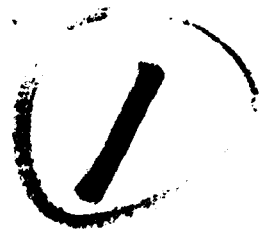


Research Note 83-32



AD-A135879

# Job Sample Tests as Predictors of M1 Gunnery Performance: Appendixes A-E

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U. S. Army

Research Institute for the Behavioral and Social Sciences

September 1983

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|--|---|---|
| 1. REPORT NUMBER<br>Research Note 83-32  | 2. GOVT ACCESSION NO.<br>AD-A135879   | 3. RECIPIENT'S CATALOG NUMBER               |
| 4. TITLE (and Subtitle)<br>JOB SAMPLE TESTS AS PREDICTORS OF M1 GUNNERY PERFORMANCE: APPENDIXES A-E  | 5. TYPE OF REPORT & PERIOD COVERED<br>Final Report, November 1980 to September 1982 |   |
|  | 6. PERFORMING ORG. REPORT NUMBER<br>6639-1  |   |
| 7. AUTHOR(s)<br>David W. Biers and Daniel W. Sauer   | 8. CONTRACT OR GRANT NUMBER(s)<br>MDA903-81-C-0031                                  |   |
| 9. PERFORMING ORGANIZATION NAME AND ADDRESS<br>Systems Research Laboratories, Inc.<br>2800 Indian Ripple Road<br>Dayton, OH 45440  | 10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS<br>2Q263731A792         |   |
| 11. CONTROLLING OFFICE NAME AND ADDRESS<br>U.S. Army Research Institute for the Behavioral and Social Sciences<br>5001 Eisenhower Avenue, Alexandria, VA 22333   | 12. REPORT DATE<br>September 1983   |   |
|  | 13. NUMBER OF PAGES<br>127  |   |
| 14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)<br>--  | 15. SECURITY CLASS. (of this report)<br>UNCLASSIFIED                                |   |
| 15a. DECLASSIFICATION/DOWNGRADING SCHEDULE<br>--   |   |   |
| 16. DISTRIBUTION STATEMENT (of this Report)<br>Approved for public release; distribution unlimited.  |   |   |
| 17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)<br>--   |   |   |
| 18. SUPPLEMENTARY NOTES<br>The text to these appendixes was published separately as Technical Report 584. Barbara A. Black was the Contracting Officer's Representative (COR).   |   |   |
| 19. KEY WORDS (Continue on reverse side if necessary and identify by block number)<br>Personnel selection      M1 tank      M1 computer control panel<br>Aptitude measurement      Tank commander      Gun laying<br>Job sample test      Gunner      Target engagement<br>Tank crewmen      Loader      Tracking<br>M60A1 tank      Driver  |   |   |
| 20. ABSTRACT (Continue on reverse side if necessary and identify by block number)<br>The objectives of Phase I of this research were to (1) develop an aptitude measurement methodology which could be used to design job sample tests for armor crewmen; (2) apply the methodology to develop job sample tests; and (3) administer the job sample tests to armor crewmen and analyze the test data. Phase II, reported separately, included analyses of the predicted validity of the job sample tests. (Continued) |   |   |

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## Item 20 (Continued)

A five-stage methodology for job sample test design was developed. Stages included task identification; task prioritization; job sample dimensional analyses; trade-off analyses; and detailed job sample test development. Seven job sample tests, three computer-based and four hands-on tests, were developed using the methodology. They were Operate Computer Panel, Computer Tracking, Computer Target Engagement, Tank Commander Decision Making, Hands-On Gun Laying, Hands-On Tracking, and Hands-On Target Engagement. Tests were administered to armor crewmen stationed in Europe. The analysis of test data indicated a low degree of intercorrelation among job sample tests which suggested that they were measuring different gunnery behaviors.

Crew experience, in general, was not related to job sample test performance. There was generally good evidence for construct validity of the tests. Although no post predictor criteria were available for Phase I of the research, the results of regression analyses indicate that linear combinations of the job sample test measures account for a very high proportion of the variability in a crew's past success at Annual Qualifications.

The text to these appendixes was published separately as Technical Report 584.

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JOB SAMPLE TESTS AS PREDICTORS OF M1 GUNNERY PERFORMANCE:  
APPENDIXES A-E

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APPENDIX A  
JOB SAMPLE TEST DESCRIPTIONS

## COMPUTER PANEL

### SUBJECTS

M60A1 Tank Commanders, Gunners, Loaders, and Drivers

### JUSTIFICATION

The M1 fire control computer integrates data from a number of sources and sensors to calculate the fire control solution for each round fired under precision gunnery conditions. The proper setup and operation of the computer control panel is necessary to ensure the best possible fire control solution.

### CONDITIONS

Subjects were seated in front of a 12-inch color video monitor so that they could reach the screen of the video monitor with a light pen.

### TASK DESCRIPTION

The subjects performed computer control panel operations using a computer-generated image of the M1 computer control panel displayed on the video monitor. Operations on and responses to the simulated (computer graphic) computer control panel were accomplished through a light pen. Individual trial instructions were presented via text which appeared below the graphics area on the video monitor. The subjects conducted data checks and manually entered data into the computer. Subjects also conducted computer self-test routines and responded to automatic input failures and other system failures.

### INDEPENDENT VARIABLES

The subjects completed five practice trials which included a check data task, an enter data task, and three computer self-test tasks. Following

the practice tasks, subjects completed a series of 10 trials which included both check data tasks and enter data tasks. Following these tasks, subjects completed an additional 10 trials consisting of computer self-test tasks.

#### PROCEDURES

Subjects were seated at the video monitor on which was displayed a graphic representation of the M1 computer control panel. The experimenter presented a demonstration briefing to each subject. The briefing covered, in order, the following topics:

1. Description of the M1 Computer Control Panel
  - a. On-Off Switch
  - b. Automatic Input Buttons
  - c. Manual Input Buttons
  - d. Display Area
  - e. Number Pad
  - f. Clear and Enter Buttons
2. Description of the M1 Computer Inputs
3. Demonstration of Light Pen Usage
4. Instructions for and Demonstration of a Check Data Task
5. Instructions for and Demonstration of an Enter Data Task
6. Instructions for and Demonstration of Three Computer Self-Test Tasks
7. Subject Practiced a Check Data, an Enter Data, and Three Computer Self-Test Tasks (experimenter available to answer questions only)

Upon completion of the five practice trials, the subject completed 10 trials of check data and enter data tasks and 10 trials of computer self-test tasks without assistance from the experimenter.

A check data task included the following steps:

1. Subject read the instructions presented on the lower portion of the video monitor. Typical instruction format was "CHECK AMMO TEMP. CORRECT AMMO TEMP IS 87.5."



2. Subject used the light pen to "press" the AMMO TEMP button. The AMMO TEMP button changed color to indicate that it had been selected. AMMO TEMP value currently stored in the computer was displayed in the display area.
3. Subject compared AMMO TEMP value in display area with the correct AMMO TEMP value given in instructions.
4. For a check data task, the value in the display was always the same as the correct value. The subject's response in this case was to "press," with the light pen, the ENTER button to return the displayed value to the AMMO TEMP memory location.
5. When the ENTER button was pressed, the value in the display was erased and the AMMO TEMP button changed color to white to indicate an "off" status.
6. The subject's performance data were recorded and stored on disk and the next instruction appeared on the monitor.

An enter data task included the following steps:

1. Subject read the instructions presented on the lower portion of the video monitor. A typical instruction format was "CHECK AIR TEMP. CORRECT AIR TEMP IS 92.5."
2. Subject used the light pen to "press" the AIR TEMP button. The AIR TEMP button changed color to indicate that it had been selected. The AIR TEMP currently stored in the computer was displayed in the display area.
3. Subject compared AIR TEMP value in the display area with the correct AIR TEMP value given in the instructions.

4. For an enter data task, the value in the display was always different than the correct value. The subject's response for an enter data task was to use the number pad to enter the correct AIR TEMP value into the display. The light pen was used to select the numbers. Selected numbers overwrote the numbers which initially appeared in the display. The subject used the CLEAR button to erase numbers entered incorrectly. The CLEAR button also caused the original value to reappear in the display.
5. When the subject had selected the correct value for AIR TEMP (now appearing in the display area), the next action was to use the light pen to "press" the ENTER button. The display was erased and the AIR TEMP button changed color to white to indicate an "off" status.
6. Subjects then performed a check data task according to the procedures described above to ensure that the new value had been properly entered into the computer.
7. At the completion of the check data task, instructions appeared for the next trial.

A computer self-test task included the following steps:

1. Subject read the instruction presented on the lower portion of the video monitor. The instruction was "RUN COMPUTER SELF-TEST."
2. Subject used the light pen to "press" the TEST button.
3. Subject monitored the computer control panel as the self-test routine was executed.
4. If there were no system failures, the word PASS appeared in the display area and the self-test was complete.

5. If an automatic input failed, the failed input button flashed. Subjects had to "press" the failed input button and then the ENTER button to continue the self-test routine. If there were no additional automatic input failures and no failures in other systems, the word FAIL appeared in the display and the self-test was complete. Incorrect procedures terminated the trial.
  
6. If a failure occurred in one of four other systems, a number 1, 5, 6, or 7 appeared in the display to indicate the failed system. If more than one system failed, the failure numbers appeared one at a time in the display. The subject's response was to monitor the sequence of failure numbers which appeared in the display. After all failure numbers had appeared, FAIL appeared in the display and the NO GO light came on. The subject then used the number pad to enter the failure numbers into the computer in the same sequence in which they appeared on that trial. The trial was complete when the failure numbers had been entered correctly. Errors in entering the failure numbers terminated the trial.
  
7. A computer self-test could include any combination of automatic input failures and other system failures.

Subjects had to respond to task instructions within 15 seconds or the trial was terminated and scored as an incorrect response.

#### DEPENDENT VARIABLES

The following dependent variables were measured:

- |          |  |
|----------|--|
| ECD:CORR | The number of enter/check data trials performed correctly. |
| ECD:TIME | The amount of time to perform an enter/check trial.        |

|          |  |
|----------|--|
| CST:CORR | The number of computer self-test trials performed correctly. |
| CST:TIME | The amount of time to perform a computer self-test trial.    |
| AVG:CORR | Average number of correct trials (ECD and CST).              |
| AVG:TIME | Average time to complete trials (ECD and CST).               |

#### SCORING

The number of correct/incorrect responses to each computer operation task was scored. Time to complete a computer operation task was recorded. Scoring was automatically accomplished as part of the computerized test routine.

#### EQUIPMENT

1. Apple II Plus microcomputer used to generate graphic representation of M1 computer control panel, operate control panel, control light pen, and record performance data.
2. NEC 12-inch color video monitor used to display graphic simulation of M1 computer control panel.
3. A 3-G light pen used to operate simulated computer control panel. Light pen substituted for operable control panel buttons.

#### APPROXIMATE ADMINISTRATION TIME

|   |                   |
|---|-------------------|
| Demonstration Briefing and Practice Session | 15 minutes        |
| 20 Trials                                   | <u>20</u> minutes |
| Total                                       | 35 minutes        |

## COMPUTER TARGET ENGAGEMENT (CTE)

### SUBJECTS

M60A1 Tank Commanders, Gunners, Loaders, and Drivers

### JUSTIFICATION

The M1 tank has a laser rangefinder (LRF) which can provide very accurate range information to the M1 fire control computer. Under certain atmospheric conditions and/or if the target is partially obscured by terrain or other objects, the LRF range data may not be accurate; and the target, therefore, may be missed. The gunner and tank commander must correctly interpret and act upon the LRF range data to assure highest probability of target hit.

### CONDITION

Subjects were seated at a table in front of the image combiner apparatus. They viewed 35mm slides of actual target scenes with a controllable computer-generated reticle superimposed on the target scene. Range data were also presented in the target scene. A modified joystick controller was placed on the table surface and was operated by the subjects to move the reticle, change magnification of the target scene, operate a simulated laser range finder, and fire on the target. The modified joystick also controlled presentation of the target scenes.

### TASK DESCRIPTION

Subjects performed target engagement procedures applicable to the M1 tank. They first viewed a 3X magnification of the target scene to acquire the target and center the reticle on the target. They then selected a 10X magnification of the target scene, centered the reticle on the 10X target image, and pressed the laser rangefinder button to obtain target range data. If range data appeared without a multiple return bar, subjects immediately

pressed the fire button which then completed the trial. If range data appeared with a multiple return bar, subjects pressed the laser button again and then immediately pressed the fire button to complete the trial.

#### INDEPENDENT VARIABLES

Subjects completed two instructional trials and 18 scored trials. One instructional and nine scored trials presented initial range data without a multiple return bar, and one instructional and nine scored trials presented initial range data with a multiple return bar.

#### PROCEDURES

Subjects were seated at the table-top device while the test administrator entered the subject's name, rank, and Social Security number into the computer. Subjects were then given instructions on the M1 gunner's primary sight, the use of the 3X and 10X magnification settings, and the operation of the laser rangefinder. Subjects were briefed on the significance of the multiple return bar and the procedures to follow if a multiple return bar did appear when using the laser rangefinder.

After the subjects were briefed on the M1 equipment, the experimenter explained how the table-top device would be used to simulate some of the M1 equipment and exercise some of the target engagement procedures unique to the M1. The subject was presented with an actual target scene representing the 3X magnification setting of the gunner's primary sight. A reticle was superimposed on the target scene and a four-digit range number appeared below the scene. Subjects were then briefed on the functions of the joystick box. Subjects practiced using the joystick itself to move the reticle over the target scene. Subjects were then told to center the reticle on the target vehicle appearing in the 3X magnification scene. When the reticle was centered on the target, the experimenter explained that the "10X" button on the joystick box should be used to obtain a 10X magnification of the target. The subject pressed the 10X button and the target scene changed to a 10X scene of the same target. Subjects were instructed to center the

reticle on the target in the 10X scene and press the "Laser" button on the joystick box to simulate use of the laser rangefinder. For the first demonstration trial, the range numbers below the scene changed to indicate range to the target. A multiple return bar did not appear over the range numbers. Subjects were then told to keep the reticle centered on the target and immediately press the "Fire" button on the joystick box to simulate firing on the target. Pressing the "Fire" button completed the trial and activated the presentation of the 3X target scene for the following trial. The subject then completed the second demonstration trial while the experimenter observed and corrected errors as necessary. When the subject pressed the "Laser" button in the second trial, the range numbers changed as in the first trial but a multiple return bar also appeared over the range numbers. At this point the experimenter explained that the multiple return bar indicated a problem with the range data and that the proper response was to make sure the reticle was centered on the target and press the "Laser" button again in an attempt to get more accurate range data. Whether the multiple return bar disappeared or remained after the second "Laser" press, the subject was instructed to press the "Fire" button to complete the engagement.

After the instructions and the two demonstration trials, each subject completed 18 trials on his own (nine trials with no multiple return bar after first laser press and nine trials with a multiple return bar after first laser press). Each subject received the same sequence of trials. The appearance of a multiple return bar trial could not be anticipated and subjects were not told the number of multiple return bar trials which would appear. Subjects were instructed to place the reticle on target as accurately as possible, to complete engagement procedures as quickly as possible, and to observe correct laser range finder procedures.

## DEPENDENT VARIABLES

The following dependent variables were measured:

|            |  |
|------------|--|
| PROC:ERROR | Errors in responding to the presence or absence of a multiple return bar over the range data obtained from the initial "Laser" button press.   |
| 3X:ERROR   | Number of computer graphic "pixels" between the center of mass of the 3X target image and the center of the reticle immediately prior to selecting the 10X target scene. Average and median distances were calculated. |
| L1:ERROR   | Number of computer graphic "pixels" between the center of mass of the 10X target image and the center of the reticle when the first "Laser" was pressed. Average and median distances were calculated.                 |
| L2:ERROR   | Number of computer graphic "pixels" between the center of mass of the 10X target image and the center of the reticle when and if the second "Laser" was pressed, averaged, and median distances were calculated.       |
| F:ERROR    | Number of computer graphic "pixels" between the center of mass of the 10X target image and the center of the reticle when the "Fire" button was pressed. Average and median distances were calculated.                 |
| 3X:TIME    | Time from appearance of the 3X target scene to press of the "10X" button.  |



|          |   |
|----------|---|
| L1:TIME  | Time from press of "10X" button to initial press of "Laser" button.   |
| L2:TIME  | Time from initial press of "Laser" button to second press of "Laser" button.  |
| F:TIME   | (a) Time from initial press of "Laser" button to press of "Fire" button when a multiple return bar was not present.<br>(b) Time from second press of "Laser" button to press of "Fire" button when a multiple return bar was present. |
| 10X:TIME | Time from press of "10X" button to press of "Fire" button.  |
| TOT:TIME | Time from initial appearance of 3X target scene to press of "Fire" button. Average and median values were calculated.   |

#### SCORING

Correct response procedures for the presence or absence of the multiple return bar were recorded by the Apple II Plus microcomputer.

Standard locations of target images, expressed in X-Y coordinates of computer graphic "pixels," were used as benchmarks to determine the straight line (hypotenuse) distance between standard target locations and location of center of reticle controlled by subjects.

Time data was obtained from timing capabilities of the Apple II Plus microcomputer.

## EQUIPMENT

1. Apple II Plus microcomputer generated the reticle, range data, multiple return bar, provided time data, and controlled the presentation of target scenes.
2. MIMCO joystick control used by subject to move reticle over target scene, to select 10X target scene, to activate simulated laser rangefinder, and to fire on the target.
3. Kodak carousel 35mm slide projector used to project the 3X and 10X target scenes.
4. NEC 12-inch color video monitor used to present the computer graphic image of the reticle, the laser range finder range data, and multiple return bar.

## APPROXIMATE ADMINISTRATION TIME

|  |                   |
|--|-------------------|
| Present Two Instructional Trials       | 7 minutes         |
| Subject Completion of 18 Scored Trials | <u>20</u> minutes |
| Total                                  | 27 minutes        |

## COMPUTER TRACKING (CT)

### SUBJECTS

M60A1 Tank Commanders, Gunners, Loaders, and Drivers

### JUSTIFICATION

Tracking is an important part of target engagement. Tracking assumes more importance in the M1 in that computation of automatic lead requires that the gunner track moving targets for minimally two seconds to ensure the proper firing solution.

### CONDITION

Subjects were seated in front of the image combiner apparatus described in Computer Target Engagement. Subjects viewed the monitor which presented a reticle fixed in the center of the display and a moving target cursor.

### TASK DESCRIPTION

Subjects used the joystick control to keep a moving target cursor superimposed on the center of the fixed reticle. A computer-generated aural signal indicated a "hit" when the target cursor was in the center of the reticle. Subjects "tracked" the cursor during three two-minute periods, with each period presenting a faster cursor speed. Periods were designated easy, moderate, and hard based on increasing speed of the cursor and were presented in that order to all subjects.

### INDEPENDENT VARIABLES

Subjects completed three tracking periods with cursor speed (easy, moderate, and hard) increasing between each period.

## PROCEDURES

Subjects performed the computer tracking task immediately upon completion of the Computer Target Engagement task. The subjects were told that the reticle would remain stationary in the center of the monitor and that the target would be a moving dot or cursor. Their task was to use the joystick to keep the cursor centered on the reticle. Subjects were told that each period lasted two minutes and that the cursor would move at a higher rate of speed during each successive period. Prior to the start of the first session, the test administrator suggested that the joystick be held to the far right position until the cursor was brought into the reticle area. When the cursor was in the reticle area, the subject was told to complete the remainder of the period independently. Upon completion of a session, performance data was displayed on the monitor. Instructions for the next session were presented on the monitor and directed the subject to press a joystick button when ready to start.

A message indicating the task was complete followed the third tracking period.

## DEPENDENT VARIABLES

The following dependent variables were measured.

|          |   |
|----------|---|
| EASY:TOT | Time on target. Amount of time the reticle was centered on the moving cursor during an "easy" tracking period.  |
| MOD:TOT  | Time on target. Amount of time the reticle was centered on the moving cursor during "moderate" tracking period. |
| HARD:TOT | Time on target. Amount of time the reticle was centered on the moving cursor during a "hard" tracking period.   |

|            |  |
|------------|--|
| EASY:ERROR | Average distance error (root mean square) between the center of the reticle and the moving cursor during an "easy" tracking period.    |
| MOD:ERROR  | Average distance error (root mean square) between the center of the reticle and the moving cursor during a "moderate" tracking period. |
| HARD:ERROR | Average distance error (root mean square) between the center of the reticle and the moving cursor during a "hard" tracking period.     |
| AVG:TOT    | Average amount of time the reticle was centered on the moving cursor over all tracking periods.  |
| AVG:ERROR  | Average distance error (root mean square) between the center of the reticle and the moving cursor over all tracking periods.           |

#### SCORING

The Apple II Plus microcomputer provided time on target and distance error data for each tracking period.

#### EQUIPMENT

1. Apple II Plus microcomputer generated the fixed reticle, the moving cursor, and collected performance data.
2. MIMCO joystick control was used by the subjects to control position of the moving cursor.

3. NEC 12-inch color video monitor used to display reticle and cursor.

4. Image combiner apparatus contained the NEC monitor.

APPROXIMATE ADMINISTRATION TIME

|                        |                  |
|------------------------|------------------|
| Instructions           | 4 minutes        |
| Three Tracking Periods | <u>8</u> minutes |
| Total                  | 12 minutes       |

## TC DECISION MAKING (TCD)

### SUBJECTS

M60A1 Tank Commander and Gunners

### JUSTIFICATION

A critical component of target acquisition and target engagement is the decision the TC must make as to which target to engage. The purpose of this task is to ascertain the time it takes the TC to determine which target to engage and the accuracy of his decision.

### CONDITION

Subjects stood in the open TC's hatch of an operational M60A1 tank parked in front of a 5.4 m x 1.8 m screen on which 35mm slide images of target vehicles were projected. A three-button response panel was fastened to the front of the TC's hatch opening to be used by subjects to indicate their decision. Figure A-1 contains a diagram of the test situation.

### TASK DESCRIPTION

A set of three slides, with at least one slide containing a target vehicle, were simultaneously shown on the screen in front of the subject. The subject selected which target he would engage first. He indicated his choice by pressing one of three response buttons (corresponding to respective target images on the control box. Subjects completed 24 trials.

### INDEPENDENT VARIABLES

Subjects completed 24 threat vehicle decision making trials.

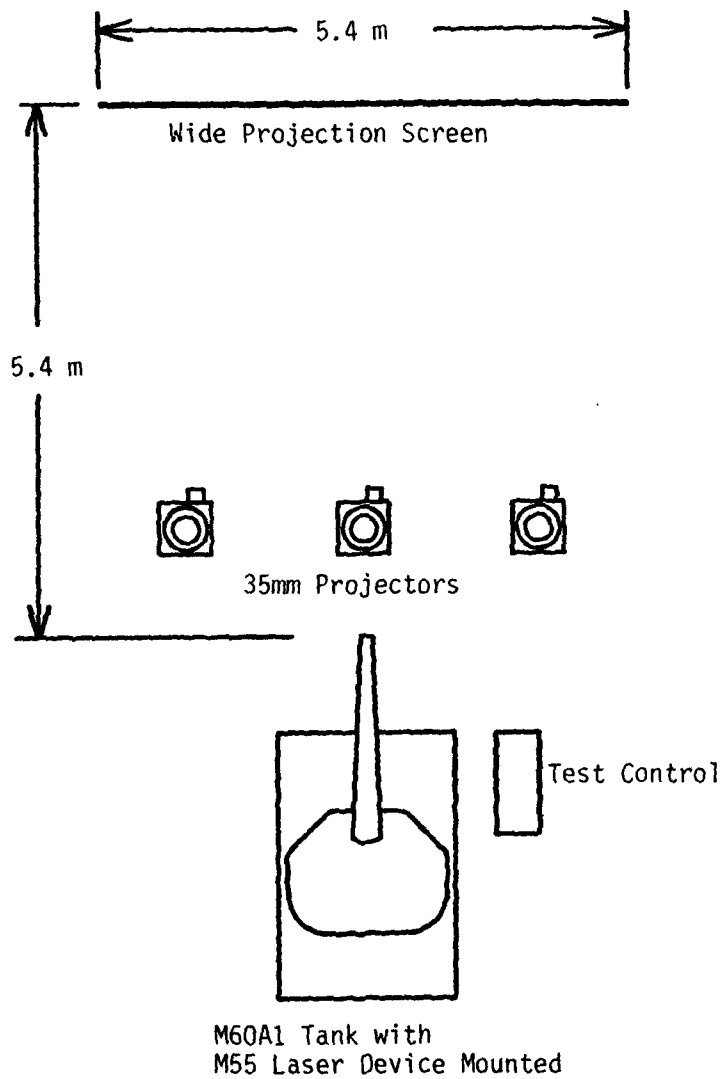


Figure A-1. Equipment Setup for the TC Decision Making, Hands-On Target Engagement, and Gun Laying Job Sample Tests



## PROCEDURES

Subjects were told that the task was to decide from among the three slides presented on the screen which slide contained the highest threat vehicle and would be engaged first. Threat was determined by apparent relative distance among targets, vehicle type, and position of gun tube if any. Subjects were told to make their decisions based on their previous armor training and experience. No explicit decision rules were imposed for this task.

When subjects had made their decision, they were told to press one of three buttons (1 = left, 2 = center, and 3 = right) corresponding to the position on the screen of the vehicle of choice. They were told to decide as rapidly and accurately as possible.

The experimenter controlled the presentation of the sets of imagery using an electronic control apparatus. Each set of target slides appeared simultaneously. At slide presentation, a digital timer was started. When the subject pressed one of the three buttons, the timer stopped, a blank slide was placed in the projector, and a light on the control device indicated the choice made by the subject. The experimenter recorded the elapsed time data and the choice and initiated the next set of slides.

Slide carousels numbered 1, 2, and 3 were placed on the left, center, and right slide projectors in the following arrangements: 3 (left), 1 (center), 2 (right), 1 2 3, and 2 3 1. Arrangements were changed between subjects to provide a different slide arrangement--same set of slides but the correct slide could appear in any of the three positions for successive subjects.

## DEPENDENT VARIABLES

The following dependent variables were collected:

D:CORR

The number of correct threat vehicle choices for the 24 trials.

D:TIME

Amount of time elapsed from the presentation of a set of threat vehicle images to the press of the choice button.

SCORING

Choices were indicated on the control-timer device and recorded on a TCD score sheet immediately after each trial. At a later time, responses were scored against an answer key.

Time was measured and displayed by the control-timer device. The experimenter recorded time data on the TCD score sheet immediately following each trial.

EQUIPMENT

1. Control-timer and response panel, built by SRL, was used to:
  - Control Initial Slide Advance
  - Measure Decision Making Time
  - Indicate Subject's Response
  - Automatically Advance to a Blank Slide Upon Completion of a Trial
2. Kodak Carousel slide projectors (3) with modified cabling to allow simultaneous advance of threat vehicle slides.

APPROXIMATE ADMINISTRATION TIME

|                  |                  |
|------------------|------------------|
| Instructions     | 5 minutes        |
| 24 Scored Trials | <u>5 minutes</u> |
| Total            | 10 minutes       |

## HANDS-ON GUN LAYING (HGL)

### SUBJECTS

M60A1 Tank Commanders and Gunners

### JUSTIFICATION

One of the critical components of target engagement is hand-off time, the time required to transfer a newly acquired target from the tank commander (TC) to the gunner. Hand-off time is partially determined by the accuracy of the TC's gun laying. The purpose of this job sample test was to obtain a measure of gun laying accuracy and time.

