Task Analysis for the Combat Vehicle Command and Control (CVCC) System

June 1991

Fort Knox Field Unit
Training Research Laboratory

U.S. Army Research Institute for the Behavioral and Social Sciences

Approved for public release; distribution is unlimited.
U.S. ARMY RESEARCH INSTITUTE
FOR THE BEHAVIORAL AND SOCIAL SCIENCES

A Field Operating Agency Under the Jurisdiction
of the Deputy Chief of Staff for Personnel

EDGAR M. JOHNSON
Technical Director

JON W. BLADES
COL, IN
Commanding

Research accomplished under contract for
the Department of the Army

Dynamics Research Corporation

Technical review by

Ronald E. Kraemer
Bruce W. Knerr

NOTICES

FINAL DISPOSITION: This Research Product may be destroyed when it is no longer needed. Please do not return it to the U.S. Army Research Institute for the Behavioral and Social Sciences.

NOTE: This Research Product is not to be construed as an official Department of the Army document, unless so designated by other authorized documents.
Task Analysis for the Combat Vehicle Command and Control (CVCC) System

Wigginton, Donald; and O'Brien, Lawrence H.

Final

June 1991

124

Kathleen Quinkert, Contracting Officer's Representative

Combat Vehicle Command and Control System (CVCC)

Close Combat Test Bed (CCTB)

This research product describes the results of a task analysis conducted to support research efforts on the Combat Vehicle Command and Control (CVCC) system. The CVCC is a set of selected futuristic components with functions simulated in the Close Combat Test Bed (CCTB) environment. The objective of the task analysis was to provide the minimum essential task information needed to support (a) the early assessment of CVCC training requirements, and (b) the development of simulation models of CVCC operator task performance.
ARI Research Product 91-13

18. SUBJECT TERMS (Continued)

Command control, communication (C3)
Simulators
Task Analysis for the Combat Vehicle Command and Control (CVCC) System

Donald Wigginton and Lawrence H. O'Brien
Dynamics Research Corporation

Field Unit at Fort Knox, Kentucky
Donald F. Haggard, Chief

Training Research Laboratory
Jack H. Hiller, Director

U.S. Army Research Institute for the Behavioral and Social Sciences
5001 Eisenhower Avenue, Alexandria, Virginia 22333-5600

Office, Deputy Chief of Staff for Personnel
Department of the Army

June 1991
The U.S. Army Research Institute for the Behavioral and Social Sciences (ARI) provides research, development, and applications support to ensure that soldier-related issues are considered in the weapon system acquisition process. The Future Battlefield Conditions team of the ARI Field Unit at Fort Knox performs research on soldier performance and training issues by using simulation-based evaluations to investigate concepts and early training requirements analyses of future systems such as those for command, control, and communication (C3).

This research product was prepared under science and technology task 3101, "Training Requirements for the Future Integrated Battlefield." ARI's research on future battlefield conditions supports two Memoranda of Understanding. One is between ARI and the U.S. Army Armor Center and School on research in future battlefield conditions, signed on 12 April 1989. The second is between ARI and the Tank Automotive Command (TACOM) on the Combat Vehicle Command and Control (CCVC) System, signed on 22 March 1989.

ARI has briefed the CVCC research and development program to the Commanding General, U.S. Army Armor Center and School, the U.S. Army Armor School's Directors of Combat Developments and Training and Doctrine, representatives from the Tank Automotive Command, Project Manager Training Devices, and the Training and Doctrine Command System Manager, SIMNET.

This product identifies CVCC-related tasks and presents task analysis information useful for two purposes. The first is to support early training requirements analysis for the functions associated with the CVCC. The second purpose is to identify essential tasks required for development of simulation models of CVCC operator task performance. The task analysis consists of both task data elements and flow diagrams of task elements within the task. The task analysis was verified on functional representations of the CVCC incorporated into the Close Combat Test Bed (CCTB), formerly referred to as SIMNET-D, at Fort Knox.

EDGAR M. JOHNSON
Technical Director
TASK ANALYSIS FOR THE COMBAT VEHICLE COMMAND AND CONTROL (CVCC) SYSTEM

CONTENTS

OBJECTIVE ........................................................................................................ 1
BACKGROUND .................................................................................................. 1
   Overview of CCTB ..................................................................................... 3
   Overview of CVCC Subsystems .............................................................. 3
TASK ANALYSIS METHODOLOGY .................................................................... 4
   Identification of Tasks to be Analyzed .................................................. 4
   Information Elements Identified in the Task Analysis .......................... 4
   Tools for Documenting Task Analysis .................................................. 8
   Data Sources ............................................................................................. 8
   Process for Conducting Analysis .......................................................... 12
DATA ELEMENT DEFINITIONS ....................................................................... 12
   Task Level ................................................................................................. 12
   Task Element Level ................................................................................. 14
TASK ANALYSIS SUMMARY ......................................................................... 15
REFERENCES ................................................................................................. 17
GLOSSARY ....................................................................................................... 19
APPENDIX A. CVCC SYSTEM DESCRIPTION .................................................. A-1
   B. TASK ANALYSIS DATA ....................................................................... B-1
   C. FLOW CHARTS .................................................................................... C-1

LIST OF TABLES

Table 3-1. CVCC user task list ......................................................................... 5
   3-2. Relationships between CVCC tasks and existing tasks .................. 6
CONTENTS (Continued)

Table 3-3. Task analysis data elements .................. 9

3-4. Summary of selected features of task analysis ........... 15

LIST OF FIGURES

Figure 3-1. Task analysis data elements .................. 10

3-2. Example flowchart ................................. 11
1.0 Objective

This research product describes the results of a task analysis conducted in support of the U.S. Army Research Institute Fort Knox Field Unit's research efforts on the Combat Vehicle Command and Control (CVCC) system. The CVCC is a set of futuristic Command, Control and Communication (C<sup>3</sup>) components whose functions are simulated in the Close Combat Test Bed (CCTB), formerly Simulation Networking-Developmental (SIMNET-D) developed by the Defense Advanced Research Projects Agency (DARPA). The objective of the task analysis was to provide the minimum essential task information needed to support (a) the early assessment of CVCC training requirements, and (b) the development of simulation models of CVCC operator task performance.

2.0 Background

The CVCC task analysis was part of a larger effort to evaluate the impact of the CVCC on tank commander performance at the company level and below. In addition to the CVCC, the company-level evaluation included the current M1 that served as the baseline comparison. During the evaluation, functional representations of the CVCC were generated using the CCTB facilities at Fort Knox. Soldiers used these systems in a series of realistic mission exercises. During the exercises, workload and performance data were collected.

The CVCC company evaluation had three major objectives: (a) to evaluate the operational effectiveness of armor companies using a tactical C<sup>3</sup> concept configuration, (b) to identify critical soldier-machine interface (SMI) issues associated with the use of the concept configuration and make recommendations concerning system design, and (c) to determine operational training requirements, issues, and concerns for the new system. The evaluation produced three major products:

1. An assessment of the impact of the CVCC on key unit performance measures (Leibrecht et al., in preparation)
3. A User Guide describing a methodology that can be used to assess performance and workload in future CCTB studies (O'Brien, Morey, & Wigginton, in preparation)

Task analysis is a central feature of the Army's Systems Approach to Training [TRADOC Pamphlet 351-13 (Draft), July, 1990] and is required for all new system developments (Department of Defense, 1979). Meister (1985) provides four purposes for performing a task analysis:

To assist in (1) the design of the system, meaning the man-machine interface, the total job, construction of procedures, job aids, etc., (2) the manning of the system, meaning the development of the selection criteria and determination of the number and type of personnel needed, (3) the development of an instructional system, meaning the development of the curriculum, selection of critical tasks to be trained, etc., and (4) the evaluation of the completed system, by establishing performance criteria against which system personnel performance can be measured. (p. 32)

System design, training, and evaluation draw on the comprehensive task analysis conducted early in the life cycle of the proposed system. With respect to training, decisions regarding new system designs and how functions are allocated between the system and its users have impacts on the training requirements for both users and maintainers. Early estimation of these training impacts, mandated by current Department of Defense directives, provides valuable inputs to the design process. Recent developments in analytical tools and automated aids for assessing these training requirements use comparability analysis as the principal method to estimate task requirements for developmental systems (Jorgensen and O'Brien, 1983). In this approach, existing systems similar to the developing system in function or capability are identified. Task data for the comparable system(s) are then collected and modified to reflect the differences in design or usage between the new and comparable system. Tasks are then rated on various criteria to determine the subset of tasks having training requirements. This list provides the basis for preliminary estimates of training program estimation (e.g., training media selection) and training resource requirements such as (a) the number of students to be trained, (b) the number of instructors and support personnel required, (c) facilities requirements, and (d) training device and training equipment requirements.

CCTB offers an alternative to comparability analysis for conducting this early training requirements analysis. Functional representations of the proposed system can be integrated into the CCTB environment. The impacts on existing user tasks or the need
for new tasks can be identified and assessed through hands-on developmental evaluations.

2.1 Overview of CCTB

CCTB refers to simulation capabilities developed under the DARPA SIMNET program. The objective of the SIMNET program was to develop a technology base for low-cost, full-crew combat system simulators. SIMNET-D utilized this technology to provide an advanced testbed for evaluating new technologies and tactics for combat weapon systems (Miller and Chung, 1987). The original SIMNET-D facility, now referred to as CCTB, includes a set of reconfigurable simulators, an advanced capability for modeling threat and friendly forces, as well as extensive capabilities for data collection and display. A more detailed description of CCTB is found in DuBois (1989) and Gound & Schwab (1988).

The CVCC system was created from functional specifications developed by the Army Research Institute in cooperation with the Tank Automotive Command (TACOM). The CVCC components integrated into the CCTB provided the primary source of information for the CVCC task analysis.

2.2 Overview of CVCC Subsystems

To represent the expected capabilities of the CVCC, four major subsystems (Position Navigation System, Command and Control Display, Commanders Independent Thermal Viewer, and Single Channel Ground Radio System) were added to M1 simulators in the CCTB facility. These four subsystems provided tank commanders with the following capabilities [see Appendix A for a more detailed description as found in Ainslie, Leibrecht, & Atwood (in preparation)].

Position Navigation (POSNAV) System -- Automatically identified the position of the tank on the battlefield in xy grid coordinates.

Command and Control Display (CCD) -- Provided a capability for generating and displaying digital maps. These maps could display the position of all tanks in the unit as well as other objects (e.g., threats, waypoints, objectives) which had been entered in the tank's digital data base either directly by the tank commander or by the tank's other digital systems (e.g., SINCGARS). The simulated SINCGARS link allowed information generated by other tanks and the unit operations center to be transmitted and then added directly to the digital data bases of other tanks.

The CCD provided a capability for generating digital versions of the most common tank commander reports. These reports supported
The incorporation of location information based on integration of data from other tank subsystems (e.g., the LRF and POSNAV).

The tank commander could also enter directions for reaching the next waypoint (heading, distance) that were directly transmitted to and presented on the driver's steer-to display.

**Commander's Independent Thermal Viewer (CITV)** -- Provided the tank commander with his own thermal viewer. This viewer could be pointed in a direction that was completely independent of the main gun (i.e., the gunner's primary sight). The CITV software had algorithms which could automatically identify targets. This software also allowed the commander to prioritize multiple target locations. The priority number of each target location was displayed to the gunner. The gunner could then select a target priority and the main gun would automatically slew to that location.

**Single Channel Ground and Air Radio System (SINCGARS)** -- Provided a capability for transmitting digital information between tanks and the unit operations center. For example, using SINCGARS, information on the current tank's positions from POSNAV could automatically be sent to all other tanks in the unit.

