Australian Government
Civil Aviation Safety Authority

Airworthiness Bulletin

AWB 25-031 Issue 8 – 3 September 2021

Defects with Night Vision Imaging Systems

An Airworthiness Bulletin is an advisory document that alerts, educates and makes recommendations about airworthiness matters. Recommendations in this bulletin are not mandatory.

1.1 Effectivity

Approved operators of Night Vision Imaging Systems (NVIS) in accordance with flight operations regulations.

1.2 Purpose

To provide approved NVIS operators expanded information regarding NVIS required and suggested defect reporting. Included are demonstrated common NVIS equipment issues including examples of potentially acceptable and unacceptable faults for flying activities.

At this time, the airworthiness concern described in this Airworthiness Bulletin is not considered an unsafe condition that would warrant an Airworthiness Directive to be issued under Part 39 of the Civil Aviation Safety Regulations 1998.

1.3 Background

Operators must comply with flight operations regulations and with the NVIS manufacturer's instructions in relation to use of NVIS including acceptable and unacceptable faults for flying activities.

In the absence of manufacturers criteria, the information contained in this AWB may assist in determination of NVIS concerns. Example images and rejection criteria have been kindly provided by Aviation Specialities Unlimited.

1.4 Requirements

CASA encourages further defect reporting for:

- NVIS equipment defects or issues that could affect safety, especially where there has been a dual image intensifier tube (IIT) failure
- non-compliance with a manufacturer's specification
- any persistent issue or defect.

Reporting defects allows CASA to conduct accurate system trend analysis to support airworthiness and flight safety.

For further information on reporting to CASA via an SDR see Advisory Circular (AC) 20-06 – *Defect reporting*.

1.5 Examples of Equipment Issues

This section contains typical NVIS failures, these are not exhaustive, and operators must always reference approved data for more information.

Security of external battery pack

CASA has received reports of external battery packs being attached with hook and loop style fasteners. There have been instances reported where the pack has fallen out of the rotorcraft.

Inconsistent installation and reinstallation practices can lead to the hook and loop style fastener not having the necessary retention to perform its intended function.

The retention characteristics of the hook and loop style fastener will degrade over time due to:

- wear
- environmental degradation from:
    - vibration
    - temperature or
    - contamination.

It is recommended to follow the manufacturer's instructions for fitment of external battery packs.

CASA recommends carrying out a visual inspection of the hook and loop fasteners at each installation.

Unacceptable for flying:

- shading – image is not fully circular (see Figure 1)

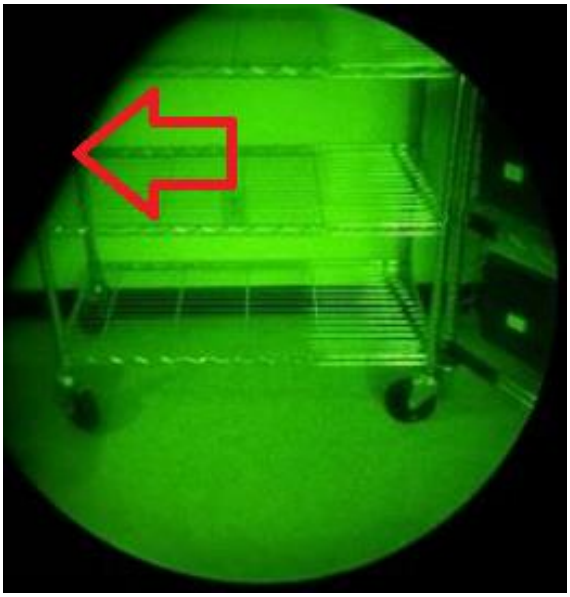

Figure 1 - Shading

- edge glow – brighter area in outer portion of viewing area (sometimes this appears as sparkling) (see Figure 2); if the edge glow is brighter than the background scintillation, this is grounds for rejection.

