XENONICS HOLDINGS INC.
SUPERVISION
DIGITAL NIGHT VISION MONOCULAR
Digital Night Vision Versus Image Intensifiers

Over the last 6 months I am sure most of you have heard about Xenonics Holdings Inc. new SuperVision Digital Night Vision monocular (SVM). It seems it's been in just about every magazine out there. Xenonics is best known thus far for their NightHunter line of extremely bright and long distance HID technology lights. Many NV users have contacted me asking me for my opinion of this new SVM compared with our current NV intensifier tubes. As most of you know I have been working with NV for quite some time in real-world environments and field test quite a bit of mission-critical gear. I have been intrigued by this new monocular and two weeks ago I spent a few hours at the Xenonics factory where the units are assembled and tested in Carlsbad California. I met with the President and CEO of Xenonics who gave me a tour of their factory and a demonstration of their SVM. The factory itself is small compared to most. They have approximately 20 employees working on-site. The Xenonics President and CEO were gracious enough to give me a SVM to take with me for an exhaustive test. I want to thank Cameron Hopkins and Chuck Hunter for taking time out talk with me about their SVM and answering all my questions. Also a special thanks goes out to Xenonics Engineer Gary Palmer who answered all my technical questions on certain aspects of the SVM.

Without getting into a full-blown discussion on the technical features of the SVM, I will give a brief overview of what CCD technology it is.

The SVM is actually a Charged Couple Device (CCD) digital monocular. I will take a quote from the good folks at mir.com who give a very good description of CCD's.

"CCDs (Charge Coupled Devices) a solid-state chip containing a series of tiny, light-sensitive photo-sites and was originally developed by Honeywell. It forms like the heart of all electronic and digital cameras. CCD's can be thought of as film for electronic cameras, but they are also found in video cameras and desktop scanners. CCDs consist of thousands or even millions of cells, each of which is light sensitive and capable of producing varying amounts of charge in response to the amount of light they receive.

Similar to a video camera, digital camera use the lens, which focuses the image onto a Charge Coupled Device (CCD), which then converts the image into electrical pulses. These pulses are then saved into memory In short, just as the film in a conventional camera records an image when light hits it; the CCD records the image electronically. The photosites convert light into electrons. The electrons pass through an analog-to-digital converter, which produces a file of encoded digital information in which bits represent the color and tonal values of a subject. CCD's are usually arranged as either a line of cells or a rectangular (a square is also a type of rectangle) array of cells. Both types of sensors can be used in digital imaging backs and cameras. Sensors employing video technology have rectangular pixels, while sensors with square pixels were created specifically for use on computer."

Here the description and technical specifications of the SVM that is now being released to the market as listed in the manual

· Minimum Illumination - 0.00003 lux
· Range of Focus – 20 feet to infinity (Focus and Diopter Adjustments)
· FOV – 525 feet at 1,000 yards
· 2x – 8x digital zoom (2x minimum viewing)
· Resolution 380 K
· Weight 20 oz.
· Battery – 18650 lithium Ion (2 hours continuous use - 3 hour charge time)
· Super Charger – AC 95-240V
· 1 year warranty

Here is a bit further technical information not listed in the manual that was given to me from Xenonics.

· CCD – ½" Sony
· Lens – Unthreaded F/.95
· Camera Resolution - 800 x 600
· IR Sensitivity – 850nm +
· View Finder Resolution – 1280 x 780
· Frames Per Second (FPS) – 5-15 based on lighting conditions (Updated with clarification from Su
    perVision, it's 5-30FPS)
· Weather resitstant
· No built in IR illumination

Over the last two weeks I have had hands-on with the SV digital monocular and have put the unit through an exhaustive field test in urban and rural outdoor environments. While there have been so many marketing advertisements out there and folks wanting to know how the unit will rate against a night vision tube intensified Gen 3 system, I decided to put this new SV digital NV monocular against some of the best Gen 3 devices out there, specifically a PVS-14 and a D-760 6x rifle scope. I have also looked at some Gen 2 (PVS-4 and D-300) units as well that will be briefly reported here. If needed, an additional review may be conducted against the Gen 2 line of gear with more pics.

Here is the Gen 3 NV gear I Utilized for this test.

Single Battery (SB) PVS-14 with an ITT Select A Tube and also listed with an authentic ITT data card that came with the unit. Specifications are as follows.

· Image Intensifier - Generation 3 US
· Resolution – 73LP
· Signal to Noise (S/N) – 29.7
· Photo Response (PR) – 2480
· EBI – 1.270
· Halo – 0.79
· Lens System - 26 mm f1.2
· FOV - 40°
· @1000 yards - 2099'
· @1000 meters - 640 meters
· Range of Focus -10" to infinity/25 cm to infinity
· Detection Range - 1148'/350 meters
· Recognition Range - 984'/300 meters
· Diopter Adjustment - +2 to –6
· Weather Resistant - Water Proof 3' for 30 min
· IR Illuminator - Yes
· Battery Type/Life – AA (x1) / 40 hours
· Dimensions - 4.5" x 2.25" x 2"/114mm x 57mm x 50mm
· Weight - 12.5 oz/355 grams
· Operating Temperature -60° F to 120° F/-51°C to +49°C
· Warranty - 2 years

D-760 6x NV riflescope with an ITT Select A Tube and also listed with an authentic ITT data card. Specifications are as follows.