### 3.0 Task Analysis Methodology

#### 3.1 Identification of Tasks to be Analyzed

The focus of the task analysis was on (a) new tasks required to operate the CVCC or (b) current tasks significantly modified by the CVCC functions. New tasks were additional tasks, beyond those performed on the current M1, required to operate the CVCC system. A variety of sources, such as the Soldier Training Publications, describe the tasks associated with the current M1 system. Task listings in these sources were reviewed to identify the specific tasks likely to be associated with CVCC operation. Table 3-1 lists the tasks that were generated by this process. Table 3-2 lists the relationship between the CVCC tasks and existing task descriptions. Section 3.4 lists the data sources.

#### 3.2 Information Elements Identified in the Task Analysis

The primary goal of the task analysis was to identify the minimum essential elements of information needed to support an "early" assessment of training requirements for the CVCC. Since only a functional representation of the CVCC was evaluated, implementation of a detailed task analysis as specified in Army training development procedures (i.e., TRADOC Form 550) was not warranted.
### Table 3-1
CVCC User Task List

<table>
<thead>
<tr>
<th>CVCC Task Number</th>
<th>Task Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Receive and Review Report Using CCD</td>
</tr>
<tr>
<td>2</td>
<td>Prepare and Submit Spot Report Using CCD</td>
</tr>
<tr>
<td>3</td>
<td>Prepare and Submit Shell Report Using CCD</td>
</tr>
<tr>
<td>4</td>
<td>Prepare and Submit Contact Report Using CCD</td>
</tr>
<tr>
<td>5</td>
<td>Prepare and Submit Call For Fire Report Using CCD</td>
</tr>
<tr>
<td>6</td>
<td>Prepare and Submit SITREP Report Using CCD</td>
</tr>
<tr>
<td>7</td>
<td>Prepare and Submit NBC Report Using CCD</td>
</tr>
<tr>
<td>8</td>
<td>Designate and Transmit Route Coordinates Using CCD</td>
</tr>
<tr>
<td>9</td>
<td>Receive and Review Route Coordinates Using CCD</td>
</tr>
<tr>
<td>10</td>
<td>Prepare and Submit Adjust Fire Report Using CCD</td>
</tr>
<tr>
<td>11</td>
<td>Prepare and Submit Ammunition Report Using CCD</td>
</tr>
<tr>
<td>12</td>
<td>Prepare and Submit Intelligence Report Using CCD</td>
</tr>
<tr>
<td>13</td>
<td>Receive, Review, and Retransmit FRAGO Report Using CCD</td>
</tr>
<tr>
<td>14</td>
<td>Search for Targets Using the CITV</td>
</tr>
<tr>
<td>15</td>
<td>Identify and Prioritize Targets Using the CITV</td>
</tr>
<tr>
<td>16</td>
<td>Control Map Display Functions Using CCD</td>
</tr>
</tbody>
</table>
### Table 3-2

Relationships Between CVCC Tasks and Existing Tasks

<table>
<thead>
<tr>
<th>TASK NO.</th>
<th>TASK TITLE</th>
<th>TASK REFERENCE</th>
<th>CVCC TASK</th>
</tr>
</thead>
<tbody>
<tr>
<td>01-1240.00-0007</td>
<td>Select Movement Route Based on the Military Aspects of Terrain</td>
<td>STP 17-12II-MQS</td>
<td>13, 16</td>
</tr>
<tr>
<td>03-3120.00-0002</td>
<td>Analyze Terrain Using the Five Aspects of Terrain</td>
<td>STP 17-12II-MQS</td>
<td>13, 16</td>
</tr>
<tr>
<td>03-3060.00-6005</td>
<td>Prepare/Submit Standard Shelling, Mortaring, and Bombing Report</td>
<td>STP 21-II/III-M</td>
<td>2-6</td>
</tr>
<tr>
<td>031-503-3005</td>
<td>Prepare/Submit NBC-1 Report</td>
<td>STP 21-24-SMCT</td>
<td>7</td>
</tr>
<tr>
<td>031-503-4004</td>
<td>Prepare/Submit NBC-4 Report</td>
<td>STP 21-24-SMCT</td>
<td>7</td>
</tr>
<tr>
<td>113-571-1003</td>
<td>Establish, Enter, or Leave a Radio Net</td>
<td>STP 17-19K1-SM</td>
<td>8, 9</td>
</tr>
<tr>
<td>113-622-2004</td>
<td>Operate Radio Set Control Op AN/GRA 39</td>
<td>STP 17-19K1-SM</td>
<td>8, 9</td>
</tr>
<tr>
<td>113-622-2011</td>
<td>Operate Intercommunication Set AN/VIC-1 on a Tracked Vehicle (Includes FM Radio)</td>
<td>STP 17-19D1-SM</td>
<td>8, 9</td>
</tr>
<tr>
<td>01-5704.03-0900</td>
<td>Prepare/Operate AN/VRC-12 Series Radio</td>
<td>STP 17-12II-MQS</td>
<td>8, 9</td>
</tr>
<tr>
<td>071-326-5502</td>
<td>Issue a Platoon Fragmentary Order (FRAGO)</td>
<td>STP 17-19D1-SM</td>
<td>16</td>
</tr>
<tr>
<td>071-326-5626</td>
<td>Prepare and Issue an Oral Operational order (OPORD)</td>
<td>STP 17-19K24-SM</td>
<td>16</td>
</tr>
<tr>
<td>01-1241.00-0001</td>
<td>Conduct Fire and Movement of a Unit at Platoon Level</td>
<td>STP 17-12II/MQS</td>
<td>11, 12</td>
</tr>
</tbody>
</table>
Table 3-2 (cont'd)

<table>
<thead>
<tr>
<th>TASK NO.</th>
<th>TASK TITLE</th>
<th>TASK REFERENCE</th>
<th>CVCC TASK</th>
</tr>
</thead>
<tbody>
<tr>
<td>01-1225.00-0001</td>
<td>Determine the Range to a Target Using the Immediate or Deliberate Method</td>
<td>STP 17-12II-MQS</td>
<td>14, 15</td>
</tr>
<tr>
<td>No task number</td>
<td>Determine Range to Target Using Laser Rangefinder</td>
<td>PDEP-9-2350-264-10-1</td>
<td>14, 15</td>
</tr>
<tr>
<td>171-123-1041</td>
<td>Issue a Fire Command</td>
<td>STP 17-19E1-SM</td>
<td>12</td>
</tr>
<tr>
<td>171-129-1020</td>
<td></td>
<td>FM 17-12-1</td>
<td></td>
</tr>
<tr>
<td>171-126-1002</td>
<td>Drive an M1/M1A1 tank</td>
<td>STP 17-19K1-SM</td>
<td>11</td>
</tr>
<tr>
<td>171-126-1001</td>
<td>Start/Stop the Engine on an M1/M1A1 Tank</td>
<td>STP 17-19K1-SM</td>
<td>11</td>
</tr>
</tbody>
</table>

Note: TASK NO. is the task identification number found in the Task Reference. There are numerous tasks (17) referenced in the STP 17-12II-MQS that are related to land navigation.
In addition to the early identification of training requirements, the task analysis was also designed to identify the descriptive information needed to support the development of the simulation models of CVCC operators. Simulation models can be developed using analytical tools such as MicroSaint that indicate operator overload, and provide overall time and performance estimates based on system design changes or alternative performance strategies.

Table 3-3 displays the information elements that were selected for inclusion in the task analysis. Table 3-3 also indicates the reason that each of these elements was selected for inclusion in the analysis (i.e., either to support early training requirements analysis or to support the simulation model development). The training-related elements were chosen by selecting a subset of the information elements used in traditional Army task analyses (i.e., TRADOC Form 550). The model-related elements were selected to meet the unique needs to the CVCC tank commander simulation models (see O'Brien, Morey, & Wigginton, in preparation).

A detailed definition of each element in Table 3-3 is provided in Section 4.

3.3 Tools for Documenting Task Analysis

Three tools were selected to record and document the information collected during the task analysis. First, a microcomputer-based data base management system (dBASE III PLUS) recorded the textual information that was used to describe most of the task analysis information elements. Figure 3-1 provides an overview of the structure of this data base. Appendix B provides a complete listing of all the information in the data base.

Second, a microcomputer-based flow chart program was used to describe the sequencing of task elements within a task. Figure 3-2 provides an example of one of the flow charts that was produced with this program. The flow charts for all of the CVCC tasks are listed in Appendix C.

Third, using video recording capabilities already present in CCTB, a video tape of potential task element sequences was made. In these videos, researchers demonstrated how CVCC control and displays were used in performing each task element.

3.4 Data Sources

The primary data source for obtaining information on current tank commander tasks was the soldier training publications for Military Occupation Specialty (MOS) 19K and Military Qualification Standards (MQS) for armor officers. The MOS 19K identifies enlisted soldiers who serve as M1 tank crewmen (tank commander, driver, gunner, or loader). The MQS for Level 11 Armor Officer...
Table 3-3
Task Analysis Data Elements

<table>
<thead>
<tr>
<th>DATA ELEMENT</th>
<th>TRAINING</th>
<th>SIMULATION MODEL</th>
<th>PRIMARY METHOD OF DOCUMENTATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duty Position</td>
<td>X</td>
<td>X</td>
<td>Textual Data base</td>
</tr>
<tr>
<td>Conditions of Performance</td>
<td>X</td>
<td></td>
<td>Textual Data base</td>
</tr>
<tr>
<td>Performance Measures</td>
<td>X</td>
<td>X</td>
<td>Textual Data base</td>
</tr>
<tr>
<td>Initiating Cues</td>
<td>X</td>
<td>X</td>
<td>Textual Data base</td>
</tr>
<tr>
<td>Terminating Cues</td>
<td>X</td>
<td>X</td>
<td>Textual Data base</td>
</tr>
<tr>
<td>Feedback Cues</td>
<td>X</td>
<td>X</td>
<td>Textual Data base</td>
</tr>
<tr>
<td>Frequency</td>
<td>X</td>
<td></td>
<td>Textual Data base</td>
</tr>
<tr>
<td>Criticality</td>
<td>X</td>
<td></td>
<td>Textual Data base</td>
</tr>
<tr>
<td>Learning Difficulty</td>
<td>X</td>
<td></td>
<td>Textual Data base</td>
</tr>
<tr>
<td>Skills and Knowledge</td>
<td>X</td>
<td></td>
<td>Textual Data base</td>
</tr>
<tr>
<td>Task Elements</td>
<td>X</td>
<td>X</td>
<td>Textual Data base</td>
</tr>
<tr>
<td>Displays</td>
<td>X</td>
<td>X</td>
<td>Textual Data base</td>
</tr>
<tr>
<td>Controls</td>
<td>X</td>
<td>X</td>
<td>Textual Data base</td>
</tr>
<tr>
<td>Performance Time</td>
<td>X</td>
<td>X</td>
<td>Textual Data base</td>
</tr>
<tr>
<td>Task Element Sequencing</td>
<td>X</td>
<td>X</td>
<td>Flow chart</td>
</tr>
</tbody>
</table>
Figure 3-1. Task analysis data elements
**Figure 3-2. Example flowchart**

The data source for identifying the unique requirements of the CVCC tasks was primarily hands-on experience of the authors. This experience was augmented with (a) the functional specifications for the CVCC system and (b) job aids provided to CVCC company-level evaluation participants.