### CONDITION

Subjects stood in the open TC hatch of an operational M60A1 tank parked in front of a 5.4 m x 1.8 m screen on which a gun laying target was projected (see Figure A-1). The M55 laser device was mounted to the tank and bore-sighted to score accuracy of the gun lay. The control-timer device measured gun lay time and controlled slide presentation.

### TASK DESCRIPTION

A single black dot approximately 6 cm in diameter on a clear background was used as the gun laying target. As soon as the dot appeared on the screen, subjects used the TC override control to lay the gun on the target dot. Time to lay on the target and distance from target were measured. Subjects completed three practice and 12 scored gun laying trials.

### INDEPENDENT VARIABLES

Subjects completed 12 trials with the target dot appearing in a different location on each trial. The sequence of target dot locations were identical for each subject.

## PROCEDURES

Subjects were told that the task was to use the TC override control to lay the gun as rapidly and accurately as possible on the target dot. Subjects were told that only a single dot would appear and that they were to lay the gun as soon as the dot appeared. Subjects were made aware of the fact that the M55 laser device would be used to score gun laying accuracy and that any previously used sighting procedures, techniques, or reference points should be adjusted accordingly. Subjects were given three practice trials to familiarize them with the test procedures. Upon completion of the practice trials, the subject completed 12 scored trials.

The experimenter used the control-timer to simultaneously advance three slides; one slide contained the target dot while the other two slides were clear. The subject laid the gun on the target dot and released the TC override palm switch as soon as he was satisfied with the gun lay. The experimenter recorded the time from the appearance of the target dot to the release of the palm switch. This time was measured by the control-timer device using electrical signals from the slide advance switch and the release of the palm switch.

The experimenter then advanced a grid slide from the projector which had presented the target dot slide for that trial. The grid slide had one solid cell approximately 6 cm square to represent the location of the target dot for that trial. The experimenter then directed the subject to use the trigger on the TC override control to activate the M55 laser device. No gun tube movement was allowed. The position of the laser dot, in X-Y grid units, relative to the target cell was recorded.

The position of the gun tube at the end of each trial was used as the starting position for the next trial.

## DEPENDENT VARIABLES

The following dependent variables were collected:

GL:ERROR                      The straight line distance in grid units from the target dot position and the M55 laser dot position.

GL:TIME                        The amount of time from the appearance of the target dot slide to completion of the gun lay as indicated by the release of the TC override palm switch.

## SCORING

Time was measured by and displayed on the control-timer device. The experimenter recorded the time on the HGL score sheet after each trial.

The experimenter recorded the X-Y grid coordinates of the M55 laser dot on the HGL score sheet after each trial. The vertical distance (a) and the horizontal distance (b) from the target dot to the laser dot were used to calculate the straight line distance (c) between the target dot and the laser dot. The formula was

$$c = \sqrt{a^2 + b^2}$$

## EQUIPMENT

1. M60A1 Tank
2. The control-timer device, built by SRL, was used to:
  - Control Target and Grid Slide Advance
  - Measure Gun Laying Time

3. Kodak carousel slide projectors (3) with modified cabling to allow simultaneous advance of target dot slides.
4. M55 Laser Device was used to score accuracy of the gun lay.

APPROXIMATE ADMINISTRATION TIME

|                   |                   |
|-------------------|-------------------|
| Instructions      | 3 minutes         |
| 3 Practice Trials | 6 minutes         |
| 12 Scored Trials  | <u>20</u> minutes |
| Total             | 29 minutes        |

## HANDS-ON TRACKING (HT)

### SUBJECTS

M60A1 Tank Commanders and Gunners

### JUSTIFICATION

Tracking is an important part of target engagement. Although the M-1 has automatic lead, the automatic computation of lead requires that the gunner track moving targets accurately for a minimum of two seconds.

### CONDITION

Subjects performed tracking tasks from the gunner's position and the open hatch TC position on an M60A1 tank parked in front of a snakeboard (see Figure A-2).

### TASK DESCRIPTION

Subjects tracked a snakeboard (see Figure A-3) using the TC override control for half the trials (open hatch) and the gunner's "Cadillac" control (gunner's sight) for the other half of the trials. The M55 laser device was mounted to the M60A1 and boresighted to the gunner's sight to serve as a scoring device. A laser pulser device pulsed the laser once per second for a one-minute period. The M60A1 triggers did not actuate the M55 for this test. The experimenter counted the number of laser pulses hitting the snakeboard track and noted the snakeboard track distance covered during the one-minute period.

### INDEPENDENT VARIABLES

Three blocks of four trials were formed from the functional combination of tracking direction (left to right/right to left) and tracking position (TC/Gunner).

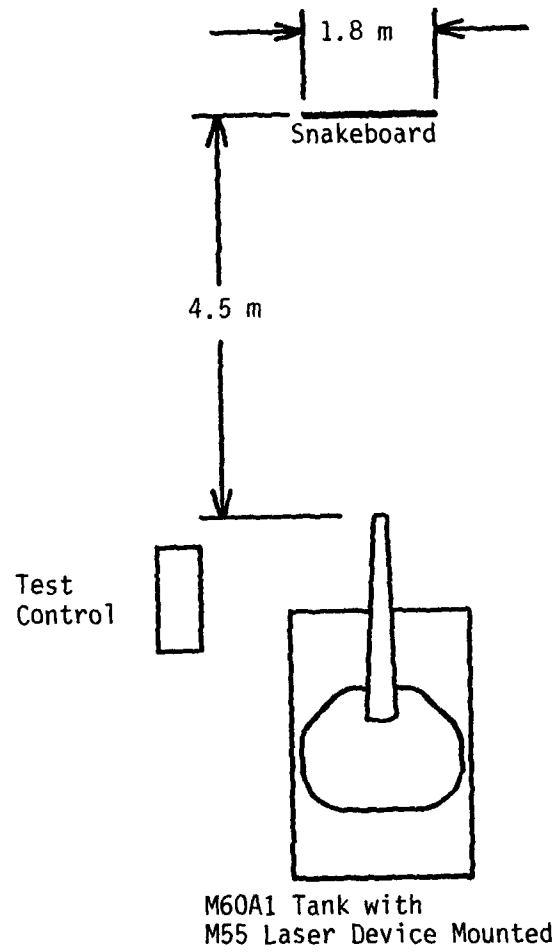


Figure A-2. Equipment Setup for Hands-On Tracking Job Sample Test



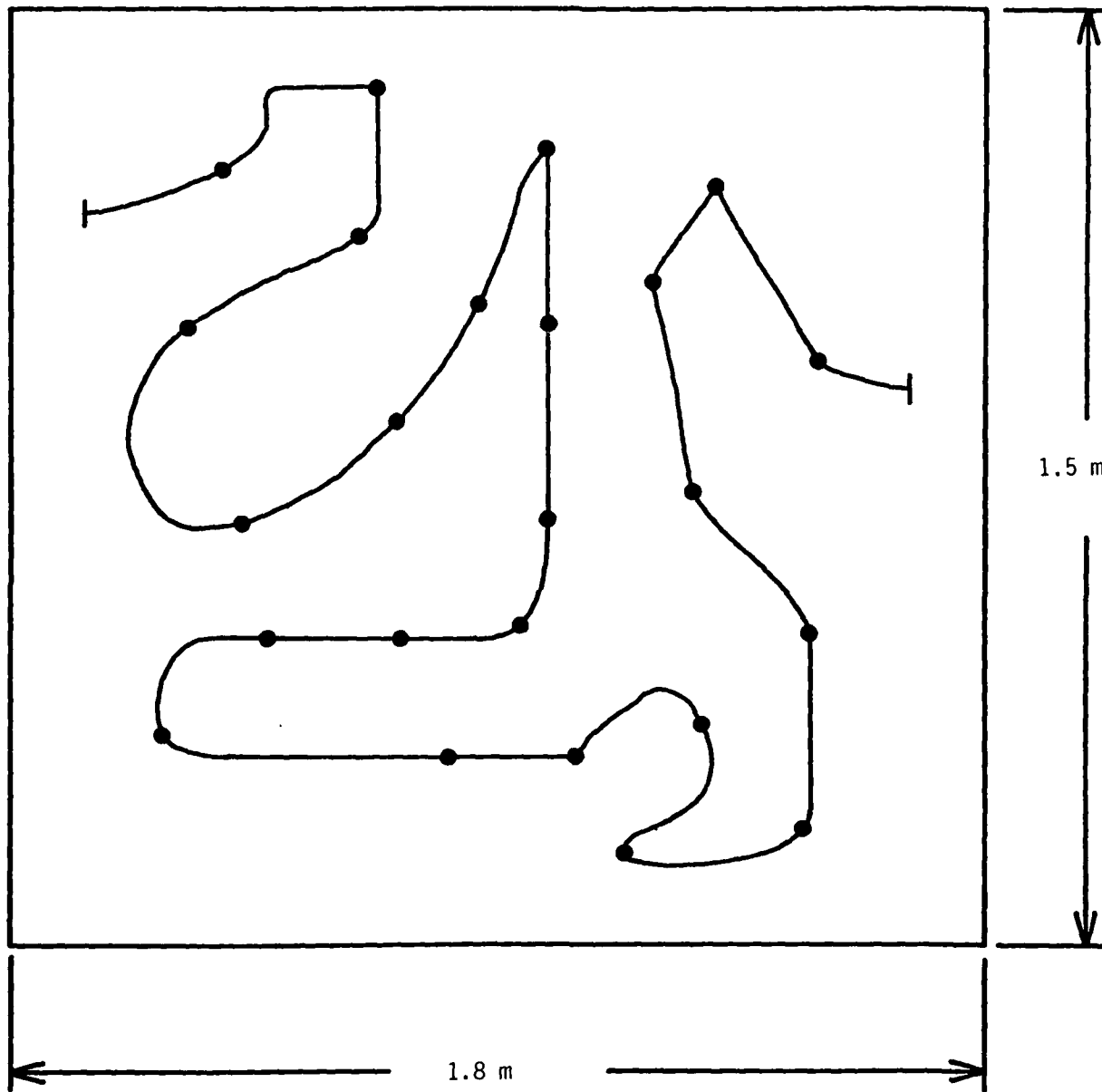


Figure A-3. Snakeboard and Snakeboard Track Used in the Hands-On Tracking Job Sample Test

## PROCEDURES

Subjects were first briefed on the tracking task and how the test devices would operate. Each trial began with the steady laser beam aimed at the left or right origin of the snakeboard track. The subject was told to begin tracking as soon as the laser beam went off. This indicated the start of the one-minute tracking trail. The experimenter observed the laser pulses (one per second) and used a manual counter to tally each laser pulse which hit the snakeboard track. An audio alarm on the laser pulser device signaled the end of the one-minute trial. At that time the laser returned to a steady-on mode.

The experimenter recorded the number of hits for that trial and the location of the laser beam on the snakeboard track at the end of the one-minute trial. Subjects were instructed to track as rapidly and as accurately as possible. Subjects were told that the laser pulser controlled the laser; the triggers did not control the M55 during this test.

The sequence of tracking trials was varied depending on the subject's crew position. Tank commander subjects performed the first trial from the TC position and tracked from left to right. He then moved to the gunner's position for trials two (right to left) and three (left to right). He returned to the TC position for the fourth trial (right to left). Gunner subjects performed their first (left to right) and fourth (right to left) tracking trials at the gunner's position. The second (right to left) and third (left to right) tracking trials were performed from the TC position. All subjects completed three blocks of four trials during a single session.

## DEPENDENT VARIABLES

The following dependent variables were measured:

TOT:HITS

The number of times the laser pulse hit the snakeboard track during the 12 trials.

|          |  |
|----------|--|
| TOT:DIST | The snakeboard track distance covered during the 12 trials.  |
| TC:HITS  | The number of times the laser pulse hit the snakeboard track during the six trials the subject tracked from the TC position.     |
| TC:DIST  | The snakeboard track distance covered during the six trials the subject tracked from the TC position.                            |
| G:HITS   | The number of times the laser pulse hit the snakeboard track during the six trials the subject tracked from the gunner position. |
| G:DIST   | The snakeboard track distance covered during the six trials the subject tracked from the gunner position.                        |

#### SCORING

The experimenter used a manual counter to tally the number of laser pulses which hit the snakeboard track during each trial. The experimenter recorded the location of the laser beam in relation to the reference points at the completion of each trial. For scoring purposes the reference points were assigned numbers for each tracking direction, and the distance in inches was measured between reference points. At the end of a trial, the administrator recorded the last reference point passed and recorded a single digit to indicate the percentage of distance covered toward the next reference point. A 2 meant that the subject had covered 20 percent of the distance to the next reference point. This information was used during data reduction to calculate total distance covered during each trial.

## EQUIPMENT

1. M60A1 Tank
2. M55 Laser Device
3. Laser Pulser Device, custom built by SRL, to pulse the M55 laser device at controlled rates for fixed periods of time.

## APPROXIMATE ADMINISTRATION TIME

|                    |                   |
|--------------------|-------------------|
| Instructions       | 2 minutes         |
| 12 Tracking Trials | <u>20</u> minutes |
| Total              | 22 minutes        |

## HANDS-ON TARGET ENGAGEMENT (HTE)

### SUBJECTS

M60A1 Tank Commanders and Gunners

### JUSTIFICATION

One of the most critical tasks performed by tank crews is target engagement. Target engagement requires performance of a sequence of tasks including TC decision making, gun laying and target hand-off to the gunner, and the gunner's precision lay on target and firing on target.

### CONDITION

Subjects were seated at the gunner's position on an operational M60A1 tank parked in front of a 5.4 m x 1.8 m screen on which actual target scenes were projected (see Figure A-1). A senior NCO (TC experienced) assisted the experimenter by performing the duties of the TC. The M55 laser device was mounted to the tank and boresighted to score hits. The control-timer device measured time to lay gun and time for gunner to fire on target, and controlled target slide presentation.

### TASK DESCRIPTION

The TC at the TC's hatch and the subject at the gunner's position were presented with target scenes. The TC, an assistant of the experimenter, knew what the target was and where it was located. He issued the appropriate fire command and laid the gun on target. When the subject called "identify," the TC released the TC override palm switch. The subject completed the engagement by firing on the target with the M55 laser device.

## INDEPENDENT VARIABLES

Subjects completed 15 target engagement trials.

## PROCEDURES

Subjects were briefed on the procedures and on the role of the TC. Subjects were told that as soon as they called "identify," the TC would release the TC override and that they were to complete the target engagement as rapidly and as accurately as possible.

The first trial began with the gun tube laid off to the left edge of the screen. The experimenter initiated the presentation of the target slides. All slides for a trial contained similar terrain but only one slide contained the target vehicle or vehicles. Target vehicles included jeeps, armored personnel carriers, and tanks. The TC issued the appropriate fire command for the type of target and used the TC override control to lay the gun on target.

As soon as the subject observed the target, through the gunner's primary sight, he called "identify." This signaled the TC to release the TC override palm switch which stopped the first timer in the control-timer device. The subject used the gunner's controls and sight to complete the engagement. When the gunner had the reticle centered on the target, he pulled the trigger which activated the M55 laser device and stopped the second timer. The TC and the experimenter observed whether the laser hit or missed the target.

At the completion of the trial, the experimenter recorded the time data and whether the target was hit or missed. The position of the gun tube at the completion of the trial was the starting point for the next trial.

## DEPENDENT VARIABLES

The following dependent variables were measured:

|          |  |
|----------|--|
| TOT:HITS | The number of hits scored over the 15 target engagement trials.  |
| TOT:TIME | The amount of time from the appearance of the target scene to trigger pull averaged over 15 trials.  |
| TC:TIME  | The amount of time from appearance of the target scene to the release of the TC override control palm switch (subject calls "identified") averaged over 15 trials. |
| G:TIME   | The amount of time from release of the TC override control palm switch (subject calls "identified") to trigger pull averaged over 15 trials.                       |

## SCORING

Target accuracy was scored as a hit or miss on the first and only M55 laser firing as observed by the TC and the experimenter.

Time was measured by the control-timer device. Two timers were started upon initiation of the target scene. Timer 1 was stopped when the TC override control palm switch was released (TC:TIME), and Timer 2 was stopped when the subject pulled the trigger to fire on the target (TOT:TIME).

G:TIME was calculated by subtracting TC:TIME from TOT:TIME.

## EQUIPMENT

1. M60A1 Tank
2. Control-timer device, built by SRL, was used to:
  - Measure Time Data
  - Control Target Scene Presentation
3. M55 Laser Device
4. Kodak carousel projectors (3) with modified cabling to allow simultaneous presentation of target slides.

## APPROXIMATE ADMINISTRATION TIME

|                  |                   |
|------------------|-------------------|
| Instructions     | 3 minutes         |
| 15 Scored Trials | <u>20</u> minutes |
| Total            | 23 minutes        |



APPENDIX B

BIOGRAPHIC FORMS AND HANDS-ON JOB SAMPLE SCORE SHEETS

**TANK COMMANDER  
GENERAL INFORMATION SURVEY**

**BIOGRAPHIC INFORMATION**

NAME: \_\_\_\_\_ SSN: \_\_\_\_\_-\_\_\_\_-\_\_\_\_ DATE \_\_\_\_\_  
Last First MI Day Mo Yr

RANK: \_\_\_\_\_ PAY GRADE: \_\_\_\_\_ AGE: \_\_\_\_\_ MOS: \_\_\_\_\_ UNIT: \_\_\_\_\_

DATE ASSIGNED: \_\_\_\_\_ TOTAL TIME IN ARMY TO DATE: \_\_\_\_\_ (Mos) \_\_\_\_\_ (Yrs)

ETS DATE: \_\_\_\_\_ (Mo) \_\_\_\_\_ (Yr)

RANK & NAME OF YOUR PRESENT GUNNER: RANK: \_\_\_\_\_ NAME: \_\_\_\_\_  
Last First

WHEN DO YOU EXPECT TO COMPLETE YOUR ASSIGNMENT IN YOUR PRESENT BATTALION?  
\_\_\_\_\_ (Mo) \_\_\_\_\_ (Yr)

**ARMOR EXPERIENCE**

1. How long have you and your present gunner been assigned together? \_\_\_\_\_ (Mos)
2. How long have you and your present gunner trained together as TC and Gunner? \_\_\_\_\_ (Mos)
3. How long have you been a TC in your present company? \_\_\_\_\_ (Mos)
4. How long have you and your current tank crew been assigned together as a complete crew? \_\_\_\_\_ (Mos)
5. How long have you served as a TC on M60A1 tanks regardless of company or crew? \_\_\_\_\_ (Mos) \_\_\_\_\_ (Yrs)
6. How long have you served as a gunner on M60A1 tanks regardless of company or crew? \_\_\_\_\_ (Mos) \_\_\_\_\_ (Yrs)
7. How long have you served on M60A1 tanks regardless of duty position, company or crew? \_\_\_\_\_ (Mos) \_\_\_\_\_ (Yrs)
8. Have you ever served on M60A3 tanks? YES/NO If YES, in what positions and for how long? \_\_\_\_\_ (Mos as Loader) \_\_\_\_\_ (Mos as Driver) \_\_\_\_\_ (Mos as Gunner) \_\_\_\_\_ (Mos as TC)
9. When did you fire on Table VIII? Fill in the boxes of years in which you fired.

|               | 1981          | 1980 | 1979 | 1978 | 1977 | 1976 | 1975 | 1974 |
|---------------|---------------|------|------|------|------|------|------|------|
| Unit Assigned |               |      |      |      |      |      |      |      |
| Type Tank     |               |      |      |      |      |      |      |      |
| Crew Position |               |      |      |      |      |      |      |      |
| RATING        | Distinguished |      |      |      |      |      |      |      |
|               | Qualified     |      |      |      |      |      |      |      |
|               | Unqualified   |      |      |      |      |      |      |      |

TRAINING

- 10. When did you last fire subcaliber Tables or exercises? \_\_\_(Mo) \_\_\_(Yr)
- 11. When did you last attend training on threat vehicle identification or recognition? \_\_\_(Mo) \_\_\_(Yr)
- 12. When did you last participate as a TC on the Combat Training Theater (CTT) device? \_\_\_(Mo) \_\_\_(Yr)
- 13. Which Armor or CMF 19 courses have you completed, where and when did you complete them? (e.g., BNCOC at KNOX, 1979)

| <u>COURSE</u> | <u>WHERE</u> | <u>WHEN</u> |
|---------------|--------------|-------------|
| _____         | _____        | _____       |
| _____         | _____        | _____       |
| _____         | _____        | _____       |

EDUCATIONAL BACKGROUND (Check Appropriate Items)

- \_\_\_ Attended high school    \_\_\_ Graduated high school    \_\_\_ Attended college
- \_\_\_ Attending high school    \_\_\_ GED    \_\_\_ Attending college
- \_\_\_ Graduated college

TRAINING DEVICES

The US Army is constantly involved in the development and acquisition of new individual gunnery training devices. Some of these devices may be similar to the electronic video games found in many amusement centers and department stores.

- 14. Do you enjoy playing electronic video games such as Space Invaders, Missile Command, Battle Zone, Asteroids, or Pac Man? YES/NO
- 15. Are games such as these available in your area? YES/NO
- 16. How frequently do you play electronic video games when they are available in your area?  
\_\_\_ once a month    \_\_\_ more than once a week but less than every day  
\_\_\_ once a week    \_\_\_ every day
- 17. If games like these were developed based on tank gunnery engagements, would you plan them? YES/NO
- 18. Would games like these be used more if they were located in the:  
(select 1st, 2nd and 3rd best choices by numbering items)  
\_\_\_ EM & NCO Clubs    \_\_\_ Recreation Halls  
\_\_\_ Company Dayroom    \_\_\_ Learning Center  
\_\_\_ Motor Pool

PT5448a

TANK GUNNER  
GENERAL INFORMATION SURVEY

BIOGRAPHIC INFORMATION

NAME: \_\_\_\_\_ SSN: \_\_\_\_-\_\_\_\_-\_\_\_\_ DATE: \_\_\_\_\_  
Last First MI Day Mo Yr

RANK: \_\_\_\_\_ PAY GRADE: \_\_\_\_\_ AGE: \_\_\_\_\_ MOS: \_\_\_\_\_ UNIT: \_\_\_\_\_

DATE ASSIGNED: \_\_\_\_\_ TOTAL TIME IN ARMY TO DATE: \_\_\_\_ (Mos) \_\_\_\_ (Yrs)

ETS DATE: \_\_\_\_\_ (Mo) \_\_\_\_\_ (Yr)

RANK & NAME OF YOUR PRESENT TANK COMMANDER (TC):

RANK: \_\_\_\_\_ NAME: \_\_\_\_\_  
Last First

WHEN DO YOU EXPECT TO COMPLETE YOUR ASSIGNMENT IN YOUR PRESENT BATTALION? \_\_\_\_\_  
Mo Yr

ARMOR EXPERIENCE

1. How long have you and your present TC been assigned together? \_\_\_\_ (Mos)
2. How long have you and your present TC trained together as TC and Gunner? \_\_\_\_ (Mos)
3. How long have you been a gunner in your present company? \_\_\_\_ (Mos)
4. How long have you and your current tank crew been assigned together as a complete crew? \_\_\_\_ (Mos)
5. How long have you served as a gunner on M60A1 tanks regardless of company or crew? \_\_\_\_ (Mos) \_\_\_\_ (Yrs)
6. Have you ever served as a TC on M60A1 tanks? YES/NO
7. How long have you served on M60A1 tanks regardless of duty position, company or crew? \_\_\_\_ (Mos) \_\_\_\_ (Yrs)
8. Have you ever served on M60A3 tanks? YES/NO If YES, in what positions and for how long? \_\_\_\_ (Mos as Loader) \_\_\_\_ (Mos as Driver) \_\_\_\_ (Mos as Gunner) \_\_\_\_ (Mos as TC)
9. When did you fire on Table VIII? Fill in the boxes of years in which you fired.

|               | 1981          | 1980 | 1979 | 1978 | 1977 | 1976 | 1975 | 1974 |
|---------------|---------------|------|------|------|------|------|------|------|
| Unit Assigned |               |      |      |      |      |      |      |      |
| Type Tank     |               |      |      |      |      |      |      |      |
| Crew Position |               |      |      |      |      |      |      |      |
| RATING        | Distinguished |      |      |      |      |      |      |      |
|               | Qualified     |      |      |      |      |      |      |      |
|               | Unqualified   |      |      |      |      |      |      |      |

TRAINING

- 10. When did you last fire subcaliber Tables or exercises? \_\_\_(Mo) \_\_\_(Yr)
- 11. When did you last attend training on threat vehicle identification or recognition? \_\_\_(Mo) \_\_\_(Yr)
- 12. When did you last participate as a gunner on the Combat Training Theater (CTT) device? \_\_\_(Mo) \_\_\_(Yr)
- 13. Which Armor or CMF 19 courses have you completed, where and when did you complete them? (e.g., BNCOC at KNOX, 1979)

| <u>COURSE</u> | <u>WHERE</u> | <u>WHEN</u> |
|---------------|--------------|-------------|
| _____         | _____        | _____       |
| _____         | _____        | _____       |
| _____         | _____        | _____       |

EDUCATIONAL BACKGROUND (Check Appropriate Items)

- Attended high school     Graduated high school     Attended college
- Attending high school     GED     Attending college
- Graduated college

TRAINING DEVICES

The US Army is constantly involved in the development and acquisition of new individual gunnery training devices. Some of these devices may be similar to the electronic video games found in many amusement centers and department stores.

