



# Tilt Lock Mechanism for Moveable Optical Device or Display

## Patent # 7,885,001

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### Situational Summary

- The Naval Surface Warfare Center's Crane Division has created a tilt lock mechanism for helmet mounted displays systems.
- The technology has a niche market and due to funding limitations by the federal government, the technology marketing strategy has been delayed.
- The tilt lock mechanism has been used within the Navy as well as other military factions for helicopter pilot applications, and is market ready.
- This tilt lock mechanism is of particular importance because it provides aircraft pilots stabilized and adjustable line-of-sight positioning especially for combat flight.

### Applications

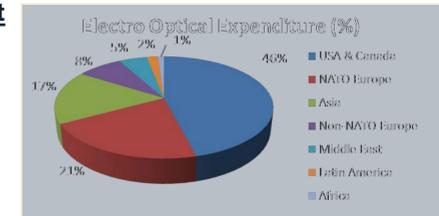
Industry Segments	Application Segments
<b>A. Military</b>	1. Helicopter pilot HMDs 2. Fixed wing aircraft HMDs 3. Naval ship board optical monitor devices 4. Land based vehicles (MRAP, M-ATV)
<b>B. Government</b>	1. Police, firefighting, and FBI for mapping, thermal, or night vision HMDs
<b>C. Civilian/Commercial Aviation</b>	1. Pilots using HMD devices
<b>D. Gaming</b>	1. 3D video gaming HMDs 2. Virtual reality optical devices
<b>E. Racing</b>	1. Formula One driver HMDs

Abbreviations: HMD - head/helmet mounted display, MRAP - mine resistant ambush protected, M-ATV - MRAP all-terrain vehicle

### Market Opportunity

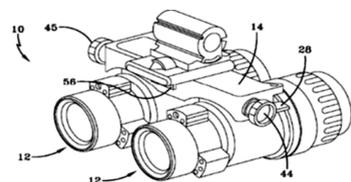
- U.S. Army's Night Vision, Thermal Weapon Sight program: \$1.2 billion<sup>1</sup>
- Military sales of HMDs are forecast to reach \$330 million in 2012
- Global electro optical market:**
  - \$6 billion
  - Growth rate: 55% in the next decade<sup>2</sup>
- Personal Viewer Market by 2012:**
  - 16 million units sold
  - \$5.7 billion in revenue<sup>3</sup>

	Defense Purchases	% World Market
<b>USA &amp; Canada</b>	\$103B	46%
<b>NATO Europe</b>	\$48B	21%
<b>ASIA</b>	\$38B	17%
China	\$14B	
Japan	\$10B	
India	\$4.3B	
S. Korea	\$3.6B	
Australia	\$3B	
Taiwan	\$1.6B	
Indonesia	\$1.6B	
<b>Non-NATO Europe</b>	\$17B	7.5%
Russia	\$13B	
<b>Middle East</b>	\$12B	5.5%
Saudi Arabia	\$6.6B	
Israel	\$3.5B	
<b>Latin America</b>	\$4.8B	2%
Brazil	\$2B	
<b>Africa</b>	\$2.7B	1%
<b>Total</b>	<b>\$227B</b>	<b>100%</b>



### Technology Synopsis

- Many pilots use head- or helmet-mounted display (HMD) devices
- Flight vibrations & jolts cause misalignment of pilot's goggles and skews line of sight
- This invention allows HMD devices to tilt and lock into position
- Interpupillary distance (IPD) adjustment capabilities
- Cost to produce: \$10-20 Price point: \$20



### Competition

#### Company Product and Product Description / Features

Northrop Grumman Litton EOS M949 Aviator 's Goggle AN/AVS-9

- Tilt adjustment: 10° minimum
- IPD adjustment: 52 – 76 mm
- Goggle/mount combined weight: 870 g



Vision Systems International (VSI), Elbit Systems/Rockwell Collins ' ANVIS/HUD

- Tilt adjustment: N/A
- IPD adjustment: N/A
- Goggle weight: 230 g



Newcon Optik Night Vision Goggles

- Tilt adjustment: N/A
- IPD adjustment: 56 – 72 mm
- Goggle weight: 610 g



Fenn Night Vision LTD NG 2000/2000A

- Tilt adjustment: 8° minimum
- IPD adjustment: 52 – 72 mm
- Goggle weight: 590 g



### Key Technology Benefits & Features

- Quick, easy, and stable tilt adjustment capabilities
- Inter-pupillary distance (IPD) adjustment capabilities
- Highly durable tilt locking pin mechanism
- Stronger metal material for superior endurance
- Light weight , less cumbersome