



**NIGHT VISION
MONOCULAR / GOGGLES
NVS 14**

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105 Sparks Ave., Toronto, ON, M2H 2S5, Canada

IMPORTANT INFORMATION

Read prior to activation.

You have purchased a sophisticated electronic device. To operate it properly, please read this manual carefully.

Ignoring operation procedures described in this manual will void your warranty.

- **NEVER** disassemble the unit. This device contains a source of high voltage, which may be hazardous to your health.
- **NEVER** open objective lens of an active unit in bright light, including daylight. At daytime objective lens must be covered by caps. A tiny hole in each cap provides enough light for daytime testing.
- **NEVER** aim active unit at intense light sources, such as lights, headlamps, campfires, the Moon, etc.
- **NEVER** reverse the polarity of a battery.
- **NEVER** connect the unit to external power sources.
- **ALWAYS** remove battery when not in use for a long period.
- **ALWAYS** keep the objective lenses covered when not in use.
- **ALWAYS** store in a warm dry place.

Precautions

NVS 14 is a sophisticated precise optical instrument equipped with electronics. It should be handled with due care:

- Unit contains fragile components. Avoid impacts, dust, moisture and sharp changes of temperature.
- Do not touch the optical surfaces other than for cleaning. Doing so may damage the anti-reflection coating.
- Clean optical surfaces with professional lens cleaning supplies.
- Use only a soft clean cloth to clean the exterior of the device.
- Keep away from sources of heat, such as heating appliances, sunlight or central heating.
- Switch off the unit and remove the battery during the extended periods of non-operation.
- Do not apply excessive force or pressure to the lens assembly, movable parts and thread connections.
- Small dark and/or light points may be seen in the field of view due to considerable optical magnification of the eyepiece. This does not affect the operational abilities of the device.

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1. OVERVIEW

NVS 14 (the Unit) is an optoelectronic monocular, intended for observation of objects and orientation at night or under dark conditions. The Unit is equipped with a generation 2+ or 3 image intensifier tube, which amplifies low light, such as moonlight, starlight or man-made light.

Add-on lens can be attached to the Unit to increase magnification.

Two Units can be combined to form a two-eye optical system with the help of an optional bridge.

Unit can be mounted on a helmet, head gear, weapon or used as a standalone monocular.

Some typical activities where NVS 14 can be useful:

- Law enforcement
- Wildlife observation
- Security
- Search and rescue
- Hunting
- Dark room photography (connected to a camera)

Features

- Built-in infrared illuminator allows observation in total darkness (i.e. basement, cave or dark room);
- Helmet mount (optional) allows combatant operations
- Weapon mount (optional) allows night shooting

- Flip/flop mechanism provides for unobstructed vision when the Unit is mounted on head gear or helmet
- Optional bridge allows combining two monocular units into a binocular instrument
- Waterproof design (2 meter deep immersion for 2 hours)
- Soft rubber eyecup makes viewing comfortable
- Unit can be connected to photo or video camera

Please read all the instructions carefully before using.

Manufacturer reserves the right to introduce minor design changes without notice.

2. DELIVERY SET

Standard* Delivery Set includes:

	<i>Quantity</i>
NVS 14 unit	1
Arm mount	1
Head gear set	1
Lens cap / Battery cover	1
Manual	1
Lens cleaning kit	2
Carrying bag (soft)	1
AA Battery	1

2.1 Optional accessories

US mount clip	Bridge
Demist shield	Hard case
Sacrificial window	Lens brush
3x add-on lens	Camera adapter
5x add-on lens	Helmet mount
Warranty card	Weapon mount

*Exact Delivery Set is subject to the specific contract terms.

3. SPECIFICATIONS

	NVS 14 1x lens	NVS 14 3x lens
Image intensifier tube	18 mm, standard ANVIS type	
Magnification	1x	3x
Field of view	40°	13°
Focus range, m	0.25-∞	3-∞
Exit pupil diameter, mm	20	
Eye relief, mm	30	
Dioptric correction	± 5	
Power supply	3V CR-123 Lithium battery, 1 pc. or 1.5 V AA Alkaline battery, 1 pc.	
Battery life, hours	40 hours with I/R 80 hours without I/R	
Size, mm	115x42x62	202x64x72
Weight, monocular only, g	300	540

NOTE: Due to continuous design improvements parameters may vary from those given above.