- 14. Do you enjoy playing electronic video games such as Space Invaders, Missile Command, Battle Zone, Asteroids, or Pac Man? YES/NO
- 15. Are games such as these available in your area? YES/NO
- 16. How frequently do you play electronic video games when they are available in your area?  
 once a month     more than once a week but less than every day  
 once a week     every day
- 17. If games like these were developed based on tank gunnery engagements, would you plan them? YES/NO
- 18. Would games like these be used more if they were located in the:  
(select 1st, 2nd and 3rd best choices by numbering items)  
 EM & NCO Clubs     Recreation Halls  
 Company Dayroom     Learning Center  
 Motor Pool

PT5448b

TC Decision Making Score Sheet

Name/Rank \_\_\_\_\_ Crew Position \_\_\_\_\_

Date \_\_\_\_\_ Experimenter \_\_\_\_\_

Check Arrangement 312 123 231

| <u>TRIAL</u> | <u>CHOICE</u> | <u>TIME</u> | <u>TRIAL</u> | <u>CHOICE</u> | <u>TIME</u> |
|--------------|---------------|-------------|--------------|---------------|-------------|
| 1            | _____         | _____       | 21           | _____         | _____       |
| 2            | _____         | _____       | 22           | _____         | _____       |
| 3            | _____         | _____       | 23           | _____         | _____       |
| 4            | _____         | _____       | 24           | _____         | _____       |
| 5            | _____         | _____       | 25           | _____         | _____       |
| 6            | _____         | _____       | 26           | _____         | _____       |
| 7            | _____         | _____       | 27           | _____         | _____       |
| 8            | _____         | _____       | 28           | _____         | _____       |
| 9            | _____         | _____       | 29           | _____         | _____       |
| 10           | _____         | _____       | 30           | _____         | _____       |
| 11           | _____         | _____       | 31           | _____         | _____       |
| 12           | _____         | _____       | 32           | _____         | _____       |
| 13           | _____         | _____       | 33           | _____         | _____       |
| 14           | _____         | _____       | 34           | _____         | _____       |
| 15           | _____         | _____       | 35           | _____         | _____       |
| 16           | _____         | _____       | 36           | _____         | _____       |
| 17           | _____         | _____       | 37           | _____         | _____       |
| 18           | _____         | _____       | 38           | _____         | _____       |
| 19           | _____         | _____       | 39           | _____         | _____       |
| 20           | _____         | _____       |              |               |             |

Gun Laying Score Sheet

Name/Rank \_\_\_\_\_ Crew Position \_\_\_\_\_

Date \_\_\_\_\_ Experimenter \_\_\_\_\_

| <u>TRIAL</u> | <u>ELAPSED TIME</u> | <u>GRID SCORE</u> |
|--------------|---------------------|-------------------|
| 1            | _____               | _____             |
| 2            | _____               | _____             |
| 3            | _____               | _____             |
| 4            | _____               | _____             |
| 5            | _____               | _____             |
| 6            | _____               | _____             |
| 7            | _____               | _____             |
| 8            | _____               | _____             |
| 9            | _____               | _____             |
| 10           | _____               | _____             |
| 11           | _____               | _____             |
| 12           | _____               | _____             |

# HANDS-ON TRACKING SCORE SHEET

Name/Rank \_\_\_\_\_ Crew Position \_\_\_\_\_

Date \_\_\_\_\_ Experimenter \_\_\_\_\_

| Position<br>(TC/Gunner) | Direction<br>(LR/RL) | Hits  | Distance        |              |
|-------------------------|----------------------|-------|-----------------|--------------|
|                         |                      |       | Reference Point | % Next Point |
| _____                   | _____                | _____ | _____           | _____        |
| _____                   | _____                | _____ | _____           | _____        |
| _____                   | _____                | _____ | _____           | _____        |
| _____                   | _____                | _____ | _____           | _____        |
| _____                   | _____                | _____ | _____           | _____        |
| _____                   | _____                | _____ | _____           | _____        |
| _____                   | _____                | _____ | _____           | _____        |
| _____                   | _____                | _____ | _____           | _____        |
| _____                   | _____                | _____ | _____           | _____        |
| _____                   | _____                | _____ | _____           | _____        |
| _____                   | _____                | _____ | _____           | _____        |
| _____                   | _____                | _____ | _____           | _____        |
| _____                   | _____                | _____ | _____           | _____        |
| _____                   | _____                | _____ | _____           | _____        |



Gunner Engagement Score Sheet

Name/Rank \_\_\_\_\_ Crew Position \_\_\_\_\_

Date \_\_\_\_\_ Experimenter \_\_\_\_\_

| <u>TRIAL</u> | <u>TC TIME</u> | <u>FIRE TIME</u> | <u>HIT/MISS</u> |
|--------------|----------------|------------------|-----------------|
| 1            | _____          | _____            | _____           |
| 2            | _____          | _____            | _____           |
| 3            | _____          | _____            | _____           |
| 4            | _____          | _____            | _____           |
| 5            | _____          | _____            | _____           |
| 6            | _____          | _____            | _____           |
| 7            | _____          | _____            | _____           |
| 8            | _____          | _____            | _____           |
| 9            | _____          | _____            | _____           |
| 10           | _____          | _____            | _____           |
| 11           | _____          | _____            | _____           |
| 12           | _____          | _____            | _____           |
| 13           | _____          | _____            | _____           |
| 14           | _____          | _____            | _____           |
| 15           | _____          | _____            | _____           |
| 16           | _____          | _____            | _____           |
| 17           | _____          | _____            | _____           |
| 18           | _____          | _____            | _____           |

APPENDIX C  
TABLES OF RESULTS:  
COMPARISONS INVOLVING INDIVIDUAL JOB SAMPLES

## GLOSSARY OF BIOGRAPHIC AND DEPENDENT VARIABLES

### BIOGRAPHIC VARIABLES

| <u>Name</u> | <u>Description</u>                                    | <u>Code Levels</u>   |
|-------------|---|--|
| AGE         | Age   |  |
| EDUC        | Highest Level of Education Attained                   | 1 = Attended High School<br>2 = High School Graduate<br>3 = Attended College<br>4 = College Graduate |
| RANK        | Rank (Pay Grade)                                      | 1 = E1<br>2 = E2<br>3 = E3<br>4 = E4, SP4<br>5 = E5, SP5<br>6 = E6<br>7 = E7                         |
| ARMY:TIME   | Number Months in Army                                 |  |
| A1:TIME     | Number Months Served in M60A1                         |  |
| A3:TIME     | Number Months Served in M60A3                         |  |
| CP:TIME     | Number Months in Current Crew Position                |  |
| SC:MLAST    | Number Months Since Last Subcaliber Fire              |  |
| VRT:MLAST   | Number Months Since Last Vehicle Recognition Training |  |
| CTT:MLAST   | Number Months Since Last CTT Training                 |  |
| CO          | Combat Composite Score from ASVAB                     |  |
| GT          | General Technical Composite Score from ASVAB          |  |

GLOSSARY OF BIOGRAPHIC AND DEPENDENT VARIABLES (continued)

| <u>Name</u>    | <u>Description</u>  | <u>Code Levels</u>  |
|----------------|---|---|
| GAME:FREQ      | Frequency With Which Play Computer Games  | 1 = Once Per Month<br>2 = Once Per Week<br>3 = More Than Once a Week<br>4 = Every Day |
| QAVG:TC        | Average Score at Annual Qualifications During 1974-1981 when in Tank Commander Crew Position                  | 1 = Unqualified<br>2 = Qualified<br>3 = Distinguished                                 |
| QAVG:G         | Average Score at Annual Qualifications During 1974-1981 when in Gunner Crew Position                          | See QAVG:TC   |
| QAVG:TCG       | Average Score at Annual Qualifications During 1974-1981 when in Either Tank Commander or Gunner Crew Position | See QAVG:TC   |
| MRQ:TC         | Score at Most Recent (1981) Annual Qualification when in TC Crew Position                                     | See QAVG:TC   |
| MRQ:G          | Score at Most Recent (1981) Annual Qualification when in Gunner Crew Position                                 | See QAVG:TC   |
| MRQ:TCG        | Score at Most Recent (1981) Annual Qualification when in Either Tank Commander or Gunner Crew Position        | See QAVG:TC   |
| COMPUTER PANEL |   |   |
| ECD:CORR       | Number Correct on Enter/Check Data (Maximum = 10)   |   |
| ECD:TIME       | Average Time (seconds) to Complete Enter/Check Data Trial   |   |

GLOSSARY OF BIOGRAPHIC AND DEPENDENT VARIABLES (continued)

| <u>Name</u>                | <u>Description</u>   |
|----------------------------|--|
| CST:CORR                   | Number Correct on Self-Test<br>(maximum = 10)                |
| CST:TIME                   | Average Time (seconds) to<br>Complete the Self-Test<br>Trial |
| AVG:CORR                   | Number Correct Averaged<br>Across Two Tasks                  |
| AVG:TIME                   | Completion Time Averaged<br>Across Two Tasks                 |
| COMPUTER TRACKING          |  |
| EASY:TOT                   | Time on Target (sec) for<br>Easy Tracking Task               |
| EASY:ERROR                 | RMS error (number pixels)<br>for Easy Tracking Task          |
| MOD:TOT                    | Time on Target (sec) for<br>Moderate Tracking Task           |
| MOD:ERROR                  | RMS Error (number pixels)<br>for Moderate Tracking Task      |
| HARD:TOT                   | Time on Target (sec) for<br>Hard Tracking Task               |
| HARD:ERROR                 | RMS Error (number pixels)<br>for Hard Tracking Task          |
| AVG:TOT                    | Average Time on Target<br>(sec)                              |
| AVG:ERROR                  | Average RMS Error (number<br>pixels)                         |
| COMPUTER TARGET ENGAGEMENT |  |
| 3X:TIME                    | Average Time (sec) in<br>3X Segment                          |
| L1:TIME                    | Average Time (sec) in<br>Laser 1 Segment                     |

GLOSSARY OF BIOGRAPHIC AND DEPENDENT VARIABLES (continued)

| <u>Name</u>                    | <u>Description</u>  |
|--------------------------------|---|
| L2:TIME                        | Average Time (sec) in Laser 2 Segment                               |
| F:TIME                         | Average Time (sec) in Fire Segment                                  |
| 10X:TIME                       | Average Total Time (sec) in 10X Segment                             |
| TOT:TIME (AVG)                 | Average Time (sec) from Beginning to End of Trial                   |
| TOT:TIME (MDN)                 | Median Time (sec) from Beginning to End of Trial                    |
| TANK COMMANDER DECISION MAKING |   |
| D:CORR                         | Number of Correct Decisions   |
| D:TIME                         | Time to Reach a Decision  |
| HANDS-ON GUN LAYING            |   |
| GL:ERROR                       | Distance Between Actual Gun Lay and Target                          |
| GL:TIME                        | Time from Appearance of Target to Completed Gun Lay                 |
| HANDS-ON TRACKING              |   |
| TOT:HITS                       | Number Hits Averaged Across the TC and Gunner Station               |
| TOT:DIST                       | Distance (inches) Tracked Averaged Across the TC and Gunner Station |
| TC:HITS                        | Number Hits at the TC Station                                       |
| TC:DIST                        | Distance (inches) Tracked at the TC Station                         |

GLOSSARY OF BIOGRAPHIC AND DEPENDENT VARIABLES (continued)

| <u>Name</u> | <u>Description</u>                              |
|-------------|---|
| G:HITS      | Number Hits at the Gunner Station               |
| G:DIST      | Distance (inches) Tracked at the Gunner Station |

HANDS-ON TARGET ENGAGEMENT

|          |   |
|----------|---|
| TOT:HITS | Total Number of Hits in 15 Trials   |
| TOT:TIME | Average Total Time (sec) from Onset of a Trial to Press of the Gunner's Trigger                           |
| TC:TIME  | Average Time (sec) from Onset of a Trial to Point at which TC Removes Hands from TC Power Handle          |
| G:TIME   | Average Time (sec) from Point at which TC Removes Hands from TC Power Handle to Press of Gunner's Trigger |





TABLE C-2. COMPUTER PANEL JOB SAMPLE: ZERO-ORDER CORRELATIONS  
 AMONG 6 MEASURES FOR TANK COMMANDERS (TC),  
 GUNNERS (G), AND COMBINED (TCG) SUBSAMPLES

| Dependent Measures |     | ECD:<br>TIME | CST:<br>CORR | CST:<br>TIME | AVG:<br>CORR | AVG:<br>TIME |
|--------------------|-----|--------------|--------------|--------------|--------------|--------------|
| ECD:CORR           | TC  | .094         | .491**       | -.638***     | .870***      | -.392*       |
|                    | G   | .009         | .049         | -.073        | .637***      | -.040        |
|                    | TCG | .039         | .300*        | -.374**      | .787***      | -.219        |
| ECD:TIME           | TC  |              | -.159        | .380*        | -.034        | .770***      |
|                    | G   |              | -.174        | .421**       | -.129        | .831***      |
|                    | TCG |              | -.171        | .407***      | -.087        | .810***      |
| CST:CORR           | TC  |              |              | -.624***     | .857***      | -.511**      |
|                    | G   |              |              | -.554***     | .801***      | -.439**      |
|                    | TCG |              |              | -.589***     | .824***      | -.472***     |
| CST:TIME           | TC  |              |              |              | -.731***     | .883***      |
|                    | G   |              |              |              | -.472**      | .855***      |
|                    | TCG |              |              |              | -.602***     | .866***      |
| AVG:CORR           | TC  |              |              |              |              | -.521**      |
|                    | G   |              |              |              |              | -.363*       |
|                    | TCG |              |              |              |              | -.435***     |

\* p < .05  
 \*\* p < .01  
 \*\*\*p < .001

TABLE C-3. COMPUTER PANEL JOB SAMPLE: MEANS, STANDARD DEVIATIONS AND SIGNIFICANCE FOR TANK COMMANDERS (TC) GUNNERS (G), AND DRIVERS/LOADERS (DL) ON 6 DEPENDENT MEASURES

| Dependent Measures |    | TC<br>(n=27) | G<br>(n=38) | DL<br>(n=101) | F <sup>1</sup><br>Value |
|--------------------|----|--------------|-------------|---------------|-------------------------|
| ECD:CORR           | M  | 7.70         | 8.05        | 7.10          | 3.61*                   |
|                    | SD | 2.37         | 1.51        | 1.99          |                         |
| ECD:TIME           | M  | 37.62        | 36.21       | 35.29         | 0.71                    |
|                    | SD | 7.37         | 8.88        | 9.87          |                         |
| CST:CORR           | M  | 8.04         | 8.39        | 8.37          | 0.38                    |
|                    | SD | 2.26         | 1.94        | 1.68          |                         |
| CST:TIME           | M  | 31.74        | 30.14       | 28.54         | 2.05                    |
|                    | SD | 10.00        | 9.52        | 6.14          |                         |
| AVG:CORR           | M  | 7.87         | 8.22        | 7.73          | 1.55                    |
|                    | SD | 2.00         | 1.26        | 1.37          |                         |
| AVG:TIME           | M  | 34.68        | 33.17       | 31.91         | 1.84                    |
|                    | SD | 7.25         | 7.75        | 6.51          |                         |

\*  $p \leq .05$

<sup>1</sup>Tests significance of variation among means.

TABLE C-4. ZERO-ORDER CORRELATIONS BETWEEN BIOGRAPHICAL MEASURES (ARMY EXPERIENCE, TRAINING, TEST SCORES) AND MEASURES OF PERFORMANCE ON COMPUTER PANEL JOB SAMPLE FOR TANK COMMANDERS (TC), GUNNERS(G), AND COMBINED (TCG) SUBSAMPLES

| Biographical Data |     | Computer Panel |           |           |           |           |           |
|-------------------|-----|----------------|-----------|-----------|-----------|-----------|-----------|
|                   |     | ECD: CORR      | ECD: TIME | CST: CORR | CST: TIME | AVG: CORR | AVG: TIME |
| RANK              | TC  | .009           | -.006     | .210      | .004      | .124      | -.000     |
|                   | G   | -.269          | -.196     | -.217     | .063      | -.328*    | -.074     |
|                   | TCG | -.165          | -.037     | -.117     | .091      | -.174     | .038      |
| ARMY:TIME         | TC  | .185           | .105      | -.241     | .011      | .228      | .061      |
|                   | G   | -.074          | -.076     | -.099     | .056      | -.121     | -.009     |
|                   | TCG | .036           | .050      | .020      | .072      | .034      | .073      |
| A1:TIME           | TC  | -.023          | -.009     | -.073     | .286      | -.055     | .193      |
|                   | G   | .186           | -.257     | .107      | -.214     | .029      | -.233     |
|                   | TCG | -.084          | -.036     | -.039     | .094      | -.075     | .041      |
| A3:TIME           | TC  | -.401*         | -.218     | -.022     | .066      | -.250     | -.065     |
|                   | G   | .126           | .017      | .136      | -.029     | .180      | -.008     |
|                   | TCG | -.060          | -.041     | .084      | -.004     | .019      | -.025     |
| CP:TIME           | TC  | -.232          | -.024     | -.255     | .320      | -.281     | .210      |
|                   | G   | -.119          | -.168     | -.062     | -.070     | -.119     | -.140     |
|                   | TCG | -.213          | -.039     | -.193     | .169      | -.251*    | .087      |
| SC:MLAST          | TC  | -.126          | -.501*    | .233      | -.266     | .049      | -.436     |
|                   | G   | .055           | .040      | -.185     | .099      | -.100     | .075      |
|                   | TCG | -.100          | -.200     | .050      | -.084     | -.031     | -.171     |
| VRT:MLAST         | TC  | -.013          | .151      | -.154     | .061      | -.093     | .118      |
|                   | G   | -.286          | .003      | -.117     | -.028     | -.263     | -.016     |
|                   | TCG | -.140          | .063      | -.139     | .018      | -.171     | .045      |
| CTT:MLAST         | TC  | .249           | .206      | .252      | .057      | .287      | .153      |
|                   | G   | .170           | -.308     | .429      | -.014     | .410      | -.246     |
|                   | TCG | .220           | .067      | .254      | .071      | .281      | .085      |
| CO                | TC  | .309           | -.235     | .314      | -.118     | .352      | -.189     |
|                   | G   | .376*          | -.228     | .050      | -.185     | .262      | -.243     |
|                   | TCG | .333*          | -.257     | .158      | -.169     | .292*     | -.246     |
| GT                | TC  | .198           | -.251     | .217      | -.174     | .240      | -.248     |
|                   | G   | .186           | -.257     | -.123     | -.102     | .015      | -.208     |
|                   | TCG | .189           | -.238     | .076      | -.138     | .161      | -.218     |
| GAME:FREQ         | TC  | -.024          | -.248     | .036      | -.192     | .007      | -.255     |
|                   | G   | -.250          | -.188     | .073      | -.280     | -.090     | -.279     |
|                   | TCG | -.137          | -.204     | .048      | -.232     | -.050     | -.260*    |

\*  $p < .05$

TABLE C-5. COMPUTER TRACKING JOB SAMPLE: ZERO-ORDER CORRELATIONS AMONG  
8 MEASURES FOR TANK COMMANDERS (TC), GUNNERS (G), AND  
COMBINED (TCG) SUBSAMPLES

| Dependent Measures | EASY: ERROR    | MOD: TOT                         | MOD: ERROR                       | HARD: TOT                        | HARD: ERR:K                     | AVG: TOT                         | AVG: ERROR                    |
|--------------------|----------------|----------------------------------|----------------------------------|----------------------------------|---------------------------------|----------------------------------|-------------------------------|
| EASY:TOT           | TC<br>G<br>TCG | -.586***<br>-.581***<br>-.574*** | -.587***<br>.649***<br>.625***   | -.462**<br>-.488***<br>-.474***  | .805***<br>.604***<br>.692***   | -.645***<br>-.535***<br>-.592*** | .942***<br>.913***<br>.925*** |
| EASY:ERROR         | TC<br>G<br>TCG | -.375*<br>-.465***<br>-.427***   | .353<br>.691***<br>.566***       | -.597***<br>-.331*<br>-.447***   | .528**<br>.611***<br>.575***    | -.667***<br>-.518***<br>-.582*** | .752***<br>.837***<br>.804*** |
| MOD:TOT            | TC<br>G<br>TCG | -.532**<br>-.599***<br>-.575***  | .758***<br>.717***<br>.733***    | -.544***<br>-.638***<br>-.595*** | .891***<br>.881***<br>.883***   | -.709***<br>-.631***<br>-.660*** | .749***<br>.955***<br>.884*** |
| MOD:ERROR          | TC<br>G<br>TCG | -.512**<br>-.564***<br>.541***   | -.704***<br>-.617***<br>-.664*** | -.629***<br>-.609***             | -.583**<br>-.629***<br>-.609*** | -.762***<br>-.559***<br>-.641*** | .890***<br>.925***<br>.903*** |
| HARD:TOT           | TC<br>G<br>TCG | -.679***<br>-.662***<br>-.676*** | -.804***<br>-.666***<br>-.721*** |                                  |                                 |                                  |                               |

\* p ≤ .05  
\*\* p ≤ .01  
\*\*\* p ≤ .001

TABLE C-6. COMPUTER TRACKING JOB SAMPLE: MEANS, STANDARD DEVIATIONS, AND SIGNIFICANCE FOR TANK COMMANDERS (TC), GUNNERS (G), AND DRIVERS/LOADERS (DL) ON 8 DEPENDENT MEASURES

| Dependent Measures |    | TC<br>(n=32) | G<br>(n=51) | DL<br>(n=101) | F <sup>1</sup><br>Value |
|--------------------|----|--------------|-------------|---------------|-------------------------|
| EASY:TOT           | n  | 32           | 51          | 101           | 4.83**                  |
|                    | M  | 17.56        | 20.77       | 24.77         |                         |
|                    | SD | 12.00        | 11.05       | 11.65         |                         |
| EASY:ERROR         | n  | 32           | 51          | 101           | 0.28                    |
|                    | M  | 38.40        | 39.10       | 37.08         |                         |
|                    | SD | 12.56        | 11.99       | 19.10         |                         |
| MOD:TOT            | n  | 31           | 51          | 99            | 9.45***                 |
|                    | M  | 13.94        | 14.86       | 19.74         |                         |
|                    | SD | 7.65         | 7.64        | 8.46          |                         |
| MOD:ERROR          | n  | 31           | 51          | 99            | 1.04                    |
|                    | M  | 29.38        | 28.98       | 26.31         |                         |
|                    | SD | 11.26        | 12.78       | 13.85         |                         |
| HARD:TOT           | n  | 26           | 43          | 93            | 6.02**                  |
|                    | M  | 6.50         | 7.88        | 9.67          |                         |
|                    | SD | 4.75         | 4.25        | 4.51          |                         |
| HARD:ERROR         | n  | 26           | 43          | 93            | 9.27***                 |
|                    | M  | 30.46        | 25.64       | 21.58         |                         |
|                    | SD | 14.91        | 12.06       | 5.98          |                         |
| AVG:TOT            | n  | 26           | 43          | 93            | 8.44***                 |
|                    | M  | 12.82        | 14.81       | 18.40         |                         |
|                    | SD | 7.34         | 6.71        | 6.90          |                         |
| AVG:ERROR          | n  | 26           | 43          | 93            | 3.01*                   |
|                    | M  | 33.86        | 31.30       | 28.48         |                         |
|                    | SD | 10.52        | 11.17       | 10.29         |                         |

\* p ≤ .05  
 \*\* p ≤ .01  
 \*\*\*p ≤ .001

<sup>1</sup>Tests significance of variation among means.

TABLE C-7. ZERO-ORDER CORRELATIONS BETWEEN BIOGRAPHICAL MEASURES (ARMY EXPERIENCE, TRAINING, TEST SCORES) AND MEASURES OF PERFORMANCE ON COMPUTER TRACKING JOB SAMPLE FOR TANK COMMANDERS (TC), GUNNERS(G), AND COMBINED (TCG) SUBSAMPLES

| Biographical Data | Computer Tracking |                         |                          |                          |                          |                          |                          |                         |  |  |
|-------------------|-------------------|-------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|-------------------------|--|--|
|                   | EASY: TOT         | EASY: ERROR             | MOD: TOT                 | MOD: ERROR               | HARD: TOT                | HARD: ERROR              | AVG: TOT                 | AVG: ERROR              |  |  |
| RANK              | TC<br>G<br>TCG    | .284<br>-.029<br>.031   | -.222<br>-.237<br>-.207  | .279<br>.207<br>.166     | .223<br>.190<br>.252     | -.367<br>-.062<br>-.199  | -.418<br>-.129<br>-.238  | .333<br>.093<br>.190    |  |  |
| ARMY: TIME        | TC<br>G<br>TCG    | .365*<br>-.112<br>.117  | -.103<br>-.209<br>-.161  | .283<br>.209<br>.218     | .027<br>.179<br>.178     | -.194<br>-.236<br>-.244* | -.263<br>-.294<br>-.294  | .175<br>.104<br>.182    |  |  |
| AI: TIME          | TC<br>G<br>TCG    | .288<br>.117<br>.167    | -.304<br>-.142<br>-.224* | .400*<br>.154<br>.232*   | .289<br>.229<br>.309**   | -.081<br>-.091<br>-.149  | -.262<br>-.192<br>-.266* | .433*<br>.255<br>.346** |  |  |
| A3: TIME          | TC<br>G<br>TCG    | -.005<br>.016<br>.009   | -.022<br>.214<br>.148    | .433*<br>-.087<br>.030   | .182<br>-.009<br>.043    | -.224<br>.114<br>.021    | -.105<br>.160<br>.084    | .199<br>.029<br>.025    |  |  |
| CP: TIME          | TC<br>G<br>TCG    | .299<br>.190<br>.205    | -.312<br>-.068<br>-.201  | .431*<br>.299*<br>.309** | .232<br>.335*<br>.323**  | -.214<br>-.150<br>-.230  | -.345<br>-.195<br>-.303* | .391*<br>.350*<br>.367* |  |  |
| SC:MLAST          | TC<br>G<br>TCG    | .036<br>.165<br>.095    | .093<br>-.171<br>-.065   | .071<br>.377*<br>.240    | -.426*<br>.441**<br>.029 | .294<br>-.139<br>.027    | .227<br>.002<br>.051     | -.234<br>.397*<br>.139  |  |  |
| VRT:MLAST         | TC<br>G<br>TCG    | -.044<br>-.039<br>-.043 | .135<br>.145<br>.134     | -.167<br>-.040<br>-.087  | -.146<br>-.066<br>-.087  | -.006<br>.060<br>.019    | .108<br>.117<br>.098     | -.201<br>-.048<br>-.097 |  |  |
| CTT:MLAST         | TC<br>G<br>TCG    | .502*<br>-.064<br>.372* | .441<br>-.217<br>.248    | -.309<br>.129<br>-.214   | -.329<br>.212<br>-.222   | .564*<br>-.169<br>.412*  | .599*<br>-.287<br>.409*  | -.379<br>-.065<br>-.295 |  |  |
| CO                | TC<br>G<br>TCG    | -.062<br>.234<br>.090   | -.257<br>.260<br>.066    | .056<br>-.129<br>-.102   | .088<br>-.223<br>-.126   | .100<br>.383*<br>.278    | -.195<br>.347*<br>.159   | .170<br>-.026<br>-.083  |  |  |
| GT                | TC<br>G<br>TCG    | .042<br>.110<br>.011    | .307<br>.333*<br>.300*   | -.128<br>-.322*<br>-.216 | -.086<br>-.289<br>-.147  | .237<br>.417*<br>.285*   | .154<br>.322<br>.201     | -.086<br>-.254<br>-.151 |  |  |
| GAME: FREQ        | TC<br>G<br>TCG    | .032<br>-.026<br>-.017  | .199<br>.117<br>.142     | .177<br>.024<br>.081     | -.046<br>-.058<br>-.039  | .097<br>-.122<br>-.040   | .122<br>-.074<br>-.003   | .068<br>-.026<br>.020   |  |  |

\* p ≤ .05  
\*\* p ≤ .01



TABLE C-9. COMPUTER TARGET ENGAGEMENT JOB SAMPLE: MEANS, STANDARD DEVIATIONS, AND SIGNIFICANCE FOR TANK COMMANDERS (TC), GUNNERS (G), AND DRIVERS/LOADERS (DL) ON 18 DEPENDENT MEASURES

| Dependent Measures |    | TC<br>(n=32) | G<br>(n=51) | DL<br>(n=101) | F <sup>1</sup><br>Value |
|--------------------|----|--------------|-------------|---------------|-------------------------|
| PROC:ERROR         | M  | 4.56         | 4.06        | 2.37          | 10.76***                |
|                    | SD | 3.06         | 3.15        | 2.46          |                         |
| 3X:ERROR(AVG)      | M  | 26.71        | 29.53       | 32.65         | 3.09*                   |
|                    | SD | 10.25        | 12.37       | 13.16         |                         |
| 3X:ERROR(MDN)      | M  | 16.77        | 15.98       | 18.86         | 0.98                    |
|                    | SD | 10.96        | 11.29       | 13.75         |                         |
| L1:ERROR(AVG)      | M  | 12.00        | 14.04       | 15.05         | 2.56                    |
|                    | SD | 4.54         | 7.01        | 7.05          |                         |
| L1:ERROR(MDN)      | M  | 6.13         | 6.76        | 6.47          | 0.36                    |
|                    | SD | 1.84         | 2.92        | 3.78          |                         |
| L2:ERROR(AVG)      | M  | 14.50        | 16.70       | 18.78         | 2.36                    |
|                    | SD | 6.54         | 10.25       | 10.98         |                         |
| L2:ERROR(MDN)      | M  | 9.28         | 10.65       | 11.75         | 0.84                    |
|                    | SD | 7.21         | 9.31        | 10.55         |                         |
| F:ERROR(AVG)       | M  | 12.45        | 14.59       | 15.49         | 2.22                    |
|                    | SD | 4.52         | 7.37        | 7.63          |                         |
| F:ERROR(MDN)       | M  | 6.18         | 7.11        | 6.76          | 0.66                    |
|                    | SD | 1.67         | 2.90        | 4.31          |                         |
| 10X:ERROR(AVG)     | M  | 12.98        | 15.11       | 16.44         | 2.58                    |
|                    | SD | 4.88         | 7.85        | 8.17          |                         |
| 10X:ERROR(MDN)     | M  | 7.20         | 8.18        | 8.33          | 0.66                    |
|                    | SD | 3.22         | 4.57        | 5.44          |                         |
| 3X:TIME            | M  | 10.64        | 12.19       | 14.16         | 4.79**                  |
|                    | SD | 4.15         | 5.11        | 6.91          |                         |
| L1:TIME            | M  | 12.83        | 12.83       | 14.21         | 1.39                    |
|                    | SD | 4.41         | 4.63        | 6.33          |                         |
| L2:TIME            | M  | 1.69         | 1.62        | 2.44          | 4.65*                   |
|                    | SD | 1.27         | 1.37        | 2.05          |                         |



TABLE C-9. COMPUTER TARGET ENGAGEMENT JOB SAMPLE: MEANS, STANDARD DEVIATIONS, AND SIGNIFICANCE FOR TANK COMMANDERS (TC), GUNNERS (G), AND DRIVERS/LOADERS (DL) ON 18 DEPENDENT MEASURES (continued)

| Dependent Measures |    | TC<br>(n=32) | G<br>(n=51) | DL<br>(n=101) | F <sup>1</sup><br>Value |
|--------------------|----|--------------|-------------|---------------|-------------------------|
| F:TIME             | M  | 2.66         | 2.71        | 3.25          | 1.48                    |
|                    | SD | 1.36         | 2.09        | 2.46          |                         |
| IOX:TIME           | M  | 16.13        | 16.17       | 18.52         | 2.52                    |
|                    | SD | 4.79         | 5.96        | 8.17          |                         |
| TOT:TIME(AVG)      | M  | 26.76        | 28.36       | 32.69         | 4.50*                   |
|                    | SD | 7.52         | 10.37       | 12.74         |                         |
| TOT:TIME(MDN)      | M  | 24.36        | 25.89       | 30.07         | 5.08**                  |
|                    | SD | 6.77         | 8.78        | 11.84         |                         |

\*  $p \leq .05$   
 \*\*  $p \leq .01$   
 \*\*\*  $p \leq .001$

<sup>1</sup>Tests significance of variation among means.

