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Night Vision Goggles in EMS

Andrew Taylor

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References

CAO 82.6

CAAP 174-1

Babcock Operations Manual D-9

Google/ITT Industries

My Background

Joined the RAN in 1997

Flew PC9/A Jet Trainer 1998-1999

AS350BA Squirrel Helicopter 1999-2001

S-70B-2 Seahawk Helicopter 2001-2004

KA350/B300 King Air Nav Trainer 2005-2007

Australian Helicopters/ Babcock Adelaide contract 2007-

- Bell 412

- BK117

- **EC130**

- **AS 350 BA**

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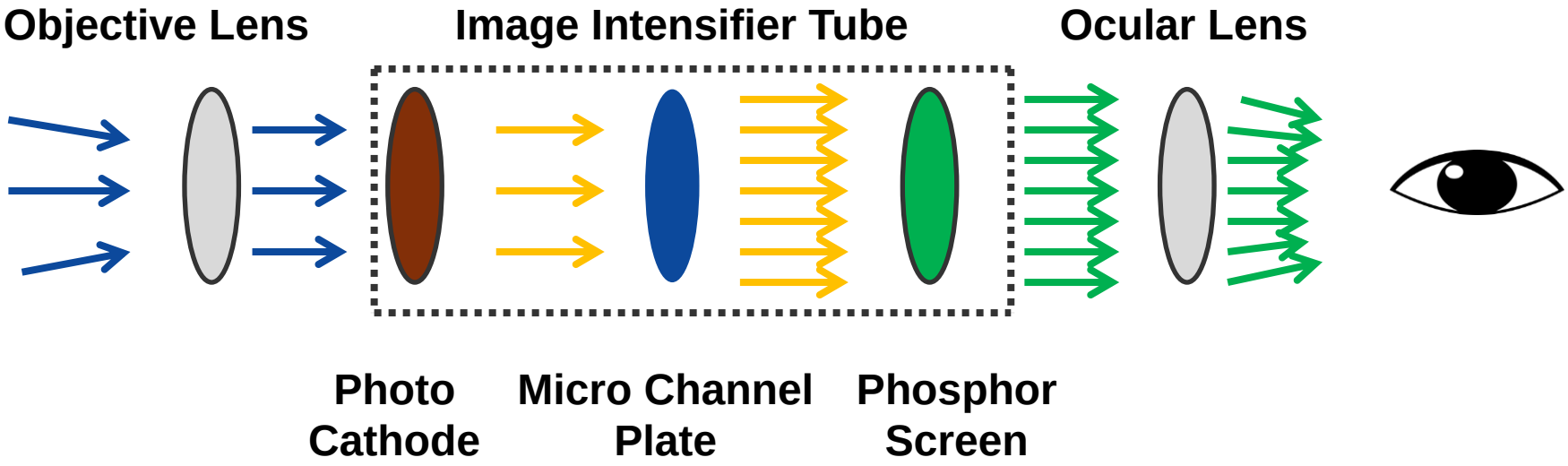
How NVG's work



NVG History

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Generation 0

The US created and used NVG in WWII and Korean War using active infrared.

System used a torch to illuminate the area with near-infrared.

Goggles used a anode and cathode to accelerate electrons rather than multiplying them.

This system caused distortion and greatly reduced the life of the tube.

Enemy could see users infrared torch.

NVG History

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Generation 1

This system used passive infrared from moon and stars to augment the normal amounts of reflected infrared.

However did not work well on cloudy or moonless nights.

Used the same image intensifier tube as Gen 0.

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Generation 2

Major improvements to Image Intensifier tube offered improved resolution, performance and reliability.

The addition of the Micro-Channel Plate allowed visibility in extreme low-light conditions.

This is because we now have multiplication of electrons rather then an acceleration of original ones.

The images are brighter and less distorted.

NVG History

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Generation 3

No substantial changes to technology, but better resolution and sensitivity.

Photo Cathode is now made from Gallium Arsenide which is extremely efficient at converting photons to electrons.

The MCP is coated with an ion barrier which dramatically increases the life of the tube.

NVG History

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Generation 4

Gen 4 or “Filmless and Gated” technology shows significant improvement in both low and high level light conditions.

Removal of the ion barrier reduces background noise and thereby enhances the signal-to-noise ratio. Resulting images are less distorted and brighter.

