PYRAMID

Issue 3/85 November '15

CUTTING EDGE

TRAINING FOR THE TECH
by Phil Masters

FREE FALLING
by Timothy Ponce

THE PERKY L33T
by Christopher R. Rice

CUTTING-EDGE ARMOR DESIGN
by David L. Pulver

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by Jon Black

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by Matt Riggsby

STEVE JACKSON GAMES

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Cover and Interior Art
Brandon Moore

In This Issue

The future is so close, you can almost taste it! This month's *Pyramid* looks at the near-now, with skills, tech, and situations for those on the bleeding edge of reality.

When weapons innovations continue to push the envelope, the best fighters are constantly *Training for the Tech.* Phil Masters – author of ***Transhuman Space: Martial Arts 2100*** – takes a look at futuristic gunplay, with styles and style components of particular interest to those in a TL9 campaign (including, of course, ***Transhuman Space***). Become a missile whisperer, partner up with a support shotgunner, and more!

When the cyberpunk tomorrow comes, there will never be a better time for *Remixing the Rocker.* See how the world of music might evolve in a world of chrome, with ***GURPS*** info on technological tweaks to tunes, mind-controlling music, and even using aural elements to help with healing!

The future might be dangerous; fortunately, you can be prepared with *Cutting-Edge Armor Design!* This month's Eidetic Memory offering from ***GURPS Ultra-Tech*** co-author David L. Pulver pushes the boundaries of armor creation, with a plethora of options to devise your own futuristic protection. Have you ever wanted to make arachnoweave or ceramic nanocomposite armor? Now you can!

The blackness of space is a frontier all its own, and one challenge its inhabitants must contend with is *Free Falling.* With this ***GURPS*** guide to all things related to weightlessness, you'll learn zero-G fighting styles, how to move in a free-fall environment, what kind of health problems you'll have in space, and more.

This issue also contains an Appendix Z that adds some perks for cyberpunk hackers, a Random Thought Table that looks at the future through the lens of the past, and an Odds and Ends that highlights the stunning cover from Brandon Moore. It also includes a vignette by Matt Riggsby, long-time ***GURPS*** author, that takes you into the world of ***Car Wars,*** as its cutting-edge development continues apace.

Sometimes the future is not knowing what you wanted until you see it . . . then you don't know how you lived without it. Even if you didn't know before you wanted to play a laser-blasting, liquid-armor-wearing musician living in microgravity, you probably want to do so now . . . and this month's issue is here to help. The future has never looked better!

Even the tiniest of actions can change the future.

– Casey Newton, in ***Tomorrowland***

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From the Editor

The Future Is Now! No, Wait; Now! Um . . . Now!

Lots of science-fiction stories take place in far-flung futures. But the future is closer than ever, and this issue of *Pyramid* is devoted to all the tomorrows that are just around the corner.

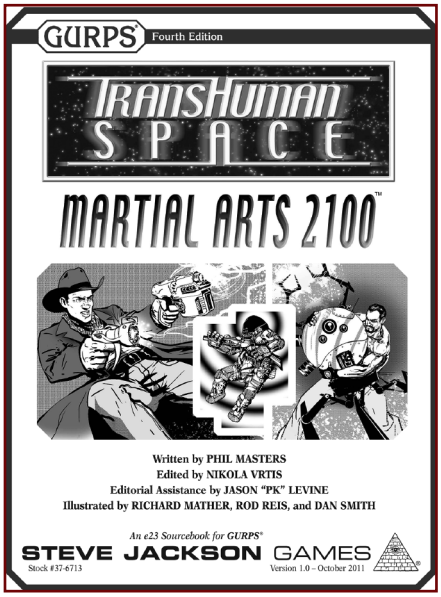
The great thing about the "near now" futuristic style is that it can be part of so many types of gaming. Certainly, campaigns set in the not-too-distant future can use more glimpses of tomorrow. However, even games that are set in "today's" world benefit from these materials – especially those that skirt the edge of believability. When a campaign has monster-hunting champions or shadow-lurking assassins, what's so unbelievable about hyper-new armor, or a quick zero-G trip outside of Earth's atmosphere? Even super-spies could find themselves on a space shuttle . . .

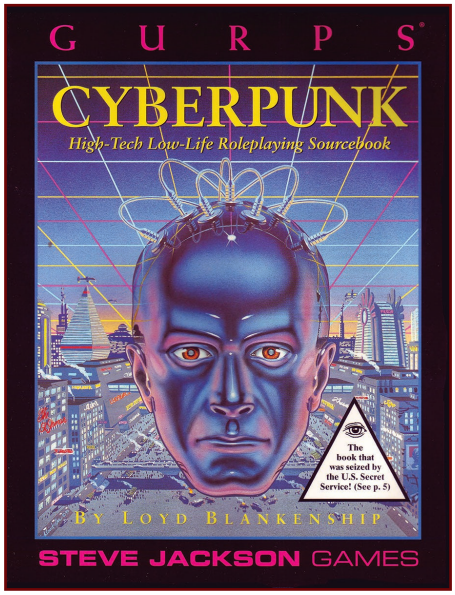
Plus, the future is always ahead until it's here. Maybe the heroes are the *first* cyberpunk-style rock band in the world, or the world's only operatives of laser-wielding battlesuits.

So if your game is in the future, there's sure to be something here that'll ring true for you. And if it's set in the present . . . well, there's no time like the future!

Write Here, Right Now!

How was your visit to the realms beyond today? Did you find something to write home about, or was something not quite what you were expecting? We love to get your comments! Let us know via ultra-tech speeding electrons that arrive personally to our inbox at **pyramid@sjgames.com**, or join our online virtual realms at **forums.sjgames.com**.





Additional Material: Sean Punch and Hans-Christian Vortisch

Training for the Tech

by Phil Masters

After ***GURPS Martial Arts*** introduced the concept of combat styles, ***GURPS Tactical Shooting*** and ***GURPS Gun Fu*** described styles for various forms of firearms gun combat, for use in realistic and cinematic games respectively. *Tactical Shooting: Tomorrow* in *Pyramid #3/55: Military Sci-Fi* looked at how material from the former could be projected forward into a world of TL9 weapons as described in ***GURPS Ultra-Tech.*** Meanwhile, ***Transhuman Space: Martial Arts 2100*** examined the development of martial arts styles in that specific TL10 setting, including a couple of firearms-related styles, developed from material in ***Transhuman Space: Changing Times.*** This article in turn builds on those foundations to suggest some further firearms styles and variations for TL9 and TL10 settings. It makes some reference to the world of ***Transhuman Space,*** but this material could be used just as well in other settings. It mostly assumes non-superscience weapon technologies, but the ideas here are quite adaptable.

The Virtual Veteran Factor

One established feature of the Transhuman Space setting is that professional soldiers (including military infomorphs) can safely be assumed to have spent hundreds or thousands of hours in highly realistic virtual reality training before they ever see real action, making them formidably skilled, at least within the scope of topics covered by the VR courses. The same could well apply in other futuristic settings. One way to represent this is to *require* everyone with such military backgrounds to take a shooting style, with at least, say, 20 points in its skills or techniques. In turn, this allows them to buy two of its style perks and another "shooting" perk of their choice, which also should be encouraged. This makes "virtual veterans" very good, while making others from similar backgrounds similar (but not necessarily identical) in their skills.

Those same training systems also would be designed to inculcate good crisis responses. A combat-oriented virtual veteran usually would have Combat Reflexes (or Enhanced Time Sense, thanks to nanotech modifications or being a robot), or a good excuse for its absence.

Battlesuits and Space Marines

Martial Arts 2100 and *Tactical Shooting: Tomorrow* have already addressed issues relating to powered armor and spaceborne, zero-g combat, so that subject isn't covered much here. Even so, many new aspects are as relevant to the Space Marine style (*Pyramid #3/55,* p. 12) as they are to the Assaulter style (***Tactical Shooting,*** pp. 47-48); the former is essentially the spacer's version of the latter.

Style Components

The styles described here use components from the sources listed above, plus a few more, as described below.

> *The **versatility** of the Jelly comes from its ammunition. There are thirteen basic types of ammunition which the SF-MC uses.*
>
> *– Jean Johnson, **A Soldier's Duty***

Advantages

As usual, these styles have various advantages commonly associated with them. Note that some of these are distinctly cinematic, requiring Gunslinger as a prerequisite. However, futuristic biotechnology or cybernetic implants may actually move some such advantages into the realm of the "realistic," if expensive in cash terms.

Gizmos

see p. B57

This is a cinematic advantage, but sometimes useful in that context. Ultra-tech gunfighters have a large range of ammunition options; cinematic heroes may have a knack for always having exactly the right types with them on any given mission. See ***Gun Fu,*** p. 15, for more notes on this advantage.

Gunslinger

see p. B58

As usual, this gives access to the cinematic elements of the firearms styles described on pp. 6-9. Also, with these rules, Gunslinger provides all the benefits of the Gunner's Guidance and Running Missile Lock perks described below. Furthermore, if you prepare a homing missile for launch while making an All-Out Attack, as described for Running Missile Lock, you *don't* take the -2 on the associated skill roll.

New Style Perks

As usual, a perk marked * is cinematic, and one marked † requires specialization. Note that, if you're using these rules in a cinematic game, the Gunslinger advantage now provides all the benefits covered by both Gunner's Guidance and Running Missile Lock, and more; you don't need to buy them if you've got that.

Gunner's Guidance†

Advances in miniaturized electronics at TL9 and beyond permit some ordinary personal firearms to be operated as launchers for homing missiles. Normally, using these requires a roll against Artillery (Guided Missile) – a completely separate skill to the one acquired to use the guns involved. However, you have learned how to operate the relevant systems as an integral part of your firearms training. This perk must be bought separately for each Guns skill specialization.

Instead of the usual roll against Artillery skill, when you're preparing to fire a homing missile from a gun of the appropriate type, you can make an IQ-based roll against the Guns specialization normally used with that type of gun in order to lock it on to the target.

Example: Corporal Chandrasingh has IQ 11, DX 13, Guns (Gyroc)-15, and Gunner's Guidance (Gyroc). When she fires a homing missile from her gyroc carbine, she makes an IQ-based Guns roll (with an effective skill of 13) to claim the gun's Acc as a bonus to the missile's roll to hit.

This perk is essentially a version of Skill Adaptation (***GURPS Martial Arts,*** p. 51, or ***GURPS Power-Ups 2: Perks,*** p. 17). Note that Transhuman Space games employing the combat rules in ***Changing Times*** already will use Guns skill to aim homing missiles fired from guns, which makes this perk irrelevant.

*Missile Whisperer**

You can, seemingly, improve a homing missile's effectiveness by sheer force of will. If you launch such a missile at a target it can reach within one second (i.e. that is within its 1/2D range), you can take an All-Out Attack (Determined) maneuver on the turn when you fire it, not a Ready maneuver; however, you cannot move at all while doing so. This gives +1 to the *missile's* attack roll. If the target was further away (outside the missile's 1/2D range but within its maximum range), you can take a Concentrate maneuver on the turn when it reaches its target, and again give it +1 to hit.

Running Missile Lock

Normally, setting up a homing missile for firing requires an initial Aim maneuver to lock it onto its target. You have practiced performing this task while on the move. When preparing to launch such a missile from a handheld gun or launcher, instead of an Aim, you may take a special All-Out Attack maneuver, permitting you to move up to half your Move at the same time, at the cost of not being able to attempt any active defense. However, you still have to make an Artillery (Guided Missile) roll (or an IQ-based Guns roll, if you also have the Gunner's Guidance perk and are using an appropriate weapon). This takes -2 in these circumstances.

*Tangled Trajectory**

When firing homing missiles at a target within 2/3 of their maximum range, you can choose to send them on wildly indirect paths, making them harder for the target to evade. Effectively, in game terms, you can make your homing missiles perform Deceptive Attacks (p. B369), giving the target -1 to active defenses against the attack for every -2 that the missile takes to its own attack roll.

Other Perks

The styles on pp. 6-9 borrow style perks from any of the sources mentioned in the introduction. Note that cinematic perks – mostly drawn from ***Gun Fu*** – are of course only used in cinematic versions of the styles, so a GM running purely realistic games won't need that supplement.

Cross-Trained

If you are using both ***Gun Fu*** and ***Tactical Shooting,*** anyone with the Gunslinger advantage can take the cinematic version of this perk, while everyone else can buy the realistic version.

Style Familiarity

The Missileer (pp. 7-8) and Support Shotgunner (pp. 8-9) styles are usually taught to those who work with teams trained in Assaulter (***Tactical Shooting,*** pp. 47-48) or Space Marine (*Pyramid #3/55,* p. 12). Hence, anyone with the Style Familiarity perk for one of those styles can claim +3 to Soldier or Tactics skills when coordinating with others trained in the Assaulter or Space Marine style by the same organization.

This officer, who held a higher rank than he, was to try a new field training technique that someone, somewhere, dreamed up.

– Mike Giesinger, ***Space Nation***

Skills

In addition to specialties of the skill covered in previous sources, Captivator stylists (below) may learn *Fast-Draw (Grenade)* as an optional skill. On a successful skill roll against this specialty, not only is a grenade pulled from a belt or pouch instantly, but the wielder can, if he wishes, press the manual arming switch on a smart grenade (***Ultra-Tech,*** pp. 146-147) as part of the process.

New Technique

This new technique can prove useful with certain types of weapons.

Disk Bouncing

Average

Default: Throwing-3.
Prerequisite: Throwing; cannot exceed Throwing-1.

Saucer grenades (***Ultra-Tech,*** p. 147) can be bounced off walls and hard surfaces as they are thrown. You have practiced this trick; use this technique instead of Throwing-3 as the base skill for the throw, then apply range and other modifiers as usual.

Other Techniques

As with perks, the styles detailed on below borrow techniques from the preexisting sources listed on p. 4. The GM will need information on the cinematic techniques only if he's running a cinematic game.

Targeted Attack

Like human beings, vehicles have hit locations; see pp. B554-5. Naturally, skilled shooters can learn to target such locations, using the rules in ***Martial Arts,*** p. 68. Vital areas (-3 to hit) are always a good target if the weapon used has enough penetration, while wheels (-4 to hit) or tracks (-2 to hit) are sometimes only lightly protected even on well-armored vehicles. A good hit there can leave a target vehicle gratifyingly immobile.

Then a surge of living monsters carried me back up into the light – and training paid off; I landed on my feet, talking and fighting.

– Robert A. Heinlein, ***Starship Troopers***

New Styles

These three new styles would be suitable for use in most realistic near-future games. They also can be fitted into cinematic games by allowing the listed cinematic options (after the stylist has taken the Gunslinger advantage, of course).

Captivator

5 points

Advances in technology at TL9 and beyond make "less than lethal" weapons increasingly effective and reliable, leading to their adoption by many individuals and organizations who prefer not to kill their opponents if possible. This style represents advanced training with such devices. It is popular with police, bodyguards, and private investigators. In some settings, it may be learned by intelligence agents who are assigned to capture opponents for interrogation or just to work with the police.

It covers a range of weapons, allowing someone to use whatever's best for the task in hand: "stun beamers" such as electrolasers (***Ultra-Tech*** pp. 119-120 or ***Changing Times*** p. 62), sonic weapons (***Ultra-Tech*** pp. 124-126), or neural weapons (***Ultra-Tech*** pp. 121-122) in games with appropriate superscience; large-caliber low-velocity guns that can launch tangler or biochemical aerosol shells (see ***Ultra-Tech,*** pp. 153-155); and grenades that can carry similar payloads in larger quantities. In addition, stylists learn to restrain opponents "by hand," although their initial training usually assumes that the opponent has been temporarily disabled with a weapon first. Many also learn to use vortex ring projectors (***Ultra-Tech,*** p. 134) or handheld sprayers to deliver liquid, gas, or nanotech attacks, but this is usually regarded as a secondary option.

Quite a few learn to use old-fashioned police weapons such as batons, more advanced stun wands or zap gloves (***Ultra-Tech,*** pp. 164-165), or small-caliber pistols loaded with gas rounds. Captivators often go into action with a different weapon in each hand, and are trained to switch quickly when the situation changes; shooting or throwing equally well with each hand is considered good, but can be hard to learn.

Given all these options, and the complex situations in which captivators often have to use their training, the style puts a premium on situational awareness and judgment. Its primary skills may be DX-based, but anyone with below-average IQ or serious psychological issues will be unlikely to pass the course.

Many captivators learn basic interrogation techniques, so that they can get extra information about a situation from one prisoner before moving on to the next objective. How brutal these get may depend on local rules of engagement, but it's hard to get either too subtle or too *effectively* ruthless in the middle of a firefight. Likewise, it's sometimes useful to be good at intimidating opponents into compliance.

Equally, many trainers try to ensure that their pupils know the basics of whatever laws or rules of engagement will apply to them; other captivators learn those rules as part of their jobs.

Cinematic captivators typically just handle complex situations with superhuman grace and efficiency and lots of specialized gadgets. In some cases, they may know uncanny "martial-arts grips" that can render opponents helpless with little more than a touch; represent this by a combination of Judo and Pressure Points skills (with Gunslinger giving access to Pressure Points in this case). In extreme cases, they may be pacifist super-gunmen, able to mow down whole armies of opponents without killing anybody; to represent such characters, merge this style with Double Trouble, Future Kill, or Ultimate Shootist from ***Gun Fu,*** importing any elements from the other style that can be used with less-than-lethal weapons.