TABLE C-10. ZERO-ORDER CORRELATIONS BETWEEN BIOGRAPHICAL MEASURES (ARMY EXPERIENCE, TRAINING, TEST SCORES) AND MEASURES OF PERFORMANCE ON COMPUTES TARGET ENGAGEMENT JOB SAMPLE FOR TANK COMMANDERS (TC), GUNNERS (G), AND COMBINED (TCG) SUBSAMPLES

| Biographical Data | Computer Target Engagement |                 |                 |                 |                 |                 |                 |                 |                 |          |          |          |         |           |                 |                 |
|-------------------|----------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|----------|----------|----------|---------|-----------|-----------------|-----------------|
|                   | PROG: ERROR                | 3T: ERROR (AVG) | 3T: ERROR (MGN) | L1: ERROR (MGN) | L1: ERROR (AVG) | L2: ERROR (AVG) | L2: ERROR (MGN) | F1: ERROR (AVG) | F1: ERROR (MGN) | 3K: TIME | L1: TIME | L2: TIME | F: TIME | 1ST: TIME | 10T: TIME (AVG) | 10T: TIME (MGN) |
| TC                | .135                       | -.035           | -.031           | .175            | -.160           | .156            | .641            | .198            | .234            | .303     | .168     | -.061    | -.037   | -.054     | .299            | -.024           |
| G                 | .332*                      | .134            | -.011           | .118            | -.010           | .130            | .645            | .134            | -.057           | .114     | -.054    | -.111    | -.022   | -.025     | -.031           | -.051           |
| TCG               | .235*                      | -.038           | -.026           | -.032           | -.064           | .012            | -.022           | -.020           | -.135           | -.011    | -.122    | -.053    | .031    | -.014     | -.055           | -.111           |
| TC                | -.256                      | .317            | .363*           | .265            | .244            | .064            | .032            | .319            | .287            | .215     | .088     | .341     | .090    | -.034     | .238            | .238            |
| G                 | -.035                      | -.097           | -.023           | -.149           | -.098           | -.117           | -.132           | -.116           | -.122           | -.132    | -.156    | .155     | -.070   | -.061     | .116            | .163            |
| TCG               | -.045                      | .014            | -.160           | -.053           | -.025           | -.091           | -.077           | -.033           | -.057           | -.066    | -.028    | .193     | -.010   | .157      | .078            | .079            |
| TC                | -.162                      | -.084           | -.143           | -.095           | -.150           | -.063           | .024            | -.098           | -.117           | -.085    | -.031    | -.045    | -.205   | -.065     | -.091           | -.076           |
| G                 | -.183                      | -.182           | -.201           | -.205           | -.239           | -.129           | -.097           | -.220           | -.181           | -.163    | .113     | .213     | .045    | .102      | .180            | .123            |
| TCG               | -.052                      | -.142           | -.004           | -.203           | -.214           | -.135           | -.070           | -.200           | -.225*          | -.182    | -.054    | .069     | -.020   | .560      | .067            | -.040           |
| TC                | -.312                      | -.197           | .284            | -.217           | -.218           | -.199           | -.130           | -.251           | -.225           | -.233    | -.177    | -.461**  | -.117   | -.133     | .169            | .165            |
| G                 | .054                       | .032            | -.150           | -.093           | -.093           | -.163           | -.103           | -.145           | -.081           | -.158    | -.111    | .116     | -.133   | .019      | .144            | .149            |
| TCG               | -.017                      | .013            | -.126           | -.157           | -.124           | -.171           | -.113           | -.166           | -.109           | -.174    | -.117    | .119     | -.157   | .034      | .147            | .165            |
| TC                | -.207                      | -.222           | .227            | .027            | .033            | .019            | .141            | -.040           | .012            | -.095    | .114     | .147     | -.034   | .055      | .055            | .035            |
| G                 | -.150                      | -.011           | .023            | -.099           | -.118           | -.058           | -.047           | -.077           | -.146           | -.082    | -.101    | .062     | -.048   | .065      | .068            | .028            |
| TCG               | -.107                      | -.020           | -.111           | -.113           | -.128           | -.078           | -.093           | -.124           | -.149           | -.107    | -.059    | -.031    | -.052   | .030      | .017            | -.024           |
| TC                | .055                       | -.167           | -.155           | -.321           | -.134           | .275            | .183            | .358            | .147            | .331*    | .189     | .108     | -.236   | -.284     | .095            | .135            |
| G                 | .295                       | .168            | -.058           | -.041           | -.054           | .074            | -.064           | .061            | -.079           | -.053    | -.073    | .205     | .199    | .232      | .243            | .199            |
| TCG               | -.197                      | -.016           | -.073           | .103            | -.010           | .124            | -.034           | -.124           | -.032           | -.124    | .015     | .134     | -.062   | .252*     | .164            | .165            |
| TC                | .233                       | .384*           | .371*           | .423*           | .355            | .130            | .025            | .373            | .422*           | .307*    | .157     | .192     | .058    | .097      | .158            | .033            |
| G                 | .045                       | .197            | .152            | .127            | .032            | .275            | .144            | .130            | .059            | .197     | .072     | .016     | -.069   | -.172     | -.106           | -.033           |
| TCG               | .128                       | .246*           | .233            | .201            | .120            | .212            | .034            | .184            | .068            | .211     | .105     | -.083    | -.015   | -.059     | -.050           | .039            |
| TC                | .434                       | -.067           | -.163           | -.355           | -.194           | -.344           | -.241           | -.371           | -.063           | -.379    | -.224    | -.070    | .360    | .063      | .053            | .031            |
| G                 | .352                       | .035            | .255            | .435            | -.070           | .606*           | .359            | .532*           | -.013           | .563*    | .270     | .232     | .012    | .950      | .251            | .237            |
| TCG               | .259                       | -.026           | .022            | -.116           | -.139           | -.022           | -.080           | -.060           | -.011           | -.060    | -.050    | .021     | -.036   | .010      | .017            | .044            |
| TC                | .155                       | -.197           | -.102           | -.015           | -.196           | .050            | -.112           | .208            | -.107           | .052     | -.146    | -.157    | -.141   | .079      | -.281           | .310            |
| G                 | .145                       | -.226           | -.311*          | -.073           | -.073           | -.129           | -.187           | -.043           | -.022           | -.091    | -.145    | -.063    | -.062   | -.140     | -.034           | .036            |
| TCG               | -.048                      | -.177           | -.226           | -.021           | -.076           | -.054           | -.133           | .053            | -.005           | -.013    | -.106    | -.073    | -.082   | -.063     | -.054           | -.052           |
| TC                | -.228                      | -.167           | -.120           | -.155           | -.177           | -.098           | -.110           | -.038           | -.130           | -.099    | -.139    | -.184    | -.144   | -.047     | .242            | .251            |
| G                 | .252                       | -.215           | -.181           | -.031           | -.050           | -.019           | -.121           | -.095           | -.040           | -.053    | -.102    | -.046    | -.103   | -.125     | -.037           | .025            |
| TCG               | -.221                      | -.195           | -.128           | -.135           | -.116           | -.068           | -.122           | -.090           | -.100           | -.093    | -.128    | -.126    | -.078   | -.085     | -.121           | .139            |
| TC                | -.095                      | -.115           | -.081           | -.335           | -.178           | .371            | .222            | .307            | -.210           | -.342*   | -.041    | -.268    | -.156   | .129      | -.216           | .216            |
| G                 | -.061                      | .206            | .174            | .020            | .051            | .071            | .096            | .064            | .038            | .032     | .081     | .140     | .031    | .089      | .118            | .118            |
| TCG               | -.264                      | .074            | .075            | -.097           | -.030           | -.184           | -.023           | -.062           | -.038           | -.115    | -.034    | -.123    | -.032   | .057      | -.142           | -.159           |

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TABLE C-11. TC DECISION MAKING JOB SAMPLE: ZERO-ORDER  
CORRELATION BETWEEN 2 MEASURES FOR TANK  
COMMANDERS (TC), GUNNERS (G), AND COMBINED  
(TCG) SUBSAMPLES

| Dependent Measures |     | D:TIME |
|--------------------|-----|--------|
| D:CORR             | TC  | .019   |
|                    | G   | .060   |
|                    | TCG | .047   |

TABLE C-12. ZERO-ORDER CORRELATIONS BETWEEN BIOGRAPHICAL MEASURES (ARMY EXPERIENCE, TRAINING, TEST SCORES) AND MEASURES OF PERFORMANCE ON TC DECISION MAKING JOB SAMPLE FOR TANK COMMANDERS (TC), GUNNERS (G), AND COMBINED (TCG) SUBSAMPLES

| Biographical Data |     | TC Decision Making |            |
|-------------------|-----|--------------------|------------|
|                   |     | D:<br>CORR         | D:<br>TIME |
| RANK              | TC  | -.202              | -.065      |
|                   | G   | -.090              | -.030      |
|                   | TCG | -.083              | -.102      |
| ARMY:TIME         | TC  | -.444**            | .219       |
|                   | G   | -.037              | -.028      |
|                   | TCG | -.234*             | .008       |
| A1:TIME           | TC  | -.188              | .195       |
|                   | G   | .238               | -.076      |
|                   | TCG | .093               | -.036      |
| A3:TIME           | TC  | .015               | .033       |
|                   | G   | .071               | -.063      |
|                   | TCG | .051               | -.041      |
| SC:MLAST          | TC  | -.127              | -.050      |
|                   | G   | .161               | .185       |
|                   | TCG | .003               | .067       |
| VRT:MLAST         | TC  | -.264              | -.206      |
|                   | G   | -.046              | -.044      |
|                   | TCG | -.143              | -.114      |
| CP:TIME           | TC  | -.293              | .228       |
|                   | G   | .052               | .008       |
|                   | TCG | -.121              | .040       |
| CTT:MLAST         | TC  | .043               | -.193      |
|                   | G   | .500*              | .042       |
|                   | TCG | .148               | -.096      |
| CO                | TC  | -.049              | -.093      |
|                   | G   | .030               | -.156      |
|                   | TCG | -.010              | -.101      |
| GT                | TC  | .133               | .085       |
|                   | G   | .033               | -.111      |
|                   | TCG | .093               | -.036      |
| GAME:FREQ         | TC  | -.143              | -.094      |
|                   | G   | -.140              | .121       |
|                   | TCG | -.142              | .030       |

\*  $p \leq .05$

\*\*  $p \leq .01$

TABLE C-13. HANDS-ON GUN LAYING JOB SAMPLE: ZERO-ORDER  
CORRELATION BETWEEN 2 MEASURES FOR TANK  
COMMANDERS (TC), GUNNERS (G), AND COMBINED  
(TCG) SUBSAMPLES

| Dependent Measures |     | GL:ERROR |
|--------------------|-----|----------|
| GL:TIME            | TC  | -.130    |
|                    | G   | .051     |
|                    | TCG | .013     |

TABLE C-14. ZERO-ORDER CORRELATIONS BETWEEN BIOGRAPHICAL MEASURES (ARMY EXPERIENCE, TRAINING, TEST SCORES) AND MEASURES OF PERFORMANCE ON HANDS-ON GUN LAYING JOB SAMPLE FOR TANK COMMANDERS (TC), GUNNERS (G), AND COMBINED (TCG) SUBSAMPLES

| Biographical Data |     | GL:<br>TIME | GL:<br>ERROR |
|-------------------|-----|-------------|--------------|
| RANK              | TC  | -.025       | .250         |
|                   | G   | -.098       | .067         |
|                   | TCG | -.309**     | .028         |
| ARMY:TIME         | TC  | -.195       | .449**       |
|                   | G   | -.062       | .063         |
|                   | TCG | -.260*      | .198         |
| A1:TIME           | TC  | -.319       | -.005        |
|                   | G   | .116        | -.091        |
|                   | TCG | -.247*      | -.071        |
| A3:TIME           | TC  | .168        | -.273        |
|                   | G   | .020        | .051         |
|                   | TCG | .040        | -.051        |
| CP:TIME           | TC  | -.120       | .055         |
|                   | G   | -.027       | .040         |
|                   | TCG | -.231*      | .006         |
| SC:MLAST          | TC  | .313        | -.197        |
|                   | G   | .144        | -.002        |
|                   | TCG | .127        | -.116        |
| VRT:MLAST         | TC  | -.134       | .231         |
|                   | G   | .120        | .238         |
|                   | TCG | .010        | .226         |
| CTT:MLAST         | TC  | -.271       | -.103        |
|                   | G   | -.337       | .205         |
|                   | TCG | -.140       | -.066        |
| CO                | TC  | -.304       | -.088        |
|                   | G   | -.104       | -.103**      |
|                   | TCG | -.052       | -.186        |
| GT                | TC  | .086        | -.095        |
|                   | G   | -.281       | -.188        |
|                   | TCG | -.123       | -.145        |
| GAME:FREQ         | TC  | .073        | -.203        |
|                   | G   | .016        | .062         |
|                   | TCG | .004        | -.056        |

\*  $p < .05$

\*\*  $p \leq .01$

TABLE C-15. HANDS-ON TRACKING JOB SAMPLE: ZERO-ORDER CORRELATIONS AMONG 6 MEASURES FOR TANK COMMANDERS (TC), GUNNERS (G), AND COMBINED (TCG) SUBSAMPLES

| Dependent Measures |     | TOT:<br>DIST | TC:<br>HITS | TC:<br>DIST | G:<br>HITS | G:<br>DIST |
|--------------------|-----|--------------|-------------|-------------|------------|------------|
| TOT:HITS           | TC  | -.504**      | .919***     | -.512**     | .776***    | -.463**    |
|                    | G   | -.536***     | .959***     | -.506***    | .915***    | -.534***   |
|                    | TCG | -.485***     | .939***     | -.472***    | .853***    | -.468***   |
| TOT:DIST           | TC  |              | -.419*      | .960***     | -.461**    | .969***    |
|                    | G   |              | -.535***    | .970***     | -.460***   | .971***    |
|                    | TCG |              | -.423**     | .968***     | -.457***   | .971***    |
| TC:HITS            | TC  |              |             | -.437**     | .465**     | -.376*     |
|                    | G   |              |             | -.522***    | .763***    | -.517***   |
|                    | TCG |              |             | -.429***    | .622***    | -.399***   |
| TC:DIST            | TC  |              |             |             | -.452**    | .861***    |
|                    | G   |              |             |             | -.411**    | .884***    |
|                    | TCG |              |             |             | -.424***   | .879***    |
| G:HITS             | TC  |              |             |             |            | -.438**    |
|                    | G   |              |             |             |            | -.481***   |
|                    | TCG |              |             |             |            | -.461***   |

\*  $p < .05$   
 \*\*  $p < .01$   
 \*\*\*  $p < .001$

TABLE C-16. ZERO-ORDER CORRELATIONS BETWEEN BIOGRAPHICAL MEASURES (ARMY EXPERIENCE, TRAINING, TEST SCORES) AND MEASURES OF PERFORMANCE ON HANDS-ON TRACKING JOB SAMPLE FOR TANK COMMANDERS (TC), GUNNERS(G), AND COMBINED (TCG) SUBSAMPLES

| Biographical Data |     | Hands-On Tracking |              |             |             |            |            |
|-------------------|-----|-------------------|--------------|-------------|-------------|------------|------------|
|                   |     | TOT:<br>HITS      | TOT:<br>DIST | TC:<br>HITS | TC:<br>DIST | G:<br>HITS | G:<br>DIST |
| RANK              | TC  | -.115             | .059         | -.171       | .071        | .016       | .044       |
|                   | G   | .055              | .119         | .060        | .142        | .039       | .030       |
|                   | TCG | .100              | .209         | .149        | .215*       | .001       | .190       |
| ARMY:TIME         | TC  | -.130             | .209         | -.085       | .252        | -.153      | .155       |
|                   | G   | -.120             | .198         | -.174       | .268        | -.027      | .118       |
|                   | TCG | -.056             | .268*        | -.019       | .307**      | -.099      | .215*      |
| A1:TIME           | TC  | -.086             | .162         | -.155       | .172        | .055       | .143       |
|                   | G   | -.035             | .096         | -.049       | .128        | -.008      | .059       |
|                   | TCG | .015              | .205         | .019        | .216*       | .006       | .183       |
| A3:TIME           | TC  | .082              | -.049        | .064        | -.052       | .081       | -.043      |
|                   | G   | -.163             | -.005        | -.119       | -.054       | -.201      | .045       |
|                   | TCG | -.085             | -.009        | -.050       | -.044       | -.118      | .025       |
| CP:TIME           | TC  | -.087             | .140         | -.102       | .208        | -.322      | .070       |
|                   | G   | -.069             | .227         | -.125       | .286*       | .021       | .155       |
|                   | TCG | -.003             | .242*        | .008        | .290**      | -.019      | .183       |
| SC:MLAST          | TC  | .144              | -.230        | .172        | -.218       | .081       | -.224      |
|                   | G   | -.283             | .016         | -.245       | .054        | -.290      | -.021      |
|                   | TCG | -.061             | -.056        | -.021       | -.034       | -.117      | -.074      |
| VRT:MLAST         | TC  | -.058             | .091         | -.015       | .105        | -.119      | .072       |
|                   | G   | -.027             | -.129        | -.018       | -.140       | -.035      | -.110      |
|                   | TCG | -.031             | -.018        | -.005       | -.022       | -.065      | -.014      |
| CTT:MLAST         | TC  | .129              | .028         | .188        | -.000       | -.022      | .050       |
|                   | G   | -.406             | .072         | -.393       | .214        | -.337      | -.058      |
|                   | TCG | .038              | .067         | .112        | .081        | -.097      | .051       |
| CO                | TC  | -.230             | .268         | -.152       | .178        | -.262      | .326       |
|                   | G   | .246              | -.064        | .235        | -.076       | .221       | -.049      |
|                   | TCG | .058              | .013         | .044        | -.020       | .063       | .043       |
| GT                | TC  | -.185             | .194         | -.238       | .131        | -.035      | .235       |
|                   | G   | .183              | .025         | .121        | .034        | .243       | .015       |
|                   | TCG | .007              | .126         | -.047       | .097        | .087       | .144       |
| GAME:FREQ         | TC  | .092              | .187         | .106        | .175        | .037       | .185       |
|                   | G   | .160              | -.227        | .071        | -.200       | .264       | -.240      |
|                   | TCG | .143              | -.041        | .103        | -.035       | .171       | -.044      |

\* p ≤ .05

\*\* p ≤ .01



TABLE C-17. HANDS-ON TARGET ENGAGEMENT: ZERO-ORDER  
CORRELATIONS AMONG 4 MEASURES FOR TASK  
COMMANDERS (TC), GUNNERS (G), AND COMBINED  
(TCG) SUBSAMPLES

| Dependent Measures |     | TOT:<br>TIME | TC:<br>TIME | G:<br>TIME |
|--------------------|-----|--------------|-------------|------------|
| TOT:HITS           | TC  | -.122        | -.209       | .110       |
|                    | G   | .033         | .072        | -.086      |
|                    | TCG | -.045        | -.053       | .000       |
| TOT:TIME           | TC  |              | .927***     | .662***    |
|                    | G   |              | .931***     | .461***    |
|                    | TCG |              | .929***     | .537***    |
| TC:TIME            | TC  |              |             | .332       |
|                    | G   |              |             | .106       |
|                    | TCG |              |             | .187       |

\*\*\*p  $\leq$  .001

TABLE C-18. ZERO-ORDER CORRELATIONS BETWEEN BIOGRAPHICAL MEASURES (ARMY EXPERIENCE, TRAINING, TEST SCORES) AND MEASURES OF PERFORMANCE ON HANDS-ON TARGET ENGAGEMENT JOB SAMPLE FOR TANK COMMANDERS (TC), GUNNERS (G), AND COMBINED (TCG) SUBSAMPLES

| Biographical Data |     | Hands-On Target Management |              |             |            |
|-------------------|-----|----------------------------|--------------|-------------|------------|
|                   |     | TOT:<br>HITS               | TOT:<br>TIME | TC:<br>TIME | G:<br>TIME |
| RANK              | TC  | .031                       | .006         | -.070       | .153       |
|                   | G   | .157                       | .141         | .184        | -.053      |
|                   | TCG | .004                       | .011         | .008        | .010       |
| ARMY:TIME         | TC  | .112                       | -.009        | -.000       | -.024      |
|                   | G   | .068                       | .221         | .242        | .017       |
|                   | TCG | .026                       | .045         | .056        | -.009      |
| A1:TIME           | TC  | .300                       | -.014        | -.094       | .150       |
|                   | G   | .070                       | .117         | .087        | .098       |
|                   | TCG | .069                       | -.000        | -.052       | .107       |
| A3:TIME           | TC  | -.035                      | .350*        | .400*       | .080       |
|                   | G   | -.039                      | -.155        | -.121       | -.118      |
|                   | TCG | -.044                      | .002         | .028        | -.056      |
| CP:TIME           | TC  | .126                       | .051         | -.007       | .142       |
|                   | G   | .145                       | -.072        | -.030       | -.112      |
|                   | TCG | .053                       | -.036        | -.058       | .031       |
| SC:MLAST          | TC  | .084                       | .098         | .089        | .058       |
|                   | G   | .187                       | .120         | .108        | .081       |
|                   | TCG | .127                       | .096         | .082        | .070       |
| VRT:MLAST         | TC  | -.052                      | -.163        | -.110       | -.173      |
|                   | G   | -.020                      | .044         | .049        | .006       |
|                   | TCG | -.027                      | -.048        | -.021       | -.072      |
| CTT:MLAST         | TC  | .107                       | -.009        | .056        | -.107      |
|                   | G   | -.143                      | -.160        | -.202       | .152       |
|                   | TCG | .064                       | -.059        | -.057       | -.028      |
| CO                | TC  | .068                       | -.006        | -.080       | .167       |
|                   | G   | -.031                      | -.097        | -.058       | -.108      |
|                   | TCG | .016                       | -.035        | -.038       | -.003      |
| GT                | TC  | -.006                      | -.042        | -.088       | .069       |
|                   | G   | -.051                      | -.142        | -.195       | .092       |
|                   | TCG | -.057                      | -.097        | -.148       | .078       |
| GAME:FREQ         | TC  | .144                       | -.209        | -.113       | -.302      |
|                   | G   | -.237                      | .167         | .190        | -.001      |
|                   | TCG | -.127                      | -.003        | .059        | -.128      |

\*  $p \leq .05$

APPENDIX D

TABLES OF RESULTS:

COMPARISONS INVOLVING INTERRELATIONSHIPS AMONG JOB SAMPLES

## GLOSSARY OF BIOGRAPHIC AND DEPENDENT VARIABLES

### BIOGRAPHIC VARIABLES

| <u>Name</u> | <u>Description</u>                                    | <u>Code Levels</u>   |
|-------------|---|--|
| AGE         | Age   |  |
| EDUC        | Highest Level of Education Attained                   | 1 = Attended High School<br>2 = High School Graduate<br>3 = Attended College<br>4 = College Graduate |
| RANK        | Rank (Pay Grade)                                      | 1 = E1<br>2 = E2<br>3 = E3<br>4 = E4, SP4<br>5 = E5, SP5<br>6 = E6<br>7 = E7                         |
| ARMY:TIME   | Number Months in Army                                 |  |
| A1:TIME     | Number Months Served in M60A1                         |  |
| A3:TIME     | Number Months Served in M60A3                         |  |
| CP:TIME     | Number Months in Current Crew Position                |  |
| SC:MLAST    | Number Months Since Last Subcaliber Fire              |  |
| VRT:MLAST   | Number Months Since Last Vehicle Recognition Training |  |
| CTT:MLAST   | Number Months Since Last CTT Training                 |  |
| CO          | Combat Composite Score from ASVAB                     |  |
| GT          | General Technical Composite Score from ASVAB          |  |

GLOSSARY OF BIOGRAPHIC AND DEPENDENT VARIABLES (continued)

| <u>Name</u> | <u>Description</u>  | <u>Code Levels</u>  |
|-------------|---|---|
| GAME:FREQ   | Frequency With Which Play Computer Games  | 1 = Once Per Month<br>2 = Once Per Week<br>3 = More Than Once a Week<br>4 = Every Day |
| QAVG:TC     | Average Score at Annual Qualifications During 1974-1981 when in Tank Commander Crew Position                  | 1 = Unqualified<br>2 = Qualified<br>3 = Distinguished                                 |
| QAVG:G      | Average Score at Annual Qualifications During 1974-1981 when in Gunner Crew Position                          | See QAVG:TC   |
| QAVG:TCG    | Average Score at Annual Qualifications During 1974-1981 when in Either Tank Commander or Gunner Crew Position | See QAVG:TC   |
| MRQ:TC      | Score at Most Recent (1981) Annual Qualification when in TC Crew Position                                     | See QAVG:TC   |
| MRQ:G       | Score at Most Recent (1981) Annual Qualification when in Gunner Crew Position                                 | See QAVG:TC   |
| MRQ:TCG     | Score at Most Recent (1981) Annual Qualification when in Either Tank Commander or Gunner Crew Position        | See QAVG:TC   |

COMPUTER PANEL

|          |   |
|----------|---|
| ECD:CORR | Number Correct on Enter/Check Data (Maximum = 10)         |
| ECD:TIME | Average Time (seconds) to Complete Enter/Check Data Trial |

