crushing or cutting attack will do a point of damage even if it doesn't penetrate. It costs $200,000 at TL10, $150,000 at TL11, $80,000 at TL12, or $50,000 at TL13+ (and 45 points). It cannot be combined with a bodyshell.

Bioplas Polyskin (TL10+)

Users of bioplas dermal armor with at least DR 1 can add any of these options; each takes one second to mentally switch on or off.

ChamoSkin: When activated, the user's bare skin will automatically alter its color and texture to blend in with the surroundings exactly like a chameleon suit (p. UT85). If nude, the user is -6 to be spotted or attacked visually (halved if moving unless the user is silhouetted against a relatively featureless background), and -3 to be spotted or attacked using infrared. $18,500 (and 30 points). The automatic feature can also be turned off, and the user can voluntarily alter his skin pigment and hair color (takes one second to change each).

SlickSkin: When activated, the user's skin, except for the palms of his hands and soles of his feet, becomes virtually frictionless. If nude or nearly so, he adds +3 to Escape skill and swimming Move; enjoys PD 7 against being snagged by lassos, bolas and so on; has +7 DX to resist grappling, and PD 1 vs. physical thrown or melee weapons. He is -4 to Climbing or Riding skill (-8 if bareback). $10,000 (and 25 points).

VariSkin: As per ChamoSkin, but lacks the chameleon feature and *only* can alter skin and hair color. Unnatural colors (e.g., green, chrome) *are* possible - proper coloration can give a +1 bonus to Camouflage skill. $5,000 (and 3 points).

Claws (TL10+)

A hand (bionic or not) may house generators that cause blades of energy to sprout from the fingertips. The hand may not have finger, claw or talon implants. Energy claws should not be available in TL8-9 cyberpunk backgrounds even if other TL9-11 implants are! Energy claws come in two types:

Sonic Claws (TL10+) do 5d-5 crushing damage (less, if the user wishes only to scratch) and armor protects with 1/5 its normal DR. The sonic vibrations cause flesh and armor alike to flow and melt. Any armor hit loses 1 DR at the location hit, natural armor loses as much DR in that spot as it blocks. Sonic claws are useless in vacuum. They are normally invisible, but do hum. For an extra $2,000, they can be fitted with a holographic projector, making them visible as blades of light. This is useful for intimidation, and to ensure the user knows exactly what he is cutting! Sonic claws cost $120,000 (and 60 points).

Force Claws (TL11+) do 4d cutting or 2d impaling damage. DR protects at one-fifth normal value. A limb taking enough damage in a single hit to cripple it is lopped off and the wound cauterized. A weapon except another kind of energy blade that successfully parries force claws is broken, unless the parry was a critical success. Force claws are $30,000 (and 60 points).

A built-in C cell powers all energy claws for 600 seconds of use. They can be activated or deactivated cybernetically at the start of any turn. Energy claws cost one-tenth as much if implanted into a full-cyborg body, or a bionic hand or arm.

Damage of energy claws increases at higher TLs by +1 per die per TL after introduction (to a maximum of +3 per die).

Sexmorph (TL10+)

The addition of a suite of sphincter valves, synthetic hormone glands and memory or bioplastic implants allow cybernetically switching functional sex within 60 seconds! Built-in memory or bioplastic implants alter body and facial contours and extend or retract organs to conform to male or female morphology. Voicebox implants adjust the vocal range, while body hair is replaced by artificial fibers that extend or retract. Each change produces some internal bruising and a brief hormonal imbalance, and as a result costs 2 fatigue. An originally male character cannot become pregnant or lactate while in female role, but could carry an implanted egg and bear a child. The implants do allow an originally female character to store banked sperm, and, among other things, sire children. If desired, a user can also adopt a neuter phase (no obvious genitalia or breasts) or transsexual phase (male genitalia, female breasts, or vice versa) with voice and features as desired. Sexmorph implants cost $50,000 (and 2 points).

Force-Field Implants (TL12+)

At TL12, a deflector belt (p. UT77) and/or at TL13+ a personal force screen (p. UT78) can be implanted in the body.

The user cybernetically controls it. A concealed socket in the user's back or stomach allows installing new power cells. If overload melts a force-screen generator *inside the body* the device must be replaced, and there is a 2-in-6 chance the user will take 3d damage (armor and Toughness don't protect).

Either costs $10,000 plus the generator's cost. The deflector costs 100 points; the personal force screen costs 200 points.

CYBERWEAR FOR NON-HUMANS

Bionics and other cybernetic implants can be installed in non-humans - aliens or animals, for example. The following considerations apply:

Social Effects: Bionic Pets

If humans are modifying themselves, it's also likely they will modify domestic animals. A cybernetically enhanced guard or police dog is far more useful than a normal animal!

Normal animals may be able to sense animals with obvious bionic implants (use the normal rules for noticing them). If an animal does, it may react at -2 or worse!

Some localities may have specific laws regulating cybernetic pets, especially dangerous animals or those with combat implants. If bionics are not very common, modifying a pet in some areas may violate laws against cruelty to animals or unlicensed animal experimentation.

Installation in Non-Humans

As long as the doctor is familiar with the species being modified, there is no change in the cost or difficulty of the operation. On the other hand, a cybersurgeon familiar with unusual animals or exotic alien races may be difficult to locate, and if little competition exists, may charge a high fee.

Damage to Bionic Parts

The hit points of a bionic limb, other body part or full cyborg body may vary for a non-human species. Take the normal hit points of the bionic part, multiply by the average species hit points (equal to Health unless the species has a split HT) and divide by 10. Round to the nearest whole number, except always round up for results below 1; a bionic part will have at least one hit point.

For instance, a bionic leg on a human normally takes 6 hits to cripple (p. UT105). A cat (p. B142) has a split HT with only 3 hit points. So a cat's bionic limb can take 6 x 3 divided by 10, or 1.8, rounded to 2 hits.

Special Considerations

Bionic Ears and Eyes (p. UT105): Some species may have naturally acute hearing or vision. Adding a basic bionic ear or eye may eliminate this bonus unless several levels of Acute Hearing or Vision are purchased for it.

Bionic Hands and Arms (p. UT106): Many non-sentient animals lack manipulatory ability, and so won't have arms or hands. It's possible to fix this with cybernetics - see *evolutionary cyberwear* below.