· Image Intensifier - Generation 3 US
· Resolution – 73LP
· Signal to Noise (S/N) – 29.9
· Photo Response (PR) – 2782
· EBI – 2.570
· Halo – 0.64
· Magnification - 6x
· Lens System - 165mm f2.0
· FOV - 8°
· @1000 yards - 459'
· @1000 meters - 140 meters
· Range of Focus - 98' to infinity 30m to infinity
· Detection Range - 1558' 475 meters
· Recognition Range - 1312' 400 meters
· Reticle Type - Mil-Dot (illuminated red-on-green)
· Windage/Elevation Adjustments - ¼ MOA/click
· @100 yards - 1/4"/click
· Diopter Adjustment - +3 to –4
· Weather Resistant - Water Proof
· IR Illuminator – None

· Battery Type/Life - AA(x2)/60 hours
· Dimensions - 13" x 3.6" x 4"330mm x 91mm x 102mm
· Weight - 46 oz 1.3 kg
· Operating Temperature -40° F to 122° F-40°C to +50°C
· Warranty - 2 years

Three other specific pieces of gear were used for this test included,

3x Mil-Spec Magnifier (PVS-14)
· F-Stop (F/) – 1.5
· FOV – 13 deg

A new High Power "Da Torch" IR Illuminator Turbo Head
· FOV – 12deg (Fixed)

Minolta DiImage Z20 5-Megapixel Digi Camera.
· ALL NV shots taken with the AUTO feature on the camera and the flash canceled and the camera held up to the eyepiece of each unit. More on this below.

Whew, with that said I wanted to throw a few disclaimers out there before we dive into the review. As most know, I have been testing and selling NV gear for quite some time. I have done several reviews here on the ARFCOM and everyone has known me to be very honest and unbiased when it comes down to reviewing gear. I have no advertisers to worry about if they may or may not like the review I give. I also have way too many LE and military customers out there whose lives and others are on the line and they depend on me to give nothing but the best opinions I can for their mission critical gear. During this review you will see numerous pictures of the SVM and NVD's in an urban and rural environment. PLEASE NOTE, the camera does not ever give the TRUE representation of what the real eye is seeing! This is especially true with normal NVD's. During the this test I found out very early, the camera I was using sometimes showed the NVD's a bit grainy and sometimes out of focus a bit versus the SVM. I will honestly note these occurrences as they happen. Also, all pictures that were taken were in auto mode and the flash canceled. I do not believe at all with playing with exposure times that can falsely give one device an advantage over another. EACH device tested was on the same playing field in regards to the environment and camera settings. They units were also mounted on a tri-pod for most pics except the PVS-14 1x shots. (I could hold the units steady enough for these.)

The first part of the test was done the weekend of (6/23/2007) during a (just about) half moon in urban and in a somewhat rural setting. Distances were established with a laser range finder except for the shooting range I was at where each birm was previously established. The 2nd part of this test was done the weekend of (6/30/2007) in a strictly urban setting during a (just about) full moon. I will note the times in the review. Most were taken during the half moon weekend, but I wanted a few shots of a license plate in a full moon condition.

The SVM comes standard in a nicely packaged box that includes the SVM unit, hand strap, carrying case, owner's manual, 1 Ion Lithium Battery, and wall charger.

The unit is powered by one Ion lithium battery and I found during testing I could only get approx. 1.5 hours continuous use. They unit is advertised at 2 hours but due to my constant zooming and gain settings, I had less operational time.

Inserting and removing the battery is accomplished by removing a large slotted screw on the back of the unit.

A coin or another slotted device must be used to accomplish this task. It was very difficult to manipulate this screw with gloves on. The Xenonics folks have told me a future change is to have a knurled knob of some sort, as well as the possibility of the unit to be powered from a CR123 type battery as well.

The unit's bottom side has two threaded ¼-20 holes for mounting to tripods as such

The unit's power and zoom buttons (5 total) are located atop the unit and are large rubber armored and I had no issue manipulating any of the functions with gloves.

In regards to the buttons and functionality the + and – are the gain functions. The SVM has 3 modes of gain, Normal, Light and Dark. Based on the lighting conditions, if the users environment is too dark due to low lighting conditions, you can select the dark mode to assist and enhance the picture. Here are the first problems I noted with the SVM while using the gain modes.

1). It seemed no matter what gain setting I used during night viewing, the system gain would not really change that much. During high bright urban lights, I would set the unit to "dark or light mode" and the unit would only show a marginal decrease of brightness. Now when I was not looking directly at a porch or streetlight, the unit did seem to show more noticeable gain changes. In talking with Xenonics, a possible future software selectable gain program will be included with the unit so the user will have much more gain selection program options.

2). One of the biggest issues I have with changing gain modes is this. It takes a FULL 7 seconds for the unit's digital signal processor to reconfigure the system for adjustments. The first 3-4 seconds, the screen is completely black! It then takes another 2-3 seconds for the image to slowly appear. If one is conducting any type of surveillance, this will be a concern to note. For most of my testing, I used the "normal mode" except were noted in the rural areas were I tried to use all modes to help in this tough environment for the SVM.

(UPDATE) I was a bit preplexed on this gain issue and Xenonics gave me a bit further information. Here is a snipp of what information was conveyed to me.

"In all three modes-- normal, dark and light-- the frame rate and gain settings are adjusted automatically by the digital signal processor (DSP) and its proprietary software. There is no difference in any of the modes in typical low light conditions. The only time a difference will be discernible is in extremely low light conditions when the frame rate is "allowed" to slow down to 5 frames per second in "dark" mode (and at the same time the "black setting" is enhanced). "Dark" should be used in, well, dark conditions."