3.5 Process for Conducting Analysis

Task elements were identified for each of the 16 CVCC tasks using available documentation. Assignments for each data element were made by the senior author, a training analyst with over 15 years experience in Army training. Assignments were based on the experiences of the analyst in directly using the CVCC and in observing users employing the CVCC during the company-level evaluation. The textual information was identified and entered into the automated data base. To facilitate entry, an entry form was created to cue the appropriate response. Flow charts were then constructed to describe the sequence of task elements within a task. The flow charts were verified by sitting in a CCTB simulator and attempting to step through the sequences indicated in the flowcharts. Once the flow charts were verified, video recordings were made. In making the videos, the flow charts were used as scripts to identify the alternative sequence for performing the elements of each task.

4.0 Data Element Definition

4.1 Task Level

Task Number -- Arbitrary number used to identify a specific task within the data base.

Task Title -- Title of task performed on CVCC.

Duty Position -- Identification of CVCC user. One of the following:

1. Company Commander
2. Platoon Leader
3. Platoon Sergeant
4. Tank Commander
Conditions of Performance -- Conditions under which the task is performed.

Performance Measures -- Potential measures that could be used to assess the adequacy of the task's performance.

Initiating Cues -- Cues which cause the CVCC user to begin the task. The generic term "tank commander" is used because all four duty positions were tank commanders. However, three of the positions (company commander, platoon leader, and platoon sergeant) have additional responsibilities.

Terminating Cues -- Cues which indicate to the tank commander that he no longer has to perform the task.

Feedback Cues -- Cues which the tank commander might receive during the performance of a task. Provides information on how well the task is being performed.

Defensive Frequency -- Frequency of performing a task during a defensive mission. All missions were approximately 3 hours in duration. One of the following:

1. Rarely - An occasional mission or exercise
2. Seldom - Every few missions
3. Regularly - Once per mission
4. Frequently - Several times per mission
5. Continuously - All during the mission

Offensive Frequency -- Frequency of performing a task during an offensive mission. All missions were approximately 3 hours in duration. One of the following:

1. Rarely - An occasional mission or exercise
2. Seldom - Every few missions
3. Regularly - Once per mission
4. Frequently - Several times per mission
5. Continuously - All during the mission

Criticality\(^1\) -- Percent of exercise participants who rated this task as their top priority during the CVCC workload assessment. Ratings were drawn from a list of priorities based on 32 tasks, only some of which are included in the task analysis. Therefore, criticality ratings do not sum to 100%.

Learning Difficulty -- This scale is the same scale used in the Army Occupational Survey program. The learning difficulty rating

\(^1\)Based on unpublished data obtained during the CVCC company-level evaluation.
was based on a comparison of a task with the average learning difficulty of the set of 16 tasks.

1. Extremely Low
2. Low
3. Somewhat Below Average
4. Average
5. Somewhat Above Average
6. High
7. Extremely High

Reasons for Difficulty -- Justification for the learning difficulty rating. Reasons were identified by the training analyst.

Data Sources -- Documentation sources used to obtain information on task.

Comments -- Anomalies associated with any of the data entries.

Skills -- Psychomotor or perceptual skills associated with the task.

Knowledge -- Types of cognitive information associated with the task.

Performance Time -- Estimate of the time it takes to perform the task.

4.2 TASK ELEMENT LEVEL

Task Element Number -- Arbitrary number used to identify a specific task element within a task.

Task Element Title -- Title of task element.

Displays -- Specific displays used in performing the task element.

Controls -- Specific controls used in performing the task element.

2Judgments provided by DRC training analysts conducting the analysis.
5.0 Task Analysis Summary

A summary of selected features of the task analysis is presented in Table 3-4. The tabulation provides a comparison of tasks with respect to frequency, criticality, learning difficulty, and performance time.

Table 3-4
Summary of Selected Features of Task Analysis

<table>
<thead>
<tr>
<th>Task</th>
<th>Defensive Frequency</th>
<th>Offensive Frequency</th>
<th>Criticality (%)</th>
<th>Learning Difficulty</th>
<th>Performance Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Receive and Review Report Using CCD</td>
<td>Continuously</td>
<td>Continuously</td>
<td>21.0</td>
<td>Somewhat Above Average</td>
<td>5 min 0 sec</td>
</tr>
<tr>
<td>Prepare and Submit Spot Report Using CCD</td>
<td>Continuously</td>
<td>Frequently</td>
<td>14.4</td>
<td>Average</td>
<td>1 min 0 sec</td>
</tr>
<tr>
<td>Prepare and Submit Shell Report Using CCD</td>
<td>Frequently</td>
<td>Frequently</td>
<td>9.3</td>
<td>Somewhat Below Average</td>
<td>1 min 0 sec</td>
</tr>
<tr>
<td>Prepare and Submit Contact Report Using CCD</td>
<td>Frequently</td>
<td>Frequently</td>
<td>33.5</td>
<td>Average</td>
<td>1 min 0 sec</td>
</tr>
<tr>
<td>Prepare and Submit Call for Fire Report Using CCD</td>
<td>Frequently</td>
<td>Frequently</td>
<td>7.5</td>
<td>Average</td>
<td>1 min 30 sec</td>
</tr>
<tr>
<td>Prepare and Submit SITREP Report Using CCD</td>
<td>Continuously</td>
<td>Frequently</td>
<td>13.3</td>
<td>Average</td>
<td>2 min 0 sec</td>
</tr>
<tr>
<td>Prepare and Submit NBC Report Using CCD</td>
<td>Regularly</td>
<td>Regularly</td>
<td>2.2</td>
<td>Somewhat Above Average</td>
<td>2 min 0 sec</td>
</tr>
<tr>
<td>Designate and Transmit Route Coordinates Using CCD</td>
<td>Frequently</td>
<td>Continuously</td>
<td>37.4</td>
<td>Somewhat Above Average</td>
<td>5 min 0 sec</td>
</tr>
<tr>
<td>Receive and Review Route Coordinates Using CCD</td>
<td>Regularly</td>
<td>Regularly</td>
<td>0</td>
<td>Somewhat Below Average</td>
<td>1 min 0 sec</td>
</tr>
<tr>
<td>Prepare and Submit Adjust Fire Report Using CCD</td>
<td>Frequently</td>
<td>Frequently</td>
<td>7.5</td>
<td>Somewhat Below Average</td>
<td>1 min 0 sec</td>
</tr>
<tr>
<td>Prepare and Submit Ammunition Report Using CCD</td>
<td>Frequently</td>
<td>Frequently</td>
<td>0</td>
<td>Low</td>
<td>1 min 0 sec</td>
</tr>
<tr>
<td>Prepare and Submit Intelligence Report Using CCD</td>
<td>Frequently</td>
<td>Frequently</td>
<td>0</td>
<td>Average</td>
<td>1 min 30 sec</td>
</tr>
<tr>
<td>Receive, Review and Retransmit FRAGO Report Using CCD</td>
<td>Regularly</td>
<td>Seldom</td>
<td>0</td>
<td>Average</td>
<td>2 min 0 sec</td>
</tr>
<tr>
<td>Search for Targets Using CITV</td>
<td>Frequently</td>
<td>Continuously</td>
<td>0</td>
<td>Average</td>
<td>3 min 0 sec</td>
</tr>
<tr>
<td>Identify and Phontize Targets Using CITV</td>
<td>Frequently</td>
<td>Continuously</td>
<td>25.1</td>
<td>Somewhat Above Average</td>
<td>3 min 0 sec</td>
</tr>
<tr>
<td>Control Map Display Functions Using CCD</td>
<td>Frequently</td>
<td>Regularly</td>
<td>0</td>
<td>Average</td>
<td>1 min 30 sec</td>
</tr>
</tbody>
</table>
6.0 References


7.0 Glossary

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMMO</td>
<td>Ammunition</td>
</tr>
<tr>
<td>CCD</td>
<td>Command and Control Display</td>
</tr>
<tr>
<td>CCTB</td>
<td>Close Combat Test Bed</td>
</tr>
<tr>
<td>CFF</td>
<td>Call for Fire</td>
</tr>
<tr>
<td>CITV</td>
<td>Commander's Independent Thermal Viewer</td>
</tr>
<tr>
<td>CVCC</td>
<td>Combat Vehicle Command and Control</td>
</tr>
<tr>
<td>FLOT</td>
<td>Forward Line of Own Troops</td>
</tr>
<tr>
<td>FRAGO</td>
<td>Fragmentary Order</td>
</tr>
<tr>
<td>GLOS</td>
<td>Gunner Line of Sight</td>
</tr>
<tr>
<td>GPS</td>
<td>Gunner Primary Sight</td>
</tr>
<tr>
<td>IFF</td>
<td>Identification Friend or Foe</td>
</tr>
<tr>
<td>LRF</td>
<td>Laser Range Finder</td>
</tr>
<tr>
<td>MOS</td>
<td>Military Occupational Specialty</td>
</tr>
<tr>
<td>MQS</td>
<td>Military Qualification Standards</td>
</tr>
<tr>
<td>NBC</td>
<td>Nuclear, Biological, and Chemical</td>
</tr>
<tr>
<td>Acronym</td>
<td>Description</td>
</tr>
<tr>
<td>------------</td>
<td>-------------------------------------------------------------</td>
</tr>
<tr>
<td>OPORD</td>
<td>Operation Order</td>
</tr>
<tr>
<td>POSNAV</td>
<td>Position Navigation</td>
</tr>
<tr>
<td>SINCgars</td>
<td>Single Channel Ground and Air Radio System</td>
</tr>
<tr>
<td>SIMNET-D</td>
<td>Simulation Networking - Developmental</td>
</tr>
<tr>
<td>SITREP</td>
<td>Situation Report</td>
</tr>
<tr>
<td>SMI</td>
<td>Soldier-Machine Interface</td>
</tr>
<tr>
<td>TC</td>
<td>Tank Commander</td>
</tr>
<tr>
<td>TRADOC</td>
<td>Training and Doctrine Command</td>
</tr>
</tbody>
</table>
APPENDIX A

CVCC SYSTEM DESCRIPTION
CVCC System Description

The vehicle commander's workstation in a CVCC-equipped tank simulator of the Fort Knox CCTB facility is shown in Figure A-1. Table A-1 lists the simulator capabilities which characterized the CVCC configuration. The key features included the Command and Control Display (CCD—previously referred to as IVIS), the Commander’s Control Handle, the CITV, Vision Blocks in all three crew stations (vehicle commander, gunner, driver), Grid Azimuth Indicator, Odometer, Laser Range Finder (LRF), Gunner’s Primary Sight (GPS), GPS extension (GPSE) in the commander's station, Turret Reference Display, the Autoloader, and simulated Single Channel Ground Airborne Radio System (SINCGARS) without terrain modeling capability.

Figure A-1. Vehicle commander's CVCC workstation.
Table A-1

Basic Capabilities of a CVCC Simulator Configuration

<table>
<thead>
<tr>
<th><strong>Navigation</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Vision blocks</td>
</tr>
<tr>
<td>Paper map with acetate overlays</td>
</tr>
<tr>
<td>Grid azimuth indicator</td>
</tr>
<tr>
<td>Odometer</td>
</tr>
<tr>
<td>Laser Range Finder (LRF)</td>
</tr>
<tr>
<td>CCD</td>
</tr>
<tr>
<td>POSNAV</td>
</tr>
<tr>
<td>Waypoint Transmission</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Target acquisition/engagement</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Vision blocks</td>
</tr>
<tr>
<td>GPS/GPSE (with thermal, 3X/10X, LRF)</td>
</tr>
<tr>
<td>Turret reference display</td>
</tr>
<tr>
<td>CITV</td>
</tr>
<tr>
<td>Target Designate</td>
</tr>
<tr>
<td>Target Stack</td>
</tr>
<tr>
<td>Identification Friend or Foe (IFF)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Communications</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercom (for crew communication)</td>
</tr>
<tr>
<td>SINCGARS radio (voice)</td>
</tr>
<tr>
<td>CCD/Reports</td>
</tr>
<tr>
<td>CCD Radio Interface Unit</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Command and Control Display Configuration</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>The CCD is pictured schematically in Figure A-2. The 10.25-inch diagonal cathode ray tube (CRT) displaying the CCD was mounted to the right of the vehicle commander. A 7 X 5.75 inch rectangular working area of the CRT face comprised the primary user interface. Five functional sections organized this interface: (a) full-feature, five-color Tactical Map (4.5 X 5.12 inches) with directional own-vehicle icon; (b) Information Center displaying date/time group, own grid location, own vehicle heading, and own call sign; (c) fixed array of dedicated soft-switch menu keys accessing specific functions; (d) working menu area displaying queue/file listings, sub-menus, and selected functions; and (e) message receipt alert key.</td>
</tr>
</tbody>
</table>
Figure A-2. Schematic drawing of the CCD user interface with the five primary functional areas labelled.