Legs (p. UT106): If a species has more or fewer than two legs, adding a bionic leg will increase move and jumping distance by 50% divided by the number of legs the animal has, not by 25%. All legs must be modified to increase Dodge!

Bionic Reconstruction (p. UT106): A species that has undergone bionic reconstruction gains hit points equal to 0.5x its species hit points, not 5. Round fractions below one up; otherwise round down. Thus, a cat with 3 hit points would gain 1.5 hit points, rounded up to 2 hit points.

Hidden Compartments (p. UT106): In a non-human's bionic limb, it may store up to body weight/75 pounds.

Bionic Gills (p. UT107): For $10,000 (and 10 points) a *water-breathing* species can be modified with a *bionic lung* implant that lets it switch over to breathing air. Use the same rules for bionic gills, but in reverse.

Silver Tongue (p. UT108): Even if the species can't manage actual speech, it can still have this advantage at the GM's option. Imagine a cybernetic cat with an especially soothing purr, or a songbird with an exceptionally beautiful trill!

Finger Talons (p. UT108): Non-sentient animals will usually have the toe claws option, since they rarely have arms.

Pet O-ROMS (TL10+)

Seep. 117.

EVOLUTIONARY CYBERWEAR

These modifications are normally added to non-sentient animals in order to make them more "human."

Enhanced Voicebox (TL8+)

This complex implant gives an animal that can't speak the ability to form human words, much like a parrot can. It can be added to any mouse-sized or larger animal. It costs $10,000. Note that giving an animal a voicebox does not mean that it learns a language: a skill chip (p. 117) for the appropriate language is needed; animals with IQ 4-6 will have a very limited vocabulary! Chips are species-specific.

Finger Paws (TL8+)

Finger paws can be added to a bionic or organic leg on an animal whose feet end in walking paws such as a rat, dog, cat or tiger. The option replaces the ordinary paw with a crude hand that can be used both for walking and grasping objects.

Manual dexterity still doesn't equal a human hand: -2 on skills that require a firm grip on an object, such as Climbing, Acrobatics, catching, shooting and most melee-weapon use. If the animal cyborg has a horizontal posture (true of almost all four or more legged creatures) then it can only use both hands when stationary (sitting up on haunches) and cannot carry or use an object one-handed moving faster than half-move.

Finger paws reduces the animal's Move by 1, since its modified hands are not as efficient for walking as ordinary paws. If the animal does not have a symmetrical arrangement of finger paws (e.g., both front legs, both back legs, or all legs), it will suffer an additional -1 to Move.

Each finger paw costs $6,000 if the animal has bionic legs or $12,000 if the upgrade is added to ordinary legs. These are complex implants.

IQ-Boosting (TL9+)

Cybernetic brain implants can increase an animal's effective IQ by 1 at TL9-10 or 2 at TL11+, although sanity may be harmed. Cost is $10,000 for a +1 increase or $20,000 for +2.

This chapter describes ways in which the brain can be cybernetically modified, for good or ill.

BRAIN IMPLANTS

Brain implants are surgically inserted in the user's skull and linked to his central nervous system. This requires a Surgery roll and takes three hours. Failure damages or destroys the implant; critical failure causes brain injury, resulting in a loss of one point of IQ, or other effects (disadvantages such as Epilepsy or a malfunctioning implant) at the GM's discretion.

Brain implant surgery normally costs 20% of the cost of the implant. Some brain implants require sockets. Sockets may be covered with flaps of imitation skin when not in use, making them just as hard to detect as fully internal implants (see *Detecting and Removing Implants* on p. 100.)

Neurotherapy Implants (TL8+)

The first use of brain implants will likely be computer chips surgically implanted into the brain to restore misbehaving or damaged functions, or act as a bridge between injured and healthy areas. A neurotherapy implant can be implanted to neutralize one or more of these disadvantages: Dyslexia, Epilepsy, Killjoy (p. CI91), Non-Iconographic (p. CI92) and Short Attention Span (p. CI94). If brain damage such as a stroke or bungled brain surgery causes DX or IQ loss or other disadvantages (e.g., Blindness or Mute, or partial paralysis resulting in a disadvantage such as One Arm), the GM may allow the implant to fix it. Cost is $1,200 per point of disadvantage neutralized.

A neurotherapy implant uses a tiny AA cell, and requires so little power that it functions indefinitely. Since the disadvantage is only checked, rather than cured, it is not actually bought off - it's simply mitigated, just as contact lenses do for Bad Sight. It will come back if the brain implant is surgically removed, or shut down (e.g., by a paralysis beam or electromagnetic pulse that fries cybernetics). Thus, the neurotherapy implant acts as a -75% limitation; it costs 75% of the disadvantage point cost to neutralize it.

By TL10, neurotherapy implants will eventually evolve into therapeutic *psych implants* (p. UT109) capable of much more precise and comprehensive effects.

Paralysis Implant (TL8+)

This brain implant allows someone to shut down the recipient's nervous system. The implant contains a micro-communicator (p. 42). If the correct code is received (unique to the implant), the user's voluntary muscles or senses will be paralyzed until an "on" code is sent.

A paralysis implant often is used on animals, prisoners or slaves - it's a cheaper but more limited alternative to more higher-TL slave or puppet implants. It also sees some use in the espionage and criminal world. For instance, an agency or criminal organization might tell its agents it is installing some benign cybernetic implant, such as a neural interface, communicator or bionic eye, but also install this device. Activated at the proper moment (e.g., during a fight, or while the subject is driving a vehicle) sudden sensory or motor paralysis can easily result in "accidental" death.

Sensory Paralysis: Shuts off one of one or more of the subject's senses.

Motor Paralysis: Paralyzes any one of the subject's limbs, or all of them.

Vocal Paralysis: Renders the subject mute.

The effects last until the proper code is sent to turn it back on, or the implant is surgically removed. A paralysis implant is a fairly simple device, and can be *built into* another form of brain implant, or a bionic eye or ear. Only disassembling the other implant will reveal the extra function.

A paralysis implant is $4,000; an implant that can perform multiple functions (e.g., sensory-motor-vocal) is $5,000 for two functions or $6,000 for all three. Worth no points in itself, it can explain an Involuntary Duty disadvantage (p. CI77).