An automatically gated power supply allows a much quicker response to a change in light levels.

Night Vision Imaging System

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The NVIS is the complete package that we use for night flying. It includes:

- Pilot and Crewman NVG and helmet mounts

- Aircraft NVG compatible lighting - certified

- Training

NVG Faults

Common Faults for NVG:

-**Bright Spots**

-**Edge Glow**

-**Emission Points**

-**Flashing, Flickering, or Intermittent Operation**

-**Shading**

NVG Limitations

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NVG's amplify available light so they need ambient light to work.

As ambient light levels reduce, NVG's work harder.

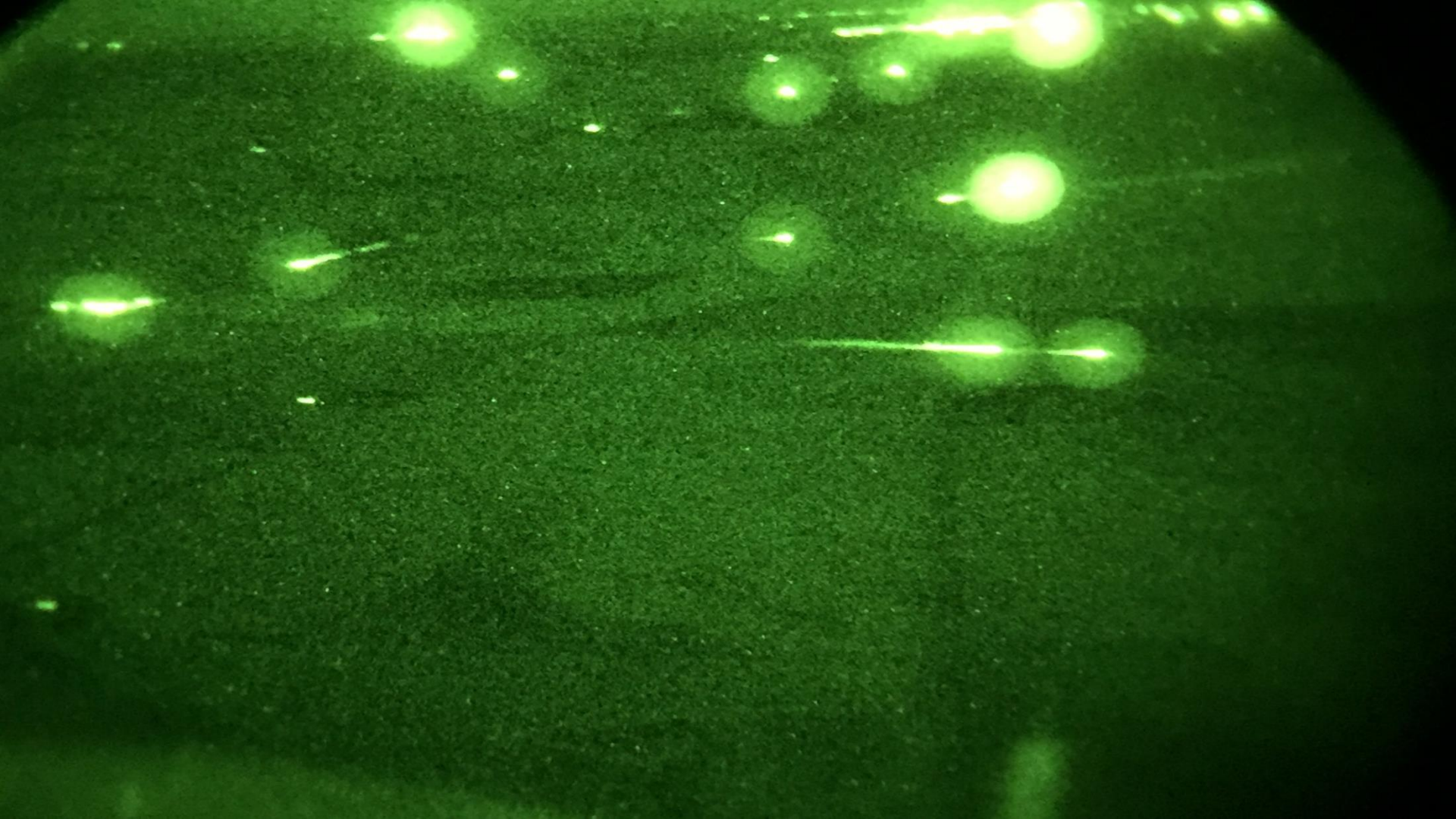
In low light we have a large amount of scintillation (distortion).