Table A-2 lists the C3-related capabilities of the CCD concept configuration. A brief overview of the system follows.

Map functions. The basic Tactical Map was a Universal Transverse Mercator (UTM) grid representation of the terrain surrounding the tank's location from an overhead perspective. Digital data in the CCTB terrain data base constituted the basis for all resident map graphics. Four map scales were available at all times—1:25,000, 1:50,000, 1:125,000, and 1:250,000—with at least a few seconds processing time required for rescaling. The CCD provided several additional features for optional selection by the vehicle commander: contour lines, rivers, roads, vegetation, and UTM grid lines, all of which were color coded. Also, the system could display graphic tactical map overlays received digitally.

Several map scroll functions enabled the vehicle commander to control positioning of the map in relation to his tank icon. The basic scroll function maintained the icon in the center of the map, scrolling the map as the tank moved. An option was to lock the map in position, maintaining a view of the same terrain segment regardless of where the tank moved. The vehicle commander could reposition the map to show a new terrain segment, allowing him flexibility to inspect icons or terrain features of interest.
Table A-2

C³ Capabilities of the CCD

Navigation

Grid map
Terrain map
Graphic overlays
Own vehicle location (grid + icon)
Directional icon (own vehicle)
Friendly vehicle locations
Report-based icons
Route waypoints
Driver's Steer-to-Display
Waypoint Autoadvance
Transmission of routes

Communications

Report preparation (text)
LRF input to reports
Send/receive/relay reports (text)
Receive/relay graphic overlays
Report-based icons

General Characteristics

Thumb control
Touchscreen control
Color display

Finally, he could position his tank icon in an off-center location while the map scrolled under the tank icon.

The Tactical Map could display key symbols (icons) representing battlefield information. These included report-based and route-based icons. Reports being prepared generated icons appearing on the map (e.g., CONTACT reports generated enemy vehicle icons). Upon completing the report, the vehicle commander could post these icons to the map. Waypoints generated under Navigation functions appeared on the map with connecting lines, forming graphic routes. The Tactical Map automatically displayed icons representing all friendly vehicles located on the terrain segment currently displayed. This was labelled the "mutual POSNAV" feature. Finally, map icons (e.g., minefield symbols) signalled reports which were received digitally. These icons remained on the map until the vehicle commander took action on the
report or until the report automatically transferred to the "old" file (a report-type filing system). Exceptions to the latter rule existed: when CONTACT and INTELLIGENCE reports transferred to the old file, their icons automatically posted to the map.

**Navigation functions.** The CCD enabled the vehicle commander to create and modify routes for navigation and to send route information to his driver. In addition, the CCD permitted any vehicle commander to transmit a route digitally to other vehicles in his unit. Routes were generated by designating up to six locations on the map (waypoints). An icon for each waypoint appeared on the map, while lines connected successive waypoints. The vehicle commander could send waypoints to his driver one at a time--manually or automatically by means of an Autoadvance option.

The Navigation subsystem included a Steer-to-Display in the driver's compartment, mounted to the right of the steering column (the T-bar). Figure A-3 depicts the driver's T-bar, to the right of the T-bar is the Steer-to-Display which presented alphanumeric information about the tank's current and required heading as well as distance from the waypoint. In addition, the display incorporated a graphic indicator with a pointer showing how the driver should steer to reach and maintain the proper heading, represented by the 12 o'clock position. Note in Figure A-3 that the pointer is approximately at the 4 o'clock position, thus the deviation (DEVN) is 111 degrees. Given this situation, the driver would neutral steer the tank 111 degrees to the West (at which time the pointer would be at the 12 o'clock position) and drive the eight kilometers to the waypoint.

Also of value in navigating and positioning was the directional own-tank icon displayed on the CCD tactical map. This helped maintain proper orientation and direction of movement. Additionally, both UTM grid location and grid azimuth heading were available in the CCD information center.

**Report functions.** The CCD supported preparation of reports by means of menu-driven screen forms. The vehicle commander was able to prepare any of the nine types of reports available on the CCD by filling in fields appearing in the working menu area. Table A-3 lists these report types along with information about number of fields in each. The vehicle commander could call up CONTACT, CALL FOR FIRE, and NUCLEAR-CHEMICAL-BIOLOGICAL (NBC) report forms directly from the fixed menu keys. The remaining report forms required him to call up a report menu first, then choose a report type from the options appearing in the working menu area.
Figure A-3. Drawing of the driver's T-bar showing the Steer-to-Display on the right.
Table A-3

Report Preparation Forms Available on the CCD

<table>
<thead>
<tr>
<th>Report Type</th>
<th>Number of option-input fields</th>
<th>Number of grid-input fields</th>
<th>Number of Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONTACT</td>
<td>4\textsuperscript{a}</td>
<td>4\textsuperscript{a}</td>
<td>1</td>
</tr>
<tr>
<td>CALL FOR FIRE</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>ADJUST FIRE</td>
<td>3</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>SPOT</td>
<td>9</td>
<td>2</td>
<td>3\textsuperscript{b}</td>
</tr>
<tr>
<td>SHELL</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>SITUATION</td>
<td>8</td>
<td>2</td>
<td>3\textsuperscript{b}</td>
</tr>
<tr>
<td>AMMUNITION</td>
<td>5</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>INTELLIGENCE</td>
<td>8</td>
<td>6</td>
<td>4\textsuperscript{b}</td>
</tr>
<tr>
<td>NBC</td>
<td>7</td>
<td>2</td>
<td>3\textsuperscript{b}</td>
</tr>
</tbody>
</table>

\textsuperscript{a} - Up to four paired ID-location fields could be filled in.
\textsuperscript{b} - Includes a final summary page.

Fill-in fields usually called for selecting inputs from option sets provided by the CCD. Fields dealing with location or heading information called for grid inputs from the tactical map or from lasing to a vehicle or terrain point. Blank fields were permitted. Since typically only four or five fields could fit in the working menu area, four of the reports required more than one "page" for complete presentation, the final page being a summary of all fields.

At any time the vehicle commander could leave a report preparation screen without completing or sending the report. That report preparation screen would remain "behind" any subsequent screens without loss of information and could be returned to for later completion. He might, for example, leave to prepare another type of report or go to the MAP function to change scales. Multiple types of reports could be open at the same time, but only one report of a given type (e.g., CONTACT) could be open at any time. No more than one report could be visible on the screen at a given moment. The vehicle commander could complete a report (and thereby dispose of that report form) by either deleting, cancelling, or sending it, using a sequence of soft-switch presses.
Digital report transmission. A simulated radio interface unit (RIU) enabled the vehicle commander to transmit digital reports prepared on the CCD. Co Cdrs and Plt Ldrs had access to two nets: Co Cdrs had the battalion and company nets, while Plt Ldrs had the company and their platoon nets. Only the platoon net was available to the platoon sergeant and the wingmen. A routing menu offered the option of sending any report on any radio net available for the vehicle commander's use, including simultaneous transmission if two nets were available. For example, a platoon leader could send a report to the TCs within his platoon (platoon net), to the Co Cdr and the other Plt Ldrs (company net), or to all of them at the same time. A default net (based on transmission direction—upward or downward) existed for each report type. If a Co Cdr or Plt Ldr sent or relayed an INTELLIGENCE Report, a FRAGO, an Overlay or a Route, the default was the downward-going net (TCs had no downward-going net). For the remainder of reports the default was the upward-going net. Upon transmission, a report copy automatically transferred to the sender's old file, from which it could be retrieved later and resent. A "MESSAGE SENT" confirmed transmission, displayed in the Information Center, but there was no feedback indicating that addressees had received and read the report.

When a vehicle commander received a transmitted report, three cues appeared at once: the message receipt alert key (located in the upper right corner of the CCD) lighted up, an audible cue sounded in the vehicle commander's headset (three tone beeps for a high priority report, one beep for others), and an icon appeared on the tactical map (blinking for the first five seconds). A report remained in the receive queue for five minutes, as did its associated icon remain on the map. As high priority reports (ADJUST FIRE, CALL FOR FIRE, CONTACT, FRAGO, INTELLIGENCE, and NBC-report priority being based on immediacy of information) arrived, they went to the head of the queue. Activation of the RECEIVE key called up the Receive Queue, listing the report type, originator, and time received for each report, enabling the vehicle commander to select a report for display in the working menu area. Up to five reports were displayed in the Receive Queue at a time, but it could be scrolled forward and backward to view the complete Queue.

If the vehicle commander failed to retrieve a report from the Queue within five minutes, the report automatically transferred to the old file (unless the vehicle commander was viewing the report when the five minutes elapsed). When transferred to the old file CONTACT and INTELLIGENCE reports automatically posted an icon to the map. For other reports, the associated icon, if not manually posted, disappeared from the map.
Once the vehicle commander selected a report to read, he could review it at his own pace. In the case of a multi-page report, only the summary page appeared. For example, when ready to terminate his review, he could cancel and file the report (with an option to post to the tactical map an icon representing it), he could relay it (see below), or he could delete it. Unless he deleted it, he could subsequently retrieve the same report as many times as he desired.

If the vehicle commander decided to pass a report along to other members of his unit, he could exercise the option to relay it (there was no capability to edit reports). Relaying a report involved the same steps as transmitting one. The same options for routing were available. The system did not limit the number of times a given report could be relayed.

Control device. The vehicle commander controlled the operation of the CCD by means of a cursor appearing on the face of the display screen. He selected menus and functions by positioning the cursor on the desired key. The CCD afforded the vehicle commander the option of manipulating the cursor position by touching with his finger the face of the touch-sensitive screen or by using a thumb control mounted on his control handle. Touching the screen automatically jumped the cursor to the new position designated by the finger's contact with the screen. When satisfied with the cursor position, the vehicle commander removed his finger from the screen. This action initiated the menu or function corresponding to the key on which the cursor rested, or resulted in a grid location input to a report if the cursor was located on the map. The cursor was offset from the touchpoint to enable the vehicle commander to see the cursor location.

When operating the thumb control, the vehicle commander could move the cursor in virtually any direction at a variable speed. With the cursor resting on the desired key, release of the thumb control initiated the corresponding menu or function.

Utility functions. The CCD provided a small set of utility functions with which to manage prepared and received reports. The automatic transfer of reports from the Receive Queue to the old file was one such function. The vehicle commander could also delete reports which he created, both during preparation and after transmission, as well as any reports he had received. The latter action could be accomplished without reviewing the contents of the report or after it had been filed. Deletion resulted in no record of the contents. To declutter the tactical map, the vehicle commander could delete icons one at a time or he could select a menu option to delete all icons older than a specified time.
Commander's Independent Thermal Viewer Configuration

The CITV afforded the vehicle commander a battlefield viewing capability and an independent laser locator. In terms of tactical utility, the diverse functions of this system spanned navigation; battlefield surveillance; target acquisition, identification, and management; and fire control. Table A-4 lists the functional capabilities of the CITV.