Neural HUD (TL9+)

This predecessor to a full neural interface is accessed through a socket mounted in the user's skull. By plugging an interface cable into the socket, the user can plug himself into any piece of electronic equipment designed to work with conventional HUD displays. The user can receive data displays such as instrument readouts or computer screens directly into his optic nerve. In effect, it serves as a head up display without requiring goggles or a helmet visor. Jacked into a weapon fitted with HUD sights it eliminates the need for a visor or goggles and reduces SS by six (instead of the usual reduction for the HUD). It uses an AA cell that powers it for 25 years. A neural HUD costs $2,000 (and 5 points). Most people have only a single socket, but up to four can be installed at an extra $500 (and no extra points) each.

Sensie Recorder Implant (TL9+)

See p. 46.

Chip Slots (TL10+)

A chip slot is a multi-purpose skull socket for the insertion of modular brain implants, colloquially known as "chips". This gives the user the ability to install an almost infinite variety of skills, abilities and even personalities.

The GM should carefully consider whether or not to make chip slots common in a campaign. More than most cybernetics (even other brain implants) they convey a very "cyberpunk" feel, which can be good or bad. As almost any type of implant can be inserted in a chip slot, the user's chips may become more important than his other skills or advantages.

A chip slot user can have no more than IQ/2 chip slots (round up). Beyond that, the brain can't handle the information. It takes two seconds to insert a chip or five seconds to remove one and insert another.

Chip slots cost $5,000 for the first slot, $10,000 more for the second, $20,000 more for the third, $40,000 more for the fourth and so on, the cost per slot doubling each time (up to a maximum of $160,000 per slot) due to the need to integrate and miniaturize circuitry. (Slots cost 5 character points each.)

A chip slot is used by inserting a chip in the slot. It then turns on automatically. For a list of chips that can be slotted, and how they work, see p. 115.

Chip ID (TL10+)

The potential danger of mislabelled chips has led to this safety feature being developed; it can be bought as an accessory for a set of chip slots. If a person has chip ID, instead of the chip activating immediately upon being inserted, the ID first performs a quick diagnostic scan. The diagnosis is about 95% accurate (it works correctly on a roll of 15 or less on 3d), and if successful tells the user what the chip *really* does. The user may then decide whether or not to activate the chip; if he chooses not to activate it, the chip is locked and does nothing. The diagnostic procedure means that a chip takes an extra two seconds to come on-line after being inserted.

The chip ID feature costs $5,000 (and one point) regardless of the number of chip slots the user has installed.

Cybergadgets (TL10+)

Chip slots (p. 111) don't have to be built into a person's skull. They can also be built into *gadgets* at the same cost. A device with a chip slot must have a neural-induction pad (see p. 43) or neural-interface jack (p. UT37); chip slots can also be built into a neural-induction helmet (p. UT37).

If a chip is inserted into the gadget and the user is touching the neural-interface pad or jacked in, the effect is the same as if he put the chip into his head. Note that chip sockets built into devices are normally concealed, just like those installed in a person's skull. This means that if someone picks up a device with an induction pad, they will be affected by the chip. This could lead to them being "possessed" by the device, if it has a "loaded" behavior or personality chip (p. 119).

Unlike with normal interface pads, it's possible to make even non-electronic gadgets into "cybergadgets." A broadsword could have a chip slot and induction pad built in. With the proper skill chip, anyone holding it could become a master swordsman - or be possessed by a chipped personality.

A gadget can have no more than weight/5 chip slots (or 10, whichever is greater). The usual limit of IQ/2 chip slots still applies when using cybergadgets - if a person interfaces with more chips, the excess chips simply won't work (if necessary, roll randomly to determine which do not function).

Cortex Vault (TL10+)

This is basically a blank computer disk and input/output system surgically implanted in the character's skull. It stores up to 10 gigabytes at TL10; this increases by a factor of 10 for every TL after TL10. It is *not* a computer: it cannot run programs, nor can the character access data stored in the vault unless he has a computer built into his head or downloads the data in the vault to a computer via neural interface.

To upload computer-data files to the cortex vault, the user needs a neural-interface socket, helmet or similar device to connect to the computer that contains the information. The data file is then downloaded normally into the vault just as if it were being copied onto a computer disk. The file always is accompanied by a retrieval code. The vault owner cannot read the files as they are stored.

To download data from a cortex vault the user must be interfaced with a computer the same way. If the proper code is sent by the computer, the file is retrieved. If the code is unknown, the computer cannot retrieve the file, nor can it delete it.

If someone with a cortex vault also has a computer implant, he can access or delete any data he knows the code phrase for at any time. If he doesn't, he can only access the data by neural-interfacing with a computer and using the code phrase. On the other hand, if he doesn't have a socket but must use an interface helmet or other method, there's no external clue he has a vault!

A person with a cortex vault can be kept ignorant of the data he is storing. This can be done simply by encrypting the file and retrieval code phrase, so the vault owner only knows the name and size of it, not its contents, when he uploads it. A cortex vault costs $10,000 (and 2 points).

Puppet Implant (TL10+)

A puppet implant is an advanced form of braintap (see p. UT109). It turns the user into a "puppet" controlled by another person. In order to control someone with a puppet implant, the prospective controller ("puppetmaster") must be neural-interfaced with a computer running puppeteer software (Complexity 4, $20,000) that is linked to a communicator in contact with the puppet implant. If the puppet is in range of the communicator (and vice versa) the puppetmaster can seize

control of his body. A puppet has no memory of anything that occurs during the period of control. He is essentially "sleepwalking." He may not be aware that he *was* controlled, especially if the implant took over his body while he slept. A person who is unconscious as the result of injury, stunning, drugs, etc. may not be controlled, only someone who is asleep or awake.

The puppetmaster's own body is in a trance while he "possesses" the puppet's body. He controls the puppet's body as if it were his own, using all its senses. He has no access to the puppet's memories, and cannot communicate with the puppet's consciousness. The puppetmaster will feel all physical sensations the puppet feels and suffer any pain, shock, stunning, Fright Checks and so on - but take no damage. If the puppet is knocked out, he'll be mentally stunned. If the puppet is killed, the GM may require a Fright Check for the puppetmaster.