The *many* variants of this style are reflected in the choices built into the skill selections, which usually will be determined by the employer, not their own personal choice. In general, ordinary cops and the more discreet sorts of bodyguard or PI learn skill specialties for pistol-sized weapons, while hostage-rescue specialists and the like prefer bigger, more powerful weapons that are likely to work on the first hit.

Skills: Beam Weapons (Pistol or Rifle); Guns (Pistol or Rifle); Throwing; Wrestling.

Techniques: Arm Lock; Behind-the-Back Shot; Close-Hip Shooting; Close-Quarters Battle; Corner-Shot; Disarming; Disk Bouncing (p. 6); Dual-Weapon Attack; Handcuffing; Retain Weapon; Sweep.

Cinematic Skills: Blind Fighting; Invisibility Art; Zen Marksmanship (any).

Cinematic Techniques: Timed Dodge.

Perks: Akimbo; Barricade Tactics; Battle Drills; Concealed Carry Permit; Cool Under Fire; Dial-a-Round; Dual Ready; Flimsy Cover; Grip Mastery; Gun Sense; Lightning Fingers; Off-Hand Weapon Training; Pistol-Fist; Quick-Sheathe (Pistol); Quick-Swap; Robust Hearing; Standard Operating Procedure (any); Sure-Footed (Slippery *or* Uneven).

Optional Traits

Secondary Characteristics: Improved Basic Speed, Per, and Will.

Advantages: Ambidexterity; Combat Reflexes; Danger Sense; Enhanced Dodge; Enhanced Tracking; Extra Attack; Fearlessness; Peripheral Vision.

Disadvantages: Duty; Honesty; Pacifism; Responsive; Sense of Duty ("Innocents").

Skills: Brawling; Detect Lies; Fast-Draw (any, *including* Grenade); Forced Entry; Interrogation; Intimidation; Judo; Law (Local Civil or Police); Liquid Projector (Sprayer); Savoir-Faire (Police); Shortsword; Stealth; Tactics; Tonfa; Traps.

Techniques: Armed Grapple; Targeted Attack (Pistol/Face).

Missileer

3 points

At TL9 and beyond, miniaturization transforms smaller but highly effective self-propelled missile launchers from a heavy support arm to something the size of a personal firearm, or even a pistol. The missiles fired from such launchers can even be equipped with homing systems. One consequence of this is that Guns (Gyroc) becomes one of the possible primary skills for some versions of the Assaulter style (and Battlesuit Shooter and Space Marine from *Pyramid #3/55,* pp. 11-12), but some troops focus more closely on the specific capabilities of this weapon type, usually working as specialists within infantry squads or even fire teams who are mostly trained with other weapons.

This style represents the training given to these specialists. Many missileers move into this specialty after a stint as regular infantry with the Assaulter or Space Marine style; others train as missileers from the first, but may well acquire skills from their colleagues along the way.

Note on Existing Styles

See *Tactical Shooting: Tomorrow* for extensive notes on adapting existing gun styles to ultra-tech weapons. In general, most of the styles from ***Tactical Shooting*** and ***Gun Fu*** should still be available in "realistic" or "cinematic" TL9 or 10 (and maybe more advanced) futures respectively, although some will obviously be more useful than others, depending on circumstances.

For example, Way of the West (***Gun Fu,*** p. 35) is a style for folks using revolvers and riding horses – not much use in any but the strangest TL10 settings. Likewise, Rifleman (***Tactical Shooting,*** p. 51) is a style for soldiers using low-tech rifles, which are unlikely to be seen much on TL9+ battlefields, except in the hands of underequipped insurgents, who don't have full style-level training. That said, if those insurgents are getting minimal hardware support from outside allies, and some useful software-based training, they might be given specially designed programs intended to turn them into the best soldiers they can be with those guns (and training to accomplish as much as possible with single-shot attacks could be one way to encourage conservation of scarce ammunition).

If the available technology in a setting includes significant numbers of beam weapons (such as lasers, blasters if the TL is high enough, or various other types if the right sort of superscience is available), Beam Weapons skill can replace or be added to Guns in many of the styles. In some cases, some styles may switch over to Beam Weapons while others stick to Guns; for example, at TL9, lasers may be regarded as useful sniper weapons but poor choices for ordinary troops – in which case, the Assaulter style (***Tactical Shooting,*** p. 47) may remain largely unchanged, while Sharpshooter (***Tactical Shooting,*** p. 51) can be adapted into "Laser Sharpshooter," with Guns (Rifle) replaced by Beam Weapons (Rifle) and any skill or perk specializations which refer to guns or bullet use deleted or replaced by specializations for beam weapons.

Incidentally, even if lethal lasers and blasters are still largely unknown in a setting, "less-than-lethal" electrolasers (***Ultra-Tech,*** pp. 119-120, or ***Changing Times,*** pp. 62-3) and other somewhat specialized weaponry may make Beam Weapons skill useful, especially for cops and civilians. Hence, it can become an optional skill for many styles learned by anyone from those backgrounds.

The gyroc carbine is usually their preferred weapon, although most stylists pride themselves on being familiar with all of the gyroc variants known to their force. Some mount underbarrel grenade launchers or shotguns on their carbines, giving them extra shots and extra flexibility while also allowing them even more options for exotic warhead combinations.

A missileer is trained to engage the lighter sort of armored opponents sometimes met on high-tech battlefields, including battlesuit troops, robots, and some soft-skinned vehicles, and sometimes to act as a sniper. This implies use of armor-piercing warheads and homing missiles; other missile types can be employed to attack targets behind cover (using explosive or SEFOP warheads). Switching loads fast is a virtue, but usually is not considered an absolute necessity. Gyroc rounds are expensive, with a low rate of fire, so missileers are expected to choose their targets carefully, and to make every shot count.

Cinematic missileers always seem to have the right projectile for the job, loaded and ready to go; a level or two of the Gizmos advantage suits such stylists very well. They also tend to have a cinematic sniper's ability to score hits at "impossible" ranges. Missileers in general have a "techie" image by infantry standards.

Missileers are trained to use homing missiles, which is why Artillery skill is a part of the style. In some cases, they drop that skill from the style's list and take the Gunner's Guidance (Gyroc) perk as soon as they have the Style Familiarity perk and a point in Guns (Gyroc), rather than waiting until they've spent 10 points on the style's skills and techniques. In fact, if the GM permits this option, they may be *required* to take this perk as soon as possible.

Skills: Artillery (Guided Missile); Guns (Gyroc).

Techniques: Close-Quarters Battle; Corner-Shot; Precision Aiming; Targeted Attack (Gyroc/Vehicle Tracks); Targeted Attack (Gyroc/Vehicle Vital Areas); Targeted Attack (Gyroc/Vehicle Wheels).

Cinematic Skills: Zen Marksmanship (Gyroc).

Cinematic Techniques: Whirlwind Attack (Gyroc).

Perks: Army of One; Cross-Trained; Deadeye; Dial-a-Round; Early Adopter; Gunner's Guidance (Gyroc) (p. 5); Gun Whisperer (Gyroc); Intuitive Armorer; Lightning Fingers; Missile Whisperer; Motorized Training; Quick Reload; Running Missile Lock; Standard Operating Procedure (On Alert); Tangled Trajectory.

Optional Traits

Secondary Characteristics: Improved Per.

Advantages: Acute Vision; Fearlessness; Fit; Gizmos; Hard to Kill.

Disadvantages: Callous; Duty; Overconfidence.

Skills: Armoury (Small Arms); Camouflage; Expert Skill (Robotics); Guns (Grenade Launcher, LAW, *or* Shotgun); Savoir-Faire (Military); Soldier; Tactics; any skill taught as part of the Assaulter or Space Marine style in the same force.

Techniques: Any technique taught as part of the Assaulter or Space Marine style in the same force.

Transhuman Space Games

In games employing the weapons and combat rules from ***Changing Times,*** delete the Artillery skill, reducing the style cost by 1 point, and delete the Gunner's Guidance perk as unnecessary.

Support Shotgunner

4 points

The shotgun was always rather marginal as a military or paramilitary weapon, as the notes on the Shotgunner style (***Tactical Shooting,*** p. 52) make clear. As TL8 military technology develops, it becomes increasingly irrelevant, as more widespread availability of personal armor makes its relative lack of penetrating power more of an issue.

However, at TL9, the military shotgun makes a modest comeback. High-tech miniaturization allows some exotic payloads to be installed in small rounds from that TL onward (see ***Ultra-Tech,*** pp. 152-159), but a need may still exist for relatively large caliber weapons to exploit these new technologies; explosive rounds certainly benefit from being as large as possible. The military shotgun thus returns as, in effect, a low-cost exotic munitions launcher which can also fire buckshot or slugs in a pinch. This style is designed to make the most of this option. It really comes into its own at TL10, when a shotgun can be used to fire HEMP warheads.

Some support shotgunners are pure specialists, who go into action with a shotgun as their primary weapon. Others are part-timers, usually having an underbarrel shotgun mounted on a rifle which otherwise matches their unit's standard issue, and learning this style after learning Assaulter or Space Marine. A few even carry shotgun pistols. Stereotypically, they are their squad's solidly reliable "backup guy."

The style assumes the use of the sort of military shotguns described on pp. 136-138 of ***Ultra-Tech.*** Most of these have box or tube magazines, permitting fast loading; the underbarrel shotgun requires individual shell loading, but that is only expected to be used intermittently, with the gun to which it is attached providing primary firepower. Hence, the style excludes some of the tricks which were previously learned by Shotgunner stylists to make the most of what were essentially slow-loading civilian weapons. Instead, it covers the use of the shotgun to launch anything that will fit in its barrel, including homing rounds. Like missileers (pp. 7-8), support shotgunners usually learn Artillery skill, but, again as with the Missileer style, some students may be allowed or required to drop that skill from the style's list and to take Gunner's Guidance (Shotgun) as soon as they have taken the Style Familiarity perk and put a point in the style's other required skills. If the GM permits this option, the shooter may be *required* to take this perk as soon as possible.

The support shotgunner is expected to be *versatile* above all else. He may launch those homing missiles against distant targets, but he also may take on robots or light vehicles with armor-piercing rounds that can still do decent damage after penetrating; scrub away soft cover or hurt people behind harder protection with well-placed HE shots; get really fancy with homing SEFOP projectiles; smash open doors during house-to-house fighting with frangible ammunition (***GURPS High-Tech,*** p. 103); knock enemy miniature recon drones out of the air with buckshot; or drive off civilian rioters with baton rounds (***High-Tech,*** p. 103). Switching loads in a hurry is a necessary part of the style! Cinematic support shotgunners are all but required to have a few levels in Gizmos and perhaps some points of Lifting ST; they have an image as people who are quick on their feet despite being loaded down with cool kit.

Skills: Artillery (Guided Missile); Fast-Draw (Ammo); Guns (Shotgun).

Techniques: Close-Hip Shooting; Close-Quarters Battle (Shotgun); Corner-Shot (Shotgun); Retain Weapon; Targeted Attack (Shotgun/Vehicle Vital Areas); Targeted Attack (Shotgun/Vehicle Wheels).

Cinematic Skills: Breaking Blow (Guns); Zen Marksmanship (Shotgun).

Cinematic Techniques: Timed Dodge; Whirlwind Attack (Shotgun).

Perks: Armorer's Gift; Area Defense; Barricade Tactics; Battle Drills; Cinematic Knockback; Cookie Cutter; Cool Under Fire; Dial-a-Round; Dramatic Death; Fireball Shot; Flimsy Cover; Gunner's Guidance (Shotgun) (p. 5); Gun Shticks (any); Gun Whisperer (Shotgun); Infinite Ammunition; Intuitive Armorer; Lightning Fingers; Motorized Training; Missile Whisperer; Muzzle Flamethrower; One-Armed Bandit; Quick Reload; Recoil Rocket; Robust Hearing; Running Missile Lock; Scattergun; Standard Operating Procedure (any); Tacticool; Walking Armory.

Optional Traits

Secondary Characteristics: Improved Basic Speed and Per.

Advantages: Combat Reflexes; Danger Sense; Fearlessness; Fit; Gizmos; Hard to Subdue; Lifting ST; Signature Gear.

Disadvantages: Callous; Chummy; Code of Honor; Congenial; Duty; Impulsiveness; Overconfidence; Sense of Duty (Squadmates).

Skills: Armoury (Small Arms); Forced Entry; Guns (Pistol *or* SMG); Savoir-Faire (Military); Soldier; Tactics; any skill taught as part of the Assaulter or Space Marine style in the same force.

Techniques: Any technique taught as part of the Assaulter or Space Marine style in the same force.

Transhuman Space Games

The GM who employs just the weapons tables from ***Changing Times*** will note that no shotguns are listed there. If you want to include this style in such games, and you don't have access to ***Ultra-Tech,*** simply use the TL7 auto shotgun from the ***Basic Set*** (p. B279), with HUD and laser sights (as in the main ***Transhuman Space*** book, pp. 156-7) fitted as standard. It can fire the special ammunition types from ***Changing Times***; start with 4d+4 pi++ damage for unmodified slugs, and apply the listed modifiers to that, or assume a 15mm warhead where that is relevant.

Also, in campaigns using the combat rules from ***Changing Times,*** delete Artillery (Guided Missile) skill from the style, reducing the style cost by 1 point, and delete the Gunner's Guidance perk.

No more drills, no more practice.
You are all about to receive the honour of going into combat for the first time, as Ultramarines.

– Proteus, in ***Ultramarines***

About the Author

Phil Masters is the ***Transhuman Space*** Line Editor and the author of several previous supplements for the line, including ***Changing Times*** and ***Bio-Tech 2100.*** He is British, has been a roleplaying game writer for over 30 years, and has worked with Steve Jackson Games for over 20 years, as well as writing for Hero Games, White Wolf, Posthuman Studios, Osprey Publishing, and others. His credits also include the ***Discworld Roleplaying Game.*** His website is at **philmasters.org.uk**.

Remixing the Rocker

by Jon Black

The musician and his high-tech gear are staples of near-future science fiction, particularly cyberpunk. The "rocker-boy" was one of the original character archetypes of the ***Cyberpunk*** roleplaying game when it was released in 1986. William Gibson's cyberpunk novel *Idoru* revolves around an AI musician. In Bruce Sterling's "We See Things Differently," a successful rocker becomes America's last, best hope. Music is part of our vision of the future and part of the technology defining that future.

Technology, some which already exists and some on the not-too-distant horizon, will create new possibilities and realities for music, many of which make cyberpunk eerily prescient. From today's pitch correction software to technologies allowing musicians to influence audience behavior, the near-future is a world where money and tech can make anyone into a star, and where death is no reason to end a musical career.

This discussion highlights the impact of cutting-edge technology (from tomorrow until early TL9) on music and the music industry and extrapolates roleplaying opportunities created by resulting social, economic, and artistic changes. Suggested mechanics for modeling these technologies in ***GURPS*** are provided.

Variables such as the TL when a device is introduced and a campaign's intended flavor make price an issue for the GM to set. Useful starting points can be found in the ***GURPS Basic Set, GURPS Cyberpunk, GURPS High-Tech, GURPS Space***, ***GURPS Ultra-Tech,*** and *Pyramid #3/21: Cyberpunk*.

Auto-Tune In, Auto-Turn On, Auto-Drop Out

Technology to edit sound is already widespread. Further advances will redefine the music industry and possibly music itself. Auto-Tune, a brand name, is often used to describe any software performing pitch correction for voice or instruments. By ensuring that notes always come out pitch perfect, this technology has the potential to turn mediocre (or wretched) performances into flawless ones.

Pitch correction is advancing more rapidly than the typical ***GURPS*** equipment modifiers (p. B345) suggest. For a more plausible progression, top-of-the-line pitch correction software could provide +6 to Musical Instrument and Singing skills at mid-TL8, +8 at late TL 8, and +10 by early TL9. Apply -2 when pitch correcting live performances, which is more challenging than for recordings.

There is already backlash against pitch correction because it diminishes the role of talent and skill. In the future, corporations could transform anyone they want into the perfect musician. Even desktop software will enable ordinary people to give professional-sounding performances.

If anyone can sound flawless, conceptions of what constitutes "musical talent" may evolve. Society may redefine what it means to be a star by elevating some other aspect of the performance, as the following ideas suggest.

Emphasis on Authenticity: To prove true talent, fans insist that musicians perform without pitch correction. Devices may be developed to detect pitch correction technology, and recordings come with "correction free" certifications. Of course, certifications can be faked and technology concealed. Taken to its extreme, this path might lead to a new folk revival, emphasizing acoustic instruments and analog recording technologies resistant to pitch correction. Some players may not like the low-tech feel, while its quirky juxtaposition may attract others.

Emphasis on Image: In a world of pitch correction on demand, the defining element of greatness becomes image, that nebulous amalgam of appearance, style, presence, and *je ne sais quoi.* Such a music scene would be dominated by visually distinctive genres and subcultures, over-the-top appearances, and dramatic performance styles as well as a cult of excess and egomaniacal, eccentric performers.