Mounted directly to the front of the vehicle commander, the CITV interface arrayed control switches around three sides of a central display screen (Figure A-4). Switches on the right margin of the interface were nonfunctional. The vehicle commander controlled operation of the CITV via inputs through the functional switches and through push buttons on his control handle. The control handle was also used to control manual movement of the CITV sensor. The interface components entailed: (a) rectangular (6.5 X 5.88 inches) monochrome CRT display screen with own vehicle icon and sighting reticle; (b) power switch with OFF, STANDBY, and ON positions (three-position toggle); (c) push-button selector switches for basic mode (CITV, GPS); (d) push-button selector switches for operational mode (AUTOSCANN, MANUAL SEARCH, GLOS); (e) push-button selector switches for independent laser range finder; (f) push-button selector switches for identification friend or foe (IFF); (g) push-button selector switches for target designate; and (h) push-button selector switches for gunner's line of sight (GLOS), own vehicle icon (directional, all parts moving).

Table A-4

Capabilities of the CITV

<table>
<thead>
<tr>
<th>Independent thermal search</th>
</tr>
</thead>
<tbody>
<tr>
<td>3X and 10X magnification</td>
</tr>
<tr>
<td>White-hot and black-hot polarity</td>
</tr>
<tr>
<td>Manual Search</td>
</tr>
<tr>
<td>Autoscan</td>
</tr>
<tr>
<td>Independent Laser Range Finder</td>
</tr>
<tr>
<td>Identification Friend or Foe (IFF)</td>
</tr>
<tr>
<td>Target Designate</td>
</tr>
<tr>
<td>Target Stack</td>
</tr>
<tr>
<td>Gunner's Line of Sight (GLOS)</td>
</tr>
<tr>
<td>Own vehicle icon (directional, all parts moving)</td>
</tr>
</tbody>
</table>
Figure A-4. Drawing of the vehicle commander's crewstation in a manned tank simulator with the CITV in the center.

(e) two-position push-button switch for polarity (WHITE-HOT, BLACK-HOT); (f) Autoscan control switches for setting sector limits and adjusting scan rate; (g) vehicle commander's Target Stack display with four push-button target selector switches and ON-OFF push-button switch; (h) gunner's Target Stack display similar to the vehicle commander's (depicted in Figure A-5, along the bottom of the gunner's crewstation); (i) control handle with push buttons for switching magnification (3X, 10X), operating the laser, and designating targets (depicted in Figure A-6). Summarized below is an overview of the system functions.

**Basic modes.** In the GPS mode, the CITV was functionally inactivated, with the last active scene from the sensor remaining static on the screen. Requiring the vehicle commander to use his
Figure A-5. Drawing of the gunner's crewstation, with the Target Stack buttons along the bottom, labelled one through four.

Figure A-6. Drawing of the commander's control handle with the functions labelled.
GPSE for viewing, this mode enabled him to override the gunner in moving the turret/gun tube and firing. The CITV mode permitted the vehicle commander to select three types of surveillance--GLOS, Manual Search and Autoscan. The GLOS mode slaved the CITV line of sight to the main gun alignment, except when the vehicle commander depressed his palm switch to activate Manual Search. The slaved alignment provided a view overlapping the gunner's view while enabling the vehicle commander to operate his own laser and change magnification and polarity. The Manual Search and Autoscan capabilities, both providing independent surveillance, are discussed below. For the purposes of this research effort the vehicle commander could not move or fire the main gun from the CITV mode.

In all CITV modes the display screen presented optional fields of view: wide field (3X magnification, 7.5 X 10 degrees) and narrow field (10X magnification, 2.5 X 3.3 degrees). In providing uninterrupted horizontal sweep capability, the system afforded a 360 degree field of regard. The vertical expanse of the field of regard ranged from +20 to -12 degrees. According to his preference, the vehicle commander could select White-Hot or Black-Hot display options. In White-Hot mode, warmer objects within the field of view appeared "white" against a darker background. In Black-Hot mode, warmer objects appeared black against a lighter background.

The own tank icon present on the display screen depicted the direction of the turret/gun and CITV. The CITV indicators included the CITV's line of sight as well as the Autoscan sector limit markers. The entire icon rotated to represent the proper grid azimuth heading of the tank hull. The CITV tank icon was consistent with the CCD own tank icon.

**Manual Search.** In selecting Manual Search, the vehicle commander could control the CITV's line of sight manually by manipulating his control handle. Both direction (horizontal, vertical, and oblique) and speed of movement could be controlled simultaneously. This mode allowed the vehicle commander to vary at will his pace and pattern as he searched for targets. It preserved access to other control options such as magnification, polarity, and target designation.

**Autoscan.** Autoscan permitted the vehicle commander to sweep automatically the CITV's line of sight back and forth across a specified sector at a set rate of speed. The search pattern required no input from the vehicle commander once initial parameters were set. Setting or resetting left and right sector limit markers defined the portion of the field of regard to be scanned. To adjust scan rate, the vehicle commander could increase or decrease the current rate, which began at a default value upon initialization. The entire 360 degree field of regard
could be selected as the scanning sector, if desired. As with Manual Search, Autoscan maintained availability of secondary control options such as polarity, magnification, and target designation. The latter function required the vehicle commander to activate a temporary Manual Search option by depressing his palm switch.

**Independent Laser Range Finder.** The CITV system included a laser capability independent of the standard LRF. The vehicle commander could exercise this capability in GLOS, Manual Search, and Autoscan modes; lasing in the latter mode required interruption of scanning to stabilize the sight picture. Each lase event produced a range-to-target reading in meters, displayed in the lower left corner of the display screen; this reading could indicate flawed determinations and double returns. Lasing also supported the IFF function, which had an 85% accuracy rate and generated symbology characterizing the target as friendly, enemy, or uncertain. This symbology appeared in the upper left portion of the display.

**Target designation.** In the Manual Search and Autoscan modes, the vehicle commander could use the Designate function to quickly hand off a target to his gunner. Having identified an enemy target for immediate engagement, the vehicle commander pressed the DESIGNATE button on his control handle. This rapidly slewed the main gun to the CITV's line of sight, overriding the gunner's controls. The vehicle commander then could hand off the target.

**Target Stacking.** The CITV configuration incorporated a target management feature referred to as Target Stack. In both the Manual Search and Autoscan modes, the vehicle commander could use this feature to cue the gunner about available targets. After lasing to and identifying an enemy target the vehicle commander pressed one of four buttons to mark the target's location. He could cumulate up to four targets in the stack. The vehicle commander placed targets in the stack in priority order (number one being highest priority). As the vehicle commander stacked targets, cuing lights on the gunner's display came on and, for each target, two LEDs indicated the relative position of the target with respect to the direction of the main gun (left, right, or centered). The gunner could use these indicators to anticipate the direction in which the turret would slew after pushing a target stack button. After the gunner engaged a target selected from the target stack, it dropped from the stack.

**Radio nets**

The simulated SINCGARS radio system serviced five radio nets--battalion, company, and three platoons. The manned simulators connected to these nets in a doctrinally realistic arrangement. The Co Cdr, Plt Ldrs, and platoon sergeant accessed two nets each,
while the two wingmen accessed only one. An RIU linked the CCD with the SINCGARS system to enable electronic transmission of messages via digital burst technique. The voice radio net scheme defined the automated routing options for each vehicle commander except the platoon sergeant, who could transmit CCD messages on only the platoon net.
**Task Analysis Index**

<table>
<thead>
<tr>
<th>Task</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Task 2.</td>
<td>Prepare and Submit Spot Report Using CCD</td>
<td>B-9</td>
</tr>
<tr>
<td>Task 3.</td>
<td>Prepare and Submit Shell Report Using CCD</td>
<td>B-15</td>
</tr>
<tr>
<td>Task 4.</td>
<td>Prepare and Submit Contact Report Using CCD</td>
<td>B-19</td>
</tr>
<tr>
<td>Task 5.</td>
<td>Prepare and Submit Call for Fire Report Using CCD</td>
<td>B-23</td>
</tr>
<tr>
<td>Task 6.</td>
<td>Prepare and Submit SITREP Report Using CCD</td>
<td>B-27</td>
</tr>
<tr>
<td>Task 7.</td>
<td>Prepare and Submit NBC Report Using CCD</td>
<td>B-33</td>
</tr>
<tr>
<td>Task 8.</td>
<td>Designate and Transmit Route Coordinates Using CCD</td>
<td>B-39</td>
</tr>
<tr>
<td>Task 9.</td>
<td>Receive and Review Route Coordinates Using CCD</td>
<td>B-43</td>
</tr>
<tr>
<td>Task 11.</td>
<td>Prepare and Submit Ammunition Report Using CCD</td>
<td>B-51</td>
</tr>
<tr>
<td>Task 12.</td>
<td>Prepare and Submit Intelligence Report Using CCD</td>
<td>B-55</td>
</tr>
<tr>
<td>Task 14.</td>
<td>Search for Targets Using the CITV</td>
<td>B-65</td>
</tr>
<tr>
<td>Task 15.</td>
<td>Identify and Prioritize Targets Using CCD</td>
<td>B-69</td>
</tr>
<tr>
<td>Task 16.</td>
<td>Control Map Display Functions Using CCD</td>
<td>B-73</td>
</tr>
</tbody>
</table>
CVCC TASK AND TASK ELEMENT DATA FORM

Task Number 1

**TASK TITLE:** Receive and Review Report Using CCD

**DUTY POSITION**
- Company Commander
- Platoon Leader
- Platoon Sergeant
- Tank Commander

**CONDITIONS**
- Tactical or nontactical situation under all weather conditions
- All types of terrain
- May be performed in an NBC environment
- M1A2 tank, simulator or stand alone situation
- Use PDEP 9-2350-264-10-1 (M1A2)

**PERFORMANCE MEASURES**
- Report generation time
- Report accuracy
- Report completeness

**INITIATING CUES**
- Receive Message light illuminates
- Voice communications (report has been transmitted)

**TERMINATING CUES**
- Message reviewed
- Message deleted
- Message canceled

**FEEDBACK CUES**
- None

**DEFENSIVE FREQUENCY**
- Continuously - All during the mission

**OFFENSIVE FREQUENCY**
- Continuously - All during the mission
CRITICALITY: 21.00%
21.0 percent of the workload respondents ranked this task as their top priority task.

LEARNING DIFFICULTY
Somewhat above average

REASON FOR DIFFICULTY
Operator must keep track of Receive Message light when illuminated, and attempt to address those messages in the receive queue prior to 5 minutes elapsing or message is automatically forwarded to the message file. Messages are coming in from several different sources.

DATA SOURCE
CVCC exercise observations
Workload data analysis

COMMENTS
None

SKILLS
Manipulate display cursor
Act on message while still in receive queue (5 minutes).