When controlling a puppet, use the puppet's ST, DX, HT, physical advantages and disadvantages but the puppeteer's IQ, mental advantages, disadvantages and skills. If the puppet has a higher DX or HT than the puppetmaster, the puppetmaster's DX or HT-based skills are increased by the difference between the two characters, while if the puppet has a lower DX or HT, they are decreased by the difference. E.g., if the puppetmaster has Karate-15 and DX 32 and the puppet has DX 13, the puppetmaster effectively has Karate-16 when using the puppet. If the puppet has DX 11, the puppetmaster's skill will drop to Karate-14.

While the puppetmaster is using the module, he can choose to "log out" and turn off the module at any time, returning the puppet to control of his own body. Otherwise his consciousness is totally transferred to the puppet body; he has neither awareness nor control of his own body.

Puppet implants have a variety of uses. Criminals and intelligence agencies can use them for a wide variety of covert operations. People with puppet implants may voluntarily rent out their bodies to perform anything from sex to physical labor. Sometimes the puppet may not even know what it is he was doing - or may not *want* to know. Of course, the condition of his body afterward may provide some clues! Puppet implants can also be placed in animals of mouse-size or larger - actually "becoming" a beast might be a favorite adventure.

A puppet implant has a range of 500 yards. Anything that will block radio blocks the transmitter - a shielded helmet, for instance. It runs off an AA cell for a decade, and costs $10,000. A puppet implant is worth no points as such, but can explain an Involuntary Duty disadvantage (p. CI77).

Slave Implant (TL10+)

This gadget is another way of controlling people. It differs from a puppet implant (above) in that while a puppet implant allows one person to control the user's body, a slave implant affects the user's mind and makes him susceptible to obeying orders from *anyone,* giving them the Slave Mentality disadvantage (p. CI94). It suppresses volition, turning the victim into a living zombie, much like a low-grade robot. A person under a slave implant exists in a "dreamlike" state in which everything seems unreal; the best way to simulate this is on a PC is for the GM to take over for the character as an NPC while the implant

Someone planning to use a slave implantee in a situation where he may receive conflicting orders, such as combat, is advised to cut off his access to outside input. One way of doing that it is to give him ear plugs while sending orders via an implanted or ear-mounted communicator. Provided no one cuts in on the frequency used, this will usually work. Alternatively, it's possible to use slaves who don't share a language with anyone else they will come into contact with but their master. (A slave implantee will not usually think to give another slave implantee orders, but certainly could if told to.)

Because these implants create slaves who totally lack self-initiative, they do not see widespread use: more subtle psychological coercion is usually better in the long term. Slave implants are good for controlling prisoners or creating slaves for manual labor, gladiator battles or cannon fodder.

When the implant is removed or turned off, the user will often not remember everything that happened, particular if it was traumatic. For dramatic effect, the GM should give the character back his memory gradually, in flashbacks that occur in response to stimuli he encounters. For instance, if someone under a slave implant was forced to fight as a gladiator, he may remember images of the fight only after seeing blood, or a weapon similar to the one he used. The Flashbacks disadvantage (p. CI90) is usually appropriate.

The implant can be turned on or off by anyone with the proper codes (usually voice-activated). Thus, the victim may spend part of his time controlled, part free. A slave implant costs $10,000; an AA cell powers it for 10 years. A slave implant is a -40 point disadvantage if the character is always "under" the implant. If it's only used periodically, its usually just an Involuntary Duty disadvantage (p. CI77).

Puppeteer Jack (TL11+)

Any implanted spike or claw that inflicts impaling damage can be equipped with a puppeteer jack. To use it, the modified cyber-weapon must penetrate the subject at the skull or base of the spine and inflict at least one point of damage; damage in excess of the victim's HT/3 is ignored.

The puppeteer jack interfaces with the subject's nervous system and places it under the jack user's control. The user can operate the subject's body like a puppet (see *Puppet Implant,* p. 112). The user has no access to the subject's mind, but can control any brain implants or other cybernetics.

The subject remains under control only for as long as the puppeteer jack remains in his body. The controller cannot move while controlling the subject (Concentrate maneuvers only) and the subject cannot move farther away than the reach of the arm containing the puppeteer jack. (But installing the jack in a spike on the end of a long bionic tentacle will allow the subject considerable freedom of movement!)

If the jack is withdrawn, the subject is freed but must make a HT roll. If the HT roll succeeds, the subject is mentally stunned, and at -2 to rolls to recover. Should the HT roll fail, the subject falls unconscious for 20-HT minutes and has suffered serious neurological damage as a result of the invasion. This causes a permanent loss of 1d DX and 1d IQ (roll separately for each attribute). On a critical failure, the neural damage is irreversible. Otherwise, TL10+ medical care in a hospital or automed can repair this damage, hut slowly: roll vs. the

attending doctor's Physician skill every week (every day at TL13+) to recover a lost attribute point.

A puppeteer jack costs $30,000 (and 10 points). The operation involves modifying the spike or claw into a jack and installing a neural controller in the user's brain. The puppeteer jack is treated as a brain implant for installation unless the user already has an implant computer (p. UT110). If he does, the dollar cost is halved and the jack is a complex implant.

Backup Brain (TL13+)

This brain implant consists of a dedicated neural-net computer and sensor whose sole function is to monitor the user's chemical and electrical thought processes and reshape its own neural network to imitate them.

A backup brain will configure itself into an electronic duplicate of the user's mind after a number of months equal to the user's IQ. The implant is normally a passive monitor. But after it has successfully mimicked the user, a simple operation can shut down the organic brain and give the backup brain control of the user's body. The advantage of doing so is two-fold: the implant is more resistant to brain damage, and it does not suffer IQ losses due to aging, brain disease, etc.

A backup brain implant can also be transplanted into a clone body. This is an ordinary brain-transplant operation except that it costs only half as much (and any rolls to succeed are at +2) because the implant is easier to install than an organic brain. The result will be a clone controlled by a computer that behaves *exactly* like the original person.

If the user dies, the brain implant may survive, preserving the user's memory and personality. This is the case whether or not the ordinary brain has been shut down. If the user was killed by any injury that left his head intact, the implant will always survive. If the brain implant user was killed by a head injury, the implant will survive unless the head was totally destroyed (i.e., damage to the head alone was greater than 5 x HT). If the implant survived, it can be salvaged and transplanted into a cloned body.

A backup brain implant costs $50,000. Once the implant has taken over, the user's combined ability to avoid IQ losses from aging and sometimes evade death is worth 10 points.