This is a VERY new product as you know and the bueauty of an on-line review is you can obtain clari-fication and not have to wait 6 months for a print change! Indeed I am seeing the automatic gain set-tings. I want to thank the SuperVision folks for the clarification and I have updated the gain descrip-tions in the photo's.

The other sets of two buttons controls the zoom functions of the SVM. The minimum magnification is 2x and travels out to 8x via the up and bottom arrowed buttons. The zoom features bring me to a few other issues to note. The unit has a minimum 20 feet to infinity focus. I did not test the unit indoors for this reason, as most areas of a residential home would be difficult to focus in. Due to this minimum focus, it's not realistic to navigate with the SVM. This is why the unit so far is categorized as a hand held unit for 25 feet and further targets.

The unit has a manual focusable objective lens and a diopter adjustment that worked as any normal focus and diopter does.

Upon my first viewing of the SVM and the most impressive feature of the unit is its viewfinder! I feel this is what sets this unit apart from all other digital type devices. The SVM viewfinder has a resolu-tion of 1280 x 780 and is really is like viewing into a high definition television.

Listed below is a size comparison to give you an idea of the size of the SVM. From top to bottom is a Gen 2 PVS-4, D-760, SuperVision and a Single Battery PVS-14

Field Tests – Urban Environment

The first part of my field test consisted of numerous pics in an urban neighborhood with porch and streetlights. Why I chose the high light urban is to show blooming and how they can affect each unit and also how the units see in darker shadows. Please note, the moon in all the pics is half and some of the later pics were at full moon. I will state when the pics consisted of a full moon.

Please keep in mind that some of the NV shots actually look much better in some shots as stated earlier. I will comment when needed. For the most part, the SVM looked very close to the real eye outside of the camera.

I want to first show the gain selection between each mode. Once again as previously discussed, the SVM has a light, normal, and dark modes of gain selection via the toggle buttons atop the unit. The 1st set of shots is with the SVM consists of a house window at approx. 50m with some light spill from a garage coach light off to the left side approx. 10m away.

NORMAL MODE

DARK MODE

LIGHT MODE

As you can see, it's a bit hard to distinguish between the light and normal modes of indirect light. With a high light (direct) environment, it gets even harder to tell the difference. I found in these high direct light environments of 150m and closer, when I tried all modes to subdue (my term) "white-out," it was still very difficult to cut down on this effect as you will see. This was very troublesome at times. Due to this issue, I was not able to see in the shadows as much versus a NV intensifier tube system. Please keep in mind that this was in a half and full moon high light urban environment. In a darker environment, this issue would be more substantial along with the SVM's frame rate. (More on that frame rate issue as we transition into the rural review.) Also, I should mention now that the PVS-14 unit I was using along woth the PVS-4, I have kept thei adjustable gains turned to their highest level at all times during this evaluation. The D-760 has no adjustable gain for those who do not know.

Here is where I start the direct comparison shots of the NV intensifier tube versus the SVM.

We will see a lot of this home at approx. 150 yards away. The first is with a 1x PVS-14.

I chose this spot, as there is much to see as we analyze this area with both systems. I have circled the points of interest we will look at as we go forward.

Here is the SVM at it's minimum 2x-3x in both light and dark modes to show this "white-out" we can see. I have a hard time seeing much in the porch area of the home.

SVM 3x Dark Mode

SVM 3x Light Mode

Here is a PVS-14 at 3X

You can see the lighting difference between the two systems. The PVS is actually seeing between the blooms. Thus far the SVM is experiencing a "white-out" effect.

What I have discovered with the SVM is I feel the gain may be programmed too high. It was interesting to note that during every gain change, the image would climb to its preset gain mode. There would come a time in the 3-4 second change over where the image was good and I wanted it to STOP. Case in point where I captured this image on its gain climb. A few frames before this, the image was even a bit better with less whiteout.

SVM 6x during gain switch

In all modes selected in a high lit urban area depicted here, the whiteout is still troublesome.

Here is the first D-760 6x pic of the same house. You can see the startling differences.
D-760 6x

The next point of interest is the fire hydrant I have circled in earlier PVS reference pic. I wanted to see how a subject appeared here on the low foreground in front of the hydrant with a high light background. My subject is a 6'-2" male.

The PVS-1x is first. While the image is a bit grainy (camera) I was able to see the subject very easy and much clearer than depicted on NV tube shots.

PVS 1x Subject

PVS 3x Subject

D-760 6X Subject

Here is the SVM at 3x

SVM at 7-8X

Here are the same pics, now with the high power IR Da-Torch Illuminator

PVS-3X with Torch

D-760 6x with Torch

SVM 3x with Torch

SVM 6x with Torch

SVM 8x

The next set of pics was a driveway adjacent (right) to the main target house you see circled in the PVS-1x pic above. Even though it was still a half moon and bright out there, it was a bit darker shot to look at in an urban area.

PVS 3x

PVS 3x with IR Torch Illuminator (Please note the dark out effect is due to the camera processing the image)

Next was the SVM with the same truck. I thought I would show the light and dark gain modes without direct lighting to show the subtle differences.

SVM 3x Dark Gain Mode

SVM 3x Light Gain Mode

SVM 3x with IR Illuminator

The next set of shots I want to show the finite resolution both systems display. This particular car is approx. 80 yards away. Please not once again the NV shots are a bit grainy and the naked eye image is MUCH clearer than this. I was able to CLEARLY see the license plate numbers with the D-760 and a few digits with the PVS-3x. I was not able to discern the license numbers with the SVM in any magnification or mode.