4. UNIT DESIGN



FIGURE 1

- | | |
|--|--|
| 1. On / Off and IR illuminator switch | 6. Battery compartment cover with battery type adapter |
| 2. Infrared illuminator and light sensor | 7. Battery compartment |
| 3. Objective lens with lens cup | 8. Tightening screw |
| 4. Eyepiece with eyecup | 9. Release button |
| 5. Head gear | 10. Dove tail platform |

5. IMAGE INTENSIFIER TUBE SPECIFICATIONS

The Unit utilizes a small size inverting image intensifier with direct image transfer. The tube contains a microchannel plate, multi-alkaline metal S-25 (NC tube type) or GaAs (N3 tube type) photocathode, yellow-green screen and built-in electronic high voltage DC to DC converter. The input window is made of flat surface glass. The output window is a concave fibre optics element with 180° image rotation.

Both tube types are manufactured in two grades HD (High Definition) or XT (eXTreme performance).

5.1 Main parameters

Image Intensifier type	NCXT3631IC	N3XT3631IC
Photocathode operating diameter, mm	18	
Photocathode type	S-25	GaAs
Resolution, lines/mm	45-57 (HD) / 57-72 (XT)	
Photocathode sensitivity, min:		
Integral, $\mu\text{A}/\text{lm}$	500-750	1200-2100
Spectral at $\lambda = 850 \text{ nm}$, mA/W	35	45
Tube light amplification, fl/fc , min	30,000	
Image magnification	1	
Dark background brightness, max, cd/m^2	$1 \cdot 10^{-3}$	

Image Intensifier type	NCXT3631IC	N3XT3631IC
Signal-to-noise ratio (SNR), min	18-28	18-24
Current consumption, max, mA	25	30
Voltage, V	2.8±0.8	
Length, mm	31.1	
Diameter, mm	36.7	
Tube life until parameters degrade, hrs	10,000	
Storage time, years	15	
Operating temperature range, °C	-50...+55	

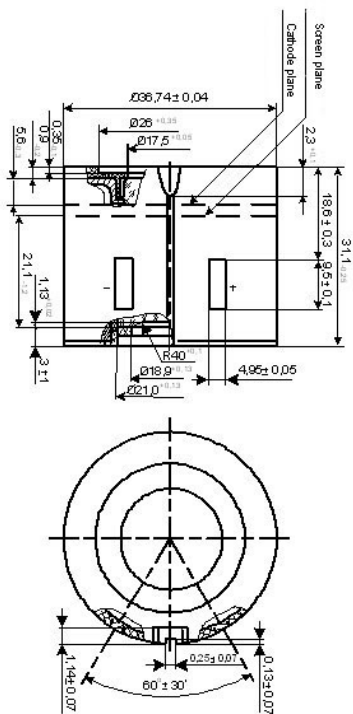
5.2 Spatial frequency-contrast characteristics (MTF)

Frequency, lp/mm	HD grade (low resolution)	XT grade (high resolution)
2.5	0.89	0.92
7.5	0.68	0.80
15.0	0.40	0.58

5.3 Field of view cleanness

Zone by diameter, mm	Maximum diameter of defects			Permitted total area of defects, mm ²
	Neglected	Permitted		
		Ø, mm	Qty	
0 – 9.0	0.06	0.12	1	0.10
9.0 - 14.4	0.08	0.18	2	0.20
14.4 -18.0	0.10	0.20	2	0.35

5.4 Schematic drawing



6. OPERATION INSTRUCTIONS

6.1 Installing battery

Unit is supplied with battery not installed.

Prior to installing the battery, make sure the switch (1) is in the OFF position and the lens cap is on.

The unit can operate on either AA Alkaline or CR-123 Lithium battery. Lithium battery provides approximately twice longer battery life and better performance at low temperatures.

To install battery unscrew the battery compartment cover (6). When using CR-123 Lithium type battery, remove the battery type adapter. Observe the correct polarity indicated on the housing. Put the battery in and screw the battery cover back on.

6.2 Switching the Unit on

In daytime put on the lens cap with the daylight filter prior to switching on.

To check if the Unit is operational switch it ON (rotate switch (1) clockwise) and look through eyepiece (4). You should see greenish-lit screen. If the screen is not lit check the battery.

When the Unit is ON through the eyepiece user may see either one or two circular indicators (Fig. 2). When not active they are hardly noticeable. Bright yellow or flashing red spot indicate low battery voltage. For uninterrupted operation keep a fresh battery ready and replace it on time. Bright red indicator reminds the user that the IR illuminator is on (for more details see 6.9).