GLOSSARY OF BIOGRAPHIC AND DEPENDENT VARIABLES (continued)

| <u>Name</u> | <u>Description</u>   |
|-------------|--|
| CST:CORR    | Number Correct on Self-Test<br>(maximum = 10)                |
| CST:TIME    | Average Time (seconds) to<br>Complete the Self-Test<br>Trial |
| AVG:CORR    | Number Correct Averaged<br>Across Two Tasks                  |
| AVG:TIME    | Completion Time Averaged<br>Across Two Tasks                 |

COMPUTER TRACKING

|            |   |
|------------|---|
| EASY:TOT   | Time on Target (sec) for<br>Easy Tracking Task          |
| EASY:ERROR | RMS error (number pixels)<br>for Easy Tracking Task     |
| MOD:TOT    | Time on Target (sec) for<br>Moderate Tracking Task      |
| MOD:ERROR  | RMS Error (number pixels)<br>for Moderate Tracking Task |
| HARD:TOT   | Time on Target (sec) for<br>Hard Tracking Task          |
| HARD:ERROR | RMS Error (number pixels)<br>for Hard Tracking Task     |
| AVG:TOT    | Average Time on Target<br>(sec)                         |
| AVG:ERROR  | Average RMS Error (number<br>pixels)                    |

COMPUTER TARGET ENGAGEMENT

|         |  |
|---------|--|
| 3X:TIME | Average Time (sec) in<br>3X Segment      |
| L1:TIME | Average Time (sec) in<br>Laser 1 Segment |

GLOSSARY OF BIOGRAPHIC AND DEPENDENT VARIABLES (continued)

| <u>Name</u>                           | <u>Description</u>  |
|---------------------------------------|---|
| L2:TIME                               | Average Time (sec) in Laser 2 Segment                               |
| F:TIME                                | Average Time (sec) in Fire Segment                                  |
| 10X:TIME                              | Average Total Time (sec) in 10X Segment                             |
| TOT:TIME (AVG)                        | Average Time (sec) from Beginning to End of Trial                   |
| TOT:TIME (MDN)                        | Median Time (sec) from Beginning to End of Trial                    |
| <b>TANK COMMANDER DECISION MAKING</b> |   |
| D:CORR                                | Number of Correct Decisions   |
| D:TIME                                | Time to Reach a Decision  |
| <b>HANDS-ON GUN LAYING</b>            |   |
| GL:ERROR                              | Distance Between Actual Gun Lay and Target                          |
| GL:TIME                               | Time from Appearance of Target to Completed Gun Lay                 |
| <b>HANDS-ON TRACKING</b>              |   |
| TOT:HITS                              | Number Hits Averaged Across the TC and Gunner Station               |
| TOT:DIST                              | Distance (inches) Tracked Averaged Across the TC and Gunner Station |
| TC:HITS                               | Number Hits at the TC Station                                       |
| TC:DIST                               | Distance (inches) Tracked at the TC Station                         |

GLOSSARY OF BIOGRAPHIC AND DEPENDENT VARIABLES (continued)

| <u>Name</u> | <u>Description</u>                              |
|-------------|---|
| G:HITS      | Number Hits at the Gunner Station               |
| G:DIST      | Distance (inches) Tracked at the Gunner Station |

HANDS-ON TARGET ENGAGEMENT

|          |   |
|----------|---|
| TOT:HITS | Total Number of Hits in 15 Trials   |
| TOT:TIME | Average Total Time (sec) from Onset of a Trial to Press of the Gunner's Trigger                           |
| TC:TIME  | Average Time (sec) from Onset of a Trial to Point at which TC Removes Hands from TC Power Handle          |
| G:TIME   | Average Time (sec) from Point at which TC Removes Hands from TC Power Handle to Press of Gunner's Trigger |



TABLE D-1. ZERO-ORDER CORRELATIONS BETWEEN MEASURES OF PERFORMANCE ON COMPUTER TRACKING JOB SAMPLES FOR TANK COMMANDERS (TC), GUNNERS(G), AND COMBINED (TCG) SUBSAMPLES

| Computer Panel | Computer Tracking |             |          |            |           |             |          |            |       |  |  |
|----------------|-------------------|-------------|----------|------------|-----------|-------------|----------|------------|-------|--|--|
|                | EASY: TOT         | EASY: ERROR | MOD: TOT | MOD: ERROR | HARD: TOT | HARD: ERROR | AVG: TOT | AVG: ERROR |       |  |  |
| EOD:CORR       | TC                | .261        | -.034    | .192       | -.251     | .352        | -.420    | .346       | -.322 |  |  |
|                | G                 | .064        | .022     | .097       | .209      | -.038       | -.162    | .070       | .014  |  |  |
| EOD:TIME       | TC                | .221        | -.340    | -.008      | -.109     | .100        | .160     | .098       | -.108 |  |  |
|                | G                 | .064        | .313     | .138       | .026      | .125        | -.061    | .042       | .168  |  |  |
| CST:CORR       | TC                | .029        | .201     | .036       | -.125     | .136        | -.210    | -.121      | -.101 |  |  |
|                | G                 | -.047       | .005     | -.011      | .058      | -.008       | -.124    | .043       | -.050 |  |  |
| CST:TIME       | TC                | -.185       | -.071    | -.059      | .224      | -.144       | .372     | -.115      | .238  |  |  |
|                | G                 | -.021       | .066     | -.130      | -.029     | -.172       | .250     | -.144      | .133  |  |  |
| AVG:CORR       | TC                | .136        | .095     | .133       | -.218     | .316        | -.400    | .186       | -.278 |  |  |
|                | G                 | .001        | .018     | .050       | .173      | -.030       | -.198    | .008       | -.032 |  |  |
| AVG:TIME       | TC                | -.017       | -.221    | -.045      | .100      | -.147       | .333     | -.029      | .108  |  |  |
|                | G                 | .024        | .219     | -.002      | -.004     | -.039       | .123     | -.067      | .175  |  |  |
|                | TCG               | -.009       | -.004    | -.028      | -.058     | -.084       | .209     | -.058      | .141  |  |  |

\* p ≤ .05

NOTE: Boxed-in area indicates relationships among primary variables.

TABLE D-2. ZERO-ORDER CORRELATIONS BETWEEN MEASURES OF PERFORMANCE ON COMPUTER PANEL AND COMPUTER ENGAGEMENT, SUBSAMPLING, AND TARGET ENGAGEMENT FOR PANE COMPANIES (IC), GUNNEPS (G), AND UPM/VED (TCG) SUBSAMPLING

| Computer Panel | Computer Target Engagement |                 |                 |                 |                 |                 |                |                |                  |                  |          |          |          |         |           |                 |                 |
|----------------|----------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|----------------|----------------|------------------|------------------|----------|----------|----------|---------|-----------|-----------------|-----------------|
|                | PROC. ERROR (A/G)          | 3K: ERROR (A/G) | 3K: ERROR (M/N) | L1: ERROR (A/G) | L1: ERROR (M/N) | L2: ERK/R (M/N) | F: ERROR (A/G) | F: ERROR (M/N) | IOE: ERROR (A/G) | IOE: ERROR (M/N) | 3K: TIME | L1: TIME | L2: TIME | F: TIME | LOE: TIME | IOE: TIME (A/G) | TOT: TIME (M/N) |
| ECD: CORR      |                            |                 |                 |                 |                 |                 |                |                |                  |                  |          |          |          |         |           |                 |                 |
| G              | -.361                      | -.034           | -.091           | -.212           | -.476*          | -.415*          | -.118          | -.369          | -.303            | -.603**          | -.054    | -.299    | -.391    | -.054   | -.562     | -.117           | -.063           |
| IC             | -.173                      | -.198           | -.177           | -.037           | -.130           | -.117           | -.028          | -.025          | -.013            | -.013            | -.100    | -.070    | -.052    | -.041   | -.031     | -.031           | -.051           |
| G              | -.280*                     | -.152           | -.034           | -.092           | -.097           | -.393           | -.079          | -.093          | -.182            | -.232            | -.019    | -.141    | -.231    | -.098   | -.082     | -.082           | -.045           |
| ECD: TIME      |                            |                 |                 |                 |                 |                 |                |                |                  |                  |          |          |          |         |           |                 |                 |
| G              | -.054                      | -.082           | -.014           | -.118           | -.093           | -.477*          | -.262          | -.083          | -.270            | -.329            | -.091    | -.172    | -.131    | -.283   | -.101     | -.064           | -.053           |
| IC             | -.064                      | -.167           | -.160           | -.128           | -.017           | -.207           | -.164          | -.191          | -.131            | -.133            | -.085    | -.160    | -.128    | -.115   | -.134     | -.118           | -.101           |
| G              | -.052                      | -.128           | -.107           | -.134           | -.023           | -.264*          | -.201          | -.076          | -.228            | -.136            | -.015    | -.176    | -.129    | -.154   | -.137     | -.085           | -.105           |
| CST: CORR      |                            |                 |                 |                 |                 |                 |                |                |                  |                  |          |          |          |         |           |                 |                 |
| G              | -.152                      | -.218           | -.282           | -.020           | -.364           | -.094           | -.084          | -.201          | -.016            | -.285            | -.386    | -.376    | -.199    | -.217   | -.457**   | -.482*          | -.491*          |
| IC             | -.137                      | -.335*          | -.199           | -.046           | -.124           | -.140           | -.101          | -.075          | -.111            | -.295            | -.013    | -.097    | -.111    | -.106   | -.077     | -.037           | -.015           |
| G              | -.156                      | -.273*          | -.244           | -.029           | -.026           | -.097           | -.081          | -.023          | -.083            | -.042            | -.178    | -.102    | -.150    | -.139   | -.155     | -.185           | -.200           |
| CST: TIME      |                            |                 |                 |                 |                 |                 |                |                |                  |                  |          |          |          |         |           |                 |                 |
| G              | -.204                      | -.130           | -.161           | -.026           | -.345           | -.172           | -.022          | -.342          | -.061            | -.293            | -.162    | -.061    | -.371    | -.151   | -.146     | -.177           | -.154           |
| IC             | -.204                      | -.271           | -.135           | -.066           | -.091           | -.174           | -.008          | -.063          | -.170            | -.053            | -.285    | -.345*   | -.647    | -.593   | -.346*    | -.307           | -.307           |
| G              | -.224                      | -.180           | -.153           | -.038           | -.029           | -.147           | -.024          | -.031          | -.074            | -.170            | -.083    | -.186    | -.175    | -.629   | -.131     | -.122           | -.122           |
| AVG: CORR      |                            |                 |                 |                 |                 |                 |                |                |                  |                  |          |          |          |         |           |                 |                 |
| G              | -.298                      | -.104           | -.108           | -.135           | -.486*          | -.472*          | -.030          | -.330          | -.183            | -.504**          | -.190    | -.355    | -.344    | -.110   | -.415*    | -.344           | -.317           |
| IC             | -.215                      | -.371*          | -.287           | -.059           | -.178           | -.077           | -.076          | -.199          | -.022            | -.127            | -.096    | -.018    | -.049    | -.014   | -.018     | -.019           | -.019           |
| G              | -.268*                     | -.210           | -.181           | -.018           | -.059           | -.139           | -.051          | -.014          | -.015            | -.109            | -.159    | -.151    | -.235    | -.034   | -.176     | -.171           | -.159           |
| AVG: TIME      |                            |                 |                 |                 |                 |                 |                |                |                  |                  |          |          |          |         |           |                 |                 |
| G              | -.090                      | -.131           | -.118           | -.042           | -.047           | -.010           | -.114          | -.278          | -.074            | -.030            | -.158    | -.044    | -.142    | -.247   | -.051     | -.120           | -.060           |
| IC             | -.117                      | -.146           | -.157           | -.049           | -.031           | -.010           | -.125          | -.022          | -.065            | -.029            | -.062    | -.261    | -.043    | -.102   | -.172     | -.132           | -.136           |

\* p < .05  
\*\* p < .01

NOTE: Bold-in areas indicate relationships among primary variables.

TABLE D-3. ZERO-ORDER CORRELATIONS BETWEEN MEASURES OF PERFORMANCE ON COMPUTER TRACKING AND COMPUTER TARGET ENGAGEMENT JOINT SAMPLES FOR TANK COMPANIES (TC), BOMBERS (B), AND COMBINED (C) SUBSAMPLES

| Computer Tracking | Computer Target Engagement |                 |                 |                 |                 |                 |                 |                |                |                 |                 |          |          |          |         |                |                |                |
|-------------------|----------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|----------------|----------------|-----------------|-----------------|----------|----------|----------|---------|----------------|----------------|----------------|
|                   | PROCS: ERROR               | 35: ERROR (AVG) | 35: ERROR (MIN) | 11: ERROR (AVG) | 11: ERROR (MIN) | 12: ERROR (AVG) | 12: ERROR (MIN) | F: ERROR (AVG) | F: ERROR (MIN) | 10: ERROR (AVG) | 10: ERROR (MIN) | 35: TIME | 11: TIME | 12: TIME | F: TIME | 10: TIME (MIN) | 10: TIME (MAX) | 10: TIME (AVG) |
| EASY:TOT          | -.001                      | -.061           | -.081           | -.088           | .652            | -.297           | -.187           | -.072          | .105           | -.184           | -.110           | -.276    | -.072    | -.172    | -.108   | -.110          | -.256          | -.112          |
| S                 | -.061                      | -.007           | -.073           | -.030           | .036            | -.034           | -.140           | -.079          | .010           | -.033           | -.077           | -.327*   | -.144    | -.074    | -.107   | -.077          | -.144          | -.107          |
| TOT               | -.025                      | -.001           | -.071           | -.021           | .055            | -.089           | -.141           | -.073          | .006           | -.053           | -.069           | -.205*   | -.078    | -.074    | -.116   | -.069          | -.147          | -.116          |
| EASY:ERROR        | TC                         | -.015           | .024            | .031            | .182            | .046            | .141            | .063           | .019           | .114            | .173            | .116     | .181     | .160     | .117    | .141           | .205           | .160           |
| B                 | -.024                      | .045            | .122            | .146            | -.030           | .150            | .095            | .141           | -.055          | .153            | .042            | .307*    | .011     | .127     | .107    | .134           | .205           | .107           |
| C                 | -.088                      | .041            | .064            | -.133           | -.004           | -.146           | -.131           | .119           | -.076          | .141            | .094            | .241*    | -.076    | .138     | .174    | .150           | .205           | .138           |
| MOD:TOT           | TC                         | -.171           | .215            | .269            | -.065           | .042            | -.144           | -.025          | -.032          | .073            | .079            | -.189    | -.059    | .017     | -.108   | -.079          | -.171          | -.047          |
| B                 | -.088                      | .117            | .194            | -.072           | -.096           | -.089           | -.191           | -.078          | -.092          | -.044           | -.171           | -.279*   | -.083    | .015     | -.174   | -.171          | -.171          | -.174          |
| C                 | -.124                      | .155            | .218*           | -.039           | -.038           | -.094           | -.133           | -.074          | -.085          | -.079           | -.017           | -.275*   | -.069    | -.14     | -.121   | -.121          | -.121          | -.121          |
| MOD:ERROR         | TC                         | .071            | .233            | .199            | .018            | .040            | -.009           | .063           | -.131          | .046            | .105            | .111**   | .063     | .133     | .171    | .105           | .171           | .133           |
| B                 | .006                       | .041            | .212            | .046            | .094            | .013            | .090            | -.093          | -.043          | -.044           | .027            | .348*    | -.045    | .144     | .144    | .144           | .144           | .144           |
| C                 | .088                       | -.101           | -.206           | .035            | -.027           | .019            | .003            | .071           | -.076          | -.031           | -.031           | .362**   | -.076    | .073     | .171    | .171           | .171           | .171           |
| HARD:TOT          | TC                         | -.201           | .015            | .210            | -.110           | -.049           | -.148           | -.045          | -.068          | -.041           | -.037           | -.211    | .093     | .143     | .171    | .171           | .171           | .171           |
| B                 | -.182                      | -.104           | -.092           | -.067           | .137            | -.075           | -.248           | -.098          | -.158          | -.066           | -.268*          | -.304*   | .274     | .144     | .171    | .171           | .171           | .171           |
| C                 | -.186                      | -.016           | .068            | -.055           | -.089           | -.054           | -.172           | -.074          | -.048          | -.060           | -.157           | -.278*   | .171     | .14      | .171    | .171           | .171           | .171           |
| HARD:ERROR        | TC                         | .220            | -.122           | -.215           | -.044           | -.019           | .157            | .057           | -.088          | .037            | .070            | .141     | .101     | .171     | .171    | .171           | .171           | .171           |
| B                 | .135                       | .068            | .068            | -.043           | .070            | .108            | .214            | .070           | -.093          | .084            | .145            | .171     | .171     | .171     | .171    | .171           | .171           | .171           |
| C                 | .134                       | -.205           | -.150           | -.007           | -.061           | .101            | .115            | -.000          | -.090          | .045            | .072            | .171     | .171     | .171     | .171    | .171           | .171           | .171           |
| AVG:TOT           | TC                         | -.191           | .239            | .276            | -.111           | .093            | -.295           | -.131          | -.106          | .096            | .184            | -.272    | .047     | .094     | .171    | .171           | .171           | .171           |
| B                 | -.035                      | -.023           | .076            | -.013           | .041            | -.040           | -.274           | -.031          | .078           | -.033           | -.152           | -.312**  | .040     | .040     | .171    | .171           | .171           | .171           |
| C                 | -.098                      | .077            | .140            | -.024           | .070            | -.102           | -.178           | -.031          | .073           | -.063           | -.119           | -.370**  | .171     | .171     | .171    | .171           | .171           | .171           |
| AVG:ERROR         | TC                         | .154            | -.221           | -.202           | .017            | -.029           | .169            | .084           | .025           | .098            | .045            | .270     | .145     | .144     | .171    | .171           | .171           | .171           |
| B                 | -.063                      | .046            | -.161           | .154            | .002            | -.119           | .193            | .106           | -.081          | .198            | .042            | .204     | .101     | .171     | .171    | .171           | .171           | .171           |
| C                 | -.080                      | -.345           | -.195           | .078            | -.014           | .133            | .149            | .087           | -.081          | .198            | .042            | .194*    | .078     | .171     | .171    | .171           | .171           | .171           |

\* p < .05  
 \*\* p < .01  
 \*\*\* p < .001

NOTE: Boxed-in areas indicate relationships among primary variables.

TABLE D-4. ZERO-ORDER CORRELATIONS BETWEEN MEASURES OF PERFORMANCE ON TC DECISION MAKING AND HANDS-ON GUN LAYING JOB SAMPLES FOR TANK COMMANDERS (TC), GUNNERS (G), AND COMBINED (TCG) SUBSAMPLES

| TC<br>Decison<br>Making |     | Hands-On Gun Laying |              |
|-------------------------|-----|---------------------|--------------|
|                         |     | GL:<br>TIME         | GL:<br>ERROR |
| D:CORR                  | TC  | -.053               | .055         |
|                         | G   | .276                | -.118        |
|                         | TCG | .156                | -.043        |
| D:TIME                  | TC  | .379*               | -.010        |
|                         | G   | .180                | .184         |
|                         | TCG | .254*               | .119         |

\*  $p \leq .05$

TABLE D-5. ZERO-ORDER CORRELATIONS BETWEEN MEASURES OF PERFORMANCE ON  
 TC DECISION MAKING AND HANDS-ON TRACKING JOB SAMPLES FOR  
 TANK COMMANDERS (TC), GUNNERS(G), AND COMBINED (TCG) SUBSAMPLES

| TC<br>Decision<br>Making | Hands-On Tracking |              |              |             |             |            |
|--------------------------|-------------------|--------------|--------------|-------------|-------------|------------|
|                          | TC                | TOT:<br>HITS | TOT:<br>DIST | TC:<br>HITS | TC:<br>DIST | G:<br>DIST |
| D:CORR                   | TC                | .101         | -.428*       | .066        | -.402*      | -.423*     |
|                          | G                 | .074         | -.066        | .082        | -.068       | -.060      |
|                          | TCG               | .083         | -.210        | .071        | -.198       | .209       |
| D:TIME                   | TC                | .071         | -.001        | .068        | .010        | -.011      |
|                          | G                 | .112         | -.377**      | .136        | -.367**     | -.365**    |
|                          | TCG               | .085         | -.263*       | .087        | -.255*      | -.254*     |

\* p ≤ .05

\*\* p ≤ .01

NOTE: Boxed-in area indicates relationships among primary variables.

TABLE D-6. ZERO-ORDER CORRELATIONS BETWEEN MEASURES OF PERFORMANCE ON TC DECISION MAKING AND HANDS-ON TARGET ENGAGEMENT JOB SAMPLES FOR TANK COMMANDERS (TC), GUNNERS (G), AND COMBINED (TCG) SUBSAMPLES

| TC Decision Making | Hands-On Target Engagement |              |              |             |            |
|--------------------|----------------------------|--------------|--------------|-------------|------------|
|                    |                            | TOT:<br>HITS | TOT:<br>TIME | TC:<br>TIME | G:<br>TIME |
| D:CORR             | TC                         | -.293        | .047         | -.079       | .278       |
|                    | G                          | -.085        | .126         | .054        | .214       |
|                    | TCG                        | -.140        | .094         | .004        | .241*      |
| D:TIME             | TC                         | .167         | .125         | .004        | .306       |
|                    | G                          | .005         | .125         | .026        | .278       |
|                    | TCG                        | .051         | .134         | .031        | .284**     |

\*  $p \leq .05$

\*\*  $p \leq .01$

NOTE: Boxed-in areas indicate relationships among primary variables.

TABLE D-7. ZERO-ORDER CORRELATIONS BETWEEN MEASURES OF PERFORMANCE ON HANDS-ON TRACKING JOB SAMPLES FOR TANK COMMANDERS (TC), GUNNERS(G), AND COMBINED (TCG) SUBSAMPLES

| Hands-On Gun Laying | Hands-On Tracking |           |          |          |          |         |
|---------------------|-------------------|-----------|----------|----------|----------|---------|
|                     | TOT: HITS         | TOT: DIST | TC: HITS | TC: DIST | G: HITS  | G: DIST |
| GL: TIME            | TC<br>.033        | -.102     | .002     | -.068    | .072     | -.126   |
|                     | G<br>-.137        | -.219     | -.108    | -.249    | -.160    | -.181   |
|                     | TCG<br>-.102      | -.241*    | -.120    | -.247*   | -.051    | -.223*  |
| GL: ERROR           | TC<br>-.482**     | .053      | -.429*   | .054     | -.396*   | .049    |
|                     | G<br>-.422**      | -.022     | -.355*   | -.006    | -.460**  | -.036   |
|                     | TCB<br>-.450***   | -.007     | -.393*** | .003     | -.427*** | -.016   |

\*  $p \leq .05$

\*\*  $p \leq .01$

NOTE: Boxed-in area indicates relationships among primary variables.

TABLE D-8. ZERO-ORDER CORRELATIONS BETWEEN MEASURES OF PERFORMANCE ON HANDS-ON GUN LAYING AND HANDS-ON TARGET ENGAGEMENT JOB SAMPLES FOR TANK COMMANDERS (TC), GUNNERS (G), AND COMBINED (TCG) SUBSAMPLES

| Hands-On<br>Gun<br>Laying | Hands-On Target Engagement |              |              |             |            |
|---------------------------|----------------------------|--------------|--------------|-------------|------------|
|                           |                            | TOT:<br>HITS | TOT:<br>TIME | TC:<br>TIME | G:<br>TIME |
| GL:TIME                   | TC                         | .161         | .326         | .203        | .414*      |
|                           | G                          | -.044        | .246         | .163        | .273       |
|                           | TCG                        | -.005        | .286**       | .203        | .298**     |
| GL:ERROR                  | TC                         | -.461**      | -.081        | -.125       | .047       |
|                           | G                          | -.305        | .074         | .078        | .011       |
|                           | TCG                        | -.269*       | .020         | .011        | .026       |

\*  $p \leq .05$

\*\*  $p \leq .01$

NOTE: Boxed-in areas indicate relationships among primary variables.



TABLE D-9. ZERO-ORDER CORRELATIONS BETWEEN MEASURES OF PERFORMANCE ON HANDS-ON TRACKING AND HANDS-ON TARGET ENGAGEMENT JOB SAMPLES FOR TANK COMMANDERS (TC), GUNNERS (G), AND COMBINED (TCG) SUBSAMPLES

| Hands-On Tracking |     | Hands-On Target Engagement |              |             |            |
|-------------------|-----|----------------------------|--------------|-------------|------------|
|                   |     | TOT:<br>HITS               | TOT:<br>TIME | TC:<br>TIME | G:<br>TIME |
| TOT:HITS          | TC  | .205                       | .035         | .115        | -.140      |
|                   | G   | -.280                      | .038         | .018        | .062       |
|                   | TCG | -.214                      | .027         | .042        | -.022      |
| TOT:DIST          | TC  | -.216                      | -.191        | -.144       | -.193      |
|                   | G   | .266                       | -.194        | -.071       | -.359*     |
|                   | TCG | .153                       | -.210        | -.120       | -.283**    |
| TC:HITS           | TC  | .222                       | -.018        | .068        | -.180      |
|                   | G   | -.268                      | .107         | .062        | .147       |
|                   | TCG | -.203                      | .035         | .041        | -.001      |
| TC:DIST           | TC  | -.258                      | -.169        | -.134       | -.158      |
|                   | G   | .248                       | -.184        | -.067       | -.339*     |
|                   | TCG | .143                       | -.195        | -.113       | -.260*     |
| G:HITS            | TC  | .096                       | .107         | .148        | -.028      |
|                   | G   | -.251                      | -.064        | -.045       | -.064      |
|                   | TCG | -.173                      | .010         | .033        | -.049      |
| G:DIST            | TC  | -.164                      | -.198        | -.144       | -.211      |
|                   | G   | .268                       | -.196        | -.071       | -.363**    |
|                   | TCG | .155                       | -.213        | -.121       | -.291**    |

\*  $p \leq .05$

\*\*  $p \leq .01$

\*\*\*  $p \leq .001$

NOTE: Boxed-in areas indicate relationships among primary variables.

TABLE D-10. ZERO-ORDER CORRELATIONS BETWEEN MEASURES OF PERFORMANCE ON COMPUTER PANEL AND TC DECISION MAKING JOB SAMPLES FOR TANK COMMANDERS (TC), GUNNERS (G), AND COMBINED (TCG) SUBSAMPLES

| Computer Panel |     | TC Decision Making |            |
|----------------|-----|--------------------|------------|
|                |     | D:<br>CORR         | D:<br>TIME |
| ECD:CORR       | TC  | -.079              | -.036      |
|                | G   | .115               | -.100      |
|                | TCG | .010               | -.072      |
| ECD:TIME       | TC  | .108               | -.369      |
|                | G   | -.051              | .274       |
|                | TCG | .009               | .038       |
| CST:CORR       | TC  | -.110              | .148       |
|                | G   | .111               | -.147      |
|                | TCG | .007               | -.019      |
| CST:TIME       | TC  | -.042              | -.068      |
|                | G   | .161               | .478**     |
|                | TCG | .064               | .246*      |
| AVG:CORR       | TC  | -.109              | .062       |
|                | G   | .154               | -.173      |
|                | TCG | .011               | -.055      |
| AVG:TIME       | TC  | .026               | -.234      |
|                | G   | .070               | .450**     |
|                | TCG | .046               | .179       |

\*  $p \leq .05$

\*\*  $p \leq .01$

NOTE: Boxed-in area indicates relationships among primary variables.

