Edward K. Beale
San Diego State University
EDTEC 540 - Summer 2006
Job Aid Report

Introduction

Coast Guard Landing Signals Officers (LSOs) wear Night Vision Goggles (NVGs). They are required to adjust their NVGs to achieve optimal focus. Properly focused NVGs significantly enhance performance, and allow the greatest margin of safety when conducting helicopter operations at night. The consequence of a performance failure is potentially catastrophic. It is cost-prohibitive to send over 100 LSOs from 35 home ports for standardized NVG training. A job aid provides an effective low-cost tool to achieve more standard, consistent NVG alignment and focus.

Analysis Techniques

Audience: An LSO is a strong leader with high intelligence (high school diploma or higher) and no physical limitations, who can apply a complex set of rules while manipulating technical equipment. The operators are accustomed to following procedural steps presented by job aids. Maintaining high-level performance motivation is typically not a problem.

Environment: NVGs are used at night, aboard moving ships, while under helicopter rotors blowing salt spray. Space to focus NVGs is limited. LSOs can't stop to review procedures while using the equipment, so all NVGs must be properly aligned and focused before each use.

Subject Matter Experts: The seven standardization instructors from the Aviation Training Center (ATC) provided excellent information about the overall problem, and insightful suggestions for job aid development and improvement. The instructors have over 140 years of combined operational experience, including thousands of landings and hundreds of hours using NVGs. They cautioned that the learners (LSOs) represented three distinct populations. First, there are learners with no skills, who need detailed instructions. Second are learners who have familiarity with NVGs, but use them infrequently. Lastly are expert learners, who sometimes try to complete alignment steps out of order.

Extant data: NVGs used by LSOs are identical to the ones used by helicopter pilots, so it is not surprising to discover the best source material contained in pilot training documents. The most valuable resources are the NVG user's guide and the Ship-Helicopter NVG refresher powerpoint. These references outline NVG focusing as a procedural process.

Objectives

Proper alignment and focus is highly dependent on an individual's ability to judge if a certain visual presentation looks more aligned and in-focus than another. This ability is a pre-existing skill and need not be trained. Speed and accuracy are important.

The job aid was designed to accomplish two objectives:

1) Given a set of NVGs mounted on a LSO helmet assembly, and the job aid, the LSO will *align* the NVGs to match their eyes in less than five minutes.
2) Given a set of aligned NVGs, and the job aid, the LSO will *focus* the NVGs to achieve 20/30 visual acuity or better in less than five minutes.

Job Aid Development

In A Handbook of Job Aids (Rossett and Gautier-Downes, 1991), the authors identify seven situations that dictate the need for a procedural job aid. Of these seven, the following five apply to the problem:

- The performance is a procedure
- The performance is infrequent
- The consequences of error are high
- The situation is complex
- There are insufficient resources for training.

The cramped shipboard spaces and harsh environmental conditions give preference to a small and uncomplicated job aid. NVG alignment and focus procedures will not change until this type of NVGs is replaced, so a placarded job aid will not become obsolete for many years.

Graphics were selected to demonstrate key controls and a desired end-state condition. Low-light conditions during NVG use dictated larger, sans-serif fonts. Each sub-task was clearly separated from others using boxes and underlined headings.

The job aid text targeted all three learner populations. Key procedural steps were capitalized and set in bold text, intended for expert learners who only need access to the procedural order. Each step has highlighted reminders for intermediate learners who perform the task infrequently. Finally, detailed explanations guide novice learners.

Pilot Test

General: The job aid was produced as a single-sided laminated color card. The intent of the prototype was to place one near each NVG focus area. The prototype job aid was given to six LSOs from two cutters home-ported in San Diego, CA: CGC Chase and CGC Hamilton. Four LSOs were "seasoned" NVG operators with a combined total of several hundred NVG helicopter landings. The other two had no experience using NVGs.

Positive: The LSOs were unanimous in their praise of the job aid. The job aid made it easy for them to complete the alignment and focusing procedure, and to do so in less time and with greater accuracy than by memory alone. The more skilled LSOs indicated the job aid was useful as a last-minute refresher, and useful as an aid for training new LSOs. The unskilled LSOs stated they could probably achieve acceptable focus with no training just by using the job aid. This was attempted, and both new LSOs were able to achieve satisfactory focus on the first attempt. All testers stated they would use the job aid during their next operational patrol.

Recommendations: The LSOs requested a black-and-white version, because there were no color copiers on their ships. They suggested the job aid have a label or title to identify its purpose to the user. The LSOs suggested the text be made larger to help them read it in low-light conditions. They also suggested the graphics and photos be replaced with simple line drawings to eliminate unnecessary detail. Finally, while they appreciated the detailed instructions, they would prefer to use a larger size, wall or table-mounted reference with less detail.

Pilot Test Interpretations and Revisions

The pilot test revealed details about the performance context not immediately apparent based on analysis alone. There was no way for operators to carry a job aid with them to the flight deck, because the job aid itself could have become a foreign object damage (FOD) hazard to aircraft and personnel. Fortunately, the LSOs were aligning and focusing their NVGs in an enclosed room with access to a table. The job aid could be modified to accommodate a table or wall mounted presentation. A graphic artist should be employed to convert the color graphics and photographs to line drawings. Both the Alpha and Beta versions of the job aid are enclosed at the end of this report.

Solution System

The original performance analysis identified four major drivers and provided a solution system of recommendations. The job aid partially addresses the first recommendation: "develop standard training materials that teach NVG terminology and demonstrate sequenced focusing steps". The job aid provides a standardized solution that is low cost, locally reproducible, and easily adapted to various display media. The job aid can be included in the Shipboard-Helicopter Operational Procedures Manual as part of the NVG appendix.

Conclusion

The "NVG Alignment and Focus Guide for LSOs" job aid provides a low-cost, standardized tool that assists LSOs in the daily performance of their job. Printed on a placard, it is external to the individual, and provides procedural information to guide them while properly aligning and focusing their NVGs.