PVS-3x

D-760 6X

SVM 3X

SVM 6x

We're now going to move out of our house of interest and move directly under a streetlight to attempt to read a license plate at 100 yards and 50 yards away. Please note this particuliar evening we had a FULL MOON for both the SVM and NV tube systems. Even though the images for the NV tube system are a bit cleaner in the camera, they were still cleaner real time. I was able to clearly see the license plate with the D-760 at 100 yards and could not with the SVM. At 50 yards away, I was clearly able to see with both the PVS-3x, as well as the D-760. Once again, I could not see the license plate clearly enough to identify it at any magnification. I re-adjusted the focus and diopter adjustments numerous times and I still could not read the plate.

PVS 1x

PVS 3X

D-760 6x

SVM 3x

SVM 6x

SVM 8x

I next went to a closer truck at approx. 50 yards away with both systems. This time both the PVS 3x and the D-760, the plate was clearly scene. I was not able to discern the license numbers with the SVM in any magnification or mode. This particular shot did not have the help of a streetlight directly overhead, but the full moon was direct behind the truck. Also note the bushes in a darker area behind and to the right of the truck. With the NV intensified tubes, I was able to see more clearly into these dark sections. The was a coach light on the garage in front of the truck as well.

PVS-1x

PVS 3x

D-760 6x

SVM 3x

SVM 6x

The next set of shots were taken in a residential back yard at approx 30 yards away with a subject in the corner against the fence. Once again, it was a half moon overhead and bright.

PVS 1x

PVS 3x

SVM 3x

I have updated a few NO MOON shots this evening with a 1996 PVS-4 Gen 2 system. Since there has been some discussions on why the SVM images look small compared to the NV images I have left the original raw shots without cropping the black borders to show foks the SVM still looks the same. The reason for this is the eyepiece of the SVM is smaller than the EP of of NV tube gear. The SVM also has a stiff rubber eye guard that does not remove or compress easy is also why the SVM images my look rounded or stretched at times as I press the camera into the eye guard to get the FULL FOV my eye was seeing.

OK, below is the latest NO MOON shots I have taken of the same house we have been observing. As you can see the PVS-4 Gen II system shows a bit more wide spread blooming. We can still see the white-out effect with the SVM.
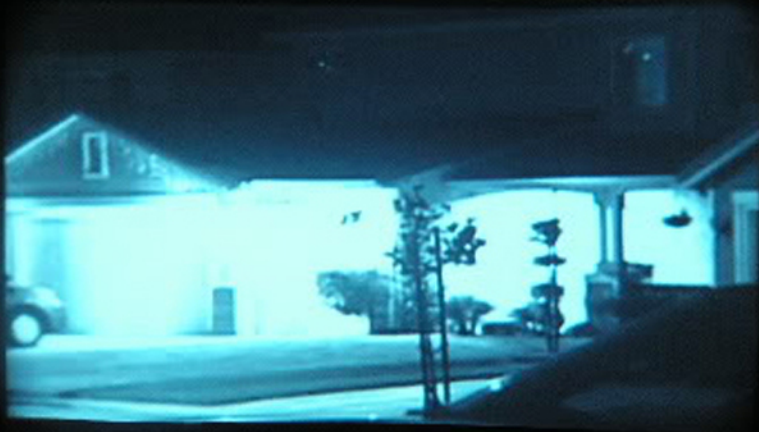
PVS-4 Gen 2

D-760 6x

SVM 4x

SVM 6x

In closing with this high light urban test it was apparent the SVM was having issues with any direct urban light causing a whiteout effect. The Gen 3 NV systems were clearly able to see better in regards to dark shadows and a clearly much better in resolution in reading license plates from 50 to 100 yards. It should also be noted here that a PVS-4 Gen 2 system was now looked at in this urban environment. The Gen 2 system also performed well and saw into the shadows of the urban environment as well as the SVM did. Once gain please keep in mind this urban test was in a high light environment to look at blooming, shadows and resolution.

The next phase of this urban test I wanted to look at was indoors. Specifically I wanted to simulate a subject hiding in a house with very low light. If white lights are not what someone's mission's call for and stealth is the primary concern, I wanted to see how both units would compare. In this house pic I have a scenario of someone hiding in a dark corner of a room at approx 20+ feet away. The ambient light is VERY low and is coming from an outside lawn light near the porch of the home through closed wooden shutters. While viewing with an unaided naked eye, I cannot see the subject at all; he is well hidden in a dark shadow corner except for the subjects tritium watch. (I purposely wanted him to wear this for viewing purposes) Also, once again I have used the raw footage with no cropping of the black border of each image.

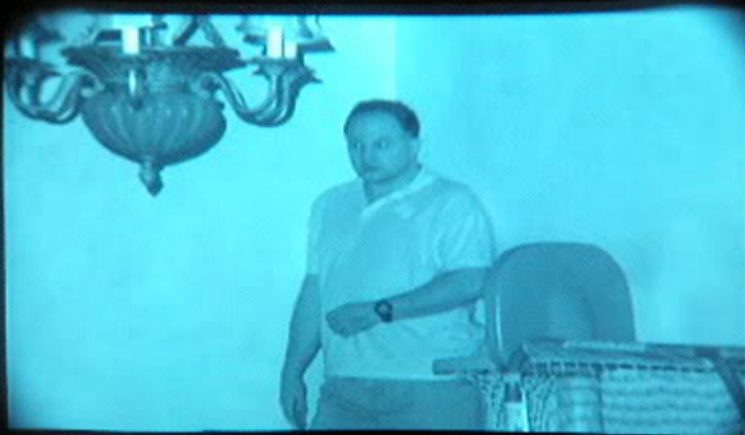**Here is the PVS-14 1x first**

Now for the SVM 2x

I then introduced a variable IR torch illuminator set to a 6 deg beam and observed the results.