Emphasis on Marketing: With pitch correction leveling the playing field, musical fame and success default to questions of advertising budgets and media exposure. This scenario rewards the already successful and corporate protégées.

Emphasis on Songwriting: With vocal and instrumental talent now meaningless, the ability to write quality music and lyrics is at a premium. It is a golden age for singer-songwriters. Songwriting may even eclipse musical performance as a valued art form.

Emphasis on Spontaneity: Talent is judged by the ability to improvise complex melodic structures or clever lyrics, a potentially bizarre future of free jazz and rap battles.

These visions of future music are not mutually exclusive. Two or more may blend together. Likewise, differing responses may exist separately but simultaneously, either in coexistence or conflict. A musical future pitting emphasis on image versus emphasis on marketing is very cyberpunk.

The Camera Loves You

Video editing already does for images what pitch correction does for sound, and its capabilities will continue to improve. It may become possible to perform near flawless real-time video editing and CGI, allowing artists to look their best even during live broadcasts.

With appropriate equipment, a successful Electronics Operations (Media) roll cleans up and enhances video, adding one level of Appearance to performers. Modifiers include -1 for each individual being edited simultaneously and other penalties as appropriate for difficult conditions (pyrotechnics, musicians body-sculpted to resemble werewolves, gun battle going on during broadcast, etc.). The equipment can, of course, also be used to subtract a level of Appearance (people will, no doubt, devise ways to make that useful).

The New Plugged In

If neural interfaces exist, artists can potentially play instruments as rapidly and intricately as their minds allow, free of physical limitations such as response time and distance between different strings or keys. This enables previously impossible levels of instrumental virtuosity. Someone with a neural interface and appropriate instrument receives a bonus of up to +4 on the relevant Musical Instrument specialty.

It is possible that performing via neural interface will be view as "cheating," much like many people currently view pitch correction. If so, physical skill will remain fundamental to musical talent. Conversely, audiences may conclude that results are what matter and that the mental agility required by neural interface is just as valid as the physical ability currently required. Remember, at one time, electric instruments were widely considered cheating; that attitude has clearly changed.

VR Killed the Radio Star

The development of virtual reality or dreamgames technology would create lucrative opportunities for the music industry. Music videos, in decline since the early 1990s, could receive a boost from technology putting viewers in the video. Making these programs interactive would further enhance marketability. Likewise, many fans would pay to virtually "attend" live shows, entire festivals, or enjoy a private performance by their favorite star. Related VR offerings might include games where stars appear as characters, interactive "reality-VR" programs allowing fans to step into a day in the life of a star, or educational VRs with musicians teaching guitar, keyboards, or cyber-sitar.

Gray- or black-market VRs would be as lucrative as legitimate offerings. As with YouTube, fan-created videos would flourish. If the technology to create VR is inexpensive and portable, unauthorized concert recordings may circulate as freely as bootleg Grateful Dead cassettes circa 1973. VRs lampooning stars and parodying their music will thrive. Corporations might view these unofficial VRs either as copyright infringement warranting legal (and extra-legal) action or as welcome free advertising.

"Rock star" and "sex symbol" are frequently synonymous. Unsanctioned pornographic VRs featuring computer-rendered versions of popular musicians will find buyers. Depending on social mores, of course, such offerings could be official and legal.

Destined to Be a Hit

Currently, music is one of the few industries not using extensive predictive modeling for products (beyond "her last album did well" or "the kids seem to be into this hip hop thing"). Music would be less risky and more profitable if hits could be predicted before they were released or, better yet, before they were *written*.

Several algorithms already exist to predict a song's success, using data as diverse as common characteristics of Top 40 hits, recurring pitches and rhythms of popular songs, frequent instrumental combinations, and monitoring the brain activity of listeners. Success rates as high as 75-80% are claimed for some models (sadly, they also show people like bland, repetitive music). Advances in computing and neuroscience could radically increase the accuracy of predictions.

Commercial Potential: Software provides a bonus of up to +4 on Merchant or Psychology to evaluate a song's commercial potential. Treat successful evaluation of a promising song as a bonus to Merchant or Propaganda (Corporate) for promoting the song.

Popular and Commercial Appeal: From there, retro-engineering the process to create songs optimized for commercial success is a logical step. If an algorithm is accurate, simply plugging in the right variables may yield songs tickling the auditory cortexes of billions – leaving a few million outliers scratching their heads and grumbling. Software provides a bonus of up to +4 on Musical Composition pertaining to popular and commercial appeal only (the bonus has no impact on critics, at least those not owned by corporations). For stronger cyberpunk flavor, apply an equivalent penalty to its appeal to subcultures and fringe elements.

Individual Tastes: This technology could be modified for individual use. Neuro-monitoring might quantify the characteristics of an individual's musical taste. Using that profile, with a database or net access, a computer could identify songs, bands, or genres that the individual is almost guaranteed to like. It might also connect him to social media groups and other people with similar tastes or immediately forward his profile to corporate marketing departments. Software provides up to +4 on Research attempts to find music the person likes or to connect with likeminded groups or individuals.

The Ultimate Comeback Tour

With sufficient computing power, it is possible to recreate the musical talent, style, and even personality of a deceased musician. Detailed personality simulations (to say nothing of actual AI) combined with the ability to mathematically model the behavior, performance style, and creative output of an individual allows functional recreation of a dead artist. A digitally recreated artist (DRA) can write new songs in the idiom of the original, communicate in the appropriate style, and behave with the right attitude. With holographic or robotic technology, DRAs can also perform and move like the original artist. A self-aware DRA may feel that, in every way that matters, it *is* the artist.

The authenticity of a DRA depends on the amount of data available about the original artist. Generally, the more recent the artist, the more data available (there are exceptions; we know more about Beethoven than Blind Lemon Jefferson).

Gathering the necessary data and transforming it into a DRA requires six months and a successful Research roll. Time can be cut at a penalty of -2 per month. Additional time provides +1 per month, to a maximum of +6. The GM should modify the roll based on the volume of information available about the artist. Specifics vary, but -1 per 25 years between an artist's death and the campaign's present is a solid starting point.

The greater the margin of success, the more felicitous the DRA's recreation of the original. A critical success would fool the artist's mother. Succeeding exactly results in a DRA equivalent to a talented cover artist and gifted impersonator – good enough for casual listening but not to fool diehard fans or serious investigation. Optionally, a critical failure might create a talented DRA but nothing like the intended artist.

The Prefab Four

From DRAs, it is a short jump to technology that builds a superstar or entire band from scratch – as in Gibson's *Idoru*. The Japanese word for "idol" (often transliterated as *aidoru*), is an appropriate term for any original, digitally based musician, whether actually AI or just a complex personality simulation. Witty denizens of the future might capitalize the first two letters (to AIdoru) for obvious reasons.

Designed as a Computer: Build aidoru using the computer rules (p. B472). Typically, aidoru use the highest Complexity computers available, often with the High Capacity enhancement. Even then, an aidoru may require two or more linked megacomps. It's not cheap, but if building a rock god was easy, everyone would do it. Treat the aidoru's personality as Complexity 7 if AI, or Complexity 6 otherwise. Memory requirements are extreme, in the 10 to 100 TB range. The cost of the Expert Skill programs necessary to create a world-class musician may be very expensive as well.

Designed With Points: If the above seems too complicated, consider building aidoru using points instead. Voice should *de rigueur* for aidoru. Also consider building aidoru with the Musical Ability Talent. If it has a video, holographic, or robotic presence, the aidoru will likely have one level of Appearance above Average and possible many more. The GM who wishes to blur the line between human and machine can allow aidoru to be programmed with one or more levels of Charisma. A middle ground would allow that only to true AIs.

DRAs and aidoru need not be restricted to musicians. Digitally driven managers, producers, DJs, or even roadies each offer a distinct flavor of weirdness to a campaign.

Musical Mind Control

Music's ability to influence and control others is a convention of both roleplaying and science fiction. In ***Cyberpunk 2020,*** the rockerboy's special ability was "Charismatic Leadership," swaying audience emotion and behavior. A rocker's tech will never match the powers of a fantasy bard in this regard, but evidence suggests technology can augment a performer's ability to persuade. The key appears to rest on a combination of infrasound, ultrasound, rhythm, and subliminal messaging.

Infrasound and ultrasound are sounds below and above (respectively) the *conscious* hearing of humans. Studies strongly suggest, however, humans are *subconsciously* aware of and responsive to infrasound and ultrasound, but they are not specifically influenced by vocal messages in either range.

Infrasound is linked to the creation of negative states such as anxiety, awe, fear, paranoia, fatigue, sorrow, and irritation. It has been associated with reports of supernatural phenomena, leading to suggestions that infrasound causes people to erroneously perceive paranormal occurrences (A horror or supernatural campaign might invert that relationship, positing that infrasound heightens sensitivity to the paranormal.) Conversely, reactions to ultrasound are positive: good mood, alertness, confidence, creativity, euphoria, and even pain tolerance.

Musical Mind-Control Specialties

Use the following specialties to help with Influence, mind control, or similar actions.

Musical Instrument

see p. B211

Drums: Because rhythm is the only consciously audible component of musical mind control, it uses the normal Tuned or Untuned Drums skill at -2, representing the difficulty of a targeted effect. The GM may consider allowing idiophone Musical Instrument specialties (see ***GURPS Low Tech Companion 1: Philosophers and Kings,*** p. 18) to apply to mind control.

Infrasound: This specialty covers artistic and effective use of whatever instrument(s) the GM determines are responsible for infrasound influence in musical mind control. If the GM deems it feasible, one musician may play infrasound and ultrasound, at -2 to both. Defaults at -5 to a similar traditional instrument.

Ultrasound: As per Infrasound, above.

Singing

see p. B220

Subliminal: This specialty covers the artistic and effective use of the voice (human, computer-driven, or otherwise) at subconscious levels for musical mind control. Subliminal and conventional singing default to each other at -4.

Rhythm assists in the coordination of group behavior, allowing for the synchronization of actions and (some have argued) thought. Subliminal messaging, while shown to impact listeners, is not as effective as conventional communication. The two in tandem, however, have greater impact than conventional communication alone.

As Reaction Modifiers: A combination of infrasound, ultrasound, rhythm, and subliminal messaging predisposes audiences to a performer's explicit message. A +1 reaction modifier is realistic, +2 plausible, and +3 cinematic.

As Enablers: For a cinematic game mechanic, treat the same combination of elements as prerequisites enabling a musician to use Enthrallment (p. B191) or Musical Influence (p. B210).

The GM also decides how influencing/controlling elements are designed, produced, and inserted into performances or recordings. The process could be computer driven, produced by musicians, or both. If the process is computer controlled, use Musical Composition *after* successful Psychology and Electronic Operation (Media) rolls. If musicians are involved, they can use appropriate Musical Instrument specialties (see p. 12).

Such techniques need not be used furtively or illicitly. Part of music's appeal is its emotional power and influence. Many fans would flock to bands taking that effect to the next level.

Human dependence on language limits the ability to influence audiences instrumentally. A group without a vocalist is restricted to creating strong specific emotions (anything expressible in a single word).

No discussion of musical mind control is complete without "backmasking," subliminal messages laid backward onto another recording. Some groups once alleged that the music industry extensively used backmasking. Evidence supports neither backmasking's effectiveness nor that it was ever used non-ironically. Of course, in a ***GURPS Cthulhupunk, GURPS Illuminati,*** or ***GURPS Technomancer*** campaign, backmasking might be both real and effective.

Music Is the Doctor

With current evidence, using music to directly heal would require magic, not technology. But the research does support music's ability to induce physiological states highly conducive to healing. It can help respiration, pulse, and blood pressure remain at, or return to, healthy levels. It facilitates calm dispositions and positive outlooks. With further research, it is possible that these therapeutic effects could be manipulated more consciously and actively.

Using music in a medical context requires a roll against Esoteric Medicine (Music), below.

Negate Pain/Fatigue: Cancels the pain and fatigue effects of being reduced to 1/3 or less FP or HP (but not the fatigue or injury itself). Thirty minute sessions, effective for six hours.

Resist Disease: By stimulating healthy body processes, musical therapy can aid in fighting disease. For long-term illness, patients receive +1 to resist or recover from a disease after a month of daily sessions. For shorter-term sickness, effects begin after a week. Working more quickly or delivering a greater impact than +1 is cinematic.

Stimulate Healing: Creating a positive mindset and promoting healthy vitals catalyzes the healing process, reflected in healing rolls. Adding 1 point of healing per day is realistic. Adding 1 point per recovery roll is plausible. Adding 1d/2 points (minimum 1) per recovery roll is cinematic. Healing gained from musical treatment is cumulative with other forms of treatment.

Esoteric Medicine

See p. B192

Music: This specialty reflects knowledge and experience in consciously and deliberately using music to stimulate the body's natural healing. Unless otherwise specified, patients must undergo hour-long daily sessions. Effective skill level is limited by the relevant Musical Instrument specialty. In the case of a variant TL(7+1) or TL(7+2) technology emphasizing acoustics and mind-body medicine, standard medical skills may apply instead. Defaults are other Esoteric Medicine-6, appropriate Musical Instrument-4, or Physician-6.

Physicians can use prerecorded music or sheet music performed by someone else for musical healing. In either case, the physician must first make a successful Esoteric Medicine (Music) or Physician-3 roll to identify appropriate recordings or sheet music. (Note that Physician-3 is higher than the skill's normal default because it assumes that physicians have access to reference materials to select appropriate music.)

Based on the roll's margin of success or failure, the GM should assign the recordings or sheet music an effective skill level for Esoteric Medicine (Music). Because pre-prepared music is not fine-tuned to an individual patient's condition, these treatments are typically less effective than a live performance by a trained practitioner. With that in mind, a maximum skill of 14 is appropriate. The GM who likes the flavor of *I Saw Them Live* (p. 14) may want consider a maximum of 12 instead. Because live performers, even those untrained in musical healing, have some ability to individualize their performance, treat effective skill levels as one higher.

To then use prerecorded music for healing, the practitioner makes a successful roll against its effective skill level. For sheet music, use the lower of the music's effective skill level or the musician's appropriate Musical Instrument specialty (at the full skill, not the typical default of -4).

Is There Anybody in There?

Music's ability to impact mood and mental condition is widely accepted and has received limited study. As with musical healing, additional research and technological enhancement may allow for a more accurate and nuanced use.

Using music to psychologically impact an individual requires a successful Musical Influence roll. If the Musical Influence skill is not used in a campaign, roll against the lower of Psychology and either Musical Instrument or Singing.

Unless the GM declares otherwise, music therapy requires daily sessions of at least an hour in length. Potential uses for this skill include the following:

Coping With Trauma: Each successful daily check reduces the effects of a failed Fright Check by one entry on the *Fright Check Table* (pp. B360-361), to a maximum of one-half the original entry level (round down). At GM discretion, this can apply to other mental disadvantages resulting from traumatic experiences. If allowed, one month of therapy removes one point of a disadvantage's value. The GM may require some or all of the disadvantage to be bought off with points, but the therapy can provide the excuse needed.

Cinematically Coping With Trauma: A more cinematic application enables musical therapists to repress or numb the effects of trauma before it takes hold, so they can begin long-term treatment immediately. Each successful roll delays the trauma for a day. Treat critical successes as a week's delay. Critical failure brings an immediate onset of the trauma, and may increase it (as the GM deems appropriate). If onset is delayed for a full month, up to 2/3 of the Fright Check's effect can be bought off.

Improving Concentration: A successful role by the musical therapist imparts Single-Minded (p. B85), allowing the subject to perform a focused, lengthy mental task. The effect persists for six hours following treatment. If the subject experiences significant distraction during that time, he must make a Will roll (modified as appropriate for the nature of the distraction) or lose the benefit.

Increase Will: On a successful roll by the therapist, the subject gains +2 to Will or self-control rolls (+5 on a critical success), to resist a particular disadvantage (Addiction, Chronic Pain, Manic-Depressive, etc.) for a 24-hour period. Alternately, it can impart a general boost to the patient's Will. This treatment is at -2 to skill and provides +1 (+2 on a critical success) to Will.

Use equipment modifiers (p. B345) for medical and psychological musical treatment. Headphones, portable speakers/amplifiers or other handheld sound devices constitute basic-quality equipment. Hospital beds or therapist couches with built-in surround-sound are good-quality equipment. Reserve fine-quality equipment for full-room facilities, such as surgical theaters or therapeutic calm rooms, with top of the line sound systems. In some therapeutic situations, an isolation tank with cutting-edge acoustics and sound system also may constitute fine-quality equipment.

The applicability of medical and psychological techniques to nonhumans depends on how *universal* the GM wants music to be. If musical aesthetics are constant across races, unfamiliarity penalties (p. B169) reflecting physical and mental differences may apply. If races have radically different aesthetics and psychology, -6 is generous or the GM may forbid using the skill cross-species.

I Saw Them Live

Even as the quality of recorded music improves, live music remains popular and, for some, preferred. This fits a frequent convention of cyberpunk that the mass-media saturation of corporate music lacks the power of a rebel rocker's live performance. For the GM who enjoys that flavor, presume recordings do not fully reflect a musician's Charisma or Appearance (Voice still works at full effect), though they do improve with the quality of media. The effect can be modeled as follows.

