RTCA, Inc.
1140 Connecticut Avenue, NW, Suite 1020
Washington, DC 20036, U.S.A

CONCEPT OF OPERATIONS
Night Vision Imaging System for Civil Operators

RTCA/DO-268
March 27, 2001

Prepared by SC-196

Copies of this document may be obtained from

RTCA, Inc.
1140 Connecticut Avenue, NW, Suite 1020
Washington, DC 20036-4008 USA

Telephone: 202-833-9339
Facsimile: 202-833-9434
Internet: www.rtca.org

Please call RTCA for price and ordering information.

FOREWORD

This report was prepared by Special Committee 196 (SC-196) and approved by the RTCA Technical Management Committee (TMC) on March 27, 2001.

RTCA, Incorporated is a not-for-profit corporation formed to advance the art and science of aviation and aviation electronic systems for the benefit of the public. The organization functions as a Federal Advisory Committee and develops consensus based recommendations on contemporary aviation issues. RTCA's objectives include but are not limited to:

- coalescing aviation system user and provider technical requirements in a manner that helps government and industry meet their mutual objectives and responsibilities;

- analyzing and recommending solutions to the system technical issues that aviation faces as it continues to pursue increased safety, system capacity and efficiency;

- developing consensus on the application of pertinent technology to fulfill user and provider requirements, including development of minimum operational performance standards for electronic systems and equipment that support aviation; and

- assisting in developing the appropriate technical material upon which positions for the International Civil Aviation Organization and the International Telecommunication Union and other appropriate international organizations can be based.

The organization's recommendations are often used as a basis for government and private sector decisions as well as the foundation for many Federal Aviation Administration Technical Standard Orders.

Since RTCA is not an official agency of the United States Government, its recommendations may not be regarded as statements of official government policy unless so enunciated by the U.S. government organization or agency have statutory jurisdiction over any matters to which the recommendations relate.

This page intentionally left blank.

EXECUTIVE SUMMARY

The hours of darkness add to a pilot's workload by decreasing those visual cues commonly used during daylight operations. The decreased ability of a pilot to see and avoid obstructions at night has been a subject of discussion since aviators first attempted to operate at night. Technology advancements in the late 1960s and early 1970s provided military aviators some limited ability to see at night and therein changed the scope of military night operations. Continuing technological improvements have advanced the capability and reliability of night vision imaging systems to the point that they are receiving increasing scrutiny are generally accepted by the public and are viewed by many as a tool for night flight.

Simply stated, night vision imaging systems are an aid to night VFR flight. Currently, such systems consist of a set of night vision goggles and normally a complimentary array of cockpit lighting modifications. The specifications of these two sub-system elements are interdependent and, as technology advances, the characteristics associated with each element are expected to evolve. The complete description and performance standards of the night vision goggles and cockpit lighting modifications appropriate to civil aviation are contained in the Minimum Operational Performance Standards for Integrated Night Vision Imaging System Equipment.

An increasing interest on the part of civil operators to conduct night operations has brought a corresponding increased level of interest in employing night vision imaging systems. However, the night vision imaging systems do have performance limitations. Therefore, it is incumbent on the operator to employ proper training methods and operational procedures to minimize these limitations to ensure safe operations. In turn, operators employing night vision imaging systems must have the guidance and support of their regulatory agency in order to safely train and operate with these systems.

The role of the regulatory agencies in this matter is to develop the technical standard orders for the hardware as well as the advisory material and inspector handbook materials for the operations and training aspect. In addition, those agencies charged with providing flight weather information should modify their products to include the night vision imaging systems flight data elements not currently provided.

An FAA study (DOT/FAA/RD-94/21, 1994) best summarized the need for night vision imaging systems by stating, "When properly used, NVGs can increase safety, enhance situational awareness, and reduce pilot workload and stress that are typically associated with night operations."

This page intentionally left blank.

TABLE OF CONTENTS

This page intentionally left blank.

1 INTRODUCTION

The desired integration of aviation night vision imaging system (NVIS) technology into civil aviation requires the successful interface of numerous disciplines. Presently, three documents will be used to fully and completely describe the various elements of a successful NVIS program, the complete discussion of these NVIS disciplines is distributed across the Concept Of Operations, the Minimum Operations Performance Standards (MOPS) for the NVIS Equipment, and the Training Guidelines. There is crossover from document to document and the Concept of Operations contains some areas more specific than others when there is no associated document more appropriate to the information. Items such as hardware specifications or training are specifically provided for in the MOPS and Training Guidelines and therefore, are treated superficially by the Concept of Operations.

1.1 Purpose

The purpose of this document is to describe the concept of operations supporting the implementation of aviation NVIS technology into the national airspace system (NAS) by civil aviation operators. This paper discusses the terminology, capabilities, limitations, operations, training and other supporting agencies for NVIS. The focus of the paper is the safe and efficient implementation of NVIS during various phases of flight. The goal of implementing NVIS into the NAS is to improve an operator's situation awareness during night visual flight rule (VFR) operations without compromising safety.

1.2 Background

In 1971, the US Army adopted night vision devices for use in aviation. By the late 1980's many military trained night vision goggle (NVG) helicopter pilots were in the civil industry. The demand for night vision technology was spreading to the civil sector.

In 1989, Rocky Mountain Helicopters, a Part 135 air ambulance operator, informed the FAA of their intention to start employing NVGs in their single pilot operations.

In 1990, the Federal Aviation Administration (FAA) stated that Night Vision Enhancement Devices (NVEDs) are considered an appliance and that if an applicant wanted approval for operation with an NVED, a minimum operational performance standard (MOPS) would need to be developed and accepted by the FAA.

In 1994, the FAA released a study, Night Vision Goggles in Emergency Medical Service (EMS) Helicopters. The report stated that "NVGs are a viable tool during the enroute and terminal operations during certain EMS scenarios. When properly used, NVGs can increase safety, enhance situational awareness, and reduce pilot workload and stress that are typically associated with night operations."

In 1996, Rocky Mountain Helicopters again approached the FAA with a plan to utilize NVGs. The FAA coordinated with the US Army to review training, operational, and goggle standards. The FAA determined that the critical issues to be resolved were pilot training, NVG certification standards and approval, and aircraft lighting. In order to expedite the program, the first several operator approvals were completed through the Supplemental Type Certification (STC) process.