PVS 1x

SVM 2x

You can see the results here are pretty much "night and day" differences. The SVM could not see the subject except for his tritium watch and an ever so slight outline the camera saw that my eye in the actual view finder could not. The real difficulty seen here besides the image; is the frame rate itself. The SVM is as always mounted on tri-pod for this pic. Hand-holding the SVM while attempting to view this whole corner of the room was non-usable due to the severe frame rate hit of 5FPS (the lowest frame rate documented for the unit). I could not keep the image steady enough with the frames skipping and going in and out of focus. Also to note, I set the SVM to DARK MODE per Xenonics instructions that the gain would only basically auto set in a high light mode so I manually selected the gain to dark. I also tried every gain setting to insure nothing was missed.

As you can see, once an IR illuminator was used, the image became very clear and no frame rate issues were noted.

The next part of our field test will continue in a somewhat rural setting but still with a half moon. The final session will be a very rural setting with no moon and no urban lights. I will then wrap up this test with my conclusions with the merits and non-merits for each unit tested.

Field Tests – Semi-Rural Environment

The next part of the test I embarked on was in a semi-rural environment. I picked a local shooting range with shooting birms that mark distances of 50, 100 and 200m.

It is important to note the lighting conditions of this test. It was a clear HALF-moon night and some light spill from nearby streetlights. On the range itself, due to the half moon, you could see shadows. I consider this particular evening a bright night semi-rural setting.

Once again all pics except for the PVS-14 at 1x were taken atop a tripod. Nothing has changed in regards to the camera or its settings, i.e. all set to auto functions. Da IR 12 deg torch was used for all IR illumination test again as well. Also, the same male subject is used for reference seen in all the earlier field reports.

My initial impressions upon looking through the SVM in this semi-rural area, I noticed the frame rate was a bit slower when scanning and tracking my subject compared to the high light urban pics. Even though there was a half moon, I estimated the frame rate slightly decreased to approx. 20FPS. It's important to remember this aspect due to the fact the pics taken on the tri-pod do not reflect the frame rate nor the focusing issues at close in targets when I hand held the unit. Once I start to observe longer-range targets with more magnification, I will show an example of the distortion I observed that emulates me hand holding the SVM. I tried all gain setting as well with the SVM during this session with the same results. On the extended 200m range, I then used the IR illuminator, which improved the frame rate and focusing.

The first pic taken is a PVS-14 1x looking at the subject at 50m.

PVS 1x

PVS-3x

D-760 6x

SVM 2-3x

SVM 6x

Now for 100m

PVS-1x

PVS 3x (Camera Bloom, very bright image)

D-760 6x (You can see the shadow the half moon was casting on my subject.

SVM 3x (Once again you can see the shadow from my subject)

SVM 6x at actually 80m (Was having some frame rate issues with higher magnification)

Now for 200m.
PVS 3x (Image much cleaner real view outside the camera)

D-760 6x

SVM 3-4x

SVM 6x

With the increased magnification and range, the SVM shows some degradation. I then introduced da torch for the 200m-birm pics below at 6x. You will see there was only moderate change to the D-760 image due to the overall brightness of the half moon. Due to the illuminator the camera actually darkened the surrounding area bit, which is a normal aspect of the cameras auto setting looking through a intensifier tube at times with a high power illuminator.

D-760 6x IR Illuminator Torch

SVM 6x IR Illuminator Torch

You can see with the introduction of an IR illuminator, the SVM's images have improved.

To give you an example of the frame and focusing issues I was experiencing, here is an image of the SVM at 200 of what my real eye would see as I had my subject walk across the range and I attempted to follow him.
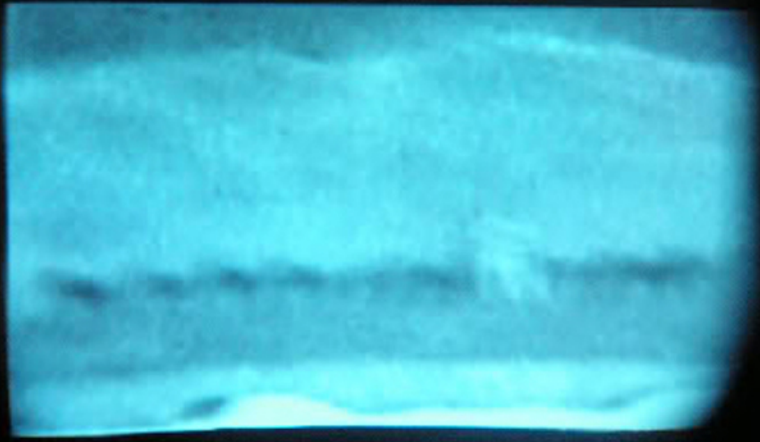
Without the IR illuminator, I could not follow the subject without the SVM going in and out of focus due to the frame rate skipping. With the illuminator, I could follow my subject with much less degradation. In the next part of this review in a darker rural setting, I will portray this issue again

The next set of shots taken is at cement factory at 500m that show some very key characteristics of both resolution and long-range light blooming changes. The environment of this shot is the same night as above, half moon overhead with a near field semi rural area. The cement factory itself is lo-cated behind the shooting range in a dark field with only high light within the factories property.