MODULAR BRAIN IMPLANTS: CHIPWARE

"Chips" are modular brain implants that are slotted into chip sockets. There are several types of chips available, from offline memory to chips that alter the user's psychology. Each chip is about 3/4"xl/2"xl/4" in size, just large enough to be easy to handle. A chip is tough enough to avoid most accidental damage.

Like other cyberwear, chips cost points. Since they require slots to use, if a character owns more chips than slots, he only pays full point cost for his (number of slots) most expensive chips. Any additional chips cost 60% of normal.

Example: Moshe has four chip slots, and owns three 15-point chips, three 10-point chips and five 5-point chips. In addition to the point cost of the chip slots, Moshe's chips cost him 82 points - he's paying full point cost for the three 15-point chips and one of the 10-point chips; the others get a 40% discount, as he can use four chips at a time. If Moshe later buys a 20-point chip, he'd pay an extra 16 points: his most expensive chips become one 20-point and three 15-point chips, a total of 65 points. The other 55 points worth of chips would cost him 33 points.

CHIP LABELLING & DIAGNOSIS

Chips are convenient and useful, but they have one big risk. When you slot a chip, you are handing over your mind to the person who programmed the chip. If they were incompetent, or if the chip is not what you think it is . . . you're in trouble!

To prevent accidents, most commercially available chips are carefully marked and color-coded, with the labels securely etched into them. Some may even have warnings on them ("Not for children. May result in personality changes."). But simple error when labelling or TL8+ tools and a successful Forgery skill roll can easily alter a chip's label. Experimental, military or black-market chips will often use cryptic or false codes, or be totally unmarked!

The diagnostic probes included in a set of **TL8+** electronics tools can analyze a chip (or other brain implant) without taking it apart. A quick diagnostic scan takes a minute. To perform the scan, the GM rolls against Electronics Operation (Medical) or Electronics Operation (Cybertech) skill. Electronic tools are required; modifiers are +2 for a portable shop or microsurgery, 0 for basic tools, -2 for a portable tool kit, -4 for a mini tool kit. Success reveals a chip's general function; this is useful for making sure it matches the label! Failure means the chip can't be identified; critical failure means it is wrongly identified; critical success may reveal any secret or hidden bugs. A more detailed scan (takes an hour) gives +4 to skill.

DRAWBACKS OF CHIPPED SKILLS

Three types of chipware (O-ROMS, skill chips and reflex chips) allow the user to gain skill levels by plugging in a chip. Someone who relies heavily on chipware runs one danger: some of his actions will rely on suggestions and information within the chip, which can make him predictable. If someone knows the *exact* make of chipware that a competitor or opponent is using, and has carefully studied that chip, he can get a + 1 to +3 bonus (GM's option, depending on the extent of the knowledge) in any Contest of Skills where having an idea of an opponent's strategies or moves would be an advantage.

For example, Natsuki has Karate-16. Her opponent Ken has Karate-15 but also has a reflex chip that boosts him to Karate-17. Natsuki knows that Ken is using the Streetslayer II chip and that the chip is biased toward certain moves and combinations. Natsuki has carefully studied these. When Ken attacks her and tries a tricky maneuver, the GM gives Natsuki a +2 bonus to her own Karate skill to counter Ken's feint. The same type of modifier could apply to any suitable contest, whether it

is one of Gambling, Economics or Tactics. In general, the bonus should only last until the opponent guesses what is happening and acts to counter it (or removes the chip), but figuring this out may require an IQ or skill roll, and possibly a defeat or two.

Relying on chipped skills may have other drawbacks. Ideally, it will simply give the user the necessary technique while allowing him to concentrate on original execution and ideas, but sometimes the built-in expert systems and preprogrammed reflexes actually suppress originality. Optionally, if someone is trying to do something artistic or inventive with a chip-enhanced skill, the GM may wish to limit their ultimate degree of success, e.g., by treating any critical success as an ordinary success. Thus, a highly skilled chipped artist may produce technically perfect work, but be unable to create an original masterpiece.

TYPES OF CHIPS

Some of the more common chips are described below. GMs should feel free to come up with other examples.

Amp Chip (TL10+)

The user of this chip needs very little sleep. All fatigue losses from missed sleep (see p. BI34) accumulate weekly instead of daily. This means a week without sleep costs 5 fatigue rather than 35 fatigue! $10,000 (and 10 points).

Chameleon Chip (TL10+)

A chip can be designed to defeat analysis by either Chip ID (p. 112) or chip diagnosis by electronically masquerading as something else. A chameleon chip subtracts 5 from the chance of a successful chip analysis or chip ID *and* any failure means a false readout: the chip is automatically misidentified as whatever it was programmed to look like. Chameleon chips are not normally available on the open market! Making a chip into a chameleon chip adds $2,000 to its cost.

Clock Chip (TL10+)

This chip features an onboard clock and timer accurate down to milliseconds (1/1000 of a second). It conveys the Absolute Timing advantage (p. B19). $500 (and 5 points).

ID Chip (TL10+)

This functions the same way as a chip ID implant. The disadvantage is that it takes up a chip slot itself. See *Chip ID* on p. 112. $4,000 (and one point).

Macho Chip (TL10+)

This simple chip overrides all the body's pain sensors. The user is immune to physical stunning due to pain and does not slow down when brought to three or fewer hit points. The user may hurt himself accidentally: he could feel a tap on the leg without knowing for sure whether it was a cut. While this chip is slotted, the *player* no longer knows how many hits his character has taken, though the GM should inform the player of how bad the injuries *look* when the PC takes the time to examine them. A Macho chip costs $2,000 (and 5 points).

Sensie Chip (TL10+)

See p. 46. Also called a "Trip."

Sensie Recorder Chip (TL10+)

See p. 46.

Advantage Chips (TL10+)

When slotted in, these chips give the equivalent of an advantage. Advantages not listed here cannot be chipped in. The following chips are available:

Ambidexterity (TL10+): $10,000 (and 10 points).
Charisma (TL11+): $5,000 (and 5 points) per level.
Combat Reflexes (TL10+): $15,000 (and 15 points).
Common Sense (TL11+): $10,000 (and 10 points).
Fearlessness (TL10+): $2,000 (and 2 points) per level.
High Pain Threshold (TL10+-): $10,000 (and 10 points). For a cheaper version, see Macho Chip, above.
Lightning Calculator (TL10+): $5,000 (and 5 points).
Literacy (TL10+): $10,000 (and 10 points).
Strong Will (TL11+): $4,000 (and 4 points) per level.
Unfazeable (TL11+): $15,000 (and 15 points).

