THE HISTORY OF NIGHT VISION TECHNOLOGY

A **Night Vision Device (NVD)** is an optical instrument that allows images to be produced in levels of light approaching total darkness. They are most often used by the military and law enforcement agencies, but are available to civilian users. The term usually refers to a complete unit, including an image intensifier tube, a protective and generally water-resistant housing, and some type of mounting system.
Many NVDs also include sacrificial lenses, IR illuminators, and telescopic lenses. Night vision devices were first used in World War II, and came into wide use during the Vietnam War. The technology has evolved greatly since their introduction, leading to several "generations" of night vision equipment with performance increasing and price decreasing.

The Early Days | Generation 0 (GEN 0)

Photo: *The "Vampir" man-portable system for infantrymen*

Historically, many armies would not fight at night because the confusion, lack of quality on-time intelligence, and increased communication difficulty made night fighting a very dangerous and very risky proposition. Only the most highly trained soldiers with a well-rehearsed plan could take to the battlefield at night with any clear chance of success.
One of the first technologies to enhance vision at night goes all the way back to the end of WWII. The first night vision devices were introduced by the German army as early as 1939.

The first devices were being developed by AEG starting in 1935. By the end of World War II, the German army had equipped approximately 50 Panther tanks, which saw combat on both the Eastern and Western Fronts. The "Vampir" man-portable system for infantrymen was being used with Sturmgewehr 44 assault rifles.
Parallel development of night vision systems occurred in the United States. The M1 and M3 infrared night sighting devices, also known as the "sniperscope" or "snooperscope", were introduced by the US Army in World War II, and also used in the Korean War, to assist snipers. They were active devices, using a large infrared light source to illuminate targets. Their image intensifier tubes function using an anode and an S-1 photocathode, made primarily of silver, cesium, and oxygen to accelerate the electrons.

Generation 1 (GEN I)

Photo: *AN/PVS-2 Starlight scope*

First generation passive devices, introduced during the Vietnam War, were an adaptation of earlier active GEN 0 technology, and rely on ambient light instead of an infrared light source.
Using an S-20 photocathode, their image intensifiers produce a light amplification of around 1000x, but are quite bulky and require moonlight to function properly.

Generation 2 (GEN II)

Photo: *PVS 5 Goggles*

Second generation devices feature an improved image-intensifier tube utilizing micro-channel plate (MCP) with an S-25 photocathode, resulting in a much brighter image, especially around the edges of the lens.
This leads to increased illumination in low ambient light environments, such as moonless nights. Light amplification is around 20,000x. Also improved were image resolution and reliability.

Later advancements in GEN II technology brought the tactical characteristics of "**GEN II+**" devices (equipped with better optics, **SUPERGEN** tubes, improved resolution and better signal-to-noise ratios) into the range of GEN III devices, which has complicated comparisons.

Generation 3 (GEN III)

Third generation night vision systems maintain the MCP from Gen II, but now use a photocathode made with gallium arsenide, which further improves image resolution. In addition, the MCP is coated with an ion barrier film for increased tube life. The light amplification is also improved to around 30,000-50,000x.

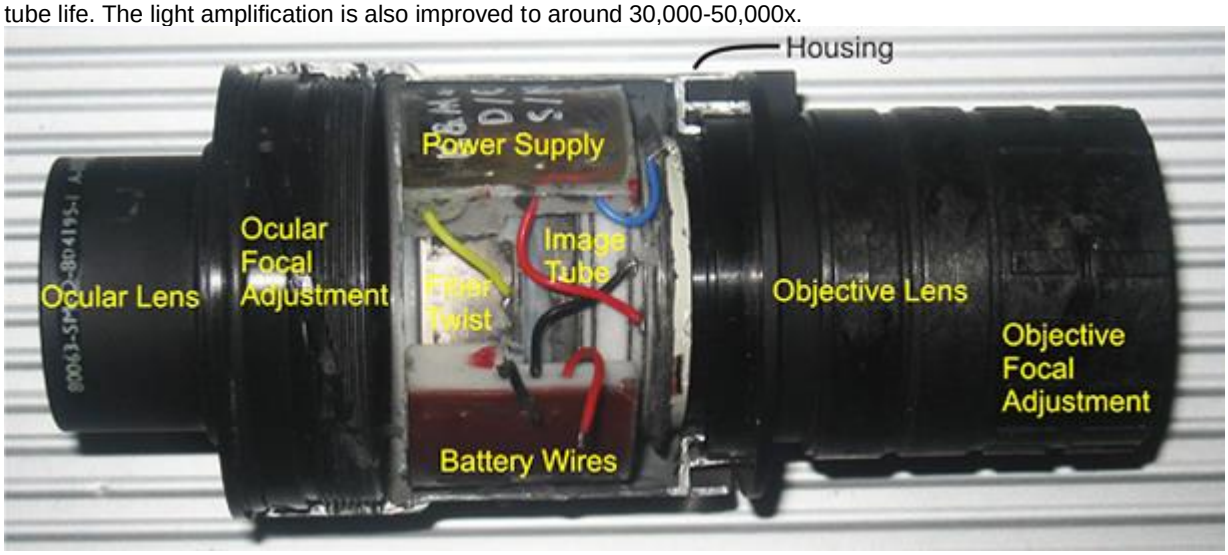

Photo: *AN/PVS-5 tube cut in half & depotted*

The Truth About Generation 4

Some say that generation (Gen) 4 is the most advanced night vision you can buy. This is not the case. To dispel this myth, let's start with the basics. There are four Generations of night vision; however, they are Gen 0-3, not Gen 1-4. Historically, the U.S. Army has defined each Generation of night vision. In the late 90's the Army did define Gen 4 as the removal of the ion barrier film creating a "filmless" tube. This new advancement was to reduce halos while increasing sensitivity, signal-to-noise ratio (SNR) and resolution, for overall improved performance. While performance was improved, the lack of an ion barrier in Gen 4 tubes led to high failure rates, ultimately leading the U.S. Army to recant the existence of Gen 4 definition. Recognizing the high failure rates of Gen 4 tubes, ITT chose to improve upon the existing Gen 3 technology and create a "thin-filmed" tube. By keeping the protective ion barrier, but greatly reducing its thickness, ITT was able to maintain the reliability of Gen 3 while at the same time delivering on the Army's performance requirements intended for Gen 4. This innovation resulted in the production of the Gen 3 thin-filmed tube, which is now the highest performing Gen 3 tube available.

Sources: *Wikipedia, Independent Blog*