In daytime with lens cap on it is normal to observe a fuzzy image. Switching on night vision device in daytime is intended for testing purposes only.

The rotating switch has four positions: “Off”, “Auto”, “On”, “IR”. In Auto mode the monocular will turn off automatically in the upright position.

This mode saves battery life and allows avoiding greenish shadow on the face, which may disclose the user.

Note: The “Auto” switch position is optional.

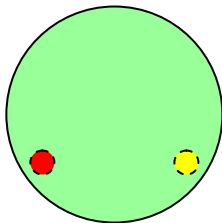


FIGURE 2

IR illuminator indicator (red, left), Low battery indicator (yellow, right, optional)

6.3 Switching the Unit off

After you finished using the device, turn it off by rotating switch (1) to OFF position. Put protective lens cap on the lens. Remove the battery from the battery compartment to avoid any damage of the device in case of electrolyte leakage.

6.4 Adjusting to individual vision

Turn on the device. Direct the device to an object placed within 8-15m from the viewer. Obtain the sharpest image possible on

the eyepiece screen focusing the eyepiece lens (4, Fig. 1) and then the objective lens (3, Fig. 1).

6.5 Focusing

To obtain sharp image on other distance adjust the lens focus (3, Fig. 1) leaving eyepiece setting intact. You should be able to obtain a sharp image for distances from 2-10m to infinity. If you wear eyeglasses or NBC protective mask, you may like to fold the rubber eyecup.

6.6 Auto shut OFF at bright light

The NVS14 monocular has a built-in high light sensor located near the IR illuminator (2, Fig. 1). This sensor shuts the monocular off after about 45 second exposure to light exceeding 10^{-1} lux level.

To reset the monocular switch it off and then back to on as described in 6.3 and 6.2.

High-light shut-off feature does not mean that the unit will react to occasional flashes or bright spots. It protects the tube against excessive light exposure only.

Note: The Auto shut OFF feature is optional.

6.7 Using the Unit with head gear or helmet

The Unit is supplied with head gear (5, Fig. 1). Prior to using head gear adjust its straps so that the head gear fits head comfortably but firmly and does not slide when you are moving.

The Unit is attached to the head gear with a swing arm mount (1, Fig. 3). To attach the arm mount to the head gear loosen the tightening screw (8, Fig. 1) on head gear, slide helmet groove (2,

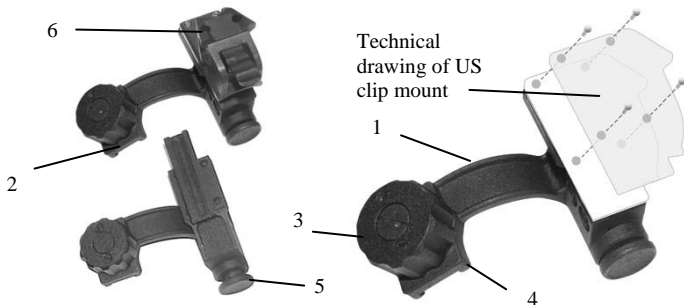


FIGURE 3

- | | |
|----------------------|------------------|
| 1. “Swing arm” mount | 4. Unit groove |
| 2. Grooved pad | 5. Flip button |
| 3. Locking knob | 6. US clip mount |

Fig. 3) onto the rail, and then tighten the screw.

To attach monocular to the arm turn the knob (3, Fig. 3), slide arm groove (4) along the dove tail platform of the monocular (10, Fig. 1), and then release the knob.

To set comfortable eye-relief (the distance between your eye and the eyepiece), loosen tightening screw (8, Fig. 1) on the head gear and move the unit, then tighten the locking screw.

To use the Unit with PASGT head and helmet mount unscrew the grooved pad (2, Fig. 3) from the swing arm mount and screw on the US type clip (6, Fig. 3) instead using four screws (Fig. 3). US type helmet clip is optional and must be ordered specially.

To switch between left and right eye, press the flip button (5, Fig. 3) on the mount and rotate it respectively until click.

6.8 Swinging Unit for unobstructed view

When mounted unit is not in use you can raise it to clear the view without taking the head gear off by using the “flip/flop” feature. To swing the unit from the view press the button (5, Fig. 3) and raise the device up, until you hear a click.

In “Auto” position of the switch, the monocular will turn off automatically. Reverse the operation for working position.

6.9 Using IR illuminator

In case of insufficient light when observing a close object turn on the IR illuminator by turning the switch (1).