Audio Recordings: Halve Charisma bonus, rounding down. No Appearance modifiers, obviously.

Video (TL6-7): Subtract one level from Charisma. Take Appearance one step toward average.

Video (TL8+): Subtract one level from Charisma. Use actual Appearance or, if using real-time video editing (p. 11) increase Appearance one level.

Encounters of a Very Close Kind

Because pitch, tone, and duration are physical constants, music has potential to serve as a universal alphabet for communication between any species with auditory senses. The key word is universal *alphabet*, not *language*. Grammar and vocabulary would still need to be developed, but music could allow first contact to bypass annoying anatomical or technological challenges.

If two species use music as a basis for communication, the GM can consider giving a small bonus to Linguistics rolls to develop mutually intelligible communication. Even with a bonus, in all but the most cinematic campaigns, it will be weeks before any meaningful communication occurs, and months or years before a functional language emerges.

The Sound of Things to Come

What does the future sound like? The GM may feel this is irrelevant or decide based on personal preferences. Others may find defining the musical sounds and scenes of the future an enjoyable and effective way to bring that world to life. The list of possibilities for redefining musical talent (p. 10) provides a starting point. Emphasizing spontaneity could favor hip hop or jazz. Emphasis on style elevates genres with distinctive looks, sounds, and subcultures. Songwriting emphasis might push blues, country, or folk.

The countries and cultures dominating a world also influence how its music sounds. If India is global power, but stagnating socially and industrially, expect Bollywood-tinged punk. If mineral resources are king, perhaps most lyrics are written in Zulu, Xhosa, or Afrikaans. If East Asia is the center of the world, pop music may be built on five-note scales.

Generally, the more cyberpunk a world, the more dichotomous its music. There will be the pleasant but vapid pop sounds of corporate music on the one hand, and the loud, angry, and colorful sound of the street on the other. Another common device in science fiction, especially cyberpunk, is creating new musical forms by fusing together incongruous genres. Perhaps Bluegrass Metal, KlezmerGoth, or Martial Pop is the sound of tomorrow.

The Future of the Industry

Musically speaking, technology points to a future which cyberpunk, in broad strokes, got right. Technology has simultaneously empowered music's biggest and smallest players. Global communications technology enables media corporations to saturate hundreds of millions, if not billions, of people with music they think people want. Exposure and advertising budgets ensure they're often right, even when they're not. That same technology enables the humblest band to record, edit, and distribute their music while promoting themselves and connecting with fans across town and around the world.

Future technology may accelerate those trends. With a bit of dramatic license, music's future, like all things cyberpunk, looks like a war (maybe metaphorical, maybe not) between the corporations (or zaibatsu, megacorps, the Military-Industrial-Entertainment complex, etc.) and the street. Corporate icons deliver music to the masses that tranquilizes and pacifies, while it maximizes shareholder profits. Rockers and chromed-out genre rebels take their loud, angry message to the street, rallying the downtrodden to fight for justice, a bigger piece of the pie, or just to break stuff. Some musicians, for their inscrutable reasons, try to play both sides of the game. Those are the stories on which music, and roleplaying, thrive.

Hooks 'n' Grooves: Music-Tech Adventure Ideas

Freedom Rock: The Free Rock League is a circle of musicians and fans devoted to music made "the old-fashioned way," sans pitch correction or neural interface. The League's arrogant superstar is dogged by allegations she secretly uses pitch correction. Her rivals have banded together to prove those rumors. Are they bitter enough to manufacture evidence if they can't find it? And whose side are the PCs on?

Orbital Blaster: For years, disc jockey "The Spaceman" has frustrated corporations with his pirate broadcasts to Earth from the space station *Acuna*, outside their jurisdiction. Now, The Spaceman's voice has mysteriously fallen silent. Rumors say he's been killed by the corps, or kidnapped by the syndicate, or hiding on Earth, or was an AI all along. The *Acuna*'s owners had their resident rebel insured for 100 million yuan, and the insurance company wants to know what's going on (of course, the policy doesn't pay in the event of suicide or murder). Characters could be law enforcement, insurance investigators, journalists, or just die-hard fans.

Finding the Next Big Thing: The race is on to perfect the software for evaluating the commercial potential of music. Entertainment corporations will literally kill to get there first and to stop their rivals. A group of netrunners wants to sabotage the entire project. Everybody is hanging out the "help wanted" signs for hardened mercenaries and committed idealists alike.

The Fade Out: After getting brain-scanned for a personal music profile, a PC was matched with an adoring (and adorable) new friend having identical musical taste. Suddenly, his friend has vanished, leaving the PC with panicked but cryptic messages on voicemail and email. Is his new friend in trouble? Is it a con? Or even a set up by the party's enemies?

Ghost of a Techie Ladies' Man: Five years ago, promising artist Jack the Ace died under mysterious circumstances. His label continued his career by bring Jack back as an AI DRA. The DRA has become obsessed with discovering what really happened the night of his death – and why his then-girlfriend is now married to his manager. He's been scouring cyberspace for people who will help him get the answers.

Hidden Bonus Track: Musical supergroup Duchamp is known for outrageous publicity stunts as well as their music. As a promotional gimmick for their new album, band members have stashed 10 million euros somewhere on Earth. Clues to find the money are hidden in their new MMO dreamgame. All the group has to do is beat the game and claim the loot. Of course, a lot of people are playing the game – including some netrunners who brought Black ICE (*Pyramid #3/21: Cyberpunk,* p. 92) to the party.

Quiet Riots: After recent concerts, fans of the PCs' favorite band have been rioting and committing acts of mayhem. Normally, that wouldn't be a problem – but it's all been directed against the same posh corporate enclave. It looks like a textbook case of musical mind control. CorpSec and the civilian government, such as it is, are breathing down the band's neck. The catch? The band's not behind it. They're as confused and worried as everyone else.

Liner Notes

Buck Rogers in the 25th Century, "Space Rockers," episode #1.21 (Guy Magar, 1980). This episode of the campy space opera involves musical mind control on an interplanetary scale.

Fisk, Colin; Moss, William; Ruggles, Scott; and Quintanar, Derek. ***Rockerboy*** (R. Talisorian Games, 1989). Of all sci-fi roleplaying games, ***Cyberpunk*** went into the greatest detail about future music and musicians. Its ***Rockerboy*** sourcebook is the mother lode.

Gibson, William. *Idoru* (Berkley, 1997). The definitive novel about AI musicians.

MacLean, Katherine. "Incommunicado," *Astounding Science Fiction* (Street & Smith, 1950). Difficult to find, but worth it. This short story combines AI musicians with musical mind control.

Pulver, David L. "The Medusa Sanction," ***GURPS Cyberpunk Adventures*** (Steve Jackson Games, 1992). High-adrenaline scenario blending music with nanotech and other classic cyberpunk tropes.

Sterling, Bruce. "We See Things Differently," *Globalhead* (Spectra, 1994). Excellent short story about a rocker on the verge of successfully changing society.

About the Author

Jon Black is an internationally published music journalist and music historian with a focus on blues and country but who has written on everything from punk to classical to klezmer. He wonders if AIs will ever be used to re-create music journalists, but is pretty sure the answer is no. Jon is also an experienced ghostwriter with one book-length project published and several smaller works in print. He has been playing roleplaying games for more than 30 years and ***GURPS*** for more than 20 years.

Eidetic Memory

Cutting-Edge Armor Design

by David L. Pulver

The following *highly optional* rules offer a "ground up" look at cutting-edge personal wearable armor design, using a system inspired by the rules developed for vehicular and robot armor. This is an expansion to my earlier *Low-Tech Armor Design* examination in *Pyramid #3/52: Low-Tech II,* and covers modern and near future materials. These rules are not intended to replace those found in ***GURPS Ultra-Tech*** or ***GURPS High-Tech*** but rather to provide additional options for the GM or player who likes building personal armor in greater detail.

This article covers modern and near-future flexible and rigid wearable armor types up through TL9, including sealed outfits. However, the complexities of vacc suits, dry or hard-shell diving suits, heated suits, and powered armor are beyond the scope of these guidelines.

Methodology

This system uses surface area and material values to construct armor on a piece-by-piece basis. The numbers are based on the concept that every DR 70 is equal to the protection of an inch of TL6-7 steel plate (technically known as rolled homogeneous armor) – that is, roughly DR 2.75 per millimeter of modern steel plate.

These rules also center on the idea of the weight of armor per square foot. For example, steel has a density of 490 lbs. per cubic foot. An inch is 1/12 of a foot, so a square foot of steel therefore weighs 490/12 = 40.83 lbs. Since an inch of steel armor is set at DR 70 in ***GURPS***, every DR 1 of steel armor would weigh 40.83/70 = 0.583 lbs. per square foot, rounded off to 0.58 lbs. Similar calculations have been used to determine other armor materials where the density is known and the armor's DR per inch can be estimated, usually from bullet and projectile penetration studies. The tables below used numbers derived from such studies.

An additional modifier is applied based on construction type, which can reduce the weight but increase cost. This accounts for both ballistic shaping (e.g., curved surfaces) and the fact that armor is rarely of uniform strength across an entire hit location – designers will usually reduce the armor in areas that are less likely to be hit. (Rules for targeting chinks in armor reflect this.)

For this system to work, it requires estimating usable values for surface area of various body parts. Surface area figures for the human body broken up by percentages are typically used in assessment of skin injuries and treatment (e.g., for burns), and a simplified version of these figures were applied in these guidelines. An adult human body averages approximately 20-22 square feet, and the torso – excluding what ***GURPS*** calls the groin area – is about is about 30-40% of that. While researching body-armor areas and weights, it became apparent that ***GURPS*** numbers for "torso" protection for vests, trauma plates, and similar armor would be far too heavy if they assumed full coverage of six to eight square feet for the entire torso (or three to four square feet for a front or back plate) as quoted in ***Ultra-Tech*** and ***High-Tech***. However, ***GURPS Low-Tech*** corrected this by dividing the "torso" location into chest (75% of torso) and abdomen (25% of torso) areas; it would probably be realistic to assume that some TL6+ vests and most rigid trauma plates noted as protecting "torso" will implicitly use the same rule and protect only the chest area.

In the case of modern flexible armor made of materials such as Kevlar or high-density plastic fibers where steel-plate rolled homogeneous armor equivalents were unavailable, armor statistics were based on analysis of published protection figures for body-armor panels or vests of a given size. Modern body-armor protection is usually rated for level of protection in terms of the pistol or rifle caliber ammunition it can stop. In ***GURPS***, this is based on average (rather than maximum) damage, e.g., a .357 magnum revolver does 3d damage (average 10.5); armor rated to stop that has DR 10 or DR 11. So, if a given armor material was described as weighing 3.5 lbs. and covering 5.25 square feet with the ability to protect against rounds up to .357 magnum, the weight per point of DR per square foot would be 3.5/(10 × 5.25) = 0.0666 lbs. This is not an exact science as it ignores extra weight for things like fastenings, so values were rounded up.

Design Sequence

To build armor, follow this step-by-step procedure.

Step 1: Tech Level and Name. Pick the TL at which the armor is built, and name the armor.

Step 2: Coverage and Surface Area. Decide on the hit location – or partial location – that will be protected by the piece of armor being built. Calculate its surface-area coverage in square feet. Record this value. Decide on the number of pieces making up the armor.

Step 3: Armor Material. Choose the material used in that piece of armor. Record its material weight and cost multipliers.

Step 4: Construction Type. Choose a construction type, such as mail or plate. Some types are only available for certain materials.

Step 5: Set DR. Decide on the armor's Damage Resistance.

Step 6: Time to Don and Concealment. Determine if the armor counts as flexible, and calculate the time it takes to put it on. Determine if it is concealable.

Step 7: Calculate Weight and Cost. This uses a formula based on the values determined in steps 1-5. Consider style options.

Step 8: Accessories. Consider any additional accessories or options.

Step 9: Armor Statistics. Record the armor's statistics block. Take note of any special factors that apply to the armor, such as reduced DR against crushing attacks.

Step 1: Tech Level and Name

Although these rules focus on futuristic armor, statistics also are provided for a few TL6-7 materials as a comparison, so the tech level can be anything from TL6 up. Consider giving the piece of armor a unique name such as "liquid metal ballistic vest" or "Mk. 2 Defender tactical helmet."

Example: Let's build some highly advanced late TL8 armor. We'll call it the Warden 7 ballistic T-shirt.

You've upgraded your armor! I've made some upgrades of my own . . .

– Iron Monger, in ***Iron Man***

Step 2: Coverage and Surface Area

Based on data used for burn victims, the human (male) body has an average area of about 21 square feet. About seven square feet of this is devoted to the torso. Using numbers derived from the *Armor Locations Table* (***GURPS Low-Tech,*** p. 100), the *Coverage Table* (below) provides values for square feet.

Example: Let's make this a short-sleeved T-shirt. The armor will cover the chest (5.25 square feet) and both shoulders (0.7 square feet) for a total of 5.95 square feet.

Directional DR: Outfits may be designed to only protect a location (other than eyes or face) from the front (such as front trauma panels, bikini top, or a low-cut dress) or the back (such as a cape or rear trauma panels). Halve the surface area; record an F or B after armor DR.

Coverage Table

Partial locations are in italics. Those locations marked as "both" protect two limbs (or partial limbs) or extremities; you can armor just one of them – e.g., the left leg – for half the surface area. Adding up the locations Head (2.1), Torso (7), Arms (3.5), Hands (0.7), Legs (7), and Feet (0.7) totals 21 square feet.

Location	*Area Coverage*	*Note*
Full coverage	21.35 square feet	All locations.
Head	2.1 square feet	Includes skull and face.
Skull	1.4 square feet	
Face	0.7 square feet	
Neck	0.35 square feet	
Torso	7 square feet	Includes chest and abdomen*.
Chest	5.25 square feet	No penalty to target; treat as torso* (includes vitals).
Abdomen	1.75 square feet	-1 to target; treat as torso* (includes groin).
Vitals only	1 square foot	-3 to target; hits vitals.
Groin only	0.35 square feet	
Both Arms	3.5 square feet	Includes shoulders, upper arms, elbows, and forearms.
Both Shoulders	0.7 square feet	Protects arm only on 1d roll of 6.
Both Upper Arms	0.7 square feet	Protects arm only on 1d roll of 5.
Both Elbows	0.35 square feet	Protects arm only on 1d roll of 4.
Both Forearms	1.75 square feet	Protects arm only on 1d roll of 1-3.
Both Hands	0.7 square feet	
Both Legs	7 square feet	Includes thighs, knees, and shins.
Both Thighs	3.15 square feet	Protects legs only on 1d roll of 5-6.
Both Knees	0.35 square feet	Protects legs only on 1d roll of 4.
Both Shins	3.5 square feet	Protects legs only on 1d roll of 1-3.
Both Feet	0.7 square feet	

* There's a 1-in-6 chance a hit to these locations will hit the vitals.

Option: Trauma Plate Carrier

Flexible armor (including scale armor) that covers the torso or chest locations may optionally be fitted with a carrier attachment for removable trauma plates – rigid armor designed to increase protection against higher-power ammunition or impaling weapons ("anti-stab plates").

Build this as an extra layer of rigid armor with plate construction covering any torso location (sometimes with a directional DR option if only a front or back plate is included). Typical material used in trauma plates at TL8 are grades of steel, titanium alloy, and polymer composites; more advanced cutting-edge materials are quite possible.

Note that it is possible to build a non-ballistic carrier vest for the plates by simply using a cheap material like nylon and assigning something like DR 1 or DR 2.

Number of Pieces

If it's not already clear, decide how many pieces the armor consists of. A suit of armor covering multiple locations can be a single piece provided they can logically be connected together. For example, both hands must be separate pieces (gloves) if they were on their own. However, two hands, two arms, and a torso (or chest) piece could be considered a single piece, since these locations can all be connected together. Use common sense, the descriptions of the locations, and the hit location diagram on p. B399 (although it doesn't list the expanded ***Low-Tech*** locations, they're fairly obvious).

Example: The chest can connect to each shoulder so despite covering three different areas this can be treated as a single piece of armor. That's important, as it means we can quickly put it on as a single unit, rather than having to attach each piece individually.

Extra Detail: Armor, Surface Area, and Size

The listed ***GURPS*** weights for armor assume they are sized to a wearer of average build (115-175 lbs. – see the *Build Table*, p. B18). In reality, a wearer who is a significantly different size or shape will need to have armor of a different size (or appropriately sized inserts) with a different weight and cost. Finding such sizes may also prove difficult.

Each +1 or -1 to SM affects surface area by the factor shown in *Adjusting for SM* (see ***GURPS Ultra-Tech,*** p. 16). Apply that factor to surface area right away, or just multiply the final cost and weight by the factor.

Armor also can be scaled individually to particular body sizes and weights. This can be done by dividing character weight by 150 (average human weight) and then raising it to the two-third power (that is, find the cube root, then square it). Use this as a multiple to surface area, rather than adjusting for SM. The formula is:

Surface Area Multiplier = (character's weight/150)$^{2/3}$.

If someone's only option is to wear ill-fitting armor, consider assessing a penalty of -1 to DX (or -2 to DX if the armor covers half or more of the surface area). In addition, if the armor is too small, consider reducing the penalty to target any chinks in armor by 1 or 2, as there will be gaps in protection.