Most of these electrically stimulate (or take over) areas of the brain to alter behavior in a pre-programmed fashion.

Charisma chips works by stimulating the user to modulate his voice and gestures in accordance with criteria known to be effective from studies of orators and actors.

Common Sense chips monitor the user's stress and excitement levels, and send out warning cues if they detect the user acting in a fashion that seems to be overly impulsive.

Literacy chips incorporate a subconscious pattern-recognition database for a particular script. They do not grant the language skill itself (see *Skill Chips* on p. 117). Also, a different literacy chip is needed for each script known.

Attitude Chip (TL10+)

This chip electrically stimulates areas of the brain to produce certain chemicals or sensations, effectively altering the user's behavior in preprogrammed ways. An attitude chip negates or adds a single mental disadvantage, depending on the chip. Basically it is much like a psych implant, but easily removable. In this way, personality becomes something like clothing which you can add or remove to suit the moment.

Attitude chips are very popular with fringe groups. For instance, the members of a medievalist society who are going to a weekend Renaissance fair may all don chips with Chivalric Code of Honor. A person also may experiment with attitude chips before deciding to change his personality for good with a psych implant.

If an attitude chip negates a disadvantage, the point cost is half that of the disadvantage negated. The cash cost is $200 times the point value of the disadvantage.

If it adds a disadvantage, say, to cause Lecherousness or Fanaticism, it reduces the character's point value and the cash cost is only $100 times the point value of the disadvantage.

Some disadvantages are object- or subject-oriented, such as Duty, Fanaticism, Obsession, Sense of Duty, Trademark or Vow. In these cases, chipped versions are generally only available if they cover a well-known subtype of the disadvantage, e.g., a Sense of Duty (Family) chip or Fanaticism (Patriotism) or (Religious). In such cases, the chip simply intensifies and directs the user's own feelings; an atheist who donned Fanaticism (Religious) chip might become a *militant* atheist, or embark on a search for mystic truth.

It *is* sometimes possible to buy chips that are more specific, as long as they relate to well-known belief structures, groups or causes, e.g., Vow (Vegetarianism), Fanaticism (Fundamentalist Christian), Delusion (Flat Earth) or Code of Honor (Gentleman's).

Attitude chips are generally legal. The exceptions are those which cover attitudes a society may class as harmful or dangerous. Examples that might be "black market" in our society are Berserker, Delusion ("I can fly without wings"), Sadism, any form of Intolerance or Fanaticism (Nazi Ideology).

Dummy Chip (TL10+)

This chip reduces the wearer's IQ by a predetermined amount. It costs $1,000 (and lowers point value while worn).

Jackhammer Chip (TL10+)

This is a chip which incapacitates the user. Most are illegal; they come in several flavors. None have a point cost.

Happy Hammer: Stimulates the pleasure center for a week. A daily Will+2 roll is required to avoid addiction. A Will roll is needed to remove the chip voluntarily or ask another to do so; failure means you can't try again for an hour. $2,000.

Headbanger: Stimulates the pain center and incapacitates the user to such a degree that he cannot remove the chip himself without a massive effort (Will-5 roll allowed per minute, or Will roll if he has High Pain Threshold). A few minutes under this and the threat of more stimulation gives a +5 to any Interrogation rolls against the victim. Some models also keep the victim from screaming while he is under. $3,000.

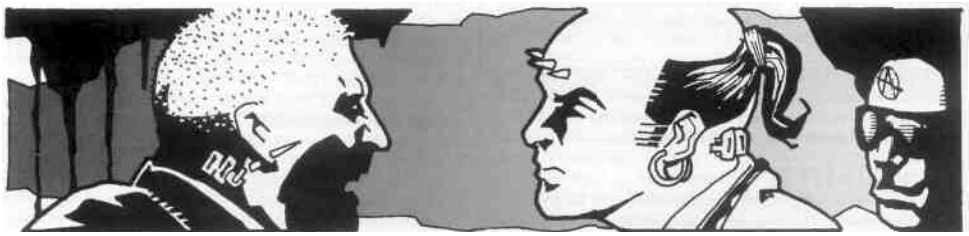
Harvey Wallbanger: The user becomes mindlessly drunk. Alcoholics can use this chip instead of actually drinking; it's easier on the liver. $1,000.

Nightmare: This stimulates the brain to induce terrible nightmarish hallucinations - for as long as the chip is worn. Afterward, a Fright Check is mandatory. The number of minutes spent under the chip will modify the penalty. Refer to the Size and Speed/Range Table on p. B201 and read "yards" as minutes to determine the penalty to the Fright Check roll. For instance, an hour (60 minutes) under the chip is a -9 modifier! $2,000.

Slave: This has the same effect as a slave implant (p. 113). The first order to a person slotting this should be, "Don't remove the chip!" $10,000.

Math Chip (TL10+)

This chip gives the equivalent of the Mathematical Ability (p. B22) advantage. It is a very common chip, and as such is relatively cheap. $5,000 (and 10 points).



Skill Chips (TL10+)

These chips (sometimes called *skips)* convey extra ability in a particular *mental* skill. They are mostly smart, interactive database and retrieval programs at the lower levels, but higher-value skips include an expert system with its own knowledge.

Each skip grants the user a certain number of character points dedicated to its specific skill. This is indicated by a number in brackets after the skill. Note that no more than 4 points can be added to a creative or performance skill like Writing or Singing. Multiple skips for the same skill are not cumulative: only the highest applies.

Example: A Metallurgy [8] skip grants 8 character points in Metallurgy. If used by someone with no Metallurgy skill, it would give them IQ+2 in that skill (8 points in any Mental/Hard skill gives IQ+2).

Even an expert can potentially benefit from a skip: it puts huge amounts of data at his instant command and he knows how to use it - but if points in a skip are insufficient to provide a skill increase, it has no effect.

The dollar cost of a skip is $2,000 per point for up to 8 points, $5,000 per point on chips from 9 to 20 points and $10,000 per point for chips of more than 20 points. (If the GM is charging character points for skips, they cost half their calculated point value: an 8-point skip would cost four character points.)

Examples: A skip worth 6 points costs $12,000. A 14-point skip would cost $70,000. A 26-point skip costs $260,000.