Red indicator visible through eyepiece will warn you that the IR illuminator is on.

Note: The IR illuminator is visible to anybody with a night vision device and can disclose the user's presence.

6.10 Installation of add-on lenses.

Always make sure that the monocular is switched off when you put on or pull off the add-on lens.



FIGURE 4

NVS 14 with attached 5x lens

Note: The following procedure is identical for 3x or 5x lenses (or any other add-on lenses).

Turn off the monocular. Remove the rubber lens cap. Put the lens on top of the monocular and press it firmly towards the eyepiece. Do not apply excessive pressure. Make sure that the lens is fixed well on the monocular. To return the monocular back to 1x magnification, pull the lens off.

6.11 Using the camera / video adapter

Before using the (optional) adapters, remove the rubber eyepiece carefully.

The adapter (Fig. 5) consists of 2 rings:

- a) Camera adapter is 52x1 mm. It fits the filter lens thread of various cameras, e.g. Nikon.
- b) Video adapter is 37x1mm. It fits Sony cameras and some others.

If our adapter does not fit your camera obtain a proper step up / step down rings.



FIGURE 5

Camera / Video adapter

6.12 Demist shield and sacrificial window

Note: Demist Shield and Sacrificial Window are optional.

Sacrificial window protects the objective lens from the abrasive influence of sand and dust at night time. It should be put on the objective lens like an objective cap with the daylight filter.

Demist shield filter protects the eyepiece against fogging. To install it fold the eyecup to the very bottom to get the full access to the thread, and screw the filter gently onto the eyepiece.

6.13 Using the helmet mount

The Unit can be equipped with an optional helmet mount. This mount can be customized to fit a wide range of existing helmet models.

The mount is attached to a helmet with stripes.

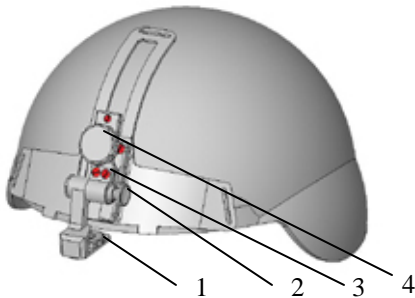
The unit is fixed to the mount by a locking screw (1) (Fig. 6). To adjust the position of the Unit to your eye level use the screw (4). To adjust the eye relief first loosen locking screw (1) and set a comfortable distance between the eyes and the eyepiece; then tighten the locking screw back.

You can fixate the unit in three predetermined positions: vertical, horizontal, and 15-20 degrees above horizontal. Although the relative angles between these positions cannot be changed, the starting point can be adjusted by screws (3). If you loosen them, you can rotate the flip-flop mechanism to find the suitable starting point. Tighten the screws (3) after the adjustment.

You can raise the Unit for unobstructed view without taking the helmet off. To do so press (and hold) the button (2) and rotate the

FIGURE 6

- | | |
|---------------------|-------------------------------|
| 1. locking screw | 3. flip-flop adjusting screws |
| 2. flip/flop button | 4. mount binding screw |



Unit until you hear a click.

All other operations with the Unit mounted on a helmet are identical to those with the head gear.

6.14 Mounting on a rifle

The Unit can be mounted on a rifle with Picatinny (MIL-STD-1913) mount adapter. The optical axle of the monocular coincides with the rifle's Picatinny rail. Although the Unit does not contain a reticle and cannot be used as an independent riflescope, being mounted behind regular riflescope or red-dot reticle, it gives you an opportunity to aim your target in the night remaining invisible for the opposite side.



FIGURE 7. NVS 14
with Picatinny adapter.

Two types of weapon mounts are available. The type shown on Fig. 7 has two screws with large grooved heads for convenient tightening. They attach the monocular to the mount and attach it to the Picatinny rail.

Note: *Over tightening the screws may damage the thread.*

The ‘Quick Release’ model (Fig 8) utilizes a latch with a spring and patented accu-torque screw. You can attach and detach your monocular within a few seconds. The accu-torque screw fixes the mount with predefined torque thus protecting the thread from accidental over tightening damage.

The advantages of the ‘Quick Release’ mount are:

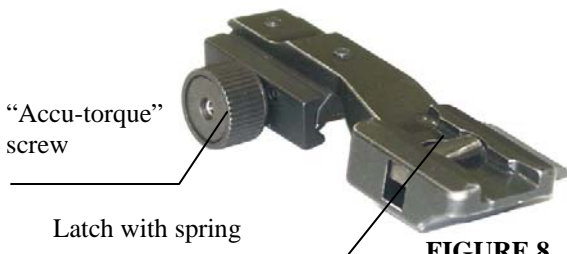


FIGURE 8

Quick Release adapter

- Quick removal and installation of the device;
- ‘Fool proof’ construction;
- Increased reliability.