Example: The armor being built here won't use these extra detail rules, but what if it were built for a slim teenager with a 110-lb. body weight? If so, the optional surface area multiplier would be (110/150)$^{2/3}$ = 0.81, so the 5.95 square foot T-shirt is only 4.81 square feet.

Typical Flexible Armor Outfits

Bodysuit covers the torso (including groin), arms, and legs: 17.5 square feet.

Gloves cover hands: 0.7 square feet.

Jacket covers the torso and arms: 10.5 square feet.

Full Suit covers all locations: 21.35 square feet.

Trousers are long pants, protecting the groin and legs (but not the feet): 7.35 square feet.

Vest is a shirt covering the chest: 5.25 square feet.

Step 3: Armor Material

Choose a material type for the armor. Stats are given in the *Armor Material Table* (p. 20).

Flexible Materials

Rubber (TL6): Natural or synthetic rubber.

Elastic Polymer (TL7): Synthetic rubber-like elastomer materials such as neoprene or Spandex, and various blends. Commonly used in wetsuits, motorcycle riding suits, superhero costumes, or lightweight protective gear (e.g., paintball armor vests).

Nomex (TL7): Flame-resistant meta-aramid blends such as Nomex (often reinforced with nylon, neoprene, etc.).

Nylon (TL7): A silky synthetic thermoplastic material; statistics are for strong ballistic weave nylon as used in early body armor and other protective gear.

Ballistic Polymer (TL8): Flexible plastic fiber composites such as Spectra Shield and Dyneema manufactured from ultra-high molecular weight polyethylene. Costlier but tougher than Kevlar.

Improved Ballistic Polymer (TL8): The latest generation of ballistic polymers.

Kevlar (TL8): Woven para-aramid fiber fabric such as Kevlar and Twaron.

Improved Kevlar (TL8): Costlier late-TL8 para-aramid materials using more sophisticated ballistic weaves.

Improved Nomex (TL8): Meta-aramid fabric reinforced with Kevlar, such as Nomex III.

Arachnoweave (TL9): Spider silk produced using genetic engineering technology. (TL10+ versions, not covered here, are further improved via enhanced spiders . . .)

Basic Nanoweave (TL9): A late-TL9 flexible armor using polymer reinforced by carbon nanotubes (albeit not quite as strong as the TL10 nanoweave armor in ***Ultra-Tech***).

Laser-Ablative Polymer (TL9): Ballistic polymer built to absorb laser fire.

Magnetic Liquid Armor (MLA) (TL9): Another, potentially even stronger, form of liquid "reflex" armor incorporates microtubules filled with magneto-rheological fluid (ferrous metallic particles suspended in a carrier liquid. The MR liquids built into the armor can instantly transition from a flexible suit to rigid metallic panels as sensors in the armor detect impacts and trigger an electric charge. The armor is self-powered (using a wearable flexible power supply that is recharged by the wearer's muscle movements).

STF Liquid Armor (TL9): Ballistic fabric such as improved Kevlar whose protective qualities are enhanced by ceramic nanoparticles soaked in sheer-thickening "liquid armor" fluid. They transition to a rigid material upon impact. This is one of the armor technologies referred to as "Reflex armor" in ***Ultra-Tech.***

Rigid Materials

Hard Steel (TL6): Face-hardened high-strength steel or high hardness alloys

High-Strength Steel (TL6): Rolled homogeneous armor plate.

Basic Ceramic (TL7): Boron carbide or aluminum oxide ceramics (or for transparent armor, possibly also quartz).

Ballistic Resin (Late TL7): Various rigid fiber-reinforced composites.

Fiberglass (TL7): Tough glass-reinforced plastic, e.g., S-glass.

Armor Material Table

TL	*Material*	*WM*	*CM*	*DR/in*	*Max DR*	*Notes*	*Construction*
Flexible Materials							
6	Rubber	0.45	$5	14	7	C, F, S*	F/O
7	Elastic Polymer	0.16	$100 ($50 at TL8+)	16	8	F	F/O
7	Nomex	0.066	$50 ($25 at TL8+)	10	5	F†	F/O
7	Nylon	0.5	$25 ($6 at TL8+)	6	3	F	F/O
8	Ballistic Polymer	0.06	$200 ($50 at TL9+)	48	24	F‡	F/O
8	Improved Ballistic Polymer	0.04	$250 ($100 at TL9+)	75	36	F‡	F/O
8	Kevlar	0.1	$80 ($20 at TL9+)	33	16	F‡	F/O
8	Improved Kevlar	0.08	$120 ($40 at TL9+)	40	20	F‡	F/O
8	Improved Nomex	0.055	$35	10	5	F†	F/O
9	Arachnoweave	0.03	$600 ($120 at TL10+)	96	48	F‡	F/O
9	Basic Nanoweave	0.03	$750 ($150 at TL10+)	110	55	F‡	F/O
9	Laser-Ablative Polymer	0.018	$150 ($75 at TL10+)	128	64	F, E§	F/O
9	Magnetic Liquid Armor	0.032	$200 ($100 at TL10+)	90	45	F‡	F/O
9	STF Liquid Armor	0.032	$150 ($75 at TL10+)	90	45	–	F/O
Rigid Materials							
6	Hard Steel	0.5	$3.50	82	16	–	R/S
6	High-Strength Steel	0.58	$3	70	14	–	R/S
7	Basic Ceramic	0.2	$25 ($12 at TL9+)	83	35	S	Solid
7	Ballistic Resin	0.55	$2.50	15	6	–	R/S
7	Fiberglass	0.6	$8 ($4 at TL9+)	17	7	S	R/S
7	High-Strength Aluminum	0.4	$12 ($6 at TL9+)	35	10	–	R/S
7	Plastic	0.75	$1.80	12	3	T	R/S
7	Polycarbonate	0.45	$10 ($5 at TL9+)	10	3	S	R/S
7	Titanium Alloy	0.35	$50 ($10 at TL9+)	66	20	–	R/S
8	Improved Ceramic	0.15	$100 ($20 at TL9+)	111	44	S	Solid
8	Laminated Polycarbonate	0.25	$25 ($12 at TL9+)	12	5	S, T	Solid
8	Polymer Composite	0.22	$40 ($10 at TL9+)	28	11	–	R/S
8	Titanium Composite	0.2	$250 ($25 at TL9+)	104	42	–	R/S
8	Ultra-Strength Steel	0.35	$30 ($8 at TL9+)	116	23	–	R/S
9	Ceramic Nanocomposite	0.1	$300 ($75 at TL10+)	166	66	S	Solid
9	Polymer Nanocomposite	0.1	$400 ($100 at TL10+)	83	33	–	R/S
9	Titanium Nanocomposite	0.12	$250 ($60 at TL10+)	174	70	–	R/S

* If assigned DR 2 or more, the full DR only applies against crushing damage. Divide DR (and DR/in) by two vs. all other damage types.

† The full DR only applies against burning damage. Divide DR (and DR/in) against other damage types by four (round down).

‡ The *full* DR *only* applies against piercing and cutting damage. Divide DR (and DR/in) against other damage types by four (Kevlar, arachnoweave), three (STF liquid armor, nanoweave, improved kevlar), 2.5 (ballistic polymer, improved ballistic polymer), or two (Nylon, magnetic liquid armor).

§ The *full* DR *only* applies against burning damage from lasers (including X-ray, gamma-ray, etc.). Divide DR (and DR/in) by six against all other damage types.

High-Strength Aluminum (TL7): Aerospace-grade aluminum alloy.

Plastic (TL7): Ordinary thermoplastic material.

Polycarbonate (TL7): Tough high-impact molded plastic; may be transparent at extra cost.

Titanium Alloy (TL7): A strong but costly light alloy.

Improved Ceramic (TL8): Costlier ceramics, e.g., silicon carbide, either with a polymer or alloy backing plate, or encapsulated in a polymer material.

Laminated Polycarbonate (TL8): Advanced multi-layered polycarbonate and polyurethane laminate, often used for transparent armor visors.

Polymer Composite (TL8): Carbon-fiber reinforced plastic or resin-bonded Kevlar. Often used to make ballistic helmets.

Titanium Composite (TL8): A titanium metal matrix composite – alloy reinforced by high-strength ceramic particles or fibers.

Ultra-Strength Steel (TL8): Triple hardened steel alloys or nanostructured steel.

Ceramic Nanocomposite (TL9): Ceramic nanoparticles in an elastic medium.

Polymer Nanocomposite (TL9): Plastic reinforced by carbon or boron nanotubes.

Titanium Nanocomposite (TL9): Titanium composite reinforced by carbon or boron nanotubes.

Armor Material Table Key

Material: A designation for the material.

TL: The tech level that material is first available for armor.

WM: This is the armor weight multiplier; it is the weight of one square foot of armor with DR 1, assuming the armor is of solid, flat construction.

CM: The base cost of worked material, per pound.

DR/in: For reference purposes, this is the DR per inch of a 1" (25-mm) thickness of that material. Some materials have a split DR as detailed in their Note.

Max DR: To avoid armor of unreasonable thickness for wearing, this is the maximum DR that any single layer of worn armor should possess. Exception: Use double the max DR for armor that only protects head, skull, or face locations.

Notes: Special notes regarding the armor, abbreviated as follows:

C indicates the armor is combustible; if DR is penetrated by *burning* damage it can catch fire. See *Making Things Burn* (p. B433); treat the armor as *resistant*.

E is energy-ablative. Treat the armor as ablative DR vs. damage from lasers, plasma or fusion guns, or flamers.

F indicates the armor material is flexible *if* it has no more than 25% of its listed DR/in. Flexible armor is flexible DR, but can be donned in 2/3 the usual time. It is subject to the blunt trauma rule (p. B379). Flexible armor may be built with "DR 0" (treat as DR 0.25 for weight and cost calculation). Use this to create normal clothing!

S indicates the armor will be semi-ablative (losing 1 DR per 10 damage absorbed).

T means it can be transparent (it doesn't have to be) at double material cost. If transparent, it has 0 DR against visible light laser beams, such as blue-green lasers, and against any blinding attack. Transparent armor is useful for creating visors, shades, and the like.

Construction: Solid means the material can only be for solid construction, and only may be used to protect the face, skull, eyes, or any torso locations. This is typical of ceramics. *R/S (Rigid or Scale)* means it can be used for any rigid (plate, solid, segmented plate, or impact-absorbing plate) construction type or for scale construction. *F/O* means the material can be used as fabric or optimized fabric. See step 4 (below) for specific flexible and rigid materials.

Example: A T-shirt sounds like it should be flexible, so we decide to use an armor material with F/O construction: improved ballistic polymer (WM 0.04, CM $250 at TL8, limited to fabric or optimized fabric construction). A note indicates that full DR only applies against piercing or cutting; otherwise divide DR by 2.5.

Step 4: Construction Type

The weight of armor material assumes solid construction from armor with no joins or gaps. Obviously, this is practical for flexible material such as cloth, but less so for rigid armor that is designed to be wearable and removable. The *Armor Material Table* lists what construction types are applicable for given materials at various TLs. Refer to the descriptions and the *Construction Table* (p. 18), and select an appropriate construction type from those available.

Flexible Armor Materials

Fabric: This is simply a padded or quilted garment. Protection is uniform across the material, so *Chinks in Armor* (p. B400) should *not* apply.

Optimized Fabric: While some flexible material has no joints or gaps, it's equally common for modern body armor to be designed with thicker material over areas that are more likely to be hit.

Rigid Armor Materials

Scales: This turns a solid material into a flexible material by cutting the material into small platelets or chips and linking it together. At TL8+ various attempts to produce scale-based armor have been attempted, with varying degrees of success. One cutting-edge technology is to use bio-mimetic models inspired by computer analysis of animal forms such as fish scales or mollusk structures for enhanced protection.

Segmented Plate: Uses large, overlapping horizontal bands of armor laced together.

Plate: Armor made of solid plates or castings, attached by joints, carefully shaped and designed to use less material in areas determined to be of reduced vulnerability in order save weight. This reduces the weight per point of DR.

Impact-Absorbing: Specially designed and padded to absorb and dissipate heavy impacts. Treat as plate, above, but it has split DR: use the full DR against crushing damage and half its DR (round down) against other types of damage. Especially common for things like motorcycle helmets, hard hats, and sports helmets.

Solid: This represents flat or gently curved plates. It's not really possible for armor added to a humanoid form, but it can be used to represent substantially cheaper flat-topped or flat-faced helmets if applied to the skull and for things like armor for vehicles, houses, doors, boxes, etc.

Construction Table

TL: The minimum TL that this construction option is available.

CW: The construction weight multiplier.

CC: The construction cost multiplier.

Min DR: The minimum DR that the armor may be assigned.

Notes: The effect on DR, as covered in step 5.

TL	*Type*	*CW*	*CC*	*Min DR*	*Notes*
0	Fabric*	1	1	1	May have reduced DR.
1	Plate	0.8	5	3	
1	Scale	1.1	0.8	2	-1 DR vs. crushing unless armor is DR 4+.
1	Solid*	1	1	2	Rarely used in body armor.
2	Segmented Plate	1.45	1.5	3	
6	Impact-Absorbing	0.65	5	2	Half DR vs. damage that isn't crushing.
6	Optimized Fabric	0.8	2	2	May have reduced DR.

* Because protection is uniform across the material, the armor is not vulnerable to *Chinks in Armor* (p. B400) and *Harsh Realism – Armor Gaps* (see ***Low-Tech,*** p. 101) – those rules apply only to armor without this footnote.

Example: The armor was improved ballistic polymer with note F/O so it must use fabric or optimized fabric. Let's have the armor use fabric construction.

Step 5: Set DR

Choose the armor's DR. Keep the following considerations in mind:

Maximum DR: The armor can't exceed the "Max DR" value for the material type specified on the *Armor Materials Table*. If armor is to be concealable as or under clothing its DR should have no more than half the material's maximum value.

Minimum DR: The armor can't be less than the Min DR specified on the *Construction Table*.

Greater DR increases cost and weight, as shown in step 7. If this is a major concern, calculate the weight and cost per point of DR first, and then choose actual DR.

If the armor material or construction type affects DR vs. some types of damage, make a note of it. Many armor materials get reduced DR vs. certain damage types.

Example: Ballistic polymer has Max of 20. This armor is intended to be a lightweight T-shirt, so we go with DR 9, just enough to stop a 9mm auto pistol's bullet (2d+2 damage). As it's polymer, that's only vs. piercing or cutting; against other attacks, it has DR 9/2.5 = 3.6, rounded to DR 4.

Step 6: Calculate Time to Don and Concealment

Armor is flexible if it uses a flexible material, or uses a rigid material plus scale construction. The base time to don high-tech or ultra-tech armor is three seconds per piece.

Any single-piece of armor that covers any of the leg locations *and* one or more other locations (besides feet) takes twice as long to don if flexible, or five times as long if it is rigid.

Armor can be put on in only 2/3 the time by not properly securing the armor, tightening straps, and adjusting the fit. For quickly donned armor, the GM should assesses -1 to DX until it can be securely fashioned. Rapidly donned sealed armor (p. 23) also may not be properly sealed (roll vs. NBC Suit or Vacc Suit skill to avoid this).

It generally takes half the specified time to remove securely fastened armor.

Example: The armor is one-piece. It takes three seconds to don.

Concealable?

Armor made of flexible materials or scale, or in trauma plate carriers, may be concealable. Whether armor actually is concealable depends on its DR and the armor's material. Essentially, this is how thick the armor is relative to the material's Max DR statistic.

Armor with *more than half* the maximum DR is not concealable. It can only pass as heavy clothing, such as a trench coat, leather outfit, or the like. Reduce LC by 1.

Armor with *up to half* the maximum DR can be concealed under clothing or pass as ordinary civilian outerwear (shirts, jackets, trousers, skirts, etc.).

Armor with *no more than one-quarter* the maximum DR can further pass as light clothing such as T-shirts, summer or evening wear, skintight suits, or normal undergarments. It can be easily worn beneath clothes. Increase LC by 1 to max LC 4.

Armor with *no more than one-sixth* the maximum DR can be disguised as swimsuits, lingerie, or other very light or diaphanous clothing. Increase LC by 1 to max LC 4.

Example: The armor has a basic DR 9. As the maximum DR was DR 36, this actually qualifies as "light clothing" (being no more than 1/4 max DR). The LC is increased by 1.

Step 7: Calculate Weight and Cost

Use the formula below to calculate the weight and cost of the armor. To instead calculate the weight and cost *per point* of DR, just use "1" for the DR in the formula.

Armor weight (in pounds) = LSA × WM × CW × DR.
Armor Cost = armor weight × CM × CC.

LSA is the location surface area from the *Coverage Table* (p. 18).

WM is the weight multiplier from the *Armor Material Table* (p. 20).

CW is the construction weight multiplier from the *Construction Table* (p. 22).

DR is Damage Resistance.

CM is the cost of material from the *Armor Materials Table.*

CC is the construction cost multiplier from the *Construction Table*.

The final weight and cost should be rounded to two significant figures – for example, round $246 to $250, and 13.5 lbs. to 14 lbs.