Pet O-ROMS (TL10+)

These can be implanted into IQ 3-7 animals that have chip slots (p. 111). Insert the chip and the animal functions as if it had been trained. (The chip also will gradually teach the animal to function as if trained even without it: each day worn is equivalent to two days of training.) Chipware for animal training costs $100 x the number of days it would take to train the animal to a given IQ level using normal means - see p. B144.

Pet O-ROMS are specific for individual species and IQ levels. For instance, if you insert one for training a boa constrictor into a dog, expect total confusion! The effects on a human are up to the GM's imagination: maybe reduction in IQ and behavior to that of a trained animal of the type and IQ it is designed for, plus the Epilepsy disadvantage due to neurological incompatibility with the signals received.

Reflex Chips (TL10+)

Reflex chips (or "flips") are very similar to skips, with a few differences. They cover physical rather than mental skills. They are also more expensive, as they require control over the user's body as well as his mind.

Just like skill chips, reflex chips add a certain number of character points dedicated to a specific skill, indicated by a number in brackets after the skill. If the slotter is highly skilled, a reflex chip may not add enough points to increase skill. Character points from multiple reflex chips slotted for the same skill are not cumulative. A user cannot combine both a reflex chip and a reflex implant (p. UT110) for the same skill at the same time - if anyone tries to, use only the chip or implant that gives the higher skill level.

The dollar cost of a reflex chip is $4,000 per point for up to 8 points, $10,000 per point on chips from 9 to 20 points and $20,000 per point for chips of more than 20 points. (If charging character points for flips, they cost half the calculated point value: a 4-point reflex chip would cost 2 points.)

A reflex chip requires time for the user to synchronize his body with the chip: 10 minutes per point is recommended, e.g., a Guns [2] chip requires 20 minutes of acclimatization.

Behavior Chip (TL10+)

This chip partially replaces the user's personality with that of another person or archetype. His skills and memory remain intact; it is behavior that has changed. The behavior chip can be thought of as a kind of super attitude chip (p. 116) or low-grade personality chip (p. 119). Behavior chips always have some sort of persona attached to them: they may be modeled on a real person or a fictional character, or a new character may have been designed especially for the chip.

A behavior chip of a "real" subject can be created using a computer model of that person if enough data is available. Usually this is only possible for celebrities, though - in the case of people who have stayed out of the public eye, a brain-tape can be used as the basis for the behavior chip construct.

The GM should list the mental advantages, disadvantages and quirks the behavior chip grants along with those *negated.* The chip may grant or negate any combination of the advantages Charisma, Common Sense, Fearlessness, Strong Will or Unfazeable, along with any quirks or mental disadvantages.

The dollar cost of a behavior chip is $100 times the total number of points (positive or negative) in added advantages, disadvantages and quirks *plus* $200 times the total number of points of any negated advantages and disadvantages. For an extra $500, the chip will negate *all* quirks the user has. For instance, a chip that grants Common Sense (10 points) and Truthfulness (-5 points) is a total of 15 pointsx$100:$1,500.

To determine the point cost of the chip, compare the advantages, disadvantages and quirks gained with those that are lost. If the net point total is positive, the user can be charged up to half the point total for the chip. Otherwise, there is no point

An example of a typical behavior chip is shown below: *Montague Sands Chip:* The user of this chip gains an personality modeled on the fictional Montague Sands, patriarch of the Sands clan in the hit soap opera *The Sands of Mars*. Anyone who slots it is granted the advantage Charisma +2, the disadvantages Bully, Greed, Overconfidence and Sense of Duty (Family) and the quirks Connoisseur of Fine Food, Chivalrous Toward Women, Collects Guns, Impatient with Fools and Martian Patriot. The chip negates all the user's quirks and also negates the disadvantages Cowardice, Gullibility, Laziness and up to 10 points of Shyness. The Montague Sands chip retails for $14,000. It is marketed to middle-income people who are indecisive, shy and want to make money. The point cost will depend on the user.

Zap Chip (TL10+)

This is an advantage, clock, skill or reflex chip, or O-ROM (see p. 118) with built-in misinformation. It may make the user generally inept, giving only a low level of ability, or it could actually subtract from it! Or it may work fine but contain a single error that fouls it up under certain circumstances (or in the case of a skill chip, gives false information). Some Zaps may even cause neural feedback that occasionally triggers effects not related to the chip's purpose. Zap chips may be deliberately created (usually as part of some plot) or simply represent "buggy" chipware. Sometimes the latter are for sale.

"It's a cherry Guns [18], ice as can be, with one tiny zap. What? Word to the wise: Don't use it with a laser sight or the feedback loop not only zeroes your accuracy, you may experience a few side effects. Headaches, temporary blindness . . ." A known zap will reduce the dollar cost of a chip; at the GM's option, it can also lower the point cost, depending on how obnoxious it is (treat this as a Nuisance Effect, p. CI111).

Occupational Chips (TL11+)

These chips are usually called O-ROMS (Occupational Read Only Memory). They basically combine the effects of multiple reflex, advantage, skill and attitude chips onto a single piece of chipware. They provide the expert systems and skill databases necessary for someone with little or no experience to act as a trained professional in a given field. Many O-ROMs incorporate those advantages and disadvantages their designer deemed useful for the profession; this choice can sometimes be quirky. All of the effects of an O-ROM operate as long as the O-ROM is slotted, and cannot be switched off.

O-ROMS are not cheap. Their base cost is equal to the sum of the cost of the equivalent skill, reflex, advantage and attitude chips whose effects they combine, plus the price of any databases included. But on the other hand, they also allow an untrained person to instantly perform like a skilled worker: giving a rookie an O-ROM is often cheaper than training and indoctrinating someone. This can be dangerous. A person with a supply of O-ROM chips combining combat skills and appropriate advantages and disadvantages could create an instant army. Since some O-ROMS can incorporate behavior modification, this could even turn unwilling victims into fanatical, highly skilled janissaries. O-ROMs could also allow terrorists to acquire scientific and engineering skills to build sophisticated weapons of mass destruction. (Though the same is true of sentient computers and skilled expert-system programs.)

Widespread use of O-ROMS might lead to a general decline in formal schooling. But they also can be used while undergoing on-the-job training: count each four hours of work at a job while using an 0-ROM as one hour of study toward attaining any one skill it includes. Thus, book-learning may be replaced with a plug-in O-ROM and an on-the-job apprenticeship to learn what isn't on the chip.