The ‘Quick Release’ mount does not provide tight fixation. It does not influence shooting because the monocular acts only as a viewer, while the reticle, which determines shooting accuracy, is fixed in a daytime part of the set.

6.15 Binocular configuration

Two Units can be combined to form a two-eye construction with the help of an optional bridge. Lens can be attached to form a binocular optical system.

To form a double-unit system use the dove tail platform (10, Fig.1) located on both sides of the Unit. These platforms are identical. The tightening screw (8) locks monoculars to the bridge. You can use the double-eye construction in a goggle (mounted on a head gear) or hand held configuration.



FIGURE 9

Binocular configuration



FIGURE 10

Binocular configuration with attached 3x lenses

In the two-eye configuration the interpupillary distance between the eyepieces can be adjusted between 58 and 72 mm.

7. TROUBLESHOOTING

7.1 **The device does not switch ON**

Check if the battery is properly installed.

Check the battery charge. Replace battery if necessary.

7.2 **Image is unclear**

Check if the lenses are foggy or dusty. Clean if necessary.

If the image is still not focused – adjust eyepieces; see 6.4 and 6.5 for details.

7.3 **Image flashes**

Image may flash during the first two minutes after activation. It may continue flashing if exposed to too much light (even with the lens caps on!)

7.4 **Condensation accumulates on the parts**

When the unit is brought from the cold into a warm environment internal condensation may appear. Unit has to warm up for up to two hours to regain full operational capacity.

7.5 **Decreased of no visibility**

Bright light sources (moon, projectors or headlights) may cause visibility to degrade or even completely disappear. Move the device away from the light source immediately. The image will restore within two minutes.

Poor atmospheric conditions such as fog, haze or extremely dark environments will decrease the visibility.

8. WARRANTY

NEWCON warrants this product against defects in material and workmanship for one year from the date of the original purchase, but no more than 18 months from the date of manufacturing. Longer warranty is available, subject to the terms of the specific sales contract. Should your Newcon product prove to be defective during this period, please deliver the product securely packaged in its original container or an equivalent, along with the proof of the original purchase date, to your Newcon Dealer.

Newcon will repair (or at its option replace with the same or comparable model), the product or part thereof, which, on inspection by Newcon, is found to be defective in materials or workmanship.

What This Warranty Does Not Cover:

NEWCON is not responsible for warranty service should the product fail as a result of improper maintenance, misuse, abuse, improper installation, neglect, damage caused by disasters such as fire, flooding, lightning, improper power supply, or service other than by a NEWCON Authorized Service.

Postage, insurance, and shipping costs incurred while presenting your NEWCON product for warranty service are your responsibility.

If shipping from North America please include a cheque or money order payable to NEWCON OPTIK for the amount of \$15.00 to cover handling and return shipping.

9. CUSTOMER SUPPORT

Should you experience any difficulties with your Newcon Optik product, consult this manual first. If the problem remains, contact our Customer Support Department at +1(416) 663-6963 or toll free at 1-877-368-6666 (North America only). Our operating hours are 9am-5pm, Monday - Friday, Eastern Standard Time.

Under no circumstances should the equipment be sent to Newcon without authorisation by of our technical support department. Newcon accepts no responsibility for unauthorized returns.

To locate NEWCON Authorized Dealer call:

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The defective products should be shipped to:

From USA only:

2331 Superior Ave. Cleveland, OH 44114, USA

From all other countries:

105 Sparks Ave., Toronto, ON

M2H 2S5, CANADA

10. ACCEPTANCE CERTIFICATE

Image Intensifier Tube serial number: _____

	Minimum	Measured
Resolution, lines/mm	45	
Photocathode sensitivity, integral, $\mu\text{A}/\text{lm}$	500	
Light amplification	30,000	

Date of production: _____

Quality Inspector signature: _____

NIGHT VISION DEVICE

NVS 14-2/HD

NVS 14-3/HD

NVS 14-2/XT

NVS 14-3/XT

Unit serial number: _____

The unit complies with all technical specifications and has passed the inspection.

Date of production: _____

Quality Inspector signature: _____

Quality Assurance Seal

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