

Cybernetics

With technological advances in both cybernetics and biotechnology most every piece of the **human** and non-human body can either be replaced or regrown. Some might even say the brain will eventually be replaceable with a computer but that is still undergoing research. Common cybernetics that have already been in place include:

Appendages

Arms, Legs, Torsos, Head, Hands, Feet, Fingers

Cyborg Arms: Essentially an arm that is made out of metal to replace the original one. Either covered with synthetic flesh or uncovered and obvious, the arm receives signals from the body's natural synaptic system and interprets them via a sensory reception system that converts the signals into motion. Usually powered by an internal self-charging battery, the arm is made to function exactly as it's flesh counterpart. It can either be made to feel just like the original with sensory receptors on the outside to simulate the sense of 'touch' or 'pain'. Regardless of whether the arm is made to look and feel like a natural arm, the inherent toughness of the limb has been increased. The alloys used to construct the limb are capable of resisting most blunt and impact attacks. To a minor degree it also resists some ballistics. Energy however is not as easily resisted and more often then not will damage or destroy the limb. The toughness however is still great enough to do more damage to a natural organic being without any inherent durability, less so to an inorganic. The hand can also be used to grip tighter and even 'locked' into position so the user does not accidentally let go if the occasion demands.

Cyborg Legs: Operates under the same principle as the arms. It replaces the original leg. There is a little more calibration necessary due to the leg's importance in maintaining the person's balance in various activities. Since the original limb was attuned naturally over a period of time, the subject may require some downtime to get used to it. The leg also becomes tougher like the arm and can deflect as well as inflict significantly more damage then before.

Cyborg Hands, Feet, Fingers: Same principle as before and they are usually coupled together. Sometimes only these appendages may have been lost. Careful precision is necessary to properly adjust the proper amount of dexterity necessary to replace the original function of these appendages.

Cyborg Torso: There are varying degrees of replacement for a torso. It could be the abdomen, the upper chest, or the back. Trauma to the torso may be too great to salvage anything thus necessitating the implanting of an entire unit. Sometimes this merely consists of applying metal on the outside to rebuild what was lost. Trauma to the organs is dealt with by either replacing the damaged ones, regrowing them, or creating a mechanical 'equivalent'. The loss of a torso is difficult and highly damaging since the subject is faced with having to replace the rest of the limbs with cybernetics. The necessary functions to keep the natural limbs take up extra room in the torso cavity, the torso is a lot 'heavier' due to its construction even if lightweight alloys are used, and the natural arms cannot be calibrated to correctly receive the neural signals the same as cyborg sensors are.

Cyborg Head: In some cases the subject's head may be damaged but the brain is still intact. If the brain

is saved then the head can either be patched or replaced by a cybernetic one. The head is capable of all necessary functions and can even be made to resemble the subject's original appearance with synthetic skin covering. The eyes, ears, nose, and mouth are all cybernetically replaced.

Organs

Eyes, Ears, Nose, Tongue, internal

While most organs have a means of being reproduced mechanically, the one that seems most popular is the eyes. Eyes tend to be the most hazard exposed organ next to the hands. Cybernetic eyes use telescopic lens principles to simulate the function of the cornea. Using the light that is trapped, the sensors translate the signal to perception sensors of the brain, thereby recreating the sense of sight as the original eyes intended. They can be calibrated to focus and give perfect 20/20, to less then, to slightly better. Anything greater becomes an enhancement. The power system is built near the eyesocket and it provides power to the focusing system of the eye and muscular system that moves the eye. Because of the extra weight of the eye, the muscles are replaced and wired to receive signals like the original muscles. The same principle is applied here as with the limbs but on a much smaller scale. Economization of weight and space is important so as not to unbalance the head. The ears, nose, and tongue can also be replaced as such. Sensors are calibrated to detect the specific stimulus and send the signal to the brain for processing.

Enhancements

Vision, Hearing, Memory, Strength, Armor, Hidden Attachments

While the body is being replaced, some decide to tailor them a little more to their liking. Certain enhancements can be made that improve over what was lost.

Vision Enhancement: There are many kinds of vision enhancements. Thermal vision, low light vision, flash compensation, ranging, and telescopic to name a few. The eyes become more a useful tool then before and it's prior 'human' limitations are nullified. There are a few limits to what the eyes are capable of. These consist of space and power. The more additional effects the eyes can do, the more hardware is necessary to do it with. There is only so much room in the cranium to work with and this limits the amount of enhancements possible. The second is power. The power unit for an eye is small so as not to interfere with the brain and other cranium functions. The more devices are at work, the more of a power draw is made. While the power unit recharges itself it is not able to keep up when too many systems are being engaged. If it continues, unless there is a failsafe, the eye may suddenly shut down and be rendered powerless.