PVS 1x

PVS 3x

D-760 6x

SVM 2-3x

SVM 6x – 7x

I find these pics about the best shots I took for long-range comparisons and show and tell us a great deal of information. The first thing you see quite easily the blooming effects (or lack thereof) of each system at long range at 3x. Take note of the far background lights. These lights did not hinder the actual cement factory image, but it was interesting to note at LONG distances and lack of blooming with the SVM vs. the 3x PVS image, there all but gone with the SVM. When we start to look into the actual cement factory compound, which had somewhat high light on its compound, the SVM shows much less whiteout effect at this long range versus the issues noted on the short-range high light urban areas. The next important aspect is the resolution differences we see at 6x. When we start looking at the 6x magnification we start to see the resolution differences between the SVM and the NV system, with the D-760 6x showing a cleaner image.

The next phase of Part 3 will be the rural no moon setting.

Field Tests – Rural Environment

The next and final round of test I needed to view in is a rural setting with no moon. My location lends itself to a local mountain range that offers a dark area at 7,200ft with some horizon city glow. This particular location, the city glow is behind me approx. 30 miles away and some glow to my front right approx 20 miles away. Once again, I chose a shooting range with 50, 100 and 200m birms with the same subject used in the photos. I can attest that I have been in much darker areas than this. Due to time factors of driving 100 miles away to get a darker spot was not feasible. I feel the location selected gave a good representation of a dark environment.

All the support equipment for this round of tests was the same except for Da Torch Illuminator. I used the variable beam 2-8 degree version and set the beam width to approx. 6 deg. I also included the same PVS-4 Gen II unit for this rural test.

My initial observations with the SV in this environment while handholding the unit was very troublesome compared to a normal NV intensified tube unit. While handholding the unit without an IR illuminator of some sort I could not hold the image steady enough due to frame rates (about 5 FPS), focusing issues and the image itself growing darker due to the frame rate playing catch up. The best way to describe the image I viewed of my subject walking is like the old Apollo moonwalk videos as the astronauts seemed to skip along through the videos. I also, as before tried all gain modes for this test.

In regards to using the IR high power IR illuminator, it was imperative that I attached the illuminator to the SVM itself. Holding the illuminator in one hand and the SVM in the other proved very difficult especially at high magnification and longer ranges. Even while using the illuminator at 200m, the frame did come up to what I feel was the same as the half moon (no IR illumination) environment of approx. 20FPS.

You will notice in the static images below when the SVM is on a tripod, we can see a decent image, but once I removed the unit to handhold, it became very difficult to view the image as described above. In regards to the NV intensified tube images, there are no issues with hand holding any of these units. All of the NV images taken here (as I spoke about earlier in the review) showed much better real eye views through the tubes than what the camera was seeing.

Since we are in a much darker area, we will first look at 25m.

PVS 1x

SVM 3x

Next are 50m

PVS 1x

PVS 3X

D-760 6x

PVS-4 4x

SVM 3x

SVM 8X

50m with the use of Da Torch

SVM 8X

D760 6x

PVS-4 4x

SVM 3x

SVM 6x

SVM 8x

100m next

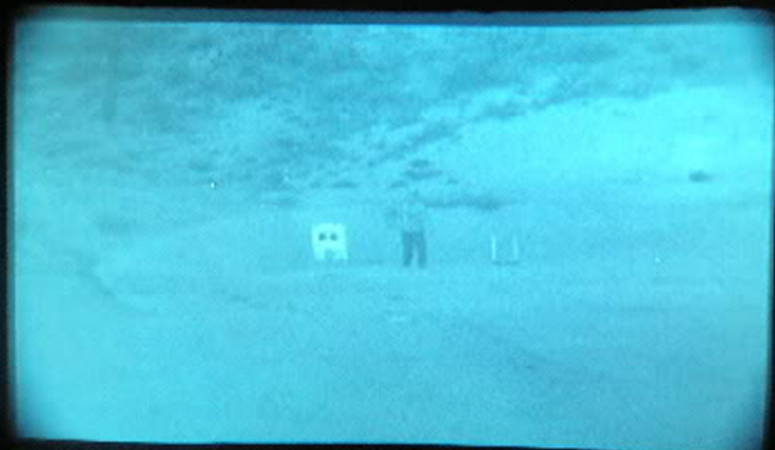**PVS 3x Image real time much cleaner than this**

D-760 6x Once again real image not grainy much better focus.