TABLE D-11. ZERO-ORDER CORRELATIONS BETWEEN MEASURES OF PERFORMANCE ON COMPUTER PANEL AND HANDS-ON GUN LAYING JOB SAMPLES FOR TANK COMMANDERS (TC), GUNNERS (G), AND COMBINED (TCG) SUBSAMPLES

| Computer Panel |     | Hands-On Gun Laying |              |
|----------------|-----|---------------------|--------------|
|                |     | GL:<br>TIME         | GL:<br>ERROR |
| ECD:CORR       | TC  | -.358               | -.013        |
|                | G   | .075                | -.267        |
|                | TCG | -.060               | -.124        |
| ECD:TIME       | TC  | -.555***            | .470*        |
|                | G   | .124                | .040         |
|                | TCG | -.108               | .202         |
| CST:CORR       | TC  | .054                | .049         |
|                | G   | .052                | -.251        |
|                | TCG | .080                | -.107        |
| CST:TIME       | TC  | -.222               | .238         |
|                | G   | .102                | .261         |
|                | TCG | -.036               | .248*        |
| AVG:CORR       | TC  | -.180               | .020         |
|                | G   | .085                | -.354*       |
|                | TCG | .016                | -.143        |
| AVG:TIME       | TC  | -.455*              | .403*        |
|                | G   | .134                | .183         |
|                | TCG | -.083               | .270*        |

\*p ≤ .05  
 \*\*\*p ≤ .001

NOTE: Boxed-in area indicates relationships among primary variables.

TABLE D-12. ZERO-ORDER CORRELATIONS BETWEEN MEASURES OF PERFORMANCE ON COMPUTER PANEL AND HANDS-ON TRACKING JOB SAMPLES FOR TANK COMMANDERS (TC), GUNNERS(G), AND COMBINED (TCG) SUBSAMPLES

| Computer Panel | Hands-on Tracking |           |          |          |         |         |
|----------------|-------------------|-----------|----------|----------|---------|---------|
|                | TOT: HITS         | TOT: DIST | TC: HITS | TC: DIST | G: HITS | G: DIST |
| ECD:CORR       | TC                | .040      | .291     | .052     | .069    | .028    |
|                | G                 | .084      | .039     | .078     | .023    | .087    |
|                | TCG               | .039      | .156     | .043     | .057    | .033    |
| ECD:TIME       | TC                | -.020     | -.038    | -.029    | .028    | -.011   |
|                | G                 | -.324*    | -.286    | -.089    | -.325*  | .019    |
|                | TCG               | -.192     | -.153    | -.055    | -.192   | .023    |
| CST:CORR       | TC                | .263      | .053     | .220     | .038    | .277    |
|                | G                 | -.218     | -.019    | -.223    | .171    | -.205   |
|                | TCG               | -.030     | -.002    | -.053    | .115    | -.007   |
| CST:TIME       | TC                | -.099     | -.154    | -.134    | -.061   | -.062   |
|                | G                 | .029      | -.127    | -.014    | -.235   | -.067   |
|                | TCG               | -.007     | -.119    | -.047    | -.163   | .028    |
| AVG:CORR       | TC                | .174      | .202     | .156     | .063    | .175    |
|                | G                 | -.118     | .008     | -.126    | .146    | -.106   |
|                | TCG               | .004      | .091     | -.009    | .108    | .015    |
| AVG:TIME       | TC                | -.079     | -.126    | -.108    | -.028   | -.048   |
|                | G                 | -.002     | -.242    | -.060    | -.331*  | .052    |
|                | TCG               | -.205     | -.160    | -.060    | -.210   | .031    |

\*  $p \leq .05$

NOTE: Boxed-in area indicates relationships among primary variables.

TABLE D-13. ZERO-ORDER CORRELATIONS BETWEEN MEASURES OF PERFORMANCE ON COMPUTER PANEL AND HANDS-ON TARGET ENGAGEMENT JOB SAMPLES FOR TANK COMMANDERS (TC), GUNNERS (G), AND COMBINED (TCG) SUBSAMPLES

| Computer Panel |     | Hands-On Target Engagement |              |             |            |
|----------------|-----|----------------------------|--------------|-------------|------------|
|                |     | TOT:<br>HITS               | TOT:<br>TIME | TC:<br>TIME | G:<br>TIME |
| ECD:CORR       | TC  | .166                       | -.230        | -.187       | -.431*     |
|                | G   | .129                       | -.082        | -.084       | -.012      |
|                | TCG | .147                       | -.205        | -.135       | -.226      |
| ECD:TIME       | TC  | -.025                      | -.311        | -.188       | -.461*     |
|                | G   | -.184                      | .038         | -.023       | .136       |
|                | TCG | -.112                      | -.110        | -.089       | -.085      |
| CST:CORR       | TC  | .041                       | .235         | .320        | -.069      |
|                | G   | -.248                      | -.062        | -.191       | .262       |
|                | TCG | -.114                      | .091         | .056        | .109       |
| CST:TIME       | TC  | .034                       | .097         | .022        | .229       |
|                | G   | -.161                      | -.050        | .026        | -.170      |
|                | TCG | -.074                      | .021         | .023        | .003       |
| AVG:CORR       | TC  | .120                       | -.042        | .073        | -.293      |
|                | G   | -.113                      | -.096        | -.195       | .192       |
|                | TCG | .012                       | -.063        | -.044       | -.063      |
| AVG:TIME       | TC  | .009                       | -.091        | -.081       | -.076      |
|                | G   | -.204                      | -.009        | .003        | -.027      |
|                | TCG | -.111                      | -.047        | -.034       | -.045      |

\*  $p \leq .05$

NOTE: Boxed-in areas indicate relationships among primary variables.

TABLE D-14. ZERO-ORDER CORRELATIONS BETWEEN MEASURES OF PERFORMANCE ON COMPUTER TRACKING AND TC DECISION MAKING JOB SAMPLES FOR TANK COMMANDERS (TC), GUNNERS (G), AND COMBINED (TCG) SUBSAMPLES

| Computer Tracking |     | TC Decision Making |            |
|-------------------|-----|--------------------|------------|
|                   |     | D:<br>CORR         | D:<br>TIME |
| EASY:TOT          | TC  | -.030              | -.316      |
|                   | G   | .203               | -.052      |
|                   | TCG | .116               | -.122      |
| EASY:ERROR        | TC  | -.130              | .205       |
|                   | G   | -.009              | .235       |
|                   | TCG | -.056              | .224*      |
| MOD:TOT           | TC  | -.098              | -.072      |
|                   | G   | .018               | .012       |
|                   | TCG | -.023              | -.008      |
| MOD:ERROR         | TC  | -.185              | .146       |
|                   | G   | -.019              | .195       |
|                   | TCG | -.079              | .178       |
| HARD:TOT          | TC  | -.165              | -.060      |
|                   | G   | .095               | -.237      |
|                   | TCG | .005               | -.153      |
| HARD:ERROR        | TC  | .024               | -.154      |
|                   | G   | .061               | .165       |
|                   | TCG | .017               | .027       |
| AVG:TOT           | TC  | -.060              | -.190      |
|                   | G   | .031               | -.087      |
|                   | TCG | .013               | -.101      |
| AVG:ERROR         | TC  | -.060              | .010       |
|                   | G   | .089               | .190       |
|                   | TCG | .014               | .120       |

\*  $p \leq .05$

NOTE: Boxed-in area indicates relationships among primary variables.

TABLE D-15. ZERO-ORDER CORRELATIONS BETWEEN MEASURES OF PERFORMANCE ON COMPUTER TRACKING AND HANDS-ON GUN LAYING JOB SAMPLES FOR FOR TANK COMMANDERS (TC), GUNNERS (G), AND COMBINED (TCG) SUBSAMPLES

| Computer Tracking |     | Hands-On Gun Laying |              |
|-------------------|-----|---------------------|--------------|
|                   |     | GL:<br>TIME         | GL:<br>ERROR |
| EASY:TOT          | TC  | .004                | -.213        |
|                   | G   | -.068               | -.334*       |
|                   | TCG | .026                | -.268*       |
| EASY:ERROR        | TC  | .160                | .173         |
|                   | G   | .245                | .062         |
|                   | TCG | .189                | .112         |
| MOD:TOT           | TC  | .143                | .147         |
|                   | G   | -.316*              | -.200        |
|                   | TCG | -.113               | -.052        |
| MOD:ERROR         | TC  | -.194               | -.192        |
|                   | G   | .325*               | .137         |
|                   | TCG | .033                | -.040        |
| HARD:TOT          | TC  | -.055               | -.189        |
|                   | G   | -.188               | -.288        |
|                   | TCG | -.072               | -.231        |
| HARD:ERROR        | TC  | -.146               | .064         |
|                   | G   | .234                | .459**       |
|                   | TCG | -.069               | .183         |
| AVG:TOT           | TC  | -.010               | -.079        |
|                   | G   | -.249               | -.372*       |
|                   | TCG | -.094               | -.233        |
| AVG:ERROR         | TC  | -.111               | -.010        |
|                   | G   | .365*               | .235         |
|                   | TCG | .046                | .085         |

\*  $p \leq .05$

\*\*  $p \leq .01$

NOTE: Boxed-in area indicates relationships among primary variables.

TABLE D-16. ZERO-ORDER CORRELATIONS BETWEEN MEASURES OF PERFORMANCE ON COMPUTER TRACKING AND HANDS-ON TRACKING JOB SAMPLES FOR TANK COMMANDERS (TC), GUNNERS (G), AND COMBINED (TCG) SUBSAMPLES

| Computer Tracking | Hands-On Tracking |           |          |          |         |         |
|-------------------|-------------------|-----------|----------|----------|---------|---------|
|                   | TOT: HITS         | TOT: DIST | TC: HITS | TC: DIST | G: HITS | G: DIST |
| EASY:TOT          | TC                | -.039     | .371*    | -.133    | -.012   | .047    |
|                   | G                 | .261      | .275     | -.117    | .202    | -.145   |
|                   | TCG               | .244*     | -.123    | -.146    | .124    | -.094   |
| EASY:ERROR        | TC                | -.145     | .149     | .232     | -.154   | .064    |
|                   | G                 | -.164     | -.197    | -.192    | -.095   | -.191   |
|                   | TCG               | -.160     | -.075    | -.044    | -.114   | -.100   |
| MOD:TOT           | TC                | -.038     | .015     | -.043    | -.057   | .063    |
|                   | G                 | .200*     | -.088    | -.079    | .224    | -.091   |
|                   | TCG               | .157      | -.060    | -.075    | .124    | -.043   |
| MOD:ERROR         | TC                | .189      | -.177    | -.153    | .215    | -.187   |
|                   | G                 | -.281*    | .044     | .077     | -.144   | .008    |
|                   | TCG               | -.121     | -.027    | .006     | -.024   | -.056   |
| HARD:TOT          | TC                | .146      | .145     | .061     | .011    | .214    |
|                   | G                 | .185      | -.046    | -.030    | .091    | -.059   |
|                   | TCG               | .150      | .005     | -.020    | .061    | .028    |
| HARD:ERROR        | TC                | -.120     | -.124    | -.091    | .098    | -.149   |
|                   | G                 | -.440**   | .221     | .237     | -.324*  | .189    |
|                   | TCG               | -.283*    | .102     | .129     | -.153   | .070    |
| AVG:TOT           | TC                | .127      | .021     | -.053    | -.080   | .087    |
|                   | G                 | .324*     | -.120    | -.104    | .233    | -.127   |
|                   | TCG               | .235      | -.085    | -.104    | .119    | -.062   |
| AVG:ERROR         | TC                | -.083     | .001     | .030     | .045    | -.025   |
|                   | G                 | -.333*    | .066     | .088     | -.202   | .038    |
|                   | TCG               | -.239*    | .059     | .084     | -.122   | .031    |

\* p ≤ .05  
 \*\* p ≤ .01  
 \*\*\*p ≤ .001

NOTE: Boxed-in area indicates relationships among primary variables.



TABLE D-17. ZERO-ORDER CORRELATIONS BETWEEN MEASURES OF PERFORMANCE ON COMPUTER TRACKING AND HANDS-ON TRACKING JOB SAMPLES FOR TANK COMMANDERS (TC), GUNNERS (G), AND COMBINED (TCG) SUBSAMPLES

| Computer Tracking |     | Hands-On Target Engagement |              |             |            |
|-------------------|-----|----------------------------|--------------|-------------|------------|
|                   |     | TOT:<br>HITS               | TOT:<br>TIME | TC:<br>TIME | G:<br>TIME |
| EASY:TOT          | TC  | -.238                      | -.367*       | -.247       | -.406*     |
|                   | G   | -.318*                     | -.199        | -.207       | -.035      |
|                   | TCG | -.272*                     | -.232*       | -.186       | -.186      |
| EASY:ERROR        | TC  | .431*                      | .169         | .069        | .271       |
|                   | G   | .478***                    | .322*        | .257        | .252       |
|                   | TCG | .451***                    | .251*        | .176        | .259*      |
| MOD:TOT           | TC  | -.236                      | -.142        | -.044       | -.252      |
|                   | G   | -.309*                     | -.320*       | -.319*      | -.095      |
|                   | TCG | -.276*                     | -.236*       | -.205       | -.156      |
| MOD:ERROR         | TC  | .156                       | -.028        | -.003       | -.061      |
|                   | G   | .623***                    | .388**       | .380**      | .131       |
|                   | TCG | .495***                    | .157         | .170        | .025       |
| HARD:TOT          | TC  | -.241                      | -.185        | -.100       | -.251      |
|                   | G   | -.105                      | -.362*       | -.352*      | -.023      |
|                   | TCG | -.137                      | -.241        | -.225       | -.123      |
| HARD:ERROR        | TC  | .121                       | .067         | .022        | .118       |
|                   | G   | .606***                    | .289         | .279        | .106       |
|                   | TCB | .395**                     | .107         | .082        | .095       |
| AVG:TOT           | TC  | -.288                      | -.291        | -.177       | -.357      |
|                   | G   | -.241                      | -.354*       | -.356*      | -.091      |
|                   | TCG | -.242                      | -.301*       | -.259*      | -.203      |
| AVG:ERROR         | TC  | .294                       | .005         | -.052       | .108       |
|                   | G   | .559***                    | .467**       | .432**      | .219       |
|                   | TCG | .465***                    | .191         | .157        | .145       |

\*  $p \leq .05$   
 \*\*  $p \leq .01$   
 \*\*\*  $p \leq .001$

NOTE: Boxed-in areas indicate relationships among primary variables.

TABLE D-18. ZERO-ORDER CORRELATIONS BETWEEN MEASURES OF PERFORMANCE ON COMPUTER TARGET ENGAGEMENT AND TC DECISION MAKING JOB SAMPLES FOR TANK COMMANDERS (TC), GUNNERS (G), AND COMBINED (TCG) SUBSAMPLES

| Computer Tracking |     | TC Decision Making |            |
|-------------------|-----|--------------------|------------|
|                   |     | D:<br>CORR         | D:<br>TIME |
| PROC:ERROR        | TC  | -.055              | -.267      |
|                   | G   | -.138              | .015       |
|                   | TCG | -.111              | -.085      |
| 3X:ERROR (AVG)    | TC  | .012               | -.074      |
|                   | G   | -.068              | .218       |
|                   | TCG | -.031              | .148       |
| 3X:ERROR (MDN)    | TC  | -.219              | -.065      |
|                   | G   | -.156              | .028       |
|                   | TCG | -.182              | -.005      |
| L1:ERROR (AVG)    | TC  | -.321              | -.038      |
|                   | G   | .161               | .145       |
|                   | TCG | .030               | .118       |
| L1:ERROR (MDN)    | TC  | -.192              | -.081      |
|                   | G   | -.046              | -.059      |
|                   | TCG | -.077              | -.051      |
| L2:ERROR (AVG)    | TC  | -.211              | .088       |
|                   | G   | .249               | .047       |
|                   | TCG | .120               | .068       |
| L2:ERROR (MDN)    | TC  | -.097              | .178       |
|                   | G   | .153               | -.017      |
|                   | TCG | .074               | .042       |
| F:ERROR (AVG)     | TC  | -.303              | -.056      |
|                   | G   | .134               | .124       |
|                   | TCG | .022               | .099       |
| F:ERROR (MDN)     | TC  | -.294              | -.117      |
|                   | G   | .042               | -.078      |
|                   | TCG | -.034              | -.065      |
| 10X:ERROR (AVG)   | TC  | -.287              | .010       |
|                   | G   | .198               | .102       |
|                   | TCG | .068               | .096       |

TABLE D-18. ZERO-ORDER CORRELATIONS BETWEEN MEASURES OF PERFORMANCE ON COMPUTER TARGET ENGAGEMENT AND TC DECISION MAKING JOB SAMPLES FOR TANK COMMANDERS (TC), GUNNERS (G), AND COMBINED (TCG) SUBSAMPLES (continued)

| Computer Tracking |     | TC Decision Making |            |
|-------------------|-----|--------------------|------------|
|                   |     | D:<br>CORR         | D:<br>TIME |
| 10X:ERROR (MDN)   | TC  | -.160              | .097       |
|                   | G   | .102               | -.040      |
|                   | TCG | .029               | .005       |
| 3X:TIME           | TC  | -.123              | .404*      |
|                   | G   | .087               | .259       |
|                   | TCG | .026               | .309**     |
| L1:TIME           | TC  | -.290              | .470**     |
|                   | G   | .075               | .059       |
|                   | TCG | -.064              | .182       |
| L2:TIME           | TC  | .360*              | .199       |
|                   | G   | .047               | -.012      |
|                   | TCG | .161               | .048       |
| F:TIME            | TC  | -.088              | -.073      |
|                   | G   | -.058              | .278*      |
|                   | TCG | -.064              | .197       |
| 10X:TIME          | TC  | -.224              | .465**     |
|                   | G   | .063               | .145       |
|                   | TCG | -.034              | .231       |
| TOT:TIME (AVG)    | TC  | -.210              | .519**     |
|                   | G   | .079               | .211       |
|                   | TCG | -.007              | .294**     |
| TOT:TIME (MDN)    | TC  | -.205              | .465**     |
|                   | G   | .090               | .190       |
|                   | TCG | -.001              | .269*      |

\*  $p \leq .05$

\*\*  $p \leq .01$

NOTE: Boxed-in areas indicate relationships among primary variables.

TABLE D-19. ZERO-ORDER CORRELATIONS BETWEEN MEASURES OF PERFORMANCE ON COMPUTER TARGET ENGAGEMENT AND HANDS-ON GUN LAYING JOB SAMPLES FOR FOR TANK COMMANDERS (TC), GUNNERS (G), AND COMBINED (TCG) SUBSAMPLES

| Computer Target Engagement |     | Hands-On Gun Laying |           |
|----------------------------|-----|---------------------|-----------|
|                            |     | GL: TIME            | GL: ERROR |
| PROC:ERROR                 | TC  | .030                | -.004     |
|                            | G   | -.096               | -.024     |
|                            | TCG | -.088               | -.021     |
| 3X:ERROR (AVG)             | TC  | .075                | .452*     |
|                            | G   | -.234               | .436**    |
|                            | TCG | -.091               | .440***   |
| 3X:ERROR (MDN)             | TC  | .053                | .348      |
|                            | G   | .264                | .292*     |
|                            | TCG | -.157               | .312**    |
| L1:ERROR (AVG)             | TC  | .230                | .268      |
|                            | G   | -.117               | -.106     |
|                            | TCG | .038                | .015      |
| L1:ERROR (MDN)             | TC  | .274                | .386*     |
|                            | G   | -.173               | -.107     |
|                            | TCG | -.016               | .042      |
| L2:ERROR (AVG)             | TC  | .371*               | .152      |
|                            | G   | -.050               | .027      |
|                            | TCG | .097                | .068      |
| L2:ERROR (MDN)             | TC  | .566***             | .076      |
|                            | G   | .007                | .075      |
|                            | TCG | .181                | .078      |
| F:ERROR (AVG)              | TC  | .194                | .246      |
|                            | G   | -.111               | -.069     |
|                            | TCG | .028                | .030      |
| F:ERROR (MDN)              | TC  | .173                | .371*     |
|                            | G   | -.153               | -.023     |
|                            | TCG | -.003               | .090      |
| 10X:ERROR (AVG)            | TC  | .296                | .227      |
|                            | G   | -.091               | -.041     |
|                            | TCG | .063                | .044      |

TABLE D-19. ZERO-ORDER CORRELATIONS BETWEEN MEASURES OF PERFORMANCE ON COMPUTER TARGET ENGAGEMENT AND HANDS-ON GUN LAYING JOB SAMPLES FOR FOR TANK COMMANDERS (TC), GUNNERS (G), AND COMBINED (TCG) SUBSAMPLES (continued)

| Computer Target Engagement |     | Hands-On Gun Laying |           |
|----------------------------|-----|---------------------|-----------|
|                            |     | GL: TIME            | GL: ERROR |
| 10X:ERROR (MDN)            | TC  | .505**              | .194      |
|                            | G   | -.065               | .023      |
|                            | TCG | .122                | .082      |
| 3X:TIME                    | TC  | .069                | -.061     |
|                            | G   | .213                | .104      |
|                            | TCG | .197                | .048      |
| L1:TIME                    | TC  | .054                | .162      |
|                            | G   | .177                | .180      |
|                            | TCG | .131                | .173      |
| L2:TIME                    | TC  | -.002               | .211      |
|                            | G   | -.003               | -.080     |
|                            | TCG | -.015               | .029      |
| F:TIME                     | TC  | .084                | .074      |
|                            | G   | -.131               | -.075     |
|                            | TCG | -.080               | -.027     |
| 10X:TIME                   | TC  | .075                | .186      |
|                            | G   | .101                | .116      |
|                            | TCG | .087                | .139      |
| TOT:TIME (AVG)             | TC  | .085                | .084      |
|                            | G   | .160                | .117      |
|                            | TCG | .150                | .107      |
| TOT:TIME (MDN)             | TC  | .131                | .090      |
|                            | G   | .200                | .123      |
|                            | TCG | .193                | .114      |

\*  $p \leq .05$

\*\*  $p \leq .01$

\*\*\* $p \leq .001$

NOTE: Boxed-in areas indicate relationships among primary variables.

TABLE D-20. ZERO-ORDER CORRELATIONS BETWEEN MEASURES OF PERFORMANCE ON COMPUTER TARGET ENGAGEMENT AND HANDS-ON TRACKING JOB SAMPLES FOR TANK COMMANDERS (TC), GUNNERS(G), AND COMBINED (TCG) SUBSAMPLES

|                            |     | Hands-On Tracking |           |          |          |         |         |
|----------------------------|-----|-------------------|-----------|----------|----------|---------|---------|
| Computer Target Engagement |     | TOT: HITS         | TOT: DIST | TC: HITS | TC: DIST | G: HITS | G: DIST |
| PROC:ERROR                 | TC  | -.176             | -.019     | -.153    | -.054    | -.144   | -.014   |
|                            | G   | .007              | .082      | .019     | .036     | -.010   | .123    |
|                            | TCG | -.049             | .065      | -.030    | .023     | -.064   | .101    |
| 3X:ERROR (AVG)             | TC  | .010              | -.142     | .089     | -.047    | -.123   | -.218   |
|                            | G   | -.109             | -.064     | -.079    | -.016    | -.135   | -.108   |
|                            | TCG | .080              | -.108     | -.037    | -.044    | -.124   | -.161   |
| 3X:ERROR (MDN)             | TC  | .037              | .003      | .125     | .023     | -.120   | -.015   |
|                            | G   | -.131             | .114      | -.134    | .171     | -.108   | .051    |
|                            | TCG | -.065             | .081      | -.021    | .125     | -.114   | .035    |
| L1:ERROR (AVG)             | TC  | -.354             | -.025     | -.315    | .065     | -.277   | -.104   |
|                            | G   | .191              | -.012     | .185     | -.032    | .170    | .008    |
|                            | TCG | .020              | -.051     | -.005    | -.038    | .053    | -.059   |
| L1:ERROR (MDN)             | TC  | -.373*            | .098      | -.357*   | .142     | -.250   | .052    |
|                            | G   | .197              | -.043     | .123     | -.046    | .268    | -.037   |
|                            | TCG | .028              | -.030     | -.045    | -.020    | .130    | -.037   |
| L2:ERROR (AVG)             | TC  | -.303             | -.124     | -.362*   | -.038    | -.088   | -.191   |
|                            | G   | .071              | -.029     | .035     | -.042    | .109    | -.015   |
|                            | TCG | -.045             | -.081     | -.108    | -.065    | .061    | -.091   |
| L2:ERROR (MDN)             | TC  | -.337             | -.050     | -.323    | .015     | -.224   | -.104   |
|                            | G   | .067              | -.042     | .015     | -.069    | .129    | -.014   |
|                            | TCG | -.068             | -.061     | -.116    | -.058    | .022    | -.060   |
| F:ERROR (AVG)              | TC  | -.276             | -.057     | -.225    | -.001    | -.248   | -.103   |
|                            | G   | .190              | .007      | .165     | .001     | .197    | .012    |
|                            | TCG | .046              | -.045     | .012     | -.032    | .084    | -.055   |
| F:ERROR (MDN)              | TC  | -.314             | .146      | -.315    | .155     | -.188   | .128    |
|                            | G   | .228              | -.044     | .158     | -.045    | .290*   | -.041   |
|                            | TCG | .067              | -.035     | -.015    | -.031    | .171    | -.036   |
| 10X:ERROR (AVG)            | TC  | -.330*            | -.080     | -.329*   | .003     | -.201   | -.149   |
|                            | G   | .147              | -.014     | .122     | -.027    | .160    | -.000   |
|                            | TCG | .001              | -.065     | -.045    | -.050    | .069    | -.073   |
| 10X:ERROR (MDN)            | TC  | -.378*            | .006      | -.364*   | .064     | -.248   | -.046   |
|                            | G   | .136              | -.047     | .070     | -.066    | .206    | -.026   |
|                            | TCG | -.028             | -.056     | -.093    | -.051    | .077    | -.057   |
| 3X:TIME                    | TC  | .138              | -.034     | .077     | -.061    | .185    | -.007   |
|                            | G   | -.371**           | .134      | -.341*   | .049     | -.356*  | .211    |
|                            | TCG | -.216             | .045      | -.209    | -.016    | -.169   | .099    |

TABLE D-20. ZERO-ORDER CORRELATIONS BETWEEN MEASURES OF PERFORMANCE ON COMPUTER TARGET ENGAGEMENT AND HANDS-ON TRACKING JOB SAMPLES FOR TANK COMMANDERS (TC), GUNNERS(G), AND COMBINED (TCG) SUBSAMPLES (continued)

| Computer Target Engagement | Hands-On Tracking |           |          |          |         |         |      |  |
|----------------------------|-------------------|-----------|----------|----------|---------|---------|------|--|
|                            | TOT: HITS         | TOT: DIST | TC: HITS | TC: DIST | G: HITS | G: DIST |      |  |
| L1:TIME                    | TC                | .051      | .200     | .009     | .024    | .085    |      |  |
|                            | G                 | -.393**   | -.363**  | .139     | -.375** | .262    |      |  |
|                            | TCG               | -.197     | .144     | -.140    | .089    | -.231*  | .188 |  |
| L2:TIME                    | TC                | -.318     | .346     | -.267    | .279    | -.342   |      |  |
|                            | G                 | -.279     | .119     | .128     | -.235   | .063    |      |  |
|                            | TCG               | .022      | .068     | -.003    | -.054   | -.078   |      |  |
| F:TIME                     | TC                | -.042     | -.048    | -.018    | -.016   | .060    |      |  |
|                            | G                 | -.155     | -.121    | -.056    | -.179   | .154    |      |  |
|                            | TCG               | -.122     | -.094    | -.046    | -.131   | .119    |      |  |
| 10X:TIME                   | TC                | .193      | .231     | -.019    | .054    | .065    |      |  |
|                            | G                 | -.360**   | -.323*   | .095     | -.356** | .244*   |      |  |
|                            | TCG               | -.182     | -.124    | .055     | -.222*  | .175    |      |  |
| TOT:TIME (AVG)             | TC                | .199      | .188     | -.046    | .136    | .037    |      |  |
|                            | G                 | -.389**   | -.353*   | -.078    | -.380** | .243    |      |  |
|                            | TCG               | -.217     | -.180    | .024     | -.217   | .153    |      |  |
| TOT:TIME (MDN)             | TC                | .156      | .138     | -.001    | .120    | .060    |      |  |
|                            | G                 | -.294*    | -.279*   | -.006    | -.270   | .143    |      |  |
|                            | TCG               | -.159     | -.144    | -.021    | -.140   | .092    |      |  |

\* p ≤ .05

\*\* p ≤ .01

NOTE: Boxed-in areas indicate relationships among primary variables.