KNOWLEDGE
Message alerts
Icon association
Function keys
Queue/file differences

PERFORMANCE TIME: 5 minutes, 0 seconds

Task Element Number 1.01

TASK ELEMENT TITLE: Display message in active queue

DISPLAYS
CCD display

CONTROLS
CCD control panel
Commander's control handle
Cursor
Task Element Number 1.02

TASK ELEMENT TITLE: Display message in message storage file

DISPLAYS
  CCD display

CONTROLS
  CCD control panel
  Commander's control handle
  Cursor

Task Element Number 1.03

TASK ELEMENT TITLE: Review message in active/storage file

DISPLAYS
  CCD display

CONTROLS
  CCD control panel
  Commander's control handle
  Cursor

Task Element Number 1.04

TASK ELEMENT TITLE: Select messages for deletion or cancellation

DISPLAYS
  CCD display

CONTROLS
  CCD control panel
  Commander's control handle
  Cursor
CVCC TASK AND TASK ELEMENT DATA FORM

Task Number 2

TASK TITLE: Prepare and Submit Spot Report Using CCD

DUTY POSITION
- Company Commander
- Platoon Leader
- Platoon Sergeant
- Tank Commander

CONDITIONS
- Tactical or nontactical situation under all weather conditions
- All types of terrain
- May be performed in an NBC environment
- M1A2 tank, simulator or stand alone situation
- Use PDEP 9-2350-264-10-1 (M1A2)

PERFORMANCE MEASURES
- Report generation time
- Report accuracy
- Report completeness

INITIATING CUES
- Initial visual contact
- Receive direct fire
- Receive indirect fire
- Receive air attack

TERMINATING CUES
- Report Sent message received on display

FEEDBACK CUES
- None

DEFENSIVE FREQUENCY
- Continuously - All during the mission

OFFENSIVE FREQUENCY
- Frequently - Several times per mission
CRITICALITY 14.40%
14.4 percent of the workload respondents ranked this task as their top priority task.

LEARNING DIFFICULTY
Average

REASON FOR DIFFICULTY
Limited time
Simultaneous tasks

DATA SOURCE
CVCC exercise observations
Workload data analysis

COMMENTS
The spot report is the preferred method of reporting contact but due to time constraints and the situation, sometimes the tank commander will make this type of abbreviated contact report.

SKILLS
Touch screen cursor control
Commander's control handle in conjunction with CITV.

KNOWLEDGE
Enemy units
Differences in enemy unit activities
Priority in routing report

PERFORMANCE TIME: 1 minute, 30 seconds

Task Element Number 2.01

TASK ELEMENT TITLE: Operate CCD Function Keys

DISPLAYS
CCD display
CCD map display

CONTROLS
CCD function keys
Task Element Number 2.02

TASK ELEMENT TITLE: Determine Enemy Unit Situation

DISPLAYS
CITV display
Commander's cupola vision blocks
IFF display

CONTROLS
CITV function switches
CCD function keys
Commander's control handle

Task Element Number 2.03

TASK ELEMENT TITLE: Operate Laser Rangefinder to Determine Enemy Location

DISPLAYS
CITV display
IFF display

CONTROLS
Commander's control handle
CITV function switches

Task Element Number 2.04

TASK ELEMENT TITLE: Use Map Display to Determine Enemy Location

DISPLAYS
CCD map display

CONTROLS
CCD function keys
Cursor control
CCD touch panel
Task Element Number 2.05

TASK ELEMENT TITLE: Determine Own Unit Situation

DISPLAYS
- CITV display
- Commander's cupola vision blocks

CONTROLS
- CITV function switches
- CCD function keys
- Commander's control handle

Task Element Number 2.06

TASK ELEMENT TITLE: Correct Report Data

DISPLAYS
- CCD display
- CCD map display
- CITV display
- Commander's cupola vision blocks
- IFF display

CONTROLS
- CCD function keys
- CITV function switches
- Commander's control handle
- Cursor control
- Laser rangefinder

Task Element Number 2.07

TASK ELEMENT TITLE: Determine Correct Routing

DISPLAYS
- CCD display

CONTROLS
- CCD function keys
Task Element Number 2.08

TASK ELEMENT TITLE: Enter Report Data to Map Display

DISPLAYS
   CCD map display
   CITV display
   Commander's cupola vision blocks
   IFF display

CONTROLS
   CCD function keys
   CITV function switches
   Commander's control handle
   Laser rangfinder
   Cursor control

Task Element Number 2.09

TASK ELEMENT TITLE: Transmit Report

DISPLAYS
   CCD display

CONTROLS
   CCD function keys
   Cursor control
CVCC TASK AND TASK ELEMENT DATA FORM

Task Number 3

TASK TITLE: Prepare and Submit Shell Report Using CCD

DUTY POSITION
Company Commander
Platoon Leader
Platoon Sergeant
Tank Commander

CONDITIONS
Tactical or nontactical situation under all weather conditions
All types of terrain
May be performed in an NBC environment
M1A2 tank, simulator or stand alone situation
Use PDEP 9-2350-264-10-1 (M1A2)

PERFORMANCE MEASURES
Report generation time
Report accuracy
Report completeness

INITIATING CUES
Receive shelling
Sight shelling

TERMINATING CUES
Report Sent message appears on CCD display

FEEDBACK CUES
Units respond to shelling by taking cover
Units avoid shelling area

DEFENSIVE FREQUENCY
Frequently - several times per mission

OFFENSIVE FREQUENCY
Frequently - several times per mission

CRITICALITY 9.30%
9.3 percent of the workload respondents ranked this task as their top priority task.

B-15
LEARNING DIFFICULTY
   Somewhat below average

REASON FOR DIFFICULTY
   Simultaneous tasks

DATA SOURCE
   CVCC exercise observations
   Workload data analysis

COMMENTS
   None

SKILLS
   Touch screen cursor control
   Commander's control handle and cursor

KNOWLEDGE
   Indicators of a shelling
   Friendly or enemy shelling

PERFORMANCE TIME: 1 minute, 0 seconds

   Task Element Number 3.01

 TASK ELEMENT TITLE: Operate CCD Function Keys

 DISPLAYS
   CCD display

 CONTROLS
   CCD function keys
   Cursor control

   Task Element Number 3.02

 TASK ELEMENT TITLE: Identify Shelling

 DISPLAYS
   CITV display
   Commander's cupola vision blocks

 CONTROLS
   CITV function switches
Task Element Number 3.03

TASK ELEMENT TITLE: Operate Laser Rangefinder

DISPLAYS
CITV display
IFF display

CONTROLS
Commander's control handle
CITV function switches

Task Element Number 3.04

TASK ELEMENT TITLE: Select Correct Report Routing

DISPLAYS
CCD map display

CONTROLS
CCD function keys

Task Element Number 3.05

TASK ELEMENT TITLE: Transmit Report

DISPLAYS
CCD display

CONTROLS
CCD function keys
Cursor control
CVCC TASK AND TASK ELEMENT DATA FORM

Task Number 4

TASK TITLE: Prepare and Submit Contact Report Using CCD

DUTY POSITION
  Company Commander
  Platoon Leader
  Platoon Sergeant
  Tank Commander

CONDITIONS
  Tactical or nontactical situation under all weather conditions
  All types of terrain
  May be performed in an NBC environment
  M1A2 tank, simulator or stand alone situation
  Use PDEP 9-2350-264-10-1 (M1A2)

PERFORMANCE MEASURES
  Report generation time
  Report accuracy
  Report completeness

INITIATING CUES
  Initial visual contact
  Receive direct fire
  Receive indirect fire
  Receive air attack

TERMINATING CUES
  Report Sent message appears on display

FEEDBACK CUES
  Additional information requested
  Another tank assists sender in engagement or some function related to report sent

DEFENSIVE FREQUENCY
  Frequently - several times per mission

OFFENSIVE FREQUENCY
  Frequently - several times per mission

B-19
CRITICALITY 33.50%
33.5 percent of the workload respondents ranked this task as their top priority task.

LEARNING DIFFICULTY
Average

REASONS FOR DIFFICULTY
Limited time
Simultaneous tasks

DATA SOURCE
Tank platoon SOP
FKSM 17-15-3, dtd Feb 1989
CVCC exercise observations
Workload data analysis

COMMENTS
In the CVCC experiment, it was noted that the method selected in performing the task was dependent on the situation. The shorter method of making a contact report was more evident in an offensive scenario (e.g., movement to contact) whereas a more time consuming method was utilized during a defensive scenario (e.g., delay).

SKILLS
Touch screen cursor control
Commander's control handle in conjunction with CITV

KNOWLEDGE
Identify enemy units
Differences in enemy unit activities
Priority in routing report

PERFORMANCE TIME: 1 minute, 0 seconds

Task Element Number 4.01

TASK ELEMENT TITLE: Operate CCD Function Keys

DISPLAYS
CCD display

CONTROLS
CCD function keys
Cursor control
Task Element Number 4.02

TASK ELEMENT TITLE: Determine Enemy Unit Type

DISPLAYS
CITV display
Commander's cupola vision blocks
IFF display

CONTROLS
CITV function switches
CCD function keys
Commander's control handle

Task Element Number 4.03

TASK ELEMENT TITLE: Operate Laser Rangefinder to Determine Enemy Location

DISPLAYS
CITV display
IFF display

CONTROLS
Commander's control handle
CITV function switches

Task Element Number 4.04

TASK ELEMENT TITLE: Designate Enemy Location with Map Display

DISPLAYS
CCD map display

CONTROLS
CCD function keys
Cursor control
Task Element Number 4.05

TASK ELEMENT TITLE: Select Routing Priority

DISPLAYS
- CCD display

CONTROLS
- CCD function keys

Task Element Number 4.06

TASK ELEMENT TITLE: Enter Report Data on Map Display

DISPLAYS
- CCD map display
- CITV display
- Commander's cupola vision blocks
- IFF display

CONTROLS
- CCD function keys
- CITV function switches
- Commander's control handle
- Laser rangefinder
- Cursor control

Task Element Number 4.07

TASK ELEMENT TITLE: Transmit Report

DISPLAY
- CCD display

CONTROLS
- CCD function keys
- Cursor control
CVCC TASK AND TASK ELEMENT DATA FORM

Task Number 5

TASK TITLE: Prepare and Submit Call for Fire Report Using CCD

DUTY POSITION
Company Commander
Platoon Leader
Platoon Sergeant
Tank Commander

CONDITIONS
Tactical or nontactical situation under all weather conditions
All types of terrain
May be performed in an NBC environment
M1A2 tank, simulator or stand alone situation
Use PDEP 9-2350-264-10-1 (M1A2)

PERFORMANCE MEASURES
Report generation time
Report accuracy
Report completeness

INITIATING CUES
Suspected enemy positions
Enemy force attacking
Enemy force large

TERMINATING CUES
Fire support received
Enemy destroyed

FEEDBACK CUES
Accuracy of fire support

DEFENSIVE FREQUENCY
Frequently - several times per mission

OFFENSIVE FREQUENCY
Frequently - several times per mission
CRITICALITY 7.50%
7.5 percent of the workload respondents ranked this task as their top priority task.

