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**Research and Evaluation
of MEMS Technologies
(5-20387 & 5-20388)**

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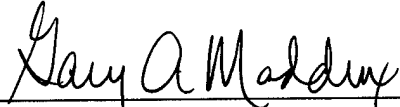
This technical report was prepared by the staff of the Research Institute, The University of Alabama in Huntsville. The purpose of this report is to provide documentation of the work performed and results obtained under Delivery Order 28 of AMCOM Contract No. DAAH01-98-D-R001. Mr. Gary Maddux was the principal investigator. Ms. Barbara Robertson, Weapon Sciences Directorate, Research, Development, and Engineering Center, U.S. Army Aviation & Missile Command, provided technical coordination. Ms. Robertson also provided technical expertise and insights in MEMS technology.

The views, opinions, and/or findings contained in this report are those of the author(s) and should not be construed as an official Department of the Army position, policy, or decision unless so designated by other official documentation.

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Prepared for: Commander
U.S. Army Aviation & Missile Command
Redstone Arsenal, AL 35898

I have reviewed this report, dated October 1999 and the report contains no classified information.



Principal Investigator

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1.0 Introduction

New micro-electro-mechanical systems (MEMS) technologies are emerging in the research community as a low cost guidance solution for missiles. DARPA and AMCOM are currently investigating this emerging technology for weapon systems that should have positive impacts on the producibility, operations and support of future missile designs. It is essential to evaluate the U.S. manufacturing base to determine MEMS performance characteristics, design, trades, and manufacturing challenges to support research activities.

The Systems Engineering and Production Directorate has the mission and function of evaluating new technologies and determining the impacts of same on the producibility and supportability of AMCOM missile systems. AMCOM required engineering support in performing assessments on MEMS technologies. The Systems Management and Production Laboratory at The University of Alabama in Huntsville (UAH) Research Institute (RI) was tasked to provide this engineering support and analytical capability.

2.0 Objective

The objective of this research task was to research and evaluate the state-of-the-technology of MEMS for missile applications. The outcome of this research was a body of knowledge that can be disseminated throughout the DOD and incorporated in the appropriate weapon systems planning. UAH conducted research to identify and categorize MEMS technologies based on the potential for DoD weapons applications and manufacturing technology maturity.

3.0 Statement of Work

The statement of work, as outlined in delivery order 28, was as follows:

UAH shall provide the personnel, resources, expertise and materials required to perform the following efforts:

3.1 UAH shall conduct research to assess technology requirements, status, and needed militarily beneficial advancements in MEMS based Inertial Navigation Systems (INS).

3.2 UAH shall conduct research to identify candidate technology maturation gaps and candidate technology demonstration platforms, and identify host platform environmental factors (missile requirements) that must be considered in technology development.

3.3 UAH shall solicit inputs from the defense, industrial and academic community on the subjects in Paragraphs 3.1 and 3.2. It is envisioned that these inputs shall be provided in electronic format, and shall be available for appropriate distribution.

3.4 The Government will host a workshop on the findings of the research conducted in Paragraphs 3.1 and 3.2 during December 1998. UAH shall participate in the selection process of the topics to be presented.

4.0 Description of Workshop

The work performed on this task led directly to the Workshop on MEMS Technology, which was held at the Sparkman Center Auditorium in December 1998. The objective of this workshop was to review the progress of MEMS technologies applicable to DoD weapon systems.

5.0 Conclusion and Recommendations

During the time frame allocated by the delivery order, members of the UAH Applied Research Program, with the cooperation of representatives from AMCOM SEPD and Missile Guidance, performed an analysis and evaluation of MEMS technologies. Results of these efforts were presented at a locally held workshop. Detailed findings can be found in the proceedings of that workshop, which was compiled by UAH and delivered under separate cover.