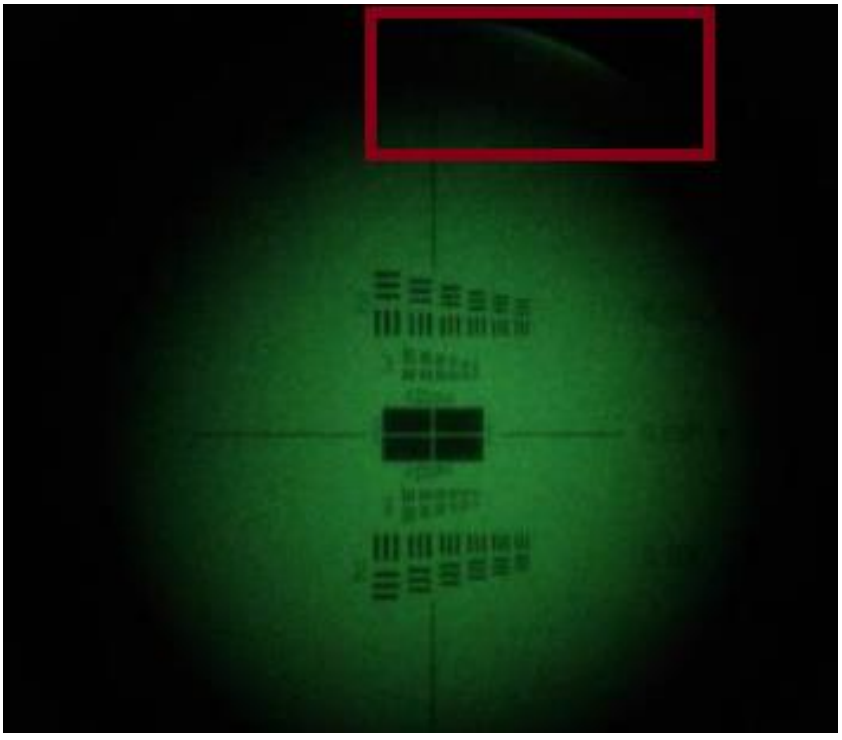

Figure 2 - Edge glow or sparkling

- flashing – most cases caused by faulty electrical connection (either in one or both tubes)
- flickering – most cases caused by faulty electrical connection (either in one or both tubes)
- intermittent operation in one or both image intensifier tubes
- power supply failure
- excessive play or looseness between in the visor attachment on the helmet
- NVIS image vibrates in flight due to movement or play in the mount attachment
- NVIS self-detaches from the helmet or visor
- cracked or missing filters that cause lighting incompatibility with other installed equipment in the flight compartment (see Figure 3).

Figure 3 - Lighting incompatibility

For further information on lighting compatibility see FAA NVIS/NVG cockpit compatibility checklist: GROUND or Appendix E of RTCA/DO-275 and RTCA/DO-268.

Acceptable for flying:

The following faults may be acceptable depending on the how the fault interferes with the viewing image:

- black spots

- bright spots or emission spots (small non-uniform bright areas). A bright spot (Figure 4) will go away when all the light is blocked and emission point does not go away when all the light is blocked (Figure 5)

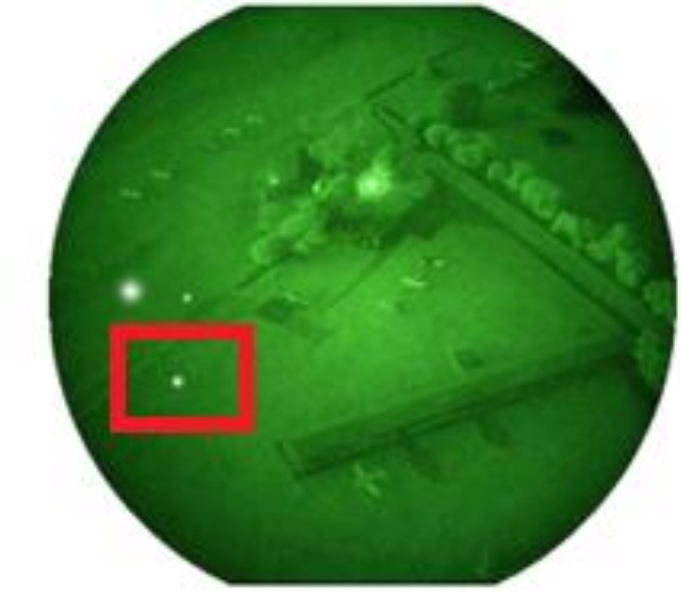

Figure 4 - Bright Spot

Figure 5 - Emission point

- fixed pattern noise or honeycomb
- chicken wire or other fixed-pattern noise – faint hexagonal or square –wave pattern; caused by fibres that do not transmit light at the boundaries of fibre cables (see Figure 6)

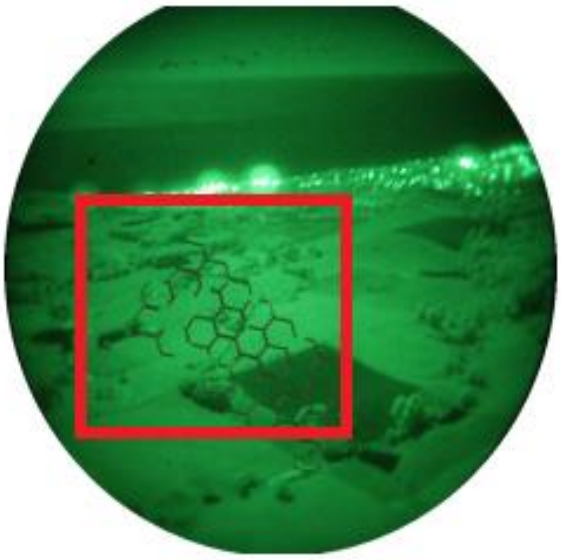

Figure 6 - Chicken wire

- the honeycomb image is formed from several thousand single hollow fibres in the microchannel plate. Figure 7 has a comparison of the diameter of human hair to the size of the honeycomb microchannels