40º Field of View, mitigated by continual head movement.

Contrast between high illumination and low illumination:

- Shadow areas on full-moon night.

- Bright lights on emergency vehicles on a dark night.

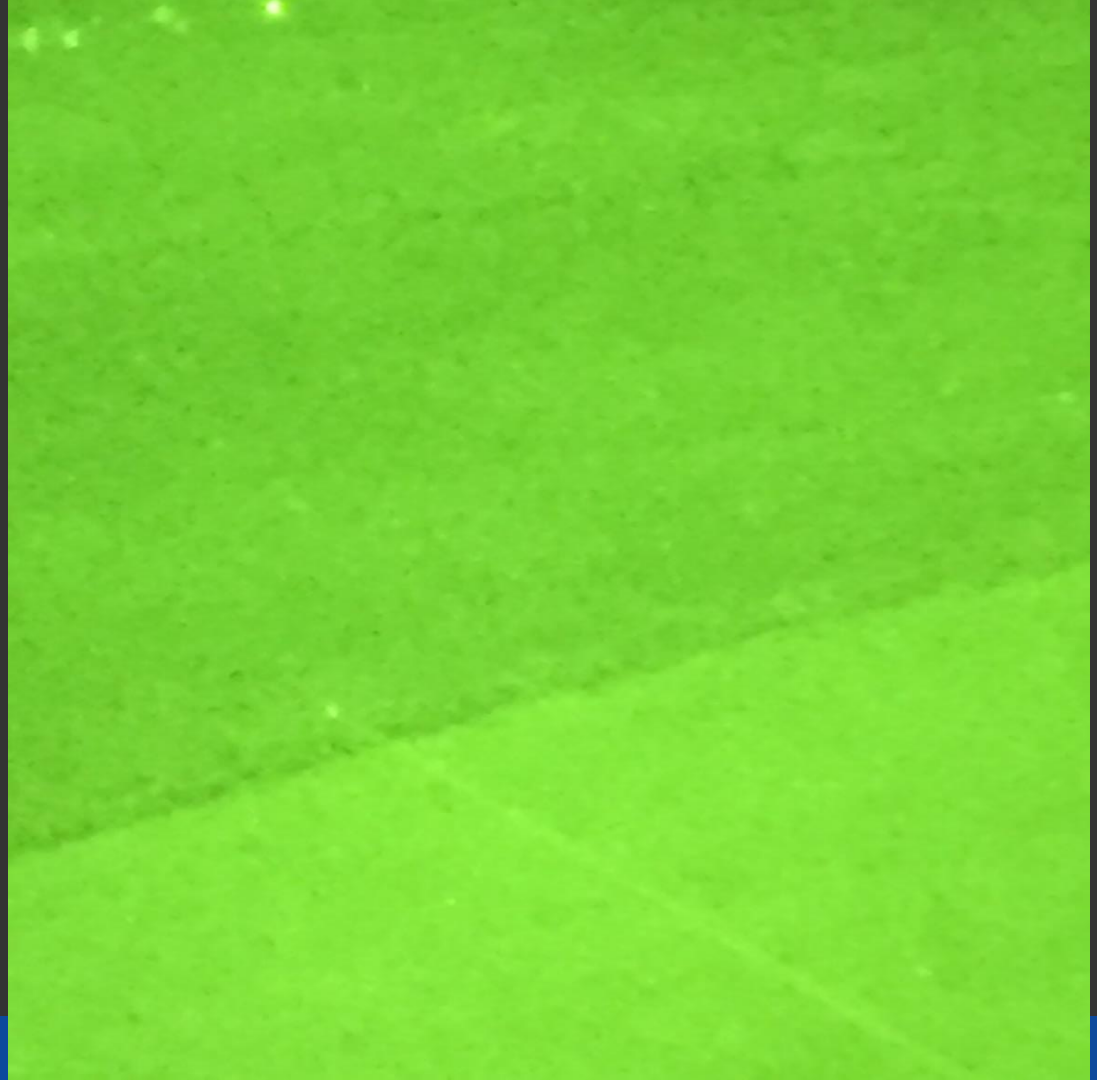


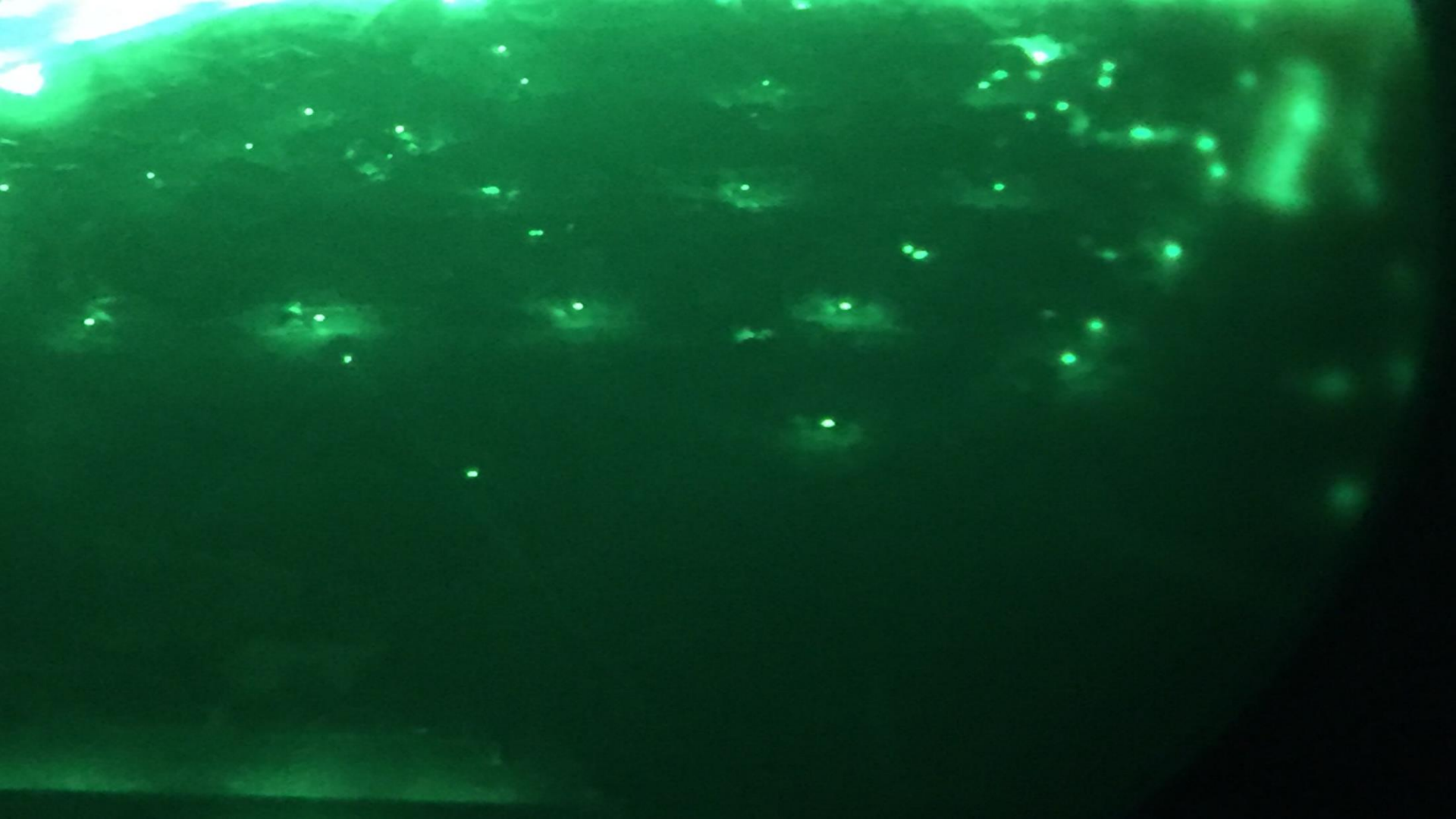
Case Analysis

General Airborne Police Use:

FLIR camera operator (Policeman)

Pilot and Mission Commander (Policeman) on NVG





Case Analysis

SAR Police Use:

FLIR camera operator (Policeman) – may also have NVG

Pilot and Crewman on NVG

Special Operations Paramedic – no NVG


MAC