PVS-4 4x

SVM 3x

SVM 6x

100m with da Torch

PVS-3x (Camera Bloom)

D-760 6x

PVS-4 4x

SVM 3x

SVM 6X

Next we go out to 200m

PVS 1x

PVS 3x (Once again real image not grainy much better focus)

D760 6x (Once again real image not grainy much better focus)

PVS-4 4x

SVM 3x

SVM 6x

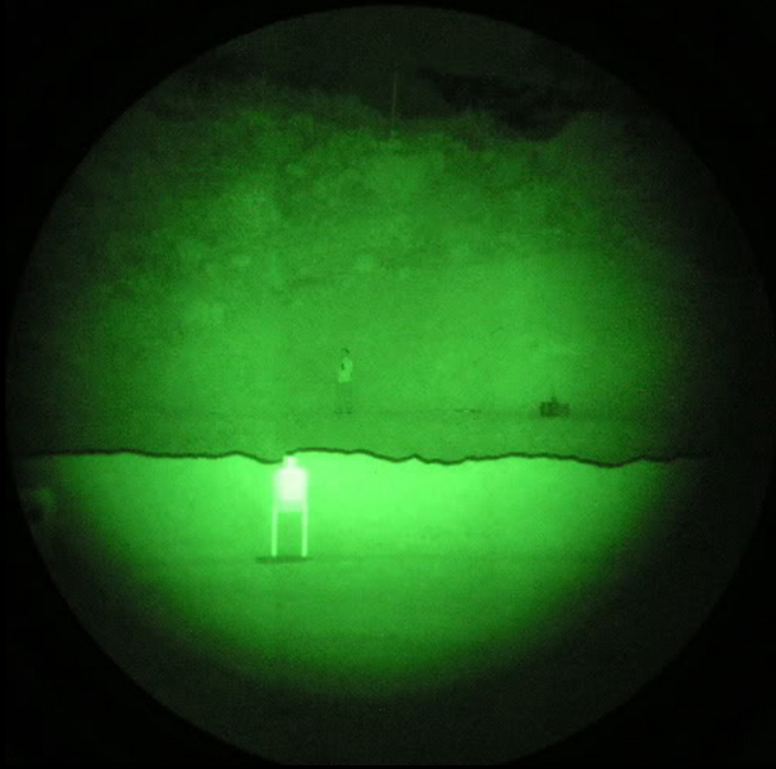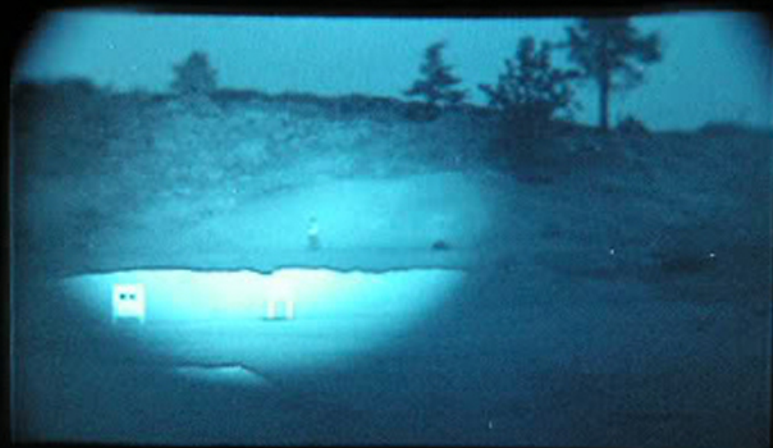SV 8x 200m Rural

200m with Da Torch

PVS 1x (Camera Bloom)
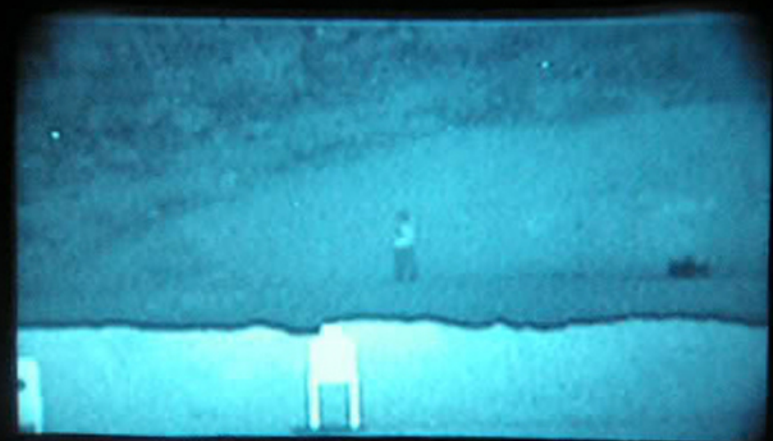
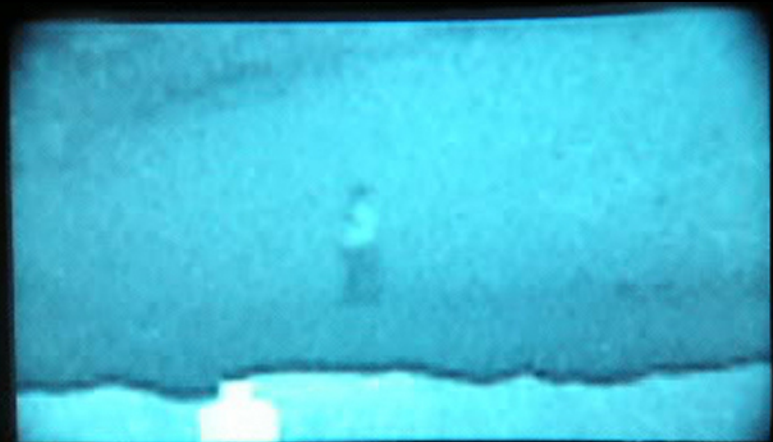**PVS 3x**

D760 6x

PVS-4 4x

SVM 3x

SVM 6x

SVM 8x

CONCLUSIONS

First and foremost, I want to first give out a big THANK YOU to my ex-military colleague who has "stood-up" sorta speak throughout this review. His valuable insight and candidness on military philosophies and critical decisions making are second to none.