LEARNING DIFFICULTY
Average

REASONS FOR DIFFICULTY
Simultaneous tasks

DATA SOURCE
CVCC exercise observations
Workload data analysis

COMMENTS
None

SKILLS
Manipulate use of display cursor
Use laser rangefinder

KNOWLEDGE
Call for fire procedures
Methods for estimating adjustments
System automated capabilities

PERFORMANCE TIME: 1 minute, 30 seconds

Task Element Number 5.01

TASK ELEMENT TITLE: Operate CCD Function Keys

DISPLAYS
CCD display
CCD map display

CONTROLS
CCD function keys
Task Element Number 5.02

TASK ELEMENT TITLE: Operate Laser Rangefinder to Determine Enemy Location

DISPLAYS
  CITV display
  IFF display

CONTROLS
  CITV function switches
  Commander's control handle

Task Element Number 5.03

TASK ELEMENT TITLE: Operate Map Display to Determine Enemy Location

DISPLAYS
  CCD map display

CONTROLS
  CCD function keys
  Cursor control

Task Element Number 5.04

TASK ELEMENT TITLE: Determine Add/Drop Shifts for Adjust Fire

DISPLAYS
  CCD display

CONTROLS
  CCD display keyboard

Task Element Number 5.05

TASK ELEMENT TITLE: Select Correct Report Routing

DISPLAYS
  CCD display

CONTROLS
  CCD function keys

B-25
Task Element Number 5.06

TASK ELEMENT TITLE: Enter Data to Map Display

DISPLAYS
  CCD map display
  CITV display
  Commander's cupola vision blocks
  IFF display

CONTROLS
  CCD function keys
  CITV function switches
  Commander's control handle
  Laser rangefinder
  Cursor control

Task Element Number 5.07

TASK ELEMENT TITLE: Transmit Report

DISPLAY
  CCD display

CONTROLS
  CCD function keys
  Cursor control
CVCC TASK AND TASK ELEMENT DATA FORM

Task Number 6

TASK TITLE: Prepare and Submit SITREP Report Using CCD

DUTY POSITION
- Company Commander
- Platoon Leader
- Platoon Sergeant
- Tank Commander

CONDITIONS
- Tactical or nontactical situation under all weather conditions
- All types of terrain
- May be performed in an NBC environment
- M1A2 tank, simulator or stand alone situation
- Use PDEP 9-2350-264-10-1 (M1A2)

PERFORMANCE MEASURES
- Report generation time
- Report accuracy
- Report completeness

INITIATING CUES
- After a significant event
- Battle position changes
- Consolidation on objective
- Requested by higher headquarters

TERMINATING CUES
- Report Sent message appears on CCD display

FEEDBACK CUES
- Additional information requested
- CCD display indicates message sent

DEFENSIVE FREQUENCY
- Continuously - all during the mission

OFFENSIVE FREQUENCY
- Frequently - several times per mission

B-27
CRITICALITY  13.30%
13.3 percent of the workload respondents ranked this task as their top priority task.

LEARNING DIFFICULTY
Average

REASONS FOR DIFFICULTY
Simultaneous tasks

DATA SOURCE
CVCC exercise observations
Workload data analysis
Tank platoon SOP
FKSM 17-15-3, dtd Feb 1989

COMMENTS
The SITREP report is not difficult to complete but due to circumstances at the time a request for a SITREP may be delayed. The first thing of importance to the TC is to conduct combat operations.

SKILLS
Touch screen cursor control
Commander's control handle cursor control

KNOWLEDGE
Know when report is required
Know what FLOT end points are
How to calculate FLOT end points
Know commander's intent
Know what various reporting status terms mean (red, green, amber, etc.)

PERFORMANCE TIME:  2 minutes, 0 seconds

Task Element Number 6.01

TASK ELEMENT TITLE: Operate CCD Function Keys

DISPLAYS
CCD display
CCD map display

CONTROLS
CCD function keys
Task Element Number 6.02

TASK ELEMENT TITLE: Operate Laser Rangefinder to Determine FLOT End Points

DISPLAYS
CITV display

CONTROLS
Commander's control handle
CCD map touch panel
Laser rangefinder

Task Element Number 6.03

TASK ELEMENT TITLE: Operate Map Display

DISPLAYS
CCD map display
CCD display

CONTROLS
CCD function keys
Cursor control

Task Element Number 6.04

TASK ELEMENT TITLE: Select Enemy Activity and Type

DISPLAYS
CITV display
Commander's cupola vision blocks
IFF display

CONTROLS
CITV function switches
CCD function keys
Commander's control handle
Task Element Number 6.05

TASK ELEMENT TITLE: Select Critical Shortages

DISPLAYS
  CCD display

CONTROLS
  CCD function keys

Task Element Number 6.06

TASK ELEMENT TITLE: Select Commander's Intent

DISPLAYS
  CCD display

CONTROLS
  CCD function keys

Task Element Number 6.07

TASK ELEMENT TITLE: Correct Report Data

DISPLAYS
  CCD display
  CCD map display
  CITV display
  Commander's cupola vision blocks
  IFF display

CONTROLS
  CCD function keys
  CITV function switches
  Commander's control handle
  Laser rangefinder
  Cursor control

Task Element Number 6.08

TASK ELEMENT TITLE: Select Report Routing

DISPLAY
  CCD display
CONTROLS
CCD function keys

Task Element Number 6.09

TASK ELEMENT TITLE: Transmit Report

DISPLAY
CCD display

CONTROLS
CCD function keys
Cursor control
CVCC TASK AND TASK ELEMENT DATA FORM

Task Number 7

TASK TITLE: Prepare and Submit NBC Report Using CCD

DUTY POSITION
Company Commander
Platoon Leader
Platoon Sergeant
Tank Commander

CONDITIONS
Tactical or nontactical situation under all weather conditions
All types of terrain
May be performed in an NBC environment
M1A2 tank, simulator or stand alone situation
Use PDEP 9-2350-264-10-1 (M1A2)

PERFORMANCE MEASURES
Report generation time
Report accuracy
Report completeness

INITIATING CUES
Chemical agent detected
Mist appears after artillery attack
Color changes M8/M9 paper
Chemical agent alarm
Individual agent symptom
Dose rate 1 CGY per hr
Observed mushroom cloud

TERMINATING CUES
Report Sent message appears on CCD display
All clear signal is received

FEEDBACK CUES
Units avoid contaminated area
Message sent indicated on CCD display
All clear signal is received

DEFENSIVE FREQUENCY
Regularly - Once per mission
OFFENSIVE FREQUENCY
Regularly - Once per mission

CRITICALITY 2.20%
2.2 percent of the workload respondents ranked this task as their top priority task.

LEARNING DIFFICULTY
Somewhat above average

REASONS FOR DIFFICULTY
Simultaneous tasks
Anxiety
Weak in knowledge of NBC operations

DATA SOURCE
CVCC exercise observations
Workload data analysis
Tank platoon SOP
FKSM 17-15-3, dtd Feb 1989

COMMENTS
Not sure of reasons for low ranking of task among test respondents. It may be due to the infrequent performance of this task during a mission. The report menus used to complete this automated report are not as friendly as other automated reports in the system.

SKILLS
Touch screen cursor control
Commander's control handle cursor control
Use of laser rangefinders

KNOWLEDGE
Know basic NBC reporting methods
Know tactical procedures involving an NBC environment

PERFORMANCE TIME: 2 minutes, 0 seconds
Task Element Number 7.01

TASK ELEMENT TITLE: Operate CCD Function Keys

DISPLAYS
  CCD display

CONTROLS
  CCD function keys
  Cursor control

Task Element Number 7.02

TASK ELEMENT TITLE: Operate Laser Rangefinder to Obtain Attack Location

DISPLAYS
  CITV display
  IFF display

CONTROLS
  CITV function keys
  Commander's control handle

Task Element Number 7.03

TASK ELEMENT TITLE: Operate Map Display

DISPLAYS
  CCD map display
  CCD display

CONTROLS
  CCD function keys
  Cursor control
Task Element Number 7.04

**TASK ELEMENT TITLE:** Select Type of Burst and Attack

**DISPLAYS**
- CCD display

**CONTROLS**
- CCD function keys

Task Element Number 7.05

**TASK ELEMENT TITLE:** Select Nuclear Burst Data

**DISPLAYS**
- CCD display

**CONTROLS**
- CCD function keys

Task Element Number 7.06

**TASK ELEMENT TITLE:** Correct Report Data

**DISPLAYS**
- CCD display
- CCD map display
- CITV display
- Commander's cupola vision blocks
- IFF display

**CONTROLS**
- CCD function keys
- CITV function switches
- Commander's control handle
- Laser rangefinder
- Cursor control
Task Element Number 7.07

TASK ELEMENT TITLE: Select Report Routing

DISPLAY
   CCD display

CONTROLS
   CCD function keys

Task Element Number 7.08

TASK ELEMENT TITLE: Enter Data to Map Display

DISPLAY
   CCD map display
   CITV display
   Commander's cupola vision Blocks

CONTROLS
   CCD function keys
   Cursor control
   CITV function switches
   Commander's control handle
   Laser rangefinder

Task Element Number 7.09

TASK ELEMENT TITLE: Transmit Report

DISPLAY
   CCD display

CONTROLS
   CCD function keys
   Cursor control
CVCC TASK AND TASK ELEMENT DATA FORM

Task Number 8

**TASK TITLE:** Designate and Transmit Route Coordinates Using CCD

**DUTY POSITION**
- Company Commander
- Platoon Leader
- Platoon Sergeant
- Tank Commander

**CONDITIONS**
- Tactical or nontactical situation under all weather conditions
- All types of terrain
- May be performed in an NBC environment
- M1A2 tank, simulator or stand alone situation
- Use PDEP 9-2350-264-10-1 (M1A2)

**PERFORMANCE MEASURES**
- Report generation time
- Report accuracy
- Report completeness
- Waypoint coordinate accuracy
- Sector control
- Distance traveled
- Misorientation
- Boundary violation
- Route deviation
- Vehicle speed over time
- Mission planning procedures

**INITIATING CUES**
- Mission planning meeting
- Receive OPORD to move
- Receive FRAGO

**TERMINATING CUES**
- Objective accomplished
- Change in mission
FEEDBACK CUES
Objective accomplished
Units respond in maintaining course

DEFENSIVE FREQUENCY
Frequently - Several times per mission

OFFENSIVE FREQUENCY
Continuously - All during the mission

CRITICALITY 37.40%
37.4 percent of the workload respondents ranked this task as their top priority task. Actual task ranked was entitled Direct Actions of Driver. This task refers to an automated capability that enables the tank commander to direct actions of the driver. This capability minimizes voice communications.

LEARNING DIFFICULTY
Somewhat above average

REASONS FOR DIFFICULTY
Lack of basic map reading and procedures
Weak in tactical movement requirements
Simultaneous tasks

DATA SOURCE
CVCC exercise observations
Workload data analysis

COMMENTS
This task normally involves considerable communication between the tank commander and the driver. Having the capability to designate a route for the driver with occasional reports from the driver on reaching a waypoint frees the TC to do other tasks. The burden of assisting the driver is reduced considerably through this automated capability. The test respondents listed the task of directing the driver as a high priority task.

SKILLS
Touch screen cursor control
Commander's control handle cursor control
Read a map
Basic map skills
KNOWLEDGE
Know movement tactical procedures
Know terrain features

PERFORMANCE TIME: 5 minutes, 0 seconds

Task Element Number 8.01

TASK ELEMENT TITLE: Operate CCD Function Keys

DISPLAYS
CCD display

CONTROLS
CCD function keys
Cursor control

Task Element Number 8.02

TASK ELEMENT TITLE: Designate Waypoint Coordinates on Map Display

DISPLAYS
CCD map display
CCD display

CONTROLS
CCD function keys
Cursor control

Task Element Number 8.03

TASK ELEMENT TITLE: Delete or Change Waypoints

DISPLAYS
CCD map display
CCD display

CONTROLS
CCD function keys
Cursor control
Task Element Number 8.04

**TASK ELEMENT TITLE:** Transmit Waypoints to Driver

**DISPLAYS**
- CCD display

**CONTROLs**
- CCD function keys
- Cursor control

Task Element Number 8.05

**TASK ELEMENT TITLE:** Retain Waypoint Coordinates in Memory

**DISPLAYS**
- CCD display

**CONTROLs**
- CCD function keys

Task Element Number 8.06

**TASK ELEMENT TITLE:** Transmit Waypoints to Other Units

**DISPLAYS**
- CCD display

**CONTROLs**
- CCD function keys
CVCC TASK AND TASK ELEMENT DATA FORM

Task Number 9

TASK TITLE: Receive and Review Route Coordinates Using CCD

DUTY POSITION
- Company Commander
- Platoon Leader
- Platoon Sergeant
- Tank Commander

CONDITIONS
- Tactical or nontactical situation under all weather conditions
- All types of terrain
- May be performed in an NBC environment
- M1A2 tank, simulator or stand alone situation
- Use PDEP 9-2350-264-10-1 (M1A2)

PERFORMANCE MEASURES
- Completeness

INITIATING CUES
- Radio communication that route has been sent
- Receive Light illuminated
- Receipt of an overlay

TERMINATING CUES
- Use route as active route
- Delete route from memory
- Save route in memory

FEEDBACK CUES
- Route is displayed on CCD map display

DEFENSIVE FREQUENCY
- Regularly - Once per mission

OFFENSIVE FREQUENCY
- Regularly - Once per mission
CRITICALITY 0.00%
Not available for this task.