TABLE D-21. ZERO-ORDER CORRELATIONS BETWEEN MEASURES OF PERFORMANCE ON COMPUTER TARGET ENGAGEMENT AND HANDS-ON TARGET ENGAGEMENT JOB SAMPLES FOR TANK COMMANDERS (TC), GUNNERS (G), AND COMBINED (TCG) SUBSAMPLES

| Computer Target Engagement |     | Hands-On Target Engagement |              |             |            |
|----------------------------|-----|----------------------------|--------------|-------------|------------|
|                            |     | TOT:<br>HITS               | TOT:<br>TIME | TC:<br>TIME | G:<br>TIME |
| PROC:ERROR                 | TC  | -.147                      | .083         | -.074       | .335       |
|                            | G   | .042                       | .098         | .211        | -.252      |
|                            | TCG | -.013                      | .076         | .100        | -.027      |
| 3X:ERROR (AVG)             | TC  | -.287                      | .007         | -.056       | .121       |
|                            | G   | -.210                      | -.024        | -.018       | -.021      |
|                            | TCG | -.216                      | .005         | -.008       | .032       |
| 3X:ERROR (MDN)             | TC  | -.145                      | -.093        | -.147       | .055       |
|                            | G   | -.219                      | -.178        | -.107       | -.229      |
|                            | TCG | -.197                      | -.149        | -.120       | -.120      |
| L1:ERROR (AVG)             | TC  | .013                       | .091         | .058        | .106       |
|                            | G   | -.070                      | .108         | .145        | -.059      |
|                            | TCG | -.039                      | .125         | .146        | -.003      |
| L1:ERROR (MDN)             | TC  | -.162                      | -.071        | -.160       | .131       |
|                            | G   | -.190                      | -.114        | -.022       | -.260      |
|                            | TCG | -.169                      | -.080        | -.032       | -.138      |
| L2:ERROR (AVG)             | TC  | .096                       | .260         | .186        | .266       |
|                            | G   | -.094                      | .004         | .047        | -.106      |
|                            | TCG | -.044                      | .089         | .099        | .007       |
| L2:ERROR (MDN)             | TC  | -.040                      | .375*        | .194        | .520**     |
|                            | G   | -.148                      | .065         | .137        | -.160      |
|                            | TCG | -.116                      | .169         | .165        | .070       |
| F:ERROR (AVG)              | TC  | -.009                      | .107         | .084        | .095       |
|                            | G   | -.073                      | .125         | .178        | -.094      |
|                            | TCG | .046                       | .141         | .178        | -.032      |
| F:ERROR (MDN)              | TC  | -.185                      | -.050        | -.099       | .066       |
|                            | G   | -.192                      | -.031        | .057        | -.227      |
|                            | TCG | -.169                      | -.005        | .053        | -.133      |
| 10X:ERROR (AVG)            | TC  | .043                       | .177         | .127        | .181       |
|                            | G   | -.085                      | .073         | .119        | -.043      |
|                            | TCG | -.045                      | .120         | .142        | -.008      |



TABLE D-21. ZERO-ORDER CORRELATIONS BETWEEN MEASURES OF PERFORMANCE ON COMPUTER TARGET ENGAGEMENT AND HANDS-ON TARGET ENGAGEMENT JOB SAMPLES FOR TANK COMMANDERS (TC), GUNNERS (G), AND COMBINED (TCG) SUBSAMPLES (continued)

| Computer Target Engagement |     | Hands-On Target Engagement |              |            |           |
|----------------------------|-----|----------------------------|--------------|------------|-----------|
|                            |     | TOT:<br>HITS               | TOT:<br>TIME | TC<br>TIME | G<br>TIME |
| 10X:ERROR (MDN)            | TC  | -.088                      | .257         | .098       | .426**    |
|                            | G   | -.180                      | .013         | .100       | -.212     |
|                            | TCG | -.149                      | .099         | .118       | -.008     |
| 3X:TIME                    | TC  | -.041                      | -.041        | .069       | -.226     |
|                            | G   | .311*                      | .041         | .084       | -.094     |
|                            | TCG | .226                       | .032         | .097       | -.136     |
| L1:TIME                    | TC  | .178                       | .192         | .298       | -.105     |
|                            | G   | .016                       | -.007        | .047       | -.135     |
|                            | TCG | .060                       | .063         | .127       | -.123     |
| L2:TIME                    | TC  | -.037                      | -.171        | -.142      | -.137     |
|                            | G   | .056                       | -.008        | -.002      | -.016     |
|                            | TCG | .040                       | -.067        | -.050      | -.062     |
| F:TIME                     | TC  | -.123                      | -.073        | -.141      | .091      |
|                            | G   | .308*                      | .054         | .087       | -.067     |
|                            | TCG | .198                       | -.012        | .022       | -.017     |
| 10X:TIME                   | TC  | .126                       | .145         | .229       | -.086     |
|                            | G   | .090                       | .006         | .057       | -.125     |
|                            | TCG | .098                       | .050         | .106       | -.111     |
| TOT:TIME (AVG)             | TC  | .055                       | .069         | .183       | -.180     |
|                            | G   | .212                       | .023         | .074       | -.118     |
|                            | TCG | .178                       | .046         | .112       | -.134     |
| TOT:TIME (MDN)             | TC  | -.106                      | .188         | .325       | -.164     |
|                            | G   | .084                       | .076         | .143       | -.141     |
|                            | TCG | .043                       | .120         | .203       | -.144     |

\*  $p \leq .05$

\*\*  $p \leq .01$

NOTE: Boxed-in areas indicate relationships among primary variables.

APPENDIX E

TABLES OF RESULTS:  
COMPARISONS WITH PAST SUCCESS AT ANNUAL QUALIFICATIONS

## GLOSSARY OF BIOGRAPHIC AND DEPENDENT VARIABLES

### BIOGRAPHIC VARIABLES

| <u>Name</u> | <u>Description</u>                                    | <u>Code Levels</u>   |
|-------------|---|--|
| AGE         | Age   |  |
| EDUC        | Highest Level of Education Attained                   | 1 = Attended High School<br>2 = High School Graduate<br>3 = Attended College<br>4 = College Graduate |
| RANK        | Rank (Pay Grade)                                      | 1 = E1<br>2 = E2<br>3 = E3<br>4 = E4, SP4<br>5 = E5, SP5<br>6 = E6<br>7 = E7                         |
| ARMY:TIME   | Number Months in Army                                 |  |
| A1:TIME     | Number Months Served in M60A1                         |  |
| A3:TIME     | Number Months Served in M60A3                         |  |
| CP:TIME     | Number Months in Current Crew Position                |  |
| SC:MLAST    | Number Months Since Last Subcaliber Fire              |  |
| VRT:MLAST   | Number Months Since Last Vehicle Recognition Training |  |
| CTT:MLAST   | Number Months Since Last CTT Training                 |  |
| CO          | Combat Composite Score from ASVAB                     |  |
| GT          | General Technical Composite Score from ASVAB          |  |

GLOSSARY OF BIOGRAPHIC AND DEPENDENT VARIABLES (continued)

| <u>Name</u> | <u>Description</u>  | <u>Code Levels</u>  |
|-------------|---|---|
| GAME:FREQ   | Frequency With Which Play Computer Games  | 1 = Once Per Month<br>2 = Once Per Week<br>3 = More Than Once a Week<br>4 = Every Day |
| QAVG:TC     | Average Score at Annual Qualifications During 1974-1981 when in Tank Commander Crew Position                  | 1 = Unqualified<br>2 = Qualified<br>3 = Distinguished                                 |
| QAVG:G      | Average Score at Annual Qualifications During 1974-1981 when in Gunner Crew Position                          | See QAVG:TC   |
| QAVG:TCG    | Average Score at Annual Qualifications During 1974-1981 when in Either Tank Commander or Gunner Crew Position | See QAVG:TC   |
| MRQ:TC      | Score at Most Recent (1981) Annual Qualification when in TC Crew Position                                     | See QAVG:TC   |
| MRQ:G       | Score at Most Recent (1981) Annual Qualification when in Gunner Crew Position                                 | See QAVG:TC   |
| MRQ:TCG     | Score at Most Recent (1981) Annual Qualification when in Either Tank Commander or Gunner Crew Position        | See QAVG:TC   |

COMPUTER PANEL

|          |   |
|----------|---|
| ECD:CORR | Number Correct on Enter/Check Data (Maximum = 10)         |
| ECD:TIME | Average Time (seconds) to Complete Enter/Check Data Trial |

GLOSSARY OF BIOGRAPHIC AND DEPENDENT VARIABLES (continued)

| <u>Name</u>                | <u>Description</u>   |
|----------------------------|--|
| CST:CORR                   | Number Correct on Self-Test<br>(maximum = 10)                |
| CST:TIME                   | Average Time (seconds) to<br>Complete the Self-Test<br>Trial |
| AVG:CORR                   | Number Correct Averaged<br>Across Two Tasks                  |
| AVG:TIME                   | Completion Time Averaged<br>Across Two Tasks                 |
| COMPUTER TRACKING          |  |
| EASY:TOT                   | Time on Target (sec) for<br>Easy Tracking Task               |
| EASY:ERROR                 | RMS error (number pixels)<br>for Easy Tracking Task          |
| MOD:TOT                    | Time on Target (sec) for<br>Moderate Tracking Task           |
| MOD:ERROR                  | RMS Error (number pixels)<br>for Moderate Tracking Task      |
| HARD:TOT                   | Time on Target (sec) for<br>Hard Tracking Task               |
| HARD:ERROR                 | RMS Error (number pixels)<br>for Hard Tracking Task          |
| AVG:TOT                    | Average Time on Target<br>(sec)                              |
| AVG:ERROR                  | Average RMS Error (number<br>pixels)                         |
| COMPUTER TARGET ENGAGEMENT |  |
| 3X:TIME                    | Average Time (sec) in<br>3X Segment                          |
| L1:TIME                    | Average Time (sec) in<br>Laser 1 Segment                     |

GLOSSARY OF BIOGRAPHIC AND DEPENDENT VARIABLES (continued)

| <u>Name</u>    | <u>Description</u>                                |
|----------------|---|
| L2:TIME        | Average Time (sec) in Laser 2 Segment             |
| F:TIME         | Average Time (sec) in Fire Segment                |
| 10X:TIME       | Average Total Time (sec) in 10X Segment           |
| TOT:TIME (AVG) | Average Time (sec) from Beginning to End of Trial |
| TOT:TIME (MDN) | Median Time (sec) from Beginning to End of Trial  |

TANK COMMANDER DECISION MAKING

|        |                             |
|--------|-----------------------------|
| D:CORR | Number of Correct Decisions |
| D:TIME | Time to Reach a Decision    |

HANDS-ON GUN LAYING

|          |   |
|----------|---|
| GL:ERROR | Distance Between Actual Gun Lay and Target          |
| GL:TIME  | Time from Appearance of Target to Completed Gun Lay |

HANDS-ON TRACKING

|          |   |
|----------|---|
| TOT:HITS | Number Hits Averaged Across the TC and Gunner Station               |
| TOT:DIST | Distance (inches) Tracked Averaged Across the TC and Gunner Station |
| TC:HITS  | Number Hits at the TC Station                                       |
| TC:DIST  | Distance (inches) Tracked at the TC Station                         |

GLOSSARY OF BIOGRAPHIC AND DEPENDENT VARIABLES (continued)

| <u>Name</u> | <u>Description</u>                              |
|-------------|---|
| G:HITS      | Number Hits at the Gunner Station               |
| G:DIST      | Distance (inches) Tracked at the Gunner Station |

HANDS-ON TARGET ENGAGEMENT

|          |   |
|----------|---|
| TOT:HITS | Total Number of Hits in 15 Trials   |
| TOT:TIME | Average Total Time (sec) from Onset of a Trial to Press of the Gunner's Trigger                           |
| TC:TIME  | Average Time (sec) from Onset of a Trial to Point at which TC Removes Hands from TC Power Handle          |
| G:TIME   | Average Time (sec) from Point at which TC Removes Hands from TC Power Handle to Press of Gunner's Trigger |

TABLE E-1. ZERO-ORDER CORRELATIONS BETWEEN BIOGRAPHICAL MEASURES (ARMY EXPERIENCE, TRAINING, TEST SCORES) AND MEASURES OF PAST SUCCESS AT ANNUAL QUALIFICATIONS (FROM BIOGRAPHICAL DATA) FOR TANK COMMANDERS (TC), GUNNERS(G), AND COMBINED (TCG) SUBSAMPLES

| Biographical Data           |      |            |          |          |          |           |            |            |       |       |            |  |  |
|-----------------------------|------|------------|----------|----------|----------|-----------|------------|------------|-------|-------|------------|--|--|
| Past Success at Annual Qual | RANK | ARMY: TIME | A1: TIME | A3: TIME | CP: TIME | SC: MLAST | VRT: MLAST | CTT: MLAST | CO    | GT    | GAME: FREQ |  |  |
| QAVG:TC                     | TC   | -.345      | -.170    | .102     | .017     | .418*     | .278       | -.128      | -.041 | -.069 | -.046      |  |  |
|                             | G    | -.153      | .197     | ---      | .187     | -.137     | -.157      | -.454      | -.559 | -.459 | .476       |  |  |
|                             | TCG  | -.227      | -.022    | .142     | .134     | .348*     | .206       | -.128      | -.185 | -.057 | .032       |  |  |
| QAVG:G                      | TC   | -.186      | -.318    | -.086    | -.177    | .357      | -.093      | .263       | .176  | .066  | .338       |  |  |
|                             | G    | .116       | .172     | -.072    | .002     | -.217     | -.104      | -.295      | -.086 | .097  | .102       |  |  |
|                             | TCG  | -.023      | -.090    | .018     | -.075    | .132      | -.093      | .129       | .032  | .102  | -.238      |  |  |
| QAVG:TCG                    | TC   | -.210      | -.067    | .028     | .117     | .394*     | .017       | .056       | .138  | -.115 | .088       |  |  |
|                             | G    | -.036      | .096     | -.035    | ---      | -.142     | -.116      | -.353      | -.144 | .007  | .154       |  |  |
|                             | TCG  | -.049      | .075     | .013     | .158     | .187      | -.045      | -.022      | -.059 | -.019 | .135       |  |  |
| MRQ:TC                      | TC   | .059       | .101     | .085     | .278     | .184      | -.078      | .361       | .131  | -.170 | .184       |  |  |
|                             | G    | .016       | .344     | ---      | .285     | .066      | -.313      | 1.000      | -.755 | -.625 | .535       |  |  |
|                             | TCG  | .144       | .232     | .125     | .343     | .127      | -.134      | .305       | -.133 | -.167 | .268       |  |  |
| MRQ:G                       | TC   | ---        | ---      | ---      | ---      | ---       | ---        | ---        | ---   | ---   | ---        |  |  |
|                             | G    | -.163      | -.033    | -.060    | -.211    | -.095     | .227       | ---        | ---   | ---   | -.200      |  |  |
|                             | TCG  | -.167      | -.048    | -.052    | -.190    | -.116     | .150       | ---        | ---   | ---   | -.191      |  |  |
| MRQ:TCG                     | TC   | .062       | .101     | .119     | .279     | .103      | -.131      | .089       | .156  | -.145 | .191       |  |  |
|                             | G    | .088       | .161     | .026     | .046     | -.095     | .005       | -.090      | -.303 | -.279 | -.030      |  |  |
|                             | TCG  | .206       | .251     | .071     | .304**   | .106      | -.043      | .073       | -.108 | -.091 | .141       |  |  |

\* p ≤ .05

\*\*p ≤ .01

<sup>1</sup> Impossible to compute correlation because (1) n=0 or (2) SD=0.



TABLE E-2. ZERO-ORDER CORRELATIONS BETWEEN PERFORMANCE MEASURES ON COMPUTER PANEL JOB SAMPLE AND MEASURES OF PAST SUCCESS AT ANNUAL QUALIFICATIONS (FROM BIOGRAPHICAL DATA) FOR TANK COMMANDERS (TC), GUNNERS(G), AND COMBINED (TCG) SUBSAMPLES

| Past Success of Annual Qual |     | Computer Panel |           |           |           |           |           |
|-----------------------------|-----|----------------|-----------|-----------|-----------|-----------|-----------|
|                             |     | ECD: CORR      | ECD: TIME | CST: CORR | CST: TIME | AVG: CORR | AVG: TIME |
| QAVG:TC                     | TC  | -.147          | -.175     | -.159     | -.040     | -.174     | -.116     |
|                             | G   | -.703          | -.169     | .354      | .749      | -.349     | .330      |
|                             | TCG | -.231          | -.066     | -.109     | .091      | -.200     | .026      |
| QAVG:G                      | TC  | -.034          | -.196     | .236      | -.415     | .091      | -.380     |
|                             | G   | -.178          | -.089     | .213      | -.265     | .038      | -.216     |
|                             | TCG | -.091          | -.145     | .216      | -.350*    | .067      | -.306*    |
| QAVG:TCG                    | TC  | -.181          | -.210     | -.018     | -.171     | -.117     | -.225     |
|                             | G   | -.247          | .058      | .221      | -.073     | .002      | -.012     |
|                             | TCG | -.213          | -.053     | .077      | -.103     | -.083     | -.096     |
| MRQ:TC                      | TC  | .272           | .004      | .226      | -.312     | .292      | -.210     |
|                             | G   | -.707          | .325      | .717      | .889      | -.000     | .805      |
|                             | TCG | .096           | .121      | .316      | -.082     | .229      | .012      |
| MRQ:G                       | TC  | ---            | ---       | ---       | ---       | ---       | ---       |
|                             | G   | .139           | .092      | .079      | -.092     | .157      | -.005     |
|                             | TCG | .114           | .068      | .075      | -.104     | .140      | -.026     |
| MRQ:TCG                     | TC  | .195           | -.022     | .201      | -.319     | .235      | -.227     |
|                             | G   | -.148          | .118      | .267      | .188      | .095      | .180      |
|                             | TCG | .042           | .089      | .210      | -.094     | .154      | -.012     |

\*  $p \leq .05$

<sup>1</sup>Impossible to compute correlation because: (1)  $n=0$  or (2)  $SD=0$ .

TABLE E-3. ZERO-ORDER CORRELATIONS BETWEEN PERFORMANCE MEASURES ON COMPUTER TRACKING JOB SAMPLE AND MEASURES OF PAST SUCCESS AT ANNUAL QUALIFICATIONS (FROM BIOGRAPHICAL DATA) FOR TANK COMMANDERS (TC), GUNNERS(G), AND COMBINED (TCG) SUBSAMPLES

| Past Success at Annual Qual | Computer Tracking |             |          |            |           |             |          |            |  |  |
|-----------------------------|-------------------|-------------|----------|------------|-----------|-------------|----------|------------|--|--|
|                             | EASY: TOT         | EASY: ERROR | MOD: TOT | MOD: ERROR | HARD: TOT | HARD: ERROR | AVG: TOT | AVG: ERROR |  |  |
| QAVG:TC                     | TC<br>.052        | -.227       | .042     | -.348      | .246      | -.293       | .225     | -.379      |  |  |
|                             | G<br>-.231        | .753        | -.589    | -.123      | -.679     | .599        | -.351    | .552       |  |  |
|                             | TCG<br>-.103      | -.040       | -.105    | -.272      | .012      | -.087       | -.012    | -.132      |  |  |
| QAVG:G                      | TC<br>.117        | -.003       | .017     | -.328      | .006      | -.237       | .027     | -.166      |  |  |
|                             | G<br>-.101        | .035        | .029     | -.102      | .042      | -.179       | -.069    | -.095      |  |  |
|                             | TCG<br>-.021      | .012        | .012     | -.182      | .017      | -.190       | -.033    | -.114      |  |  |
| QAVG:TCG                    | TC<br>-.091       | -.112       | -.030    | -.264      | .056      | -.242       | .005     | -.245      |  |  |
|                             | G<br>-.134        | .183        | -.105    | -.073      | -.166     | -.078       | -.180    | .024       |  |  |
|                             | TCG<br>-.160      | .040        | -.094    | -.136      | -.090     | -.111       | -.135    | -.061      |  |  |
| MRQ:TC                      | TC<br>.387        | -.239       | .143     | -.172      | .325      | .326        | .304     | -.366      |  |  |
|                             | G<br>-.343        | .723        | -.696    | -.098      | -.824     | .579        | -.528    | .512       |  |  |
|                             | TCG<br>.044       | -.021       | -.087    | -.115      | -.149     | -.061       | -.117    | -.063      |  |  |
| MRQ:G                       | TC<br>---         | ---         | ---      | ---        | ---       | ---         | ---      | ---        |  |  |
|                             | G<br>-.369        | .665***     | -.376    | .384       | -.260     | .024        | -.473    | .566*      |  |  |
|                             | TCG<br>-.352      | .659***     | -.372    | .390       | -.269     | .045        | -.444    | .557*      |  |  |
| MRQ:TCG                     | TC<br>.182        | -.180       | .048     | -.094      | .075      | -.200       | .068     | -.215      |  |  |
|                             | G<br>-.337        | .574**      | -.414*   | .159       | -.546*    | .171        | -.540*   | .565**     |  |  |
|                             | TCG<br>-.095      | .089        | -.172    | .034       | -.225     | .031        | -.231    | .090       |  |  |

\* p .05  
\*\* p .01  
\*\*\*p .001

1 Impossible to compute correlation because (1) n=0 or (2) SD=0.

TABLE E-4. ZERO-ORDER CORRELATIONS BETWEEN PERFORMANCE MEASURES OF COMPUTER TARGET ENGAGEMENT JOB SAMPLE AND MEASURES OF PAST SUCCESS AT ANNUAL QUALIFICATIONS (FROM BIOGRAPHICAL DATA) FOR TANK COMMANDERS (TC), GUNNERS (G), AND COMBINED (TCG) SUBSAMPLES

| Past Success At Annual Qual | Computer Target Engagement |                 |                 |                 |                 |                |                |                 |                 |           |          |          |         |          |                 |                 |
|-----------------------------|----------------------------|-----------------|-----------------|-----------------|-----------------|----------------|----------------|-----------------|-----------------|-----------|----------|----------|---------|----------|-----------------|-----------------|
|                             | PROC: ERROR                | 31: ERROR (AVG) | 31: ERROR (MOD) | L1: ERROR (AVG) | L1: ERROR (MOD) | F: ERROR (AVG) | F: ERROR (MOD) | 10: ERROR (AVG) | 10: ERROR (MOD) | 3K: ERROR | L1: TIME | L2: TIME | F: TIME | 10: TIME | TOT: TIME (AVG) | TOT: TIME (MOD) |
| QAVG:TC                     | TC                         | -0.68           | .272            | .158            | .095            | -.202          | -.162          | -.084           | -.169           | -.154     | -.164    | -.019    | -.037   | -.170    | -.166           | -.042           |
| G                           | TC                         | .403            | .754*           | -.595           | -.203           | -.013          | .030           | -.322           | -.111           | -.102     | -.091    | -.119    | -.348   | -.064    | -.195           | -.123           |
| TCG                         | TCG                        | .087            | .374            | .239            | -.068           | .121           | -.180          | -.029           | -.111           | -.160     | -.123    | .004     | .019    | -.123    | -.160           | -.066           |
| QAVG:G                      | TC                         | -.175           | -.252           | -.309           | -.006           | .084           | .055           | .072            | .059            | .096      | .032     | -.217    | -.130   | -.067    | -.010           | -.088           |
| G                           | TC                         | -.103           | -.153           | -.103           | .498**          | -.318          | -.358*         | .403*           | -.449**         | -.450**   | -.012    | -.089    | -.206   | -.010    | -.056           | -.015           |
| TCG                         | TCG                        | .000            | -.208           | -.194           | -.316*          | -.168          | -.230          | -.284*          | -.251           | -.242     | -.047    | -.133    | -.187   | -.008    | -.030           | -.084           |
| QAVG:TCG                    | TC                         | -.076           | .037            | -.032           | .213            | .164           | .268           | .142            | .242            | .203      | -.219    | .014     | .200    | -.167    | -.075           | .078            |
| G                           | TC                         | .079            | .013            | -.008           | -.443**         | -.198          | -.287          | -.246           | -.446**         | -.325     | -.099    | -.469    | -.003   | -.357    | -.138           | -.003           |
| TCG                         | TCG                        | .106            | -.007           | -.022           | -.207           | -.105          | -.114          | -.207           | -.193           | -.182     | -.103    | -.027    | -.212   | -.048    | -.051           | -.033           |
| QAVG:TC                     | TC                         | .019            | -.033           | .071            | .118            | -.003          | -.039          | .053            | .036            | -.084     | -.010    | -.127    | -.176   | -.158    | -.107           | -.037           |
| G                           | TC                         | .485            | .663            | .572            | -.539           | -.069          | -.201          | .086            | -.452           | -.078     | -.034    | -.044    | -.170   | -.560    | -.047           | -.139           |
| TCG                         | TCG                        | .078            | .132            | .168            | -.047           | .036           | -.027          | -.125           | -.042           | -.021     | -.037    | -.137    | -.033   | -.032    | -.042           | -.054           |
| QAVG:G                      | TC                         | -.181           | -.248           | -.244           | -.042           | -.056          | -.091          | -.048           | -.093           | -.013     | .023     | -.044    | -.072   | -.008    | .044            | .075            |
| G                           | TC                         | -.174           | -.247           | -.250           | -.013           | -.038          | -.046          | -.070           | -.011           | -.073     | .003     | -.040    | -.076   | -.018    | .033            | .058            |
| TCG                         | TCG                        | .051            | -.075           | .014            | .159            | .028           | -.070          | .097            | .085            | -.041     | -.020    | -.156    | -.003   | -.223    | -.135           | -.136           |
| QAVG:TCG                    | TC                         | .035            | .061            | .014            | -.182           | -.024          | -.030          | -.196           | -.114           | -.044     | -.007    | -.119    | -.025   | -.053    | .111            | -.059           |
| G                           | TCG                        | .094            | -.044           | .000            | -.076           | -.057          | -.069          | -.118           | -.090           | -.084     | -.012    | -.023    | -.061   | -.029    | -.024           | -.027           |

