GEORGIA INSTITUTE OF TECHNOLOGY
Engineering Experiment Station

PROJECT INITIATION

Date: July 6, 1972

Project Title: Radar Backscatter Measurements of Selected Ballistic Projectiles

Project No.: A-1436

Project Director: Dr. D. G. Bodnar

Sponsor: Office of Naval Research

Effective . . . . . June 1, 1972 . . . . . Estimated to run until: . . Sept. 29, 1972 * . . . . . .

Type Agreement: Task Order No. N00014-67-A-0159-0012 . . . . . Amount: $ 7,595.00 . . . . . .

* Three months from date GFP received (6-29-72)

REPORTS REQUIRED: Occasional Progress Reports; Final Technical Report

SPONSOR CONTACT PERSONS:

Technical Matters
Head, Surface & Amphibious Programs
Naval Applications and Analysis Div.
Office of Naval Research
800 Quincy Street
Arlington, Virginia 22217

Contractual Matters
(thru GTRI)
Mr. R. J. Whitcomb (ACO)
ONR Resident Representative
Hinman Research Bldg.
Campus

Defense Priority Rating: DO-C9 under DMS Reg. 1.

Assigned to . . . Sensor Systems . . . . . Division

COPIES TO:

Project Director	Photographic Laboratory
Director	Security, Property, Reports Coordinator
Assistant Director	EES Accounting
GTRI	EES Supply Services
Division Chief(s)	Library
Service Groups	Rich Electronic Computer Center
Patent Coordinator	Project File
	Other_____

RA-62

GEORGIA INSTITUTE OF TECHNOLOGY
Engineering Experiment Station

PROJECT TERMINATION

Date 5/10/73

PROJECT TITLE: Radar Backscatter Measurements of Selected Ballistic Projectiles

PROJECT NO: A-1436

PROJECT DIRECTOR: Dr. D. G. Bodnar

SPONSOR: Office of Naval Research

TERMINATION EFFECTIVE: ~~December 31, 1972 (Contract~~ Expiration)

CHARGES SHOULD CLEAR ACCOUNTING BY: ~~N/A--All funds~~ were spent by expiration date.

CONTRACT CLOSEOUT ITEMS REMAINING: Final Invoice & Closing Documents
Government Property Inventory and related Certificate
Classified Material Certificate

SENSOR SYSTEMS DIVISION

COPIES TO:

Project Director
Director
Associate Director
Assistant Directors
Division Chief
Branch Head
Accounting
Engineering Design Services
General Office Services
Photographic Laboratory
Purchasing
Report Section
Library
Security
Rich Electronic Computer Center

GTES 402 (R10-62)

A-1436

ENGINEERING EXPERIMENT STATION 225 North Avenue, Northwest · Atlanta, Georgia 30332

28 July 1972

Head, Surface and Amphibious Programs
Naval Applications and Analysis Division
Office of Naval Research
Department of the Navy
800 North Qunicy Street
Arlington, Virginia 22217

Attention: Code N00014

Reference: ONR Task Order N00014-67-A-0159-0012

Subject: Technical Status Report for the period 29 June to 29 July 1972

Gentlemen:

The following is a summary of the status of the above referenced program being conducted by Georgia Tech.

The projectiles to be measured were received on 29 June 1972 and performance of the task began on that date. Consequently, the termination date for the contract has been reset to 29 September 1972 with the Final Report being due on that date.

Preliminary backscatter measurements have been performed on the 81 mm and 105 mm projectiles for VV and HH polarizations and the three configurations specified in the Task Order. Analysis of the data is proceeding with emphasis on pinpointing aspect radar cross-section variation characteristics which may be used for target discrimination. In addition, the phase of the return signal is being examined for possible use in the discrimination process.

Respectfully submitted

Neal T. Alexander
Assistant Project Director

Approved:

Robert M. Goodman, Jr.
Chief, Sensor Systems Division

cc: Mr. Bill Fishbein
U. S. Army ECOM

ONR Resident Representative
Georgia Institute of Technology

GEORGIA INSTITUTE OF TECHNOLOGY
EXPERIMENT STATION 225 North Avenue, Northwest · Atlanta, Georgia 30332

30 August 1972

Head, Surface and Amphibious Programs
Naval Applications and Analysis Division
Office of Naval Research
Department of the Navy
800 North Quincy Street
Arlington, Virginia 22217

Attention: Code N00014

Reference: ONR Task Order N00014-67-A-0159-0012

Subject: Technical Status Report for the Period 29 July to 29 August 1972

Gentlemen:

The following is a summary of the status at the end of the current report period of the above referenced program being conducted by Georgia Tech.

Final backscatter measurements specified in the Task Order have been performed on the 81 mm and 105 mm projectiles and work is in progress to obtain data for the 155 mm and 175 mm projectiles. Additional measurements have been made on the 81 mm and 105 mm shells for ranges of aspect and elevation angles which are typical of those expected in practice. Discrimination techniques which have been evaluated include comparison of parallel-polarization to cross-polarization ratios for the various projectiles and comparison of the rate of change of this ratio. These techniques have met with moderate success. Projectile aerodynamic properties (spin, yaw, etc.) and subsequent modulation of the backscattered return are also being investigated as a means of discrimination. Further analysis and preparation of the Final Report will continue during the next report period.

Respectfully submitted,

Neal T. Alexander
Assistant Project Director

Approved:

Robert M. Goodman, Jr.
Chief, Sensor Systems Division

cc: Mr. Bill Fishbein
U. S. Army ECOM

ONR Resident Representative
Georgia Institute of Technology

A-1434

GEORGIA INSTITUTE OF TECHNOLOGY
EXPERIMENT STATION 225 North Avenue, Northwest · Atlanta, Georgia 30332

November 1, 1972

Head, Surface and Amphibious Programs
Naval Applications and Analysis
Division
Office of Naval Research
Department of the Navy
800 North Quincy Street
Arlington, Virginia 22217

Attention: Code N00014

Reference: ONR Task Order N00014-67-A-0159-0012

Subject: Technical Status Report

Gentlemen:

The following is a summary of the status on 31 October of the above referenced program being conducted by Georgia Tech.

Analysis of backscatter measurement data obtained for the 81 mm and 105 mm projectiles for ranges of azimuth and elevation angles typical of those expected in practice has been completed. Discrimination techniques evaluated include comparison of parallel-polarization to cross-polarization ratios for the various projectiles and comparison of the rate of change of this ratio. These techniques do not appear to offer useful discrimination due to overlap of projectile backscatter characteristics.

Consequently, modulation of the backscatter return due to projectile flight motion (spin, yaw, precession, etc.) is currently being investigated in hope of obtaining a discrimination technique. A mechanical structure which will allow yaw and precession motions to be simulated on the Georgia Tech Compact Radar Range has been constructed and measurements are in progress.

Due to equipment problems and additional time needed for construction of the projectile precession mechanism, a no-cost extension of the project completion date to 20 November has been requested with the concurrence of

Mr. William Fishbein. Analysis of precession data will continue and the Final Report will be submitted on the above date.

Respectfully submitted,

Neal T. Alexander
Assistant Project Director

NTA:mdh

Approved:

Robert M. Goodman, Jr.
Chief, Sensor Systems Division

cc: Mr. Bill Fishbein
U.S. Army ECOM

ONR Resident Representative
Georgia Institute of Technology