Example: Let's work out how much the armor weighs. The armor has LSA 5.95 (chest area and shoulders) × WM 0.04 (improved ballistic polymer) × CW 1 (fabric) × DR 9 = 2.142 lbs., which rounds to 2.1 lbs. Cost is armor weight 2.1 × CM $250 (ballistic polymer, assuming it's TL8) × CC 1 (fabric) = $525; with two significant digits, this becomes $530.

Cut (Optional)

Armor – even if it's not concealable (e.g., parade or tournament armor) – can be attractively styled. Stylish or better armor can also represent "authentic" appearing replicas of period armor made from inauthentic materials. Apply this as a modifier to the calculated cost.

Stylish armor is four times the above cost.

Fashion originals are 20 times the above cost.

Example: This is just a normal piece of armor, so no extra styling (or cost).

Sealed Armor

Sealed (TL6): Armor with DR 1+ can be sealed. This means all rigid armor joints are protected and/or fabric is chemically treated to make it impervious to penetration by liquids and gases. If a wearer's entire body is protected by sealed armor the person effectively has the Sealed advantage (p. B82). Sealed armor costs an extra $10 per square foot protected at TL7, or $5 per square foot at TL8+.

Step 8: Consider Accessories

Armor can have additional accessories and modifiers. Numerous options are available from ***Ultra-Tech*** and ***High-Tech,*** and a few more are offered here.

Example: It's just a basic protective T-shirt, so we skip accessories.

General Accessories

Biomedical Sensors (TL7): Can be built into any armor that includes chest coverage; add +1 to Diagnosis rolls. TL7-8: 2 lbs., $2,000; see ***High-Tech,*** p. 75; TL9+, 0.2 lbs., $200; see ***Ultra-Tech***, p. 187.

Waste-Relief System (TL7): The suit collects and packages the wearer's waste products in a hygienic manner. $1,000, 2 lbs.

Infrared Cloaking (TL8): Any suit that covers at least 70% of the entire body's area may have this option. It subtracts (TL-6) from detection by infravision. Costs $30 per square foot.

Helmet Electronics

Cutting-edge helmets (rigid skull or head armor) are often equipped with additional built-in electronics.

Tiny Radio: 0.5-mile range at TL8, or 1-mile range at TL9. 0.05 lbs., $50, includes GPS receiver (***Ultra-Tech,*** p. 74). LC4.

Hearing Protection: Screens out noise equivalent to Protected Hearing (p. B78). Add $50. LC4.

Computer (TL8): A tiny computer with the Hardened and High Capacity options. It has Complexity 1 (TL8), 3 (TL9), etc. 0.1 lb., $150 ($3,000 for Fast version with +1 Complexity). LC4.

HUDs

Rigid armor that covers the face (or entire head) with transparent material may incorporate a HUD.

Head-Up Display (HUD) (TL8): Basic helmet-mounted display. $500 at TL8 or $50 at TL9+. Adds 1 lb. (TL8) or 0.1 lb. (TL9+) LC4. See ***Ultra-Tech*** (p. 24).

HUD With Infrared Visor (TL9): This is an advanced system designed to provide increased situational awareness, unlike standard. 2× magnification; built-in digital camera. $500, 0.6 lbs., 10 hr. power; includes HUD. LC4.

Step 9: Armor Statistics

Record the armor's statistics block using the standard format with the addition of a Don time entry. Note any modifications to DR against different damage types. An * after DR should denote flexible armor, as defined under *Step 6: Calculate Time to Don and Concealment* (p. 22).

Example: Our armor has these statistics.

TL	*Armor*	*Location*	*DR*	*Cost*	*Weight*	*Don*
8	Warden 7 Ballistic T-Shirt	Chest, Shoulders	9/4*†	$530	3	3

† Split DR; use the higher DR vs. piercing or cutting, the lower against all other attacks.

We start wearing Kevlar, they buy armor piercing rounds.

– Jim Gordon, in ***Batman Begins***

About the Columnist

David L. Pulver is a Canadian freelance author. An avid science-fiction fan, he began roleplaying in junior high with the newly released ***Basic Dungeons & Dragons.*** Upon graduating from university, he decided to become a game designer. Since then, David has written over 70 roleplaying game books, and he has worked as a staff writer, editor, and line developer for Steve Jackson Games and Guardians of Order. He is best known for creating ***Transhuman Space,*** co-authoring the ***Big Eyes, Small Mouth*** anime RPG, and writing countless ***GURPS*** books, including the ***GURPS Basic Set,*** *Fourth Edition,* ***GURPS Ultra-Tech,*** and the ***GURPS Spaceships*** series.

Free Falling

by Timothy Ponce

Free fall is a truly alien environment. Objects don't fall "down," and everything collects at air-intake vents – colloquially called the Lost and Found. Throwing a bowling ball will send the thrower into a slow, backward spin, just as will pushing someone else away. These guidelines consolidate rules from ***GURPS Basic Set, GURPS Bio-Tech, GURPS Space, Transhuman Space: Martial Arts 2100,*** and ***Transhuman Space*** while filling in any gaps for all aspects of operating in "zero-g" environments, including health effects, movement, and combat. Only the ***Basic Set*** is truly required to make use of these rules.

Can you handle the challenges of free fall?

The Effects of Free Fall

Free fall has a number of physiological effects on the human body. These apply to anyone who enters free fall from a higher gravity locale.

Physiological Effects

Those who grew up in or are otherwise accustomed to microgravity should take the No Degeneration in Zero-G perk (***Biotech,*** p. 211).

Musculoskeletal Degeneration

Without the need to constantly fight the pull of gravity, muscles atrophy and bones lose calcium. This primarily occurs in the back and lower body and results in a loss of strength and increased risk of bone fracture. Regular exercise mitigates muscular degeneration and bone decalcification. At higher TLs, medical therapies or nanobots can prevent this altogether.

Every six months you live in microgravity, roll against HT. On a failure, you lose 10% of ST, and on a critical failure, you gain Vulnerability (Crushing Attacks ×2) [-30]. Regular exercise grants a +1 to this roll, and medical therapies give a bonus equal to TL-7.

Fluid Shift

In free fall, fluids shift head-ward, causing one's legs to become skinny, while one's face looks puffy and swollen; this sometimes causes a feeling of congestion. Special leggings can help mitigate this fluid shift.

Cardiovascular Weakening

Without the pull of gravity to tax the heart, it loses strength like any other muscle in the body. Unfortunately, this results in a gradual loss of overall endurance and fitness. Roll against HT after six months. On a failure, your fitness decreases by one step on the following scale: Very Fit, Fit, no trait, Unfit, Very Unfit; every step below Very Unfit gives a cumulative -1 to HT. On a critical failure, fitness decreases *two* steps.

Glossary

free fall: Any environment where gravitational acceleration is null, like in orbit or at a Lagrangian point. These rules use "free fall" and "microgravity" interchangeably because game options apply to either environment.

microgravity: Any environment with gravitational acceleration below 0.1 G, such as on extremely low-mass bodies, like asteroids and small moons.

zero gravity: Any place unaffected by gravity. This does not exist at any known point in the universe.

Spinal Stretching

Without gravity compressing the body vertically, the spine stretches out. This has no affect on SM or reach, but it can cause temporary Chronic Pain. At the end of the first day in microgravity, roll against HT. On a failure, you gain Chronic Pain (Mild; 1 hour interval; 12 or less) [-5]. On a critical failure, the interval increases to two hours and the frequency is 15 or less for [-20]. Any critical success on the daily HT roll eliminates the need for further rolls; you are accustomed to your new spinal length.

Inner Ear and Balance

Without gravity to tug the fluids of the inner ear, a person often feels disoriented and nauseous in space. This is called space adaptation syndrome (see p. B434) or "Space Sickness."

Streamlined Adaptation Syndrome

The rules above cover each aspect of adapting to free fall. Individuals may experience different – or all – aspects of this process, but it requires a lot of rolls. At the GM's option, make a single HT roll upon entering microgravity to cover spinal decompression and space sickness, followed by another HT roll after six months that covers musculoskeletal and cardiovascular effects. Make any subsequent rolls individually.

Recovery

While space adaptation syndrome is easily remedied with transdermal anti-nausea patches or even just time, recovering from cardiovascular and musculoskeletal atrophy takes years. At TL8 or less, recovering lost muscle and bone requires a successful HT roll after physical therapy lasting twice the time spent in free fall. Success removes six months of ill effects; any failure results in no progress. The physical therapist's Physician skill serves as a complementary skill for this HT roll. At TL9+, ultra-tech medicines or nanobots may drastically reduce recovery time or even mitigate the health effects of microgravity completely.

At this point I thought "We made it," by which I meant "We survived."

– Ron Garan

Free-Fall Activities

Moving, working, and fighting in zero gravity is challenging for the inexperienced, but most spacers have at least Free Fall-12 and are no less proficient at tasks than their groundbound counterparts.

Weight vs. Mass

As every high-school science teacher explains at some point, weight and mass are different. Mass refers to the property of matter that resists acceleration, and weight measures the effect of gravity on an object. ***GURPS*** often uses "weight" in place of "mass" because it is easier to conceptualize – after all, most games take place in the same Earth-normal gravity we experience daily. But in extraterrestrial environments, an object's weight varies.

The only time "weight" truly means weight is when determining how much someone can lift. Determine a load's local weight by multiplying its weight on Earth by the local gravity in Gs. All other rules – e.g., encumbrance, Ritual Path Magic weight modifiers, etc. – use "weight" as a stand-in for mass. In these instances, use the weight as measured in 1G regardless of local gravity.

Control Rolls

These rules occasionally require control rolls – rolls or Quick Contests against Free Fall or its default – that determine the extent to which people command their own movement in microgravity. Failure results in loss of control over your movement – you suffer a DX penalty equal to your margin of failure, cannot alter your course, and continue at the same speed in the same direction you were moving until you either regain control or collide with something; see *Collisions* (pp. B430-431).

Every second you remain out of control, you may roll against the higher of DX or a grappling skill to grab a nearby *stable* object. If successful, you achieve purchase and can take a Ready maneuver to erase -1 worth of control-related DX penalties. If you lack purchase, a successful Free Fall roll removes -1 in DX penalties, but failure *increases* the penalty by your margin of failure! Lastly, you can roll against Astrobatics (***Space,*** p. 224), a special type of Acrobatics only useful in free fall, to regain control and negate all penalties with a single Ready maneuver or as a step on a critical success! Failure carries the same risk as Free Fall. All rolls to erase these DX penalties may take Body Sense as a complimentary skill.

Moving in Free Fall

Unless you have Flight with one of Newtonian Space Flight or Space Flight, your Space Move is 0; otherwise, it equals 2 × Basic Move. But just because you lack Space Move doesn't mean you can't propel yourself by other means!

Anyone can climb along any surfaces that provide hand- or footholds. This requires a successful roll against either Climbing or Lizard Climbing. The former lets you move one yard per second, and the latter grants move equal to 1/2 Basic Move. Both of these options require sufficient handholds or footholds to move around.

You can also throw yourself from handholds or jump off of stable surfaces, for a Move of ST/2, but always remember to modify for encumbrance – *especially* if pushing or dragging a load. Every level of Super Jump doubles your speed when pushing off with your legs, as does a successful Flying Leap roll; Super Throw (***GURPS Supers***, p. 30) has a similar effect when using your arms to move in free fall.

Chases, races, and long-distance movement in microgravity require rolls against HT-based Free Fall skill instead of Running. High-speed maneuvers and acrobatic movement rely on Astrobatics (***Space,*** p. 224).

Knockdown

Often, circumstances require a DX roll to avoid falling down, but in free fall, there is no down! Instead, whenever you would normally roll to avoid falling down, make a similarly penalized control roll (see p. 26).

Working in Free Fall

In free fall, objects – and people – move in unintuitive ways. Without gravity pulling everything along familiar parabolic arcs to the ground, people have trouble performing DX-based skills. You can compensate, however! Roll against Free Fall whenever attempting *any* action more complicated than pulling yourself along by handholds or walking in magnetic boots, plus whenever making *any* DX rolls. Free Fall also serves as a skill cap on all DX-based skills. Lastly, those unanchored in free fall have nothing against which to brace and can only bring half their ST to bear on any task.

Thankfully, buying up Free Fall increases the cap on all DX-based skills, and the Free Fall Training technique (p. 30) increases it for one *specific* skill. This has as much to do with preventing oneself from floating in unexpected ways as it does controlling tools and materials. Time spent living in microgravity or free fall counts as four hours per day of Free Fall training automatically when using *Improvement Through Study* (p. B292).

You also can anchor yourself to a fixed object. This requires (20 - Free Fall) Ready Maneuvers and a successful Free Fall roll; the rules under *Time Spent* (p. B346) apply. If successful, your body is anchored; on a failure, you have not and the time is wasted. On a critical failure, make a control roll (p. 26). Repeated attempts are allowed.

Once anchored to an immobile surface, you enjoy +2 to your skill cap on DX-based skills, except those that require whole-body movements – e.g., Astrobatics, Jumping, etc. – and can apply your *full* ST to any task. This requires any of grips, footholds, clips, magnetic boots, suction holds, etc.

Fighting in Free Fall

Many aspects of combat differ in free fall. Indeed, combatants maneuver like vehicles, posture is nearly meaningless, and many weapons don't behave as they would Earthside.

Maneuvers in Free Fall

Because movement in microgravity differs tremendously from that in gravity – in fact, it resembles a vehicle's more than anything – many maneuvers need clarification. As with any microgravity activities, DX-based skills are capped by Free Fall skill, and excessive movement may require a control roll (p. 26).

Change Posture

Posture requires redefining in microgravity. At most, you can ball up or stretch out in an attempt to change SM, but becoming more spherical offsets any gains from reducing your height. But changing your orientation relative to another person, object, or event can be useful. Presenting a smaller area to an explosion might make dodging shrapnel and debris easier, but floating broadside to a barrage of gunfire will only lessen your odds of survival. You may take a Change Posture maneuver to reorient yourself relative to any *one* object, person, or direction; see *Posture in Free Fall* (p. 28) for details on the effects of different postures.

Move and Attack

All attacks made at more than Move 1 require an All-Out Attack, Attack, Committed Attack, or Defensive Attack, and they *all* require a control roll (p. 26) penalized for your speed based on the *Speed/Range Table* (p. B515). Use a Move and Attack maneuver specifically to accelerate or decelerate by up to Space Move or to changing facing by up to 300° while attacking without running the risk of *Losing Control* (pp. B195-196).

If you lack a Space Move, you can still propel yourself with your hands and feet as described under *Moving in Zero Free Fall* (pp. 26-27). This requires a successful control roll at an additional -3.

Move

In space, maintaining your speed and direction takes no effort (or maneuver), but any change in either requires a Move action. A Move maneuver allows you to accelerate or decelerate up to your Space Move (see *Moving in Free Fall*, pp. 26-27) or change facing up to 300°. Use *High Speed Movement* (p. B394) when moving faster than your Space Move, which is easily achieved! Make any rolls when *Pushing the Envelope* (p. B395) against the higher of DX+3, Astrobatics+3, or Free Fall+3, plus any relevant penalties.

If you lack Space Move, you can use a Move maneuver to launch yourself as per *Moving in Free Fall* (pp. 26-27). You may attempt this as a free action with a free hand or foot and a successful control roll (p. 26) at -3. This permits you to use free limbs for other tasks, such as performing a Ready maneuver or attacking; see *Move and Attack* (above)

When we're on the space station, we orbit the Earth 16 times per day, which means we're constantly moving to and away from the sun. From light to shadow, the temperature swings by 300 degrees. Of course we're protected by the gear we wear, but you can definitely feel this temperature change.

– Thomas Marshburn

Step

A step – or the 1/2 Move offered by All-Out Attack – represents a small, manageable amount of acceleration or deceleration in combat. This requires handholds or footholds *and* a free hand or foot. If using your feet to decelerate, you must roll against the higher of DX-2, Astrobatics, or Free Fall to anchor your foot securely; any failure requires a control roll (p. 26).

Retreats

Retreats are only possible when you can reasonably push or pull yourself in a direction. This requires purchase – see *Control Rolls* (p. 26) – and a successful Control Roll at +2; Astrobatics can compliment this roll.

Remember that in free fall, "up" and "down" hexes also exist. This gives normal retreats up to nine possible final hexes, and slips six potential endpoints.

Stranded in Space

It's entirely possible for a person to find himself afloat in the middle of a room without any way to push himself toward a handhold, and Newton's first law of motion will prevent him from doing much more than just spinning in place. Thankfully, Newton's third law offers a way out, albeit a somewhat embarrassing one: a stranded spacer can throw objects on his person to gain velocity in the opposite direction. The more massive the objects thrown – and the faster he throws them – the more quickly he moves.

Determine move by first figuring out how far the person normally throws the object *in 1G*; for thrown weapons, use 1/2D Range. Next, multiply the results by the object's weight. Divide the results by the person's weight, plus everything he is still carrying, to find his new Move. Remember that he will move *away* from what he threw. He may also employ some ranged weapons to gain an acceleration. Firing a projectile weapon imparts acceleration equal to (Rcl-1)/4.

Example: Harry finds himself stuck in the middle of his cargo hold with just his coveralls, a grease pen, and his boots. He has ST 10, and all his clothing and pen have a weight of 5 lbs. He can throw such a load 12 yards on Earth, and multiplying this by the weight yields 60. In his skivvies, Harry weighs 160 lbs., so he could gain a Move of about 1' per second if he doesn't mind reaching his destination in the buff!