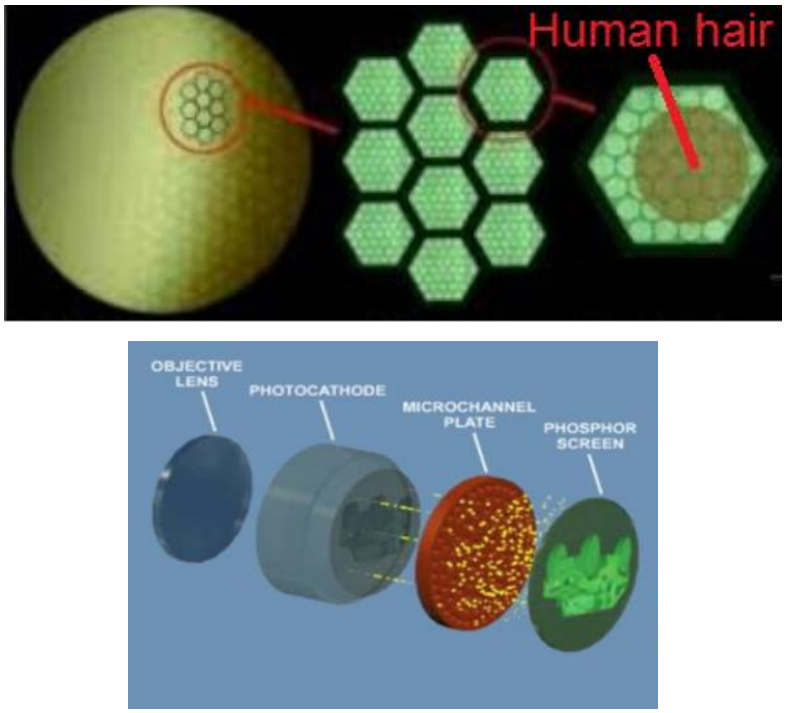

Figure 7 – Microchannel fibres

- image disparity or difference in gain
- output brightness variation or difference in gain; exposure to bright light can cause output brightness variation where the image is “burned into” the image intensifier tube in relatively dark conditions over a long period of time. The example in Figure 8 was caused by the lens cap string installed and the NVIS powered for over 24 hours. The example in Figure 9 was caused by a camera flash.

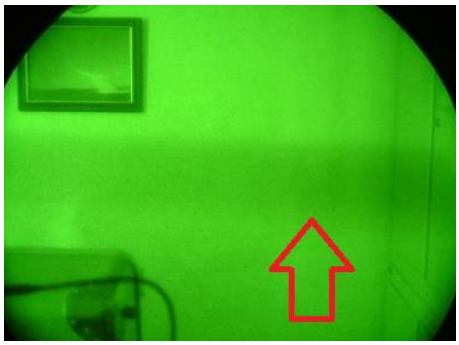

Figure 8 - Output brightness variation - lens cap string

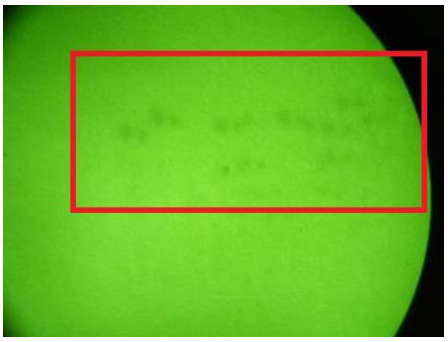

Figure 9 - Output brightness variation - flash

1.6 Further Information

A list of approved and accepted NVIS devices for civil use are available on request from CASA.

1.7 Reference Documentation

- RTCA/DO-275 Minimum Operational Performance Standards for Integrated Night Vision Imaging System Equipment
- RTCA/DO-268 Concept of Operations, Night Vision Imaging System for Civil Operators
- FAA AC 29-2C - Miscellaneous Guidance (MG)16. Certification guidance for rotorcraft Night Vision Imaging System (NVIS) aircraft lighting systems.
- FAA AC 27-1B - Miscellaneous Guidance (MG)16. Certification guidance for rotorcraft Night Vision Imaging System (NVIS) aircraft lighting systems.

1.8 Reporting

CASA encourages reporting any service difficulties with NVIS via the Defect Reporting system.

1.9 Enquiries

Enquiries with regard to the content of this Airworthiness Bulletin should be made via the direct link email address:

AirworthinessBulletin@casa.gov.au

or in writing, to:

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Civil Aviation Safety Authority
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