\* p < .05  
\*\* p < .01

1. Impossible to compute correlation because (1) n=0 or (2) SD=0.

TABLE E-5. ZERO-ORDER CORRELATIONS BETWEEN PERFORMANCE MEASURES OF PAST SUCCESS AT ANNUAL QUALIFICATIONS (FROM BIOGRAPHICAL DATA) FOR TANK COMMANDERS (TC), GUNNERS (G), AND COMBINED (TCG) SUBSAMPLES

| Past Success at Annual Qual |     | TC Decision Making |         |
|-----------------------------|-----|--------------------|---------|
|                             |     | D: CORR            | D: TIME |
| QAVG:TC                     | TC  | -.267              | -.101   |
|                             | G   | -.738              | .172    |
|                             | TCG | -.328*             | -.037   |
| QAVG:G                      | TC  | -.054              | -.337   |
|                             | G   | -.071              | -.057   |
|                             | TCG | -.064              | -.198   |
| QAVG:TCG                    | TC  | -.112              | -.221   |
|                             | G   | -.132              | .027    |
|                             | TCG | -.128              | -.100   |
| MRQ:TC                      | TC  | -.570**            | -.235   |
|                             | G   | -.822*             | .354    |
|                             | TCG | -.541**            | -.122   |
| MRQ:G                       | TC  | --- <sup>1</sup>   | ---     |
|                             | G   | .253               | -.087   |
|                             | TCG | .248               | -.077   |
| MRQ:TCG                     | TC  | -.488**            | -.214   |
|                             | G   | -.159              | .049    |
|                             | TCG | -.327*             | -.117   |

\*  $p < .05$

\*\*  $p < .01$

<sup>1</sup> Impossible to compute correlation because (1)  $n=0$  or (2)  $SD=0$

TABLE E-6. ZERO-ORDER CORRELATIONS BETWEEN PERFORMANCE MEASURES ON HANDS-ON GUN LAYING JOB SAMPLES AND MEASURES OF PAST SUCCESS AT ANNUAL QUALIFICATIONS (FROM BIOGRAPHICAL DATA) FOR TANK COMMANDERS (TC), GUNNERS (G), AND COMBINED (TCG) SUBSAMPLES

| Past Success at Annual Qual |     | Hands-On Gun Laying |           |
|-----------------------------|-----|---------------------|-----------|
|                             |     | GL: TIME            | GL: ERROR |
| QAVG:TC                     | TC  | .310                | -.230     |
|                             | G   | -.084               | .340      |
|                             | TCG | .165                | -.080     |
| QAVG:G                      | TC  | .314                | -.073     |
|                             | G   | .248                | -.164     |
|                             | TCG | .215                | -.120     |
| QAVG:TCG                    | TC  | .202                | -.079     |
|                             | G   | .329                | -.029     |
|                             | TCG | .179                | -.062     |
| MRQ:TC                      | TC  | .022                | -.279     |
|                             | G   | -.121               | .457      |
|                             | TCG | -.076               | -.043     |
| MRQ:G                       | TC  | ---                 | ---       |
|                             | G   | .640                | -.012     |
|                             | TCG | .619***             | .006      |
| MRQ:TCG                     | TC  | .074                | -.222     |
|                             | G   | .304                | .184      |
|                             | TCG | .042                | -.050     |

\*\*\*p ≤ .001

<sup>1</sup>Impossible to compute correlation because (1) n=0 or (2) SD=0

TABLE E-7. ZERO-ORDER CORRELATIONS BETWEEN PERFORMANCE MEASURES ON HANDS-ON TRACKING JOB SAMPLE AND MEASURES OF PAST SUCCESS AT ANNUAL QUALIFICATIONS (FROM BIOGRAPHICAL DATA) FOR TANK COMMANDERS (TC), GUNNERS(G), AND COMBINED (TCG) SUBSAMPLES

| Past Success at Annual Qual | Hands-On Tracking |           |          |          |         |         |        |
|-----------------------------|-------------------|-----------|----------|----------|---------|---------|--------|
|                             | TOT: HITS         | TOT: DIST | TC: HITS | TC: DIST | G: HITS | G: DIST |        |
| QAVG:TC                     | TC                | .095      | -.051    | .163     | -.013   | .029    |        |
|                             | G                 | -.564     | -.567    | -.400    | -.275   | -.563   |        |
|                             | TCG               | -.144     | .086     | -.152    | .135    | -.113   | .038   |
| QAVG:G                      | TC                | -.259     | .210     | -.228    | .147    | -.202   | .253   |
|                             | G                 | .255      | -.330    | .199     | -.320   | .301    | -.328  |
|                             | TCG               | -.021     | -.041    | -.028    | -.075   | -.001   | -.008  |
| QAVG:TCG                    | TC                | -.214     | .043     | -.248    | .065    | -.085   | .022   |
|                             | G                 | .112      | -.351    | .063     | -.353*  | .175    | -.338* |
|                             | TCG               | -.050     | -.122    | -.073    | -.121   | .002    | -.116  |
| MRQ:TC                      | TC                | -.004     | .189     | -.030    | .232    | .036    | .138   |
|                             | G                 | -.598     | -.588    | -.589    | -.498   | -.316   | -.660  |
|                             | TCG               | -.146     | .112     | -.169    | .150    | -.090   | .072   |
| MRQ:G                       | TC                | 1         | --       | --       | --      | --      | --     |
|                             | G                 | .233      | -.268    | .234     | -.308   | .197    | -.222  |
|                             | TCG               | .194      | -.268    | .143     | -.303   | .181    | -.226  |
| MRQ:TCG                     | TC                | -.071     | .176     | -.137    | .222    | .061    | .121   |
|                             | G                 | -.020     | -.296    | -.046    | -.294   | -.024   | -.290  |
|                             | TCG               | -.040     | .037     | -.053    | .051    | -.007   | .022   |

\*  $p \leq .05$

<sup>1</sup>Impossible to compute correlation because (1)  $n=0$  or (2)  $SD=0$

TABLE E-8. ZERO-ORDER CORRELATIONS BETWEEN PERFORMANCE MEASURES ON HANDS-ON TARGET ENGAGEMENT JOB SAMPLE (FROM BIOGRAPHICAL DATA) FOR TANK COMMANDERS (TC), GUNNERS (G), AND COMBINED (TCG) SUBSAMPLES

|                             |     | Hands-On Target Engagement |           |          |         |
|-----------------------------|-----|----------------------------|-----------|----------|---------|
| Past Success at Annual Qual |     | TOT: HITS                  | TOT: TIME | TC: TIME | G: TIME |
| QAVG:TC                     | TC  | -.129                      | .042      | .033     | .038    |
|                             | G   | -.531                      | -.673     | -.561    | -.517   |
|                             | TCG | -.292                      | -.119     | -.124    | -.041   |
| QAVG:G                      | TC  | .006                       | -.004     | .047     | -.102   |
|                             | G   | -.125                      | .367*     | .272     | .398*   |
|                             | TCG | -.080                      | .162      | .146     | .109    |
| QAVG:TCG                    | TC  | -.125                      | .047      | .046     | .026    |
|                             | G   | -.313                      | .284      | .164     | .371*   |
|                             | TCG | -.235                      | .148      | .093     | .181    |
| MRQ:TC                      | TC  | .136                       | -.027     | .080     | -.225   |
|                             | G   | -.791                      | -.707     | -.626    | -.420   |
|                             | TCG | -.466*                     | -.151     | -.074    | -.245   |
| MRQ:G                       | TC  | -- <sup>1</sup>            | --        | --       | --      |
|                             | G   | .100                       | .305      | .189     | .326    |
|                             | TCG | .088                       | .300      | .181     | .332    |
| MRQ:TCT                     | TC  | .128                       | .010      | .102     | -.173   |
|                             | G   | -.625***                   | -.020     | -.099    | .164    |
|                             | TCG | -.381**                    | .028      | .057     | -.049   |

\*  $p \leq .05$   
 \*\*  $p \leq .01$   
 \*\*\*  $p \leq .001$

<sup>1</sup> Impossible to compute correlation because (1)  $n=0$  or (2)  $SD=0$

TABLE E-9. FORWARD STEPPED REGRESSION UNDER TWO STATISTICAL OPTIONS OF AVERAGE ANNUAL QUALIFICATION SCORE AT TC STATION (QAVG:TC) ON ARMY EXPERIENCE AND RESIDUALIZED MEASURES OF PERFORMANCE FOR SEVEN JOB SAMPLES

| Step  | Job Sample | Variable       | Multiple R | R Square | R Square Change | Beta   | F        |
|---|------------|----------------|------------|----------|-----------------|--------|----------|
| Pairwise Deletion of Missing Cases (Minimum n=29) |            |                |            |          |                 |        |          |
| 1   |            | RANK           | .508       | .258     | .258            | 0.507  | 21.47**  |
|   |            | ARMY:TIME      |            |          |                 | -0.585 | 25.21**  |
|   |            | A1:TIME        |            |          |                 | 0.117  | 0.69     |
|   |            | CP:TIME        |            |          |                 | 0.398  | 8.11*    |
| 2   | TCD        | D:CORR         | .641       | .412     | .154            | -0.494 | 33.06**  |
| 3   | CTE        | 3X:ERROR (AVG) | .747       | .558     | .146            | 0.592  | 40.10**  |
| 4   | HGL        | GL:TIME        | .803       | .644     | .086            | 0.277  | 9.33**   |
| 5   | CT         | MOD:ERROR      | .862       | .743     | .099            | -0.494 | 18.99**  |
| 6   | CT         | MOD:TOT        | .920       | .847     | .104            | -0.459 | 19.92**  |
| 7   | HGL        | GL:ERROR       | .955       | .911     | .064            | -0.604 | 30.42**  |
| Listwise Deletion of Missing Cases (n=15)         |            |                |            |          |                 |        |          |
| 1   |            | RANK           | .611       | .374     | .374            | 0.992  | 421.27** |
|   |            | ARMY:TIME      |            |          |                 | 0.004  | 0.00     |
|   |            | A1:TIME        |            |          |                 | 0.910  | 139.92** |
|   |            | CP:TIME        |            |          |                 | -0.861 | 97.91**  |
| 2   | HT         | TC:DIST        | .791       | .626     | .252            | 1.157  | 195.95** |
| 3   | HT         | G:DIST         | .942       | .888     | .262            | -1.003 | 250.94** |
| 4   | CTE        | PROC:ERROR     | .968       | .937     | .049            | 0.344  | 78.36**  |
| 5   | CP         | CST:TIME       | .991       | .981     | .044            | -0.448 | 81.51**  |
| 6   | CT         | G:HITS         | .996       | .991     | .010            | -0.267 | 25.16**  |
| 7   | CTE        | 3X:ERROR (AVG) | .999       | .998     | .007            | -0.201 | 9.80     |

\* p ≤ .05  
 \*\* p ≤ .01



TABLE E-10. FORWARD STEPPED REGRESSION UNDER TWO STATISTICAL OPTIONS OF AVERAGE ANNUAL QUALIFICATION SCORE AT TC STATION (QAVG:TC) ON MEASURES OF PERFORMANCE FOR SEVEN JOB SAMPLES

| Step  | Job Sample | Variable        | Multiple R | R Square | R Square Change | Beta   | F       |
|---|------------|-----------------|------------|----------|-----------------|--------|---------|
| Pairwise Deletion of Missing Cases (Minimum n=29) |            |                 |            |          |                 |        |         |
| 1   | CTE        | 3X:ERROR (AVG)  | .374       | .140     | .140            | 0.617  | 56.53** |
| 2   | TCD        | D:CORR          | .490       | .240     | .100            | -0.493 | 43.62** |
| 3   | HGL        | GL:ERROR        | .566       | .320     | .080            | -0.759 | 62.56** |
| 4   | HTE        | TOT:HITS        | .656       | .430     | .110            | -0.482 | 27.58** |
| 5   | HT         | TC:HITS         | .763       | .582     | .152            | -0.363 | 17.88** |
| 6   | CT         | MOD:TOT         | .826       | .682     | .100            | -0.483 | 25.94** |
| 7   | CT         | MOD:ERROR       | .891       | .793     | .111            | -0.612 | 25.28** |
| 8   | HGL        | GL:TIME         | .912       | .831     | .038            | 0.292  | 14.42** |
| 9   | CT         | HARD:ERROR      | .934       | .873     | .042            | 0.346  | 7.50*   |
| 10  | HTE        | TC:TIME         | .953       | .909     | .036            | -0.201 | 7.10*   |
| Listwise Deletion of Missing Cases (n=15)         |            |                 |            |          |                 |        |         |
| 1   | CTE        | 10X:ERROR (AVG) | .693       | .480     | .480            | 1.428  | 58.80** |
| 2   | CP         | CST:TIME        | .785       | .617     | .137            | -0.174 | 2.33    |
| 3   | CTE        | 10X:TIME        | .840       | .705     | .088            | -0.253 | 4.01    |
| 4   | CP         | CST:CORR        | .864       | .746     | .041            | 0.342  | 9.17    |
| 5   | CT         | HARD:ERROR      | .888       | .789     | .043            | 0.865  | 25.91** |
| 6   | CP         | ECD:CORR        | .928       | .861     | .072            | 0.711  | 17.69*  |
| 7   | HGL        | GL:ERROR        | .953       | .909     | .048            | -0.451 | 9.43    |
| 8   | CT         | FAST:TOT        | .961       | .924     | .015            | 0.400  | 7.84    |
| 9   | HTE        | TC:TIME         | .975       | .950     | .025            | 0.281  | 5.60    |
| 10  | TCD        | D:CORR          | .987       | .974     | .023            | 0.251  | 3.54    |

\* p ≤ .05

\*\* p ≤ .01

TABLE E-11. FORWARD STEPPED REGRESSION UNDER TWO STATISTICAL OPTIONS OF AVERAGE ANNUAL QUALIFICATION SCORE AT GUNNER'S STATION (QAVG:G) ON ARMY EXPERIENCE AND RESIDUALIZED MEASURES OF PERFORMANCE FOR SEVEN JOB SAMPLES

| Step  | Job Sample | Variable        | Multiple R | R Square | R Square Change | Beta   | F       |
|---|------------|-----------------|------------|----------|-----------------|--------|---------|
| Pairwise Deletion of Missing Cases (Minimum n=44) |            |                 |            |          |                 |        |         |
| 1   |            | RANK            | .175       | .031     | .031            | 0.230  | 1.52    |
|   |            | ARMY:TIME       |            |          |                 | 0.009  | 0.00    |
|   |            | A1:TIME         |            |          |                 | -0.180 | 0.60    |
|   |            | CP:TIME         |            |          |                 | 0.056  | 0.05    |
| 2   | CP         | CST:TIME        | .392       | .154     | .123            | -0.400 | 7.13*   |
| 3   | CTE        | 10X:ERROR (AVG) | .474       | .225     | .071            | -0.311 | 4.73    |
| 4   | CP         | ECD:CORR        | .534       | .285     | .060            | -0.229 | 2.05    |
| 5   | HGL        | GL:TIME         | .577       | .332     | .047            | 0.224  | 2.22    |
| 6   | CT         | MOD:ERROR       | .598       | .358     | .026            | -0.195 | 1.71    |
| 7   | CT         | EASY:ERROR      | .614       | .377     | .019            | 0.148  | 1.02    |
| Listwise Deletion of Missing Cases (n=29)         |            |                 |            |          |                 |        |         |
| 1   |            | RANK            | .312       | .097     | .097            | 0.426  | 10.15** |
|   |            | ARMY:TIME       |            |          |                 | -0.197 | 1.37    |
|   |            | A1:TIME         |            |          |                 | -0.516 | 8.42**  |
|   |            | CP:TIME         |            |          |                 | 0.076  | 0.19    |
| 2   | HTE        | G:TIME          | .565       | .319     | .221            | 0.758  | 32.22** |
| 3   | CTE        | 10X:ERROR (AVG) | .699       | .489     | .170            | -0.438 | 14.72** |
| 4   | CP         | CST:TIME        | .796       | .634     | .145            | -0.622 | 25.41** |
| 5   | CTE        | 3X:TIME         | .872       | .761     | .127            | 0.430  | 15.09** |
| 6   | CP         | ECD:TIME        | .897       | .804     | .043            | 0.286  | 3.90    |
| 7   | HTE        | TC:TIME         | .910       | .828     | .024            | 0.170  | 2.48    |

\* p ≤ .05  
 \*\* p ≤ .01

TABLE E-12. FORWARD STEPPED REGRESSION UNDER TWO STATISTICAL OPTIONS OF AVERAGE ANNUAL QUALIFICATION SCORE AT GUNNER'S STATION (QAVG:G) ON MEASURES OF PERFORMANCE FOR SEVEN JOB SAMPLES

| Step  | Job Sample | Variable        | Multiple R | R Square | R Square Change | Beta   | F       |
|---|------------|-----------------|------------|----------|-----------------|--------|---------|
| Pairwise Deletion of Missing Cases (Minimum n=44) |            |                 |            |          |                 |        |         |
| 1   | CP         | CST:TIME        | .350       | .123     | .123            | -0.303 | 3.45    |
| 2   | CP         | ECD:CORR        | .424       | .179     | .056            | -0.321 | 3.99    |
| 3   | CTE        | 10X:ERROR (AVG) | .498       | .248     | .069            | -0.305 | 4.76    |
| 4   | HGL        | GL:TIME         | .537       | .288     | .040            | -0.161 | 1.18    |
| 5   | CT         | MOD:ERROR       | .559       | .313     | .025            | -0.131 | 0.34    |
| 6   | HTE        | TC:TIME         | .579       | .335     | .022            | 0.094  | 0.41    |
| 7   | TCD        | D:TIME          | .590       | .348     | .014            | -0.210 | 1.73    |
| 8   | CT         | EASY:ERROR      | .604       | .365     | .016            | 0.234  | 1.46    |
| 9   | CT         | HARD:ERROR      | .612       | .375     | .011            | -0.338 | 1.26    |
| 10  | CT         | HARD:TOT        | .627       | .393     | .018            | -0.187 | 0.95    |
| Listwise Deletion of Missing Cases (n=29)         |            |                 |            |          |                 |        |         |
| 1   | CP         | CST:TIME        | .439       | .193     | .193            | -0.660 | 24.44** |
| 2   | HTE        | G:TIME          | .606       | .368     | .175            | 0.312  | 5.82    |
| 3   | HT         | TC:DIST         | .700       | .490     | .122            | -0.574 | 14.14** |
| 4   | CTE        | 10X:TIME        | .785       | .616     | .126            | 0.330  | 6.37*   |
| 5   | CTE        | 3X:DIST         | .821       | .674     | .058            | -0.231 | 2.78    |
| 6   | TCD        | D:TIME          | .844       | .713     | .039            | 0.153  | 1.33    |
| 7   | HT         | TC:HITS         | .855       | .731     | .018            | -0.263 | 3.52    |
| 8   | CTE        | 10X:DIST        | .872       | .761     | .029            | -0.244 | 2.88    |
| 9   | CT         | EASY:ERROR      | .877       | .769     | .008            | 0.170  | 1.24    |
| 10  | CT         | EASY:TOT        | .882       | .778     | .008            | 0.127  | 0.73    |

\* p ≤ .05

\*\* p ≤ .01

TABLE E-13. FORWARD STEPPED REGRESSION UNDER TWO STATISTICAL OPTIONS OF 1981 QUALIFICATION SCORE AT TC STATION (MRQ:TC) ON ARMY EXPERIENCE AND RESIDUALIZED MEASURES OF PERFORMANCE FOR SEVEN JOB SAMPLES

| Step  | Job Sample | Variable        | Multiple R | R Square | R Square Change | Beta   | F         |
|---|------------|-----------------|------------|----------|-----------------|--------|-----------|
| Pairwise Deletion of Missing Cases (Minimum n=22) |            |                 |            |          |                 |        |           |
| 1   |            | RANK            | .400       | .160     | .160            | 0.423  | 321.50**  |
|   |            | ARMY:TIME       |            |          |                 | -0.497 | 396.86**  |
|   |            | A1:TIME         |            |          |                 | 0.014  | 0.21      |
|   |            | CP:TIME         |            |          |                 | 0.427  | 192.95**  |
| 2   | TCD        | D:CORR          | .669       | .448     | .288            | -0.634 | 1151.77** |
| 3   | HTE        | TOT:HITS        | .875       | .765     | .317            | -0.586 | 1028.00** |
| 4   | CP         | CST:CORR        | .950       | .903     | .138            | 0.395  | 451.14**  |
| 5   | HT         | TC:HITS         | .998       | .996     | .093            | -0.319 | 302.96**  |
| Listwise Deletion of Missing Cases (n=12)         |            |                 |            |          |                 |        |           |
| 1   |            | RANK            | .475       | .226     | .226            | 0.816  | 154.18**  |
|   |            | ARMY:TIME       |            |          |                 | -0.085 | 774.59**  |
|   |            | A1:TIME         |            |          |                 | -0.031 | 0.445     |
|   |            | CP:TIME         |            |          |                 | 0.750  | 144.21**  |
| 2   | CP         | ECD:CORR        | .908       | .824     | .598            | 0.762  | 232.85**  |
| 3   | CT         | HARD:ERROR      | .980       | .959     | .135            | -0.576 | 59.06**   |
| 4   | HTE        | G:TIME          | .993       | .986     | .027            | -0.425 | 69.12**   |
| 5   | CTE        | IOX:ERROR (AVG) | 1.000      | .998     | .012            | 0.370  | 21.79*    |

\* p ≤ .05  
 \*\* p ≤ .01

TABLE E-14. FORWARD STEPPED REGRESSION UNDER TWO STATISTICAL OPTIONS OF 1981 ANNUAL QUALIFICATION SCORE AT TC STATION (MRQ:TC) ON MEASURES OF PERFORMANCE FOR SEVEN JOB SAMPLES

| Step  | Job Sample | Variable       | Multiple R | R Square | R Square Change | Beta   | F        |
|---|------------|----------------|------------|----------|-----------------|--------|----------|
| Pairwise Deletion of Missing Cases (Minimum n=22) |            |                |            |          |                 |        |          |
| 1   | TCD        | D:CORR         | .541       | .293     | .293            | -0.670 | 207.01** |
| 2   | HTE        | TOT:HITS       | .769       | .592     | .299            | -0.941 | 295.97** |
| 3   | CT         | MOD:TOT        | .813       | .662     | .070            | -0.358 | 53.13**  |
| 4   | HGL        | GL:ERROR       | .856       | .733     | .071            | -0.503 | 85.37**  |
| 5   | HT         | TC:HITS        | .939       | .881     | .148            | -0.504 | 87.61**  |
| 6   | CP         | ECD:CORR       | .984       | .969     | .088            | 0.310  | 41.71**  |
| Listwise Deletion of Missing Cases (n=12)         |            |                |            |          |                 |        |          |
| 1   | CP         | ECD:CORR       | .554       | .307     | .307            | -0.001 | 0.00     |
| 2   | CTE        | PROC:ERROR     | .734       | .538     | .231            | 0.211  | 16.69**  |
| 3   | HT         | TC:DIST        | .793       | .629     | .091            | 1.528  | 192.83** |
| 4   | CT         | EASY:ERROR     | .883       | .780     | .051            | -1.181 | 181.26** |
| 5   | HT         | G:DIST         | .931       | .866     | .086            | -0.903 | 57.00**  |
| 6   | CTE        | 3X:ERROR (AVG) | .952       | .907     | .041            | 0.689  | 85.31**  |
| 7   | HTD        | D:TIME         | .982       | .964     | .057            | 0.440  | 30.34**  |
| 8   | CT         | MOD:TOT        | .998       | .996     | .032            | -0.247 | 23.92**  |

\*p ≤ .05

\*\*p ≤ .01

TABLE E-15. FORWARD STEPPED REGRESSION UNDER TWO STATISTICAL OPTIONS OF 1981 ANNUAL QUALIFICATION SCORE AT GUNNER'S STATION (MRQ:G) ON ARMY EXPERIENCE AND RESIDUALIZED MEASURES OF PERFORMANCE FOR SEVEN JOB SAMPLES

| Step  | Job Sample | Variable   | Multiple R | R Square | R Square Change | Beta   | F        |
|---|------------|------------|------------|----------|-----------------|--------|----------|
| Pairwise Deletion of Missing Cases (Minimum n=19) |            |            |            |          |                 |        |          |
| 1   |            | RANK       | .276       | .076     | .076            | 0.299  | 5.72     |
|   |            | ARMY:TIME  |            |          |                 | -0.210 | 2.75     |
|   |            | AI:TIME    |            |          |                 | 0.366  | 5.61     |
|   |            | CP:TIME    |            |          |                 | -0.444 | 8.10*    |
| 2   | CT         | EASY:ERROR | .769       | .592     | .516            | 0.865  | 51.90**  |
| 3   | HGL        | GL:TIME    | .894       | .799     | .207            | 0.451  | 19.50**  |
| 4   | CT         | HARD:ERROR | .952       | .906     | .107            | -0.429 | 12.48*   |
| Listwise Deletion of Missing Cases (n=13)         |            |            |            |          |                 |        |          |
| 1   |            | RANK       | .606       | .367     | .367            | -0.522 | 37.93**  |
|   |            | ARMY:TIME  |            |          |                 | 0.656  | 42.65**  |
|   |            | AI:TIME    |            |          |                 | -0.055 | 0.47     |
|   |            | CP:TIME    |            |          |                 | 0.228  | 10.36*   |
| 2   | CT         | EASY:ERROR | .923       | .852     | .485            | 1.541  | 579.08** |
| 3   | TCD        | D:TIME     | .965       | .931     | .079            | 0.564  | 217.57** |
| 4   | TCD        | D:CORR     | .977       | .955     | .024            | -0.348 | 85.66**  |
| 5   | HT         | TC:DIST    | .999       | .997     | .042            | 0.347  | 64.19**  |

\* p ≤ .05  
 \*\* p ≤ .01

TABLE E-16. FORWARD STEPPED REGRESSION UNDER TWO STATISTICAL OPTIONS  
 OF 1981 ANNUAL QUALIFICATION SCORE AT GUNNER'S STATION (MRQ:G)  
 ON MEASURES OF PERFORMANCE FOR SEVEN JOB SAMPLES

| Step  | Job Sample | Variable       | Multiple R | R Square | R Square Change | Beta   | F         |
|---|------------|----------------|------------|----------|-----------------|--------|-----------|
| Pairwise Deletion of Missing Cases (Minimum n=19) |            |                |            |          |                 |        |           |
| 1   | CT         | EASY:ERROR     | .659       | .434     | .434            | 0.874  | 1272.82** |
| 2   | HGL        | GL:TIME        | .829       | .687     | .253            | 0.578  | 798.66**  |
| 3   | TCD        | D:TIME         | .900       | .810     | .123            | -0.437 | 472.92**  |
| 4   | HT         | TC:HITS        | .969       | .940     | .130            | 0.294  | 207.78**  |
| 5   | CT         | HARD:ERROR     | .998       | .996     | .056            | -0.311 | 156.99**  |
| Listwise Deletion of Missing Cases (n=13)         |            |                |            |          |                 |        |           |
| 1   | CT         | EASY:ERROR     | .911       | .831     | .831            | 1.094  | 747.16**  |
| 2   | TCD        | D:TIME         | .953       | .908     | .077            | 0.477  | 202.01**  |
| 3   | CTE        | 3X:ERROR (AVG) | .961       | .924     | .016            | -0.210 | 43.66**   |
| 4   | TCD        | D:CORR         | .978       | .956     | .032            | -0.419 | 123.73**  |
| 5   | CTE        | 10X:TIME       | .984       | .968     | .012            | 0.305  | 63.53**   |
| 6   | CTR        | 3X:TIME        | .992       | .985     | .017            | -0.259 | 43.26**   |
| 7   | HTR        | G:TIME         | .995       | .990     | .005            | 0.213  | 26.93**   |
| 8   | CTE        | PROC:ERROR     | .998       | .996     | .006            | 0.107  | 8.85      |
| 9   | HT         | G:DIST         | .999       | .999     | .003            | 0.091  | 6.24      |

\* p ≤ .05  
 \*\* p ≤ .01