The high price of O-ROMS, combined with their great utility, could lead to a demand for bootleg copies and stolen black-market versions. Many of these may well have bugs of some sort, some intentional. Sure, that bootleg Marine O-ROM gives you all manner of fighting skills and makes you immune to pain - but it also gives you Sense of Duty (Federation Space Marines). Oops.

Stolen or illegally copied black-market O-ROMs may contain valuable classified information in their databases, possibly information that is unknown to the marketer. Imagine the value of a soldier O-ROM that not only included the skills needed to repair the Marines' newest tank, but also classified information on its top-secret sensor and stealth systems! Some examples of O-ROM are:

Accountant: Contains Mathematical Ability, Lightning Calculator, a few skill points in Accounting and Administration, a database of current accounting practices and the Honesty disadvantage. Legality 6.

Ship's Engineer: Contains Mechanic, Electronics, Electronics Operation, Engineering and Vacc Suit skills. Sense of Duty (Engines) and possibly the Gaelic language. Legality 5.

Cop: There are as many types of cop O-ROMs as there are police forces. Slotting one designed for the imperial secret police will give different results then one designed for a colonial sheriff. A typical O-ROM for urban beat cops includes Combat Reflexes, Unfazeable and a few skill points in each of Area Knowledge, Beam Weapons or Guns, Brawling, Driving,

First Aid, Forensics and Law, plus a handbook of police procedure. The disadvantages Honesty and Sense of Duty (The Public) and sometimes No Sense of Humor are common additions. The psychological modifications included in police CD-ROMs are the subject of heated discussion by mayors, citizen groups and police unions: if you can program a police officer, do you want the law enforced by Joe Friday or Dirty Harry? Legality 3.

Soldier: A military O-ROM usually contains Combat Reflexes and a variety of useful weapon and other skills (e.g., Armoury, Camouflage, First Aid), plus a database of military regulations and information on the equipment and tactics he is expected to use, and sometimes those of the enemy as well. A soldier O-ROM may also have a military specialty built in, such as Battlesuit, Driving or Piloting, Electronics Operation, Gunner, Mechanic or even Surgery. O-ROMs for officers include Intelligence Analysis, Leadership, Savoir-Faire (Military), Strategy and Tactics. Soldier O-ROMs may vary tremendously in scope (and cost): an O-ROM designed to turn out a quick-and-dirty militia rifleman will bear little resemblance to one intended for a space cruiser's bridge officer. Some military O-ROMs contain disadvantages such as Bloodlust, Code of Honor or Sense of Duty; other armed forces, especially those composed of volunteers, prefer O-ROMS that leave soldiers in their right minds. But a normally pacifistic culture might have to equip all its soldiers with psych-altering O-ROMs! Legality 2.

Specialized O-ROMS also are used to train animals - see *Cyberware for Non-Humans* on p. 109.

Braintap Chip (TL11+)

This exactly duplicates the effect of having a braintap implant (p. UT109). It costs $8,000 (and 0 points).

Incapacity Override Chip (TL11+)

This is a "cruise control" for the body. If the user is stunned or rendered unconscious, the chip takes over active control. Its first reaction is to run from danger to the nearest safe place. If retreat isn't possible, it goes into Berserk mode as per the disadvantage (p. B22). A person run by the chip has none of his own skills. He *can* use any skills he has on reflex (not skill) chips, but everything else operates at default level. The chip will keep the user on his feet until he dies or regains consciousness long enough to override it. The chip also can be programmed to fight until a certain amount of damage is taken, then allow flight. $15,000 (and 10 points).

Personality Chip (TL11+)

This is a personality implant (p. UT110) designed to fit in a chip socket. Basically it's a braintape program burned onto a chip. When slotted, the chip suppresses the user's personality and replaces it with the personality encoded on the chip. Its modularity gives it some special features that make it work somewhat differently from a personality implant.

Personality chips come in active and passive models. An active chip causes the user to gain the quirks, mental disadvantages, mental advantages (GM's discretion), IQ and skills of the chipped personality; physical skills are modified by the difference in DX. Effectively, he's possessed.

A passive chip is the same, except that the user retains his original general motivations and loyalties. He's still possessed, but at least his goals are the same as they were before.

A personality chip costs at least $20,000, often much more. Active chips aren't worth any points unless the new personality counts as an Ally. Passive chips are worth as many points as the net value of all new advantages, extra IQ and skill points minus any disadvantages and quirk they come with.

Independent Personality Chip (TL12+)

This active personality chip has a neural-net memory cache that allows it to store memories of its experiences while slotted. This means it can retain knowledge it gained while being slotted, and can also gain experience, just like any other character. Its personality can also change over time.

Because personality chips, unlike implants, are easily removed, independent personality chips are more like individual *entities*. In a world where chip sockets are common, a group of rogue personality chips could even kidnap new victims and transfer themselves from body to body as needed. In fact, they might exist only on chip, if the original body from which the braintape recording was made was destroyed!

A character who is nothing more than an active personality chip can be created as a PC if the GM permits. Simply ignore ST, DX, HT and any physical advantage or disadvantage when buying the character (list physical skills simply in terms of the number of points in them). The advantages and disadvantages of being a chip-entity cancel out. An independent personality chip costs at least $200,000.

CYBERBRAIN AUGMENTATION (TL12+)

This technique introduces nanomachines into a living brain. The nanomachines disassemble the brain's neurons and replace them with inorganic duplicates that function more efficiently and much faster. The result is someone who can think more rapidly and make logical leaps and connections between data that would elude ordinary people.

Introducing the nanomachines takes an hour; the transformation takes about a week to run its course, during which the subject remains conscious.

The subject gains the advantages Enhanced Time Sense (p. CI54, 45 points), Intuition (15 points) and Intuitive Mathematician (p. CI26, 25 points).

Note that sentient computers, while they think very rapidly, do not always get this bonus, because they generally lack the natural intuitive leaps of a human mind. Someone with cyberbrain augmentation is both human and machine in a way that even an AI or a cyborg with a computer brain implant is not.

Cyberbrain Augmentation costs $850,000 (and 85 points), which purchases the nanomachines. If the subject already has some of the advantages, reduce the point cost appropriately.