Hearing Enhancement: Damage to the hearing can be repaired with a mechanical replacement similar to sound detection technology. It is implanted into the original ear canal and the system is then set up to send signals to the brain just like the original ear did. With a little refining the ear can hear at greater distances and with much more clarity then regular ears can. In order to control the depth of hearing a control mechanism much like a volume control is added so that one can sleep without being jolted awake

by the slightest noise having been magnified greatly. This enhancement is precise and delicate. While the mechanism is ruggedized due to its compound makeup it can be damaged should the highest volume setting be on and a very loud explosion is set off. The sensors would be overloaded by the input and damaged if not destroyed.

Brain Enhancement: The brain while difficult to modify and replace, can be enhanced. Typically the brain's long term memory does not run out of space. The short term memory however does. To assist in remembering the brain can have memory systems implanted. The system can work off of the sensory perception signals received (i.e. sight, sound, touch) or the electrical impulses of the brain. As it flows into the system it creates a 'copy' of these impulses. This copy translates into the 'memory' and can thus be replayed into the brain until it is memorized into the long term. Or it can store this information for instant recall therefore simulating photographic memory. Automatic settings can be made as the user wishes. One example is to run the memory loop automatically while sleeping so that the memories are copied into the natural brain's long term.

Strength modification: The body can be made stronger than the natural muscles. Increased strength in one limb can make the user able to flex and move the limb with greater force than regular cyber arms do. Punching, kicking, and other forms of violent contact are capable of doing more damage to a natural organic being. Inorganic objects are susceptible to the force behind the enhancement so long as it is not constructed of stronger material, negates the kinetic force, or puts too much strain on the joint. To be able to lift greater amounts of weight the user must be balanced to compensate or the rest of the unenhanced body can be damaged. Leverage is an issue and the user must compensate for the rest of the body. The natural legs, the back, the joint where the limbs are attached, these are all issues when attempting to carry huge amounts of weight. The same could be said about trying to lift something with the enhanced legs. The legs may be able to handle the weight but the back is not and can collapse as a result. One way this can be dealt with is if the entire body, limbs and torso, is replaced. Then the full potential of the cyber limb's strength enhancement can be utilized. Another possibility is biologically enhancing the rest of the body to compensate as though it were cybernetically enhanced.

Armor: The material of cybernetics being tougher than regular flesh makes the user naturally tougher. Greater protection can be utilized by making the cybernetics out of more durable materials. Another possibility is applying armor plating underneath the 'skin' that is capable of negating blunt and ballistic damage. Even energy can be dispersed to a degree. There is only so much damage the armor can take, and even with lightweight materials there is only so much that can be applied. Too much and a subject could be made helpless if they fell on their back, too heavy to right itself.

Hidden Attachments: Cybernetics also allow for a subject to 'hide' certain devices within themselves. It could be as simple as a hand tool to as complicated as a miniature computer. One weapon application is that of retractable bladed weapons within the limbs that can be used for melee combat. The opposite principle can be applied and a secret 'pocket' can be implanted to conceal small yet vital items. The limits are subject to creativity as well as current technological feasibility.

While these steps are keeping in tune with maintaining a more human appearance, there is the possibility to go beyond these limits by shedding some vestiges of human form. Certain individuals, whether by choice or not, may find it possible to go beyond the limits by completely replacing their body with cybernetics. Without having to deal with accommodating for flesh the body can devote more resources towards enhancement. The internal organs can be replaced with smaller substitutes and the body no longer needs as many thereby increasing the space available to enhance the body or provide

more power. The head can be reshaped to be more utilitarian than its original design. This would allow for greater enhancement as well, even a larger sensor array than originally possible. The brain may even be moved away from the head and stored in the chest. Thus the full conversion cyborg sacrifices its human form for greater power. Even a full conversion that retains a human shape still has greater capabilities. For the sake of functionality and standardization, even most full conversions maintain the basic two arms, two legs, one torso, one head style. Anything different is usually custom made and difficult to maintain. Plus it sticks out even more so whereas some full conversions can still walk around and not draw as many stares if properly concealed.

One more factor regarding cybernetics is cost. Cheap cybernetics do exist, and usually have issues regarding quality. The same applies to 'used' models. The costs can add up when you think about the price of the part, the labor required, the medications, the calibrations, and maintenance over the course of the piece's lifetime. And that is just for basic models. To add the enhancements there is extra costs for more work as well as for the features themselves. Full conversion cyborgs need the backing of a government or a corporation to cover such incredible costs at one time.

Divergent methodology Overview

There are many means to achieve these outcomes and not all are based on traditional metal/electron technologies. Some use DNA-like processes and others use entirely crystal-carbon-based systems. These are known as biogenics.

Biogenics while very similar have a few significant differences: For one, they tend to be harder to detect and more reliable in the long run but lack the universal-compatibility, servicability and raw durability of traditional cybernetics.

Biogenics can go unknown by the host for decades or even an entire lifetime.

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- [Claymere Cybernetics Unlimited](#)
- [Cybernetics Aided Technology](#)
- [IPG Operator Standard Cybernetics Package](#)

OOO Notes

This article was originally written by [Nyton](#) and submitted the site on August 25, 2005 and approved by [Wes](#) the same day¹⁾.

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