During the process of this review, I have heard, seen, and been told about numerous "critics" out there who have questioned everything from my intelligence to my suitability in performing this project. Thus far, I have spent 30+ (UN-PAID) hours of my own time performing this field test. If need be, I encourage others to also spend the same amount of time I have to dispel my field report findings that are complete with dozens of pictures that have shown the best comparison to date on the product in question.

I do not believe that any experienced operator can test a piece of equipment and be 100% objective, due to various requirements, priorities, expectations, and previous experience will all affect the tester's perceptions. All I can say is that I have tried to be as objective as possible and test the SVM on its own merits and shortcomings. Further, as both a former LE officer and a current supplier of equipment to both professionals and civilians, I would be the first in line to welcome any piece of gear that does the assigned task and maybe (not a priority for professional users most of the time) saves a few hard earned bucks for the end user.

Having said that, here are the conclusions, opinions, and recommendations I have arrived at after this exhaustive (and exhausting) field test.

First off, here is what I consider the definition for a night vision device:
A Night Vision Device is a system that will function in a variety of environments from near-zero light to urban conditions without any additional implements such as a tripod or IR illuminator. The system needs to amplify the available light (in both visible and IR spectrum) and be capable of observing stationary and moving objects with sufficient clarity and contrast. Further, such a system has to be able to adjust to the various light conditions and distances to target of observation quickly, easily (with a minimum input from the operator), and, most importantly, without loss of the image at any stage of the process.

Based on such a premise, the above comparison between SVM and the various I2 systems is inherently unfair, since SVM is NOT a night vision device by definition. In its current incarnation, SVM is a low-light observation device suitable for recreational use in high-light urban environments and low-light rural conditions provided an addition of high-power IR illuminator is introduced.

As it stands right now, I would not recommend the SVM for any mission critical use whether in LE, Military, or any other field where my definition of a night vision device is crucial and a critical requirement. I do believe, as the SVM exists right now is an ambitious piece of technology with the product and concept both having potential. I consider the present state of SVM like an early AR15 with no chrome barrels, picatinny fore ends, A2 sights, SOPMOD stocks etc. I will be following future developments with interest.

Here is my take on the pros, cons, as well as thoughts on future improvements.

Pros:
1. High-resolution viewfinder: Xenonics has a winner there. It is far better then anything I have seen on other digital devices (including camcorders).
2. Zoom: while I was less then pleased with digital zoom, the potential advantages are there.
3. Minimal blooming at long distances.
4. Large, ergonomic controls atop the unit were easily manipulated with gloves.

Cons:
1. Gain mode changing took a full 6-7 seconds to complete. The first 2-3 seconds caused a complete loss of the image in an urban environment and longer in a dark rural setting.
2. Automatic gain control cannot be overridden and causes major whiteout effect at short/medium ranges in urban environments.
3. Very slow refresh rate in anything other then high-light environment.
4. Digital zoom makes it almost impossible to keep the target in focus.
5. Any magnification above 3-4x in a dark or rural environment does not allow hand-held use (the pictures posted in the review were possible only through the use of a tripod).
6. Resolution of smaller objects such as license plates from 25 yards and out was not sufficient for identification.
7. Setting the digital zoom of 5x and higher showed image degradation in all lighting conditions.
8. Uses only rechargeable batteries (and those for only 1.5-2 hours continuous). Not at all optimal for field use.
9. Requires high-power IR illuminator for almost any condition other then high-light urban environments, or half moon or better rural environments under100 yards. (Not really a con since I do not consider SVM a true night vision device, but definitely helpful).

Improvements:
1. The loss of image and long stabilization after mode change HAS to be addressed.
2. User selectable manual gain set limits that will avoid the "whiteout effect" or some way to override the automatic gain (maybe a continuous adjustment instead of 3 pre-sets). This also must be addressed.
3. Built-in or attachable IR illuminator (preferably high-power for longer distances). If the IR is attachable, then the housing will require an additional mounting point for the tripod.
4. Much higher refresh rate (especially in low light conditions).
5. Optical zoom instead of digital, or, failing that, a better algorithm and/or image stabilization for the digital one.
6. Digital video output.
7. Decreasing minimal magnification would make the system more versatile.
8. Increased battery life.
9. Option to use regular (probably lithium for increased capacity and shelf life) batteries rather then rechargeable.
10. Battery compartment needs to be redesigned to allow battery replacement without tools and easily with gloves.
11. Eyecup needs to be modified to allow easier use with glasses and a shuttered eye guard to avoid light spill onto an operators face.
12. The image in the eyepiece is relatively small (that is reason the images in the review look so much smaller compared to those through the night vision devices), so either a larger screen or a magnification element would be helpful.

Final Thoughts:

I can envision some outrage and loud arguments over what some would appear to be overly harsh results and comments. To those who may not understand, I will attempt to explain once again. In all the products I use and offer, my primary criteria is that of "mission critical" gear, i.e. would I depend on this gear in my professional career or would I recommend it to someone on the "sharp edge?" As such, SVM falls short of my expectations. That is not to say that there is no market for SVM or that it does not have potential. I think presently, it will find its place in the recreational field and general outdoors with the end users who are far less demanding then most of us here on the AR15 NV Forum, or folks with critical missions at hand. (I think there are a lot more of them out there then there are of us folk). It is my opinion that in its current design, the SVM is simply not suited for us who depend on our gear for critical mission requirements and demand the very best performance under any conditions.

Thank you,

Victor Di Cosola