Posture in Free Fall

Posture, in and of itself, is meaningless in free fall, but relative to another, it may provide a penalty to you or your foe. In microgravity, there are two general "postures" or positions: end-on and full-on.

End-On: Your head or feet directly face your foes. This presents the smallest possible cross-section at which to aim ranged or thrusting weapons, but does nothing to mitigate swinging attacks. Treat your SM as -2 for the sake of ranged and thrusting attacks, but all attempts to Block or Parry are at -2.

Full-On: Your front, side, or back faces your opponents. This presents the largest target for ranged and thrusting attacks – SM and Active Defenses are treated normally.

Melee

Melee combat skills, like all DX-based skills, are capped by Free Fall skill, and they require a control roll (p. 26). Thrusting attacks tend to be less disruptive – control rolls are at +2 – but swings can send a person spinning – roll at -2. Control rolls for punches, bites, and attacks with strikers are at +0, while kicks impose -2.

Anytime an attack *might* cause knockback, apply knockback based on *half* rolled damage to *both* combatants. The knockback sends the two parties away from each other at a number of yards per second equal to knockback, and each person must make a control roll rather than risk falling down, see *Knockdown,* p. 27.

Remember that in free fall, everyone can freely move above or below his opponent, granting an additional 360° of freedom – be sure to use *Combat at Different Levels* (p. B402), and treat opponents more head-ward than their target as "above" and more foot-ward as "below". Anyone on a level with their opponent merely deals with facing and reach.

Projectile Weapons

Guns, liquid projectors, and muscle-powered ranged weapons all hurl projectiles to inflict damage. Whenever firing such weapons, make a Free Fall roll. On a failure, Rcl is doubled, and on a critical failure, *also* make a control roll (p. 26) at a penalty equal to the weapon's Rcl.

Two factors affect projectile ranges: air drag and gravity. Multiply 1/2D Range by air pressure in atmospheres and treat Max Range as effectively infinite. Over very long distances, bullet travel (see ***GURPS Tactical Shooting***, p. 32) may enter play. Treat projectiles as moving a number of yards per second equal to their 1/2D Range. As with other DX-based skills, ranged combat skills are all capped by Free Fall skill.

Projectile weapons never benefit from being fired "downward" or suffer from being shot "upward." Such terms are meaningless in free fall.

Explosions

Explosions propagate in zero gravity the same as in gravity. Concussion range is only affected by air pressure because it's a shockwave – divide damage by (3 × air pressure in atmospheres). A lack of gravity *does* affect the maximum range of any fragmentation damage. In zero gravity, there is no gravity to pull shrapnel to the ground, giving it an effectively infinite range – anyone within line of sight of the explosion is subject to fragmentation damage, regardless of distance!

Energy Weapons

Aside from Free Fall capping their governing skills, energy weapons are unaffected by microgravity.

Anyone who spends much time in free fall should carefully note how various traits, skills, and techniques function under those conditions.

New and Existing Advantages

Several advantages function differently in free fall than in a normal terrestrial environment.

Flight

see p. B56

Flight, with Newtonian Space Flight or Space Flight, can mitigate control loss (see *Control Rolls*, p. 26). Add a bonus to your Astrobatics or Free Fall roll to regain control equal to any amount up to your total possible Space Move remaining for that second. If you have Newtonian Space Flight, you may not apply more Space Move than you have remaining in your fuel reserves. Once applied, that portion of that second's Space Move is gone.

Example: Starchild has Space Move 20 and loses control at the beginning of his turn. He may apply up to +20 to his Free Fall roll to regain control, but if he does so, he cannot move anymore until his next turn! Alternatively, he may apply +5 and retain up to Space Move 15 for the rest of his turn.

G-Experience

see p. B57

G-Experience is common among people who spend large portions of time in microgravity. While the 10-point version is not realistic for people, it would certainly be reasonable for someone to have experience with a few different gravity fields.

Improved G-Tolerance

see p. B60

While not strictly realistic unmodified, a couple of levels with Acceleration Only may reasonably fit people accustomed to extended periods of high acceleration, like torchship crewmembers.

New Special Limitations

Acceleration Only: Your improved increment only applies to higher gravities, not lower ones. -20%.

Decreased Only: Your improved increment only applies to lower gravities, not higher ones. -40%.

Spacer Talent

10 points/level

Astrobatics, Electrician, Electronics Repair, Free Fall, Machinist, Mechanic, Navigation (Space), Piloting (any spacecraft), Scrounging, Spacer, Vacc Suit.

Reaction Bonus: Anyone living in or traveling through space.

Alternative Benefit: +1/level to ST to figure Move when pushing off in zero gravity; -1/level less-severe penalties from both *Familiarity* (p. B169) when dealing with unfamiliar spacecraft systems of any kind and/or improvised equipment (see *Equipment Modifiers*, p. B345) when repairing systems with whatever is at hand. *11 points/level.*

Notes: This is an expansion of Born Spacer (***GURPS Power-Ups 3: Talents,*** p. 7) that includes several repair skills for maintaining the many critical systems that make life in space possible, as well as Scrounging for finding bits and pieces with which to improvise.

Super Jump

see p. B89

Every level of Super Jump doubles your speed when pushing off with your legs in free fall. If this is the only time you benefit from it, apply Limited, Free-Fall Move Only (-20%).

> *I wanna free fall out into nothin'*
> *Gonna leave this world for a while*
>
> *– Tom Petty and the Heartbreakers, "Free Falling"*

New and Existing Perks

The following perks are useful for living and fighting in space.

Free Faller

Whether in orbit or deep space, you can operate nearly unhindered by any lack of gravity. With this perk, you can routinely operate in microgravity or free fall without the need to make Free Fall rolls, so long as your modified skill level for any task is 16+.

Microgravity Training

You use only half your speed, where favorable, when assessing speed/range penalties. You must specialize by ranged combat skill.

No Degeneration in Zero-G

see *Biotech*, p. 211

Those who grow up or are genetically engineered to live in space should buy this perk.

Existing Skills

Three skills see expanded application with these rules.

Astrobatics

see *Space*, p. 224

In addition to the normal uses of Astrobatics, a successful roll against it can regain lost control instantly; see *Control Rolls*, p. 26.

Free Fall

see p. B197

Beyond just serving as a cap on all DX-based skills, a Ready maneuver permits a Free Fall roll to erase -1 in control loss penalties; see *Control Rolls*, p. 26.

Immovable Stance

see p. B201

In addition to its usual uses, any successful roll against Immovable Stance allows you to apply your *full* ST for one second, as if you have anchored yourself. Any failure has no effect, but any critical failure requires a control roll (p. 26)!

Everything in life is relative, where only change endures.

– Leon Trotsky

New and Existing Techniques

A few techniques require special treatment in free fall.

Astrobatic Recovery

Average

Default: Astrobatics.
Prerequisite: Astrobatics; cannot exceed Astrobatics+5.

This technique allows you to recover from all loss of control in free fall with a Ready maneuver. Roll against the higher of Astrobatic Recovery and Astrobatics to regain control (see *Control Rolls*, p. 26) in free fall. On a success, you regain control; on a critical success, you do so as a step. Any failure increases penalties for being out of control by your margin of failure.

Free Fall Training†

Average

Default: Free Fall.
Prerequisite: Free Fall; cannot exceed prerequisite skill +4.

This technique allows you to increase your effective Free Fall skill for the purposes of calculating the skill cap of *one* DX-based skill. You must specialize by skill.

Judo Throw and Sacrificial Throw

see *GURPS Martial Arts*, pp. 75, 79-80

These techniques do not change an opponent's posture in free fall, but they do strip him of control (see *Control Rolls*, p. 26). His DX penalty equals your margin of success. Additionally, you can alter which direction he travels after the throw, or allow him to continue along his previous path. Lastly, you can alter his speed by up to ST/4.

Any failure requires a control roll of your own!

Sweep

see *Martial Arts*, p. 81

Rather than knock down an opponent in free fall, this technique causes an opponent to lose control of his movements. Resolve the attack and the Quick Contest normally, but the results are as follows: On any success, your opponent loses control (see *Control Rolls*, p. 26), but base all penalties on your margin of success. Since an out-of-control opponent cannot alter his speed or direction, he may crash into furniture, walls, or other objects; see *Collisions* (pp. B430-431) to determine damage.

Trip

see *Martial Arts*, p. 81

In free fall, this technique works on any entity regardless of how many legs it has – if any! Success means your opponent misses, loses control, and continues at the same speed in the same direction he was heading before the trip. A tripped opponent may collide with objects or walls for damage; see *Collisions* (pp. B430-431).

Zero-G Styles

These fighting styles are suitable for any setting that includes extensive spacefaring.

Free Fall Assault Training

8 points

Free Fall Assault Training (FFAT) is a shooting style prominent among spaceborne soldiers. An extension of the shooting styles of 21st-century militaries, FFAT (pronounced "eff-fat") utilizes the latest in weaponry and integrated systems. This seamless integration makes possible feats that seem mythic, such as shooting accurately in any lighting condition, engaging multiple targets simultaneously, and dodging inbound ordinance. FFAT is most commonly taught to advanced military troops and police teams.

Stylists learn a wide range of weapons and skills, from laser pistols and rifles to gyrocs and electromagnetic grenade launchers, and how to quickly reload or switch between weapons.

They prefer to engage from a distance, usually at least 100 yards, but close-quarters combat engagements are hardly unheard of. Additionally, most learn Extra-Vehicular Combat (below) as a backup.

Practitioners usually make sighted shots using All-Out Attack (Determined) at ranges of 100 yards or less, and may use Aim at longer distances to pick off targets. Shootists may fall back on Guns (Gyroc or Grenade Launcher) to clear entrenched enemies and destroy hardened targets. They also make heavy use of cover and drill relentlessly in teams.

Boot camps and military academies teach their recruits and cadets more than just how to fire their weapons accurately, however. They also teach them how to maintain, repair, and operate it at lightning speeds. This includes their spacesuits, HUDs, weapons, sensors, and so on. Some academies also delve into tactics, crowd control, leadership skills, and the like.

Today, learning FFAT is as simple as enlisting in the space force, but enough retired soldiers work at shooting ranges for people to learn a trick or two without going to war.

Skills: Free Fall; Vacc Suit; *one* of Beam Weapons (Pistol, Projector, or Rifle); *one* of Guns (Gyroc or Grenade Launcher); and *three* additional choices from among Fast-Draw (Ammo, Pistol, or Long Arm) or the previous two lists.

Techniques: Close-Quarters Battle (any); Free Fall Training (any); Quick-Shot (any); Retain Weapon (any); Targeted Attack (any); Work by Touch.

Cinematic Skills: Blind Fighting; Immovable Stance; Zen Marksmanship (any).

Cinematic Techniques: Timed Dodge; Whirlwind Attack (any).

Perks: Armorer's Gift (any); Barricade Tactics (any); Battle Drills; Cool Under Fire; Cross-Trained (any); Microgravity Training (any); Grip Mastery (any); Intuitive Armorer (any); Lightning Fingers (any); Off-Hand Weapon Training (any); Quick Reload; Standard Operating Procedure (any); Style Adaptation (Extra-Vehicular Combat); Tap-Rack-Bang; Weapon Bond.

Optional Traits

Secondary Characteristics: Improved Basic Speed and Per.

Advantages: Acute Vision; Combat Reflexes; Danger Sense; Fearlessness; Fit; G-Experience; Gunslinger; Night Vision; Signature Gear.

Disadvantages: Chummy; Duty; Impulsiveness; Overconfidence.

Skills: Armoury (Small Arms); Astrobatics; Axe/Mace; Connoisseur (Guns); Electronics Operations (Sensors); Forced Entry; Gunner (Beam); Guns (Missile Launcher); Intimidation; Knife; Shield; Soldier; Spear; Stealth; Tactics; Throwing; any primary skill not learned initially.

Extra-Vehicular Combat

5 points

Descended from the unarmed military martial arts and knife fighting of the 21st-century, Extra-Vehicular Combat (EVC) is a brutal and practical style with one of two goals: puncture the opponent's suit or send him tumbling into space. Practitioners begin by learning armed-combat techniques with the knife and eventually transition to more advanced unarmed techniques.

Stylists try to use their knives foremost – unarmed combat is *always* a last resort. The knife is used offensively and defensively, with Judo parries supplementing only when multiple attacks are launched. Stylists rely on a series of probing Defensive Attacks to size up an opponent and set up a Feint. They typically follow up with an Attack on any weak points in the opponent's armor.

Grappling enters play when a weapon is lost or an opponent is too heavily armored to injure. In either case, the stylist uses a series of All-Out Defense maneuvers to set up a successful Judo parry. Once achieved, he grapples the opponent and either throws him free of any handholds or proceeds to disable whatever limb was grabbed. Once disabled, he will throw his opponent into the void.

EVC is often taught in conjunction with and as a backup to Free Fall Assault Training (pp. 30-31) in military training facilities across the solar system. While few techniques may cross from FFAT to EVC, most recruits learn to grapple with a weapon as well as the knife and body.

Movies and television often portray practitioners as strong, powerful men or lithe, graceful women, either of which can launch dizzying flurries or disable with a nimble touch. In reality, practitioners attempt few spectacular stunts in favor of efficiently dispatching the enemy.

Skills: Free Fall; Judo; Knife; Vacc Suit.

Techniques: Arm Lock (Judo or Knife); Armed Grapple (Knife); Choke Hold (Knife); Feint (Knife); Free Fall Training (Judo or Knife); Head Lock (Judo); Leg Lock (Judo or Knife); Leg Throw; Lower-Body Arm Lock (Judo); Lower-Body Leg Lock (Judo); Retain Weapon (Knife); Targeted Attack (Knife Thrust/any armor chinks).

Cinematic Skills: Immovable Stance; Pressure Points; Pressure Secrets.

Cinematic Techniques: Dual-Weapon Attack (Judo or Knife); Pressure-Point Strike (Judo or Knife).

Perks: Off-Hand Weapon Training (Knife); Quick-Swap (Knife); Style Adaptation (Free Fall Assault Training).

Optional Traits

Advantages: Combat Reflexes; Enhanced Parry (Knife); Fearlessness; Fit; G-Experience.

Disadvantages: Duty; Overconfidence.

Skills: Brawling; Fast-Draw (Knife); Main-Gauche; Shortsword; Wrestling.

Techniques: Disarming (Knife or Wrestling); Push Kick (Brawling).

About the Author

You can find Timothy "Humabout" Ponce leaping from airplanes and scaling rock walls in South Florida when he isn't working as a pharmacy technician. His love of science fiction extends back to his childhood where it led him to roleplaying with ***Alternity*** as a pastime at track meets. Ever since, gaming has been part of his life, often vying for time with sleep and video games. He couldn't have written this article without the loving support of his other half, Julia. He'd also like to thank the Pyramid Write Club, but the first rule of Write Club is "we do not talk about Write Club."

Random Thought Table

Forward Thinking

by Steven Marsh, *Pyramid* Editor

I've dabbled in strange conceptual roleplaying campaigns – one where superpowers led inexorably to death, another where magic warped reality on a fundamental level, and yet another where the heroes were metaphysical constructs. However, one of the most challenging games I've ever led was a ***Torg*** campaign I ran in the late 1990s, set when the game came out, in 1990.

You wouldn't think trying to recreate the world from a mere eight years prior would have been as difficult as it was. And yet . . . the first couple of adventures had us scratching our heads. Forget trying to remember the state of the Soviet Union; how common were cell phones in 1990? How big was the Internet? Who had email? Eventually we muddled into a kind of muddy compromise where we just didn't rely on "modern" technology much, because we couldn't agree on what stuff was around.

I know I wrote about this campaign before in the old HTML era of *Pyramid,* but – with another decade between that campaign and the last time I considered it – what I find interesting in reminiscing about it is how much easier (comparatively speaking) it would be to construct a 1990-set game *today* compared to running that same game in 1998. Why? Technology.

When I ran that game in the late 1990s, Wikipedia wasn't a thing. Google wasn't really a thing. (I know that because I used Wikipedia to tell me about Google's history.) Consumer-level high-speed Internet wasn't a thing.[1] Today, if I wanted to run a more historically accurate game set in 1990, I could use my high-speed Internet to cobble together a list of common technology along with their capabilities and limitations. For example, 1990 was the year that cell phones hit one million subscribers (compared to today, when there are nearly as many cell phones as people). What about the Internet? Well, the first commercial dial-up ISP launched in November 1989 (compared with walled-off networks, like CompuServe [1969] and Prodigy [1988]). Folks were still hashing out the WWW protocol in 1990. Email had existed since the 1970s, but few folks had it outside of the educational and tech fields.

I could go on, but the point is the previous paragraph took me about 15 minutes to research and write . . . which would have been unfathomable to me in 1997. (Around then, it took me the better part of an afternoon at the library to find out as much info as I could about the space shuttle *Enterprise* . . . which amounted to about two pages.)

So what's the point of revisiting memory lane here? First, by having a vivid snapshot at two different stages of trying to answer the same technological question (attempting to recreate an understanding of 1990 tech in both 2001 and 2015), I have a fairly interesting view for trying to figure out what the "cutting edge" might be in the next 15 years or so.