LEARNING DIFFICULTY
Somewhat below average

REASONS FOR DIFFICULTY
None

DATA SOURCE
CVCC exercise observations
Workload data analysis
Task analysis

COMMENTS
This is a short, easy task to perform and could be embedded in the main task with which it is associated, Designate a.i Transmit Route Coordinates Using the CCD. Could change task to read "Designate, Transmit and Receive Route Coordinates Using the CCD."

SKILLS
Touch screen cursor control
Commander's control handle cursor control

KNOWLEDGE
Function keys
Queue/file differences
Message alerts
Display map and route designation association

PERFORMANCE TIME: 1 minutes, 0 seconds

Task Element Number 9.01

TASK ELEMENT TITLE: Operate CCD Function Keys

DISPLAYS
CCD display

CONTROLS
CCD function keys
Cursor control
Task Element Number 9.02

**TASK ELEMENT TITLE:** Select Route from Route File

**DISPLAYS**
- CCD map display
- CCD display

**CONTROLS**
- CCD function keys
- Cursor control

Task Element Number 9.03

**TASK ELEMENT TITLE:** Designate Route as Active Route for System

**DISPLAYS**
- CCD map display
- CCD display

**CONTROLS**
- CCD function keys
- Cursor control

Task Element Number 9.04

**TASK ELEMENT TITLE:** Delete Route File

**DISPLAYS**
- CCD display

**CONTROLS**
- CCD function keys
- Cursor control

Task Element Number 9.05

**TASK ELEMENT TITLE:** Exit Route File Menu

**DISPLAYS**
- CCD display

**CONTROLS**
- CCD function keys
CVCC TASK AND TASK ELEMENT DATA FORM

Task Number 10

TASK TITLE: Prepare and Submit Adjust Fire Report Using CCD

DUTY POSITION
- Company Commander
- Platoon Leader
- Platoon Sergeant
- Tank Commander

CONDITIONS
- Tactical or nontactical situation under all weather conditions
- All types of terrain
- May be performed in an NBC environment
- M1A2 tank, simulator or stand alone situation
- Use PDEP 9-2350-264-10-1 (M1A2)

PERFORMANCE MEASURES
- Report generation time
- Report completeness
- Report accuracy

INITIATING CUES
- Suspected enemy positions
- Enemy force attacking
- Enemy force large

TERMINATION CUES
- Fire support received
- Enemy destroyed

FEEDBACK CUES
- Enemy destroyed

DEFENSE FREQUENCY
- Frequently - Several times per mission

OFFENSE FREQUENCY
- Frequently - Several times per mission
CRITICALITY 7.50%
7.5 percent of the workload respondents ranked Prepare and Submit CFF Report as their top priority task. A component of this task is Prepare and Submit Adjust Fire Report using the CCD.

LEARNING DIFFICULTY
Somewhat below average

REASONS FOR DIFFICULTY
None

DATA SOURCE
CVCC exercise observations
Workload data analysis
Task analysis

COMMENTS
This task, although a separate function of the CCD device, basically functions the same as the "Call for Fire" report. In fact, it is an extraction from the basic report.

SKILLS
Touch screen cursor control
Commander's control handle cursor control
Laser rangefinder

KNOWLEDGE
Call for fire procedures
Calculate differences in shell impact to target location
Understand system automated capabilities

PERFORMANCE TIME: 1 minutes, 0 seconds

Task Element Number 10.01

TASK ELEMENT TITLE: Operate CCD Function Keys

DISPLAYS
CCD display
CCD map display

CONTROLS
CCD function keys
Task Element Number 10.02

TASK ELEMENT TITLE: Operate CITV Function Switches

DISPLAYS
- CITV display

CONTROLS
- CITV function switches
- Commander's control handle

Task Element Number 10.03

TASK ELEMENT TITLE: Operate Laser Rangefinder to Determine Target Location

DISPLAYS
- CITV display
- IFF display

CONTROLS
- CITV function switches
- Commander's control handle

Task Element Number 10.04

TASK ELEMENT TITLE: Operate Map Display

DISPLAYS
- CCD map display
- CCD display

CONTROLS
- CCD function keys
- Cursor control

Task Element Number 10.05

TASK ELEMENT TITLE: Enter Add/Drop Shifts for Target Location

DISPLAYS
- CCD display

CONTROLS
- CCD display keyboard
Task Element Number 10.06

TASK ELEMENT TITLE: Select Report Routing

DISPLAYS
CCD display

CONTROLS
CCD function keys
Cursor control

Task Element Number 10.07

TASK ELEMENT TITLE: Enter Data to Map Display

DISPLAYS
CCD map display
CITV display
Commander's cupola vision blocks
IFF display

CONTROLS
CCD function keys
CITV function switches
Commander's control handle
Laser rangefinder
Cursor control

Task Element Number 10.08

TASK ELEMENT TITLE: Transmit Report

DISPLAYS
CCD display

CONTROLS
CCD function keys
Cursor control
Task Number 11

TASK TITLE: Prepare and Submit Ammunition Report Using CCD

DUTY POSITION
- Company Commander
- Platoon Leader
- Platoon Sergeant
- Tank Commander

CONDITIONS
- Tactical or nontactical situation under all weather conditions
- All types of terrain
- May be performed in an NBC environment
- M1A2 tank, simulator or stand alone situation
- Use PDEP 9-7350-264-10-1 (M1A2)

PERFORMANCE MEASURES
- Report generation time
- Report completeness
- Report accuracy

INITIATION CUES
- Completed a mission
- Completed fire fight
- Requested by higher headquarters

TERMINATION CUES
- Report Sent message displayed on CCD display

FEEDBACK CUES
- Additional information requested
- Sent message on CCD display

DEFENSIVE FREQUENCY
- Frequently - Several times per mission

OFFENSIVE FREQUENCY
- Frequently - Several times per mission
CRITICALITY 0.00%
   Not available for this task

LEARNING DIFFICULTY
   Low

REASONS FOR DIFFICULTY
   None

DATA SOURCE
   CVCC exercise observations
   Tank platoon SOP
   FKSM 17-15-3, dtd Feb 1989

COMMENTS
   The ammo report is a fairly easy report to complete

SKILLS
   Operate display cursor
   Operate Commander's control handle cursor

KNOWLEDGE
   Know different types of ammo used
   Know when report is required by SOP

PERFORMANCE TIME: 1 minutes, 0 seconds

Task Element Number 11.01

TASK ELEMENT TITLE: Operate CCD Function Keys

DISPLAYS
   CCD display
   CCD map display

CONTROLS
   CCD function keys
Task Element Number 11.02

TASK ELEMENT TITLE: Determine Ammo Status

DISPLAYS
  CCD display

CONTROLS
  CCD function keys
  Cursor control

Task Element Number 11.03

TASK ELEMENT TITLE: Select Report Routing

DISPLAYS
  CCD display

CONTROLS
  CCD function keys
  Cursor control

Task Element Number 11.04

TASK ELEMENT TITLE: Transmit Report

DISPLAYS
  CCD display

CONTROLS
  CCD function keys
  Cursor control
CVCC TASK AND TASK ELEMENT DATA FORM

Task Number 12

TASK TITLE: Prepare and Submit Intelligence Report Using CCD

DUTY POSITION
Company Commander
Platoon Leader
Platoon Sergeant
Tank Commander

CONDITIONS
Tactical or nontactical situation under all weather conditions
All types of terrain
May be performed in an NBC environment
M1A2 tank, simulator or stand alone situation
Use PDEP 9-2350-264-10-1 (M1A2)

PERFORMANCE MEASURES
Report generation time
Report completeness
Report accuracy

INITIATION CUES
Enemy units observed
Obstacles observed

TERMINATION CUES
Report Sent message displayed on CCD display

FEEDBACK CUES
Message sent on CCD display
Friendly units attack
Artillery destroys enemy target

DEFENSE FREQUENCY
Frequently - Several times per mission

OFFENSE FREQUENCY
Frequently - Several times per mission
CRITICALITY 0.00%
   Not available for this task

LEARNING DIFFICULTY
   Average

REASONS FOR DIFFICULTY
   Simultaneous task

DATA SOURCE
   CVCC exercise observations
   Tank platoon SOP
   FKSM 17-15-3, dtd Feb 1989

COMMENTS
   None

SKILLS
   Touch screen cursor control
   Commander's control handle cursor

KNOWLEDGE
   Know different enemy vehicles
   Know how to spot obstacles

PERFORMANCE TIME: 1 minutes, 30 seconds

Task Element Number 12.01

TASK ELEMENT TITLE: Operate CCD Function Keys

DISPLAYS
   CCD display

CONTROLS
   CCD function keys
   Cursor control
Task Element Number 12.02

TASK ELEMENT TITLE: Select Unit and Obstacle Type

DISPLAYS
  CCD display

CONTROLS
  CCD function keys
  Cursor control

Task Element Number 12.03

TASK ELEMENT TITLE: Operate CITV Function Switches

DISPLAYS
  CITV display

CONTROLS
  CITV function switches
  Commander's control handle

Task Element Number 12.04

TASK ELEMENT TITLE: Operate Laser Rangefinders to Determine Location

DISPLAYS
  CITV display
  IFF display

CONTROLS
  CITV function switches
  Commander's control handle

Task Element Number 12.05

TASK ELEMENT TITLE: Operate Map Display to Determine Location

DISPLAY
  CCD map display

CONTROLS
  CCD function keys
  Cursor control
Task Element Number 12.06

TASK ELEMENT TITLE: Select Unit Activity and Heading

DISPLAYS
  CITV display
  CCD map display
  CCD display
  Commander's cupola vision blocks
  IFF display

CONTROLS
  CITV function switches
  CCD function keys
  Commander's control handle

Task Element Number 12.07

TASK ELEMENT TITLE: Correct Report Data

DISPLAYS
  CCD display
  CCD map display
  CITV display
  Commander's cupola vision blocks
  IFF display

CONTROLS
  CCD function keys
  CITV function switches
  Commander's control handle
  Cursor control
  Laser rangefinder

Task Element Number 12.08

TASK ELEMENT TITLE: Select Report Routing

DISPLAY
  CCD display

CONTROLS
  CCD function keys
  Cursor control
Task Element Number 12.09

TASK ELEMENT TITLE: Transmit Report

DISPLAY
  CCD display

CONTROLS
  CCD function keys
  Cursor control
CVCC TASK AND TASK ELEMENT DATA FORM

Task Number 13

TASK TITLE: Receive, Review and Retransmit FRAGO Report Using CCD

DUTY POSITION
Company Commander
Platoon Leader
Platoon Sergeant
Tank Commander

CONDITIONS
Tactical or nontactical situation under all weather conditions
All types of terrain
May be performed in an NBC environment
M1A2 tank, simulator or stand alone situation
Use PDEP 9-2350-264-10-1 (M1A2)

PERFORMANCE MEASURES
Receive report
Retransmit report

INITIATION CUES
Receive key is highlighted
Communication that FRAGO was sent

TERMINATION CUES
FRAGO displayed on map