Here, then, are a couple ideas I had while contemplating the past, present, and future.

> *Human progress is furthered, not by conformity, but by aberration.*
>
> *– H.L. Mencken*

Crowdsourcing

The eruption of Wikipedia – which, again, didn't really exist in 2001 – as a pretty accurate, pretty comprehensive starting point for a whole lot of humanity's knowledge is a development that somewhat took me by surprise. Looking at the individual elements, most of them *weren't* surprising separately. I could've guessed that eventually there could be a cluster of computers capable of pulling up information quickly (and with the Internet speed to make it worthwhile). I could've even guessed that such a thing might be conceivably be free; I could've foreseen the idea of grants or non-profits making information freely available, let alone the possibility of an ad-supported version.

1. As an aside, the phrase "wasn't a thing" wasn't a thing in the 1990s either.

However, what I really didn't understand in 2001 was the power of crowdsourcing – of getting lots and lots of people to take part in a gargantuan project, breaking it down to smaller bits, all of which are tackled by individual free-working volunteers.

Sure, the Linux operating system came about largely in this way, and I'd dabbled in that at the turn of the millennium. Nonetheless, that was still largely the work of technically minded folks. Wikipedia, however, came about from the idea that anyone who wanted to put their two cents' worth in on any topic would be empowered to do so. The actual reality of how well that ideal has been realized is a topic for another day, but Wikipedia is still a more formidable project than I could have imagined a decade-plus ago.

And it's not just Wikipedia that's benefited from crowdsourcing. Humanity now has a near-limitless access to information on nearly every movie, television series, comic book, and more, thanks to volunteer labor. Project Gutenberg – active since the 1970s – relies on volunteers to help scan, OCR, and proofread classic texts. Various answer services such as Quora allow more ephemeral questions to be answered by volunteers.

What does all this mean for gaming? Well, if you were trying to develop some "cutting edge" technology for a near-now campaign, you could do worse than extrapolate some aspect of crowdsourcing into gamable material. Here are some ideas.

- A cryptic code has been beamed to a dozen radio and television frequencies around the world. It's too complicated for an individual to crack, but by coordinating efforts and comparing notes, its secrets might be revealed.
- The heroes intercept a photograph of an unknown person in strange garb at an unfamiliar locale. The interception vector was from a person of interest, so it's quite possible that this person is also either a target or perpetrator of something nefarious. By crowdsourcing, it may be possible to determine the outfit, perhaps leading to the locale, and ultimately to the identity of the person in question.
- In a quasi-totalitarian state, everyone readily records their movements and actions at all hours, either voluntarily or otherwise (such as by personal fitness trackers). This crowdsourced encapsulation of reality allows for the heroes – or antagonists – to find those trying to stay off the grid.

Constructed Realities

Not all aspects of cutting-edge contemplation need to occur within the game world; some innovations might occur at the (real) gaming table. One of the challenges of running any kind of game set in the modern day is the vast number of options players have at their disposal. Do the heroes want to visit a myriad of malls? Reprogram their computers? Crank-call people on another continent? All of these are things that a GM must be able to sort out at a moment's notice.

However, the "cutting edge" of reality has more information codified about the real world than at any point in history. It would be trivial to have the computer serve as the virtual interface between the GM and the players, conjuring information that the GM has no inclination to create.

The heroes are in the middle of downtown Brainerd, Minnesota; where is the nearest weapon shop? Pawn shop? Where's a low-key restaurant to hold a quiet public interrogation/intimidation? How good is the local taxi service? Can public transportation take the heroes somewhere? How common are street cameras? And so on.

Each one of these questions would have taken hours of research for a non-native to accurately determine two decades ago; even a decade ago, answers would have been rudimentary. However, today Google can answer (close enough for a game) "How many pawn shops are in Brainerd, Minnesota?" (Answer: three.)

In the future, it should be possible for the GM to hand off more duties to a computer program or players. Thus, clicking the nearest pawn shop would cause a dedicated program to pull up its location, a 360° virtual look at the place, a brief description of it, a floor plan, an extrapolation of its general quality and reliability (built from reviews and news items), the name of the store owner and/or an employee, etc. Such a system might even be able to delve deeper; if it finds the name of an employee, it could display a picture of that employee from social media.

If that's too creepily intrusive into the real world to contemplate, then such a computer program might instead randomize enough details for plausible deniability. It could also conjure up a stock photo or public-domain image for the players to see, ensuring that the same stock photo and person was never used for the same purpose.

About 90% of the above is possible right this minute, given enough time. Already computer programs can write commonplace newspaper articles such that it's tricky to tell they were computer-generated; this is just an extrapolation of that idea. The future may be here before we know it.

Neat, Petite, Discrete

Closely related to the idea of crowdsourcing – and a smidge more "advanced" than that method – is the means to reliably split up larger projects so that individuals or small groups don't know exactly what they're doing. For example, in the real world, there have been reports of websites requiring visitors to answer CAPTCHAs to post or interact, but those CAPTCHA answers are actually being fed to nefarious groups that are using them to *compromise* other sites.

Thus, maybe a complex code is being broken in real time by unwitting gamers who are playing a hot new cellphone app, where the code is broken into smaller segments and translated into a game-mechanical format. Or maybe someone who needs to decipher a simple code (where pictures that routinely begins with "A" – apples, ants, etc. – stand for the letter A, and so on through the alphabet) ensures that no translator ever gets more than a few sequential letters.

About the Editor

Steven Marsh is a freelance writer and editor. He has contributed to roleplaying game releases from Green Ronin, West End Games, White Wolf, Hogshead Publishing, and others. He has been editing *Pyramid* for over 10 years; during that time, he has won four Origins awards. He lives in Indiana with his wife, Nikola Vrtis, and their son.

Short Bursts

White Gold

by Matt Riggsby

The next edition of ***Car Wars*** *is coming! To help prepare,* ***Pyramid*** *proudly presents this vignette, spotlighting one aspect of its bold new world. Visit* ***carwars.sjgames.com*** *to keep abreast of the latest developments!*

* * *

As the din of mechanics shouting over the humming fabricators rolled out over the parking lot, the drivers rattled belts of ammo and racks of rockets into place. Whatever the vast concrete slab had once been, it was now home to a ziggurat of crushed cars dragged over from the rusting scrapyard, surrounded by a wolf pack of motorcycles. The woman in white leather and gold appeared at the top of the tower and thumbed the switch on the microphone. Her voice boomed out from dozens of salvaged speakers across the lot.

"My hunters!"

The bikers became no less noisy in their preparations, but they cheered loudly as they worked. Some ripped off short bursts in salute.

"Today, as on so many days, we ride to defend our honor. Today, a convoy will try to pass over our roads. With no toll! As though they owned the road!" The crowd below made exaggerated sounds of disbelief.

"The Franciscans give us no respect!" Loud boos and shouts from the bikers showed exactly that they thought of California. "The Yankees give us no respect!" More shouts and a few more rounds of gunfire; it went double for what was left of the United States.

"But we shall have our respect! And we shall have our tribute!" The jeers turned to cheering. This was the part they wanted.

"They shall fear us and give us what is ours!" More cheering, more gunfire.

"Now, tell me, hunters, who leads you to victory in every battle?"

"Queen Mob!" the bikers shouted back.

"Who wins you Sonoma wine and Philadelphia medicine?"

"Queen Mob!"

"Who is *generalissima* of Elko and Battle Mountain?"

"Queen Mob!"

"Who is the *vaquera* supreme of Nevada?"

"QUEEN MOB!"

Queen Mob descended from the ziggurat of destroyed vehicles. The polarized visor of her white-and-gold helmet finally tamed the burning midday sun as she fitted it over her kinky hair. She switched on its internal microphone.

"Bring me my cycle!" A pair of mechanics wheeled out a huge cycle, its works hidden beneath a freshly-fabricated casing of gleaming white armor plastic accented with gold. Another stumbled alongside, tightening the last connection on a pair of rocket pods hanging from either side.

"Bring out the eyes so that all can see!" A technician flipped a switch, and a cloud of tiny camera drones rose from their charging racks by the fabrication shed and took positions around the pack of motorcycles.

Queen Mob threw a leg over the seat of her cycle as the rest of the bikers hurried to mount up, slamming closed the last open hatches and snapping up stands. With a near-leap, she kicked the cycle into roaring life.

"Let's ride!"

About the Author

Matt Riggsby has written over 40 articles and supplements for Steve Jackson Games.

Odds and Ends

The Future of Forgery (or Homage?)

Currently, computers are invaluable at detecting plagiarism. They're also useful in trying to sort out clues of whether certain works were actually from the suspected creator.

However, it should be possible at some point soon to work in reverse, using computers to create works – or to edit existing works – to "pass the test" that determines whether something is a "lost work" from a creator, or merely a forgery. Thus (to simplify greatly), if the program says that a play couldn't be from Shakespeare because it uses the word "aspartame," then it might suggest an alternative word that would pass the test.

There's no reason this would be limited to textual works, either. Music, in particular, would be fairly straightforward to forge. Unlike paintings (where the existence of atmospheric radioactivity makes it easier to detect any forgeries of pre-nuclear-era artists), we can reliably recreate nearly every step of the recording industry's genesis from the wax cylinder days. "Newly discovered" master tapes (forgeries) of long-dead artists would fetch a pretty penny.

Cinematic arts – movies and television – would be more difficult to forge, since most such works have enough documentation and historical records that slipping a "lost" forgery in would be challenging. However, in the future – say, a century or two from now – there might be enough of a gap in historical records to make it easier, in the same way that our lack of definitive knowledge of Shakespeare's day-to-day whereabouts allows for the possibility of all kinds of manuscripts to surface that could have been written by him. Also, there are many cinematic lost works that could be recreated and presented as the original work, newly discovered; examples include 1927's *The Mountain Eagle* (Alfred Hitchcock's second directorial effort), 1938's *King Kong Appears in Edo* (a Japanese monster movie that predates *Godzilla* by 16 years), and 1919's *The First Men in the Moon* (the first cinematic adaption of the works of H.G. Wells).

Such forgeries need not have nefarious purposes, but could be done by creators hoping to satisfy an itch of a lost work. For example, in recent decades many people have recreated visuals for lost episodes of *Doctor Who,* using recorded soundtracks as their basis. Such efforts will only get easier as technology improves.

About the Cover

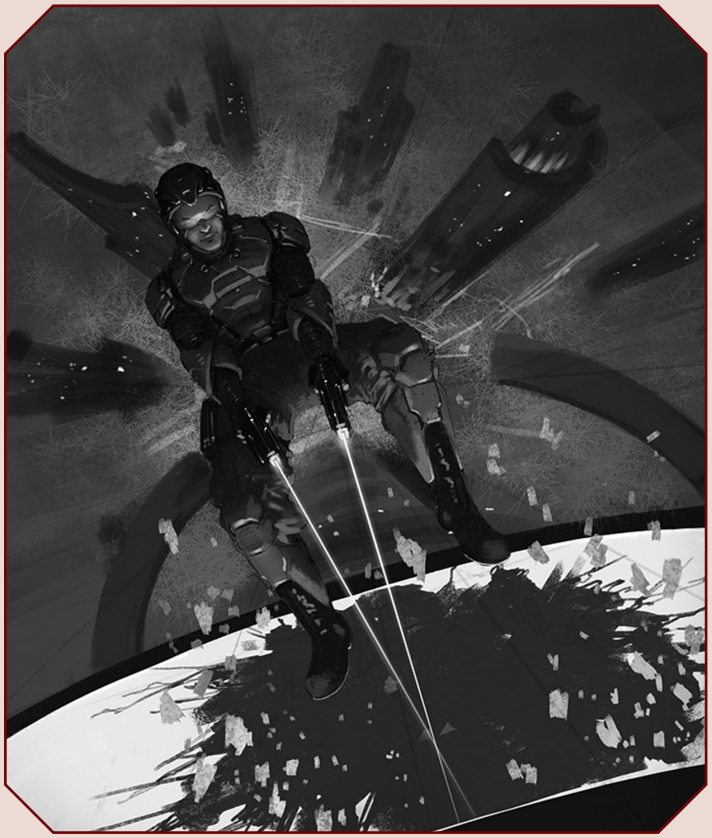
If one of the earmarks of a good cover is that it inspires the desire to want to be part of whatever it's portraying, then this month's *Pyramid* succeeds in abundance. (Your humble editor is booking his virtual passport even as he types these words!)

For this month's cover, artist Brandon Moore ties together the ideas of ultra-tech shooting, futuristic armor, and – tangentially – falling, into an explosive look at the future.

Here is the preliminary sketch of the cover. Notice how much the color adds to this piece! A text-free version of the finished artwork is on p. 36.

This month's *Pyramid* also features another Brandon Moore piece, accompanying the ***Car Wars*** vignette on p. 34. In its own way, that piece offers another glimpse of the "cutting edge" of technology . . . albeit one that's a bit less glittery than this cover (and yet at least as exciting).

When we're not begging him to draw awesome *Pyramid* covers, Brandon is continuing to work on the visuals for the next edition of ***Car Wars.*** For more artwork from him, visit his website at **artofbrandonmoore.com**.



Appendix Z

The Perky L33t

by Christopher R. Rice

The fantastic article *Console Cowboys and Cyberspace Kung Fu* (from *Pyramid #3/21: Cyberpunk,* pp. 4-12) upgrades the ***GURPS*** netrunning rules to Fourth Edition. The following special perks further expand a hacker's options. All require Quick Gadgeteer, though it may be limited to computers (e.g., with the H4xx0r limitation from ***GURPS Action 1: Heroes***). There is no perk limit – unless the GM wants one, in which case a reasonable option is one perk per 10 points in Area Knowledge (Cyberspace), Computer Hacking, Computer Operation, Computer Programming, Current Affairs (Cyberspace), Electronics Repair (Computers), and Expert (Computer Security).

Codehead

There isn't a code language out there that you don't know, and even if you don't know it now, given enough time, you will. The GM should allow you to know just about any programming language in his setting. Furthermore, you only suffer unfamiliarity penalties for not knowing a programming language if (and *only* if) the code is so alien (or new) it couldn't possibly be known by the general public. Even then, you become familiar with new computer code at twice the normal speed. This is similar to Cross-Trained (Computer Languages) (***GURPS Power-Ups 2: Perks,*** p. 16), but is better in that you can learn entirely new code by studying it; this is balanced by the need for Quick Gadgeteer.

Console Monkey

You're a master of tab completion, argument expansion, piping, and other advanced command line techniques. You can control systems you are familiar with at an incredible speed and without needing a GUI. This allows you to act much faster than others. When jacked in, you may calculate your order in the initiative based on (IQ + HT)/4 if better than your normal Basic Speed.

Cyberspace Samurai‡

You've either toughened yourself against neural damage or someone already burnt out all the vital bits . . . Either way, when determining how much harm you suffer from someone using the Damage program (*Pyramid #3/21,* p. 8) against you, reduce it by your level of this perk. This is simply DR (Limited, Damage Programs, -80%).

Flatliner‡

You've seen the light at the end of the tunnel, and it's fiber optic, baby! When incapacitated, you retain a semblance of consciousness in cyberspace and suffer less of a penalty than other netrunners. Your level of this perk (maximum five) offsets the -5 for resisting additional uses of the Damage program against you. You can never gain a net bonus.

Internal Firewall

Maybe you're stubborn, hardheaded, or you've been "brain burnt" so often that it just doesn't bother you much anymore. You make HT rolls to resist Damage programs at +3, just as if you had a hardened deck. The GM *may* allow you to improve this to Resistant to Damage Programs (+8) [3] or Immunity to Damage Programs [5], though these are probably not available in all campaigns as they take much of the risk out of netrunning.

Keyboard Cowboy‡

Your level of this perk (maximum four) offsets the -4 for improvising a program from scratch (see *Default Use, Pyramid #3/21,* p. 7). You can never gain a net bonus.

Motif

Your programs all have a motif of some sort. Pick a theme such as "classic arcade games" or "70s-era sci-fi movies"; all of your programs are coded with visual themes from this category, making it not only look cool but giving you +1 in Quick Contests against other netrunners unfamiliar with your given theme. At the GM's option, a Hobby Skill or related Motif might negate this bonus or even gain a bonus.

"Hacking" is such an ugly word. No. I'm . . . Yeah. Totally hacking into the Merlyn Global mainframe.

– Felicity Smoak, in ***Arrow*** *#1.22*

About the Author

Christopher R. Rice wishes he were cool enough to know how to code. From Portsmouth, Virginia, he dreams of being able to write full-time one day, or at least eke out a living doing it. He wishes to thank L.A., his own personal muse, as well as the rest of his gaming group; Elizabeth "Archangel Beth" McCoy for having the uttermost patience with him; and his good friend Antoni Ten Monrós for being a most excellent sounding board.

About *GURPS*

Steve Jackson Games is committed to full support of ***GURPS*** players. Our address is SJ Games, P.O. Box 18957, Austin, TX 78760. Please include a self-addressed, stamped envelope (SASE) any time you write us! We can also be reached by email: **info@sjgames.com**. Resources include:

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Rules and statistics in this book are specifically for the ***GURPS Basic Set,*** *Fourth Edition.* Page references that begin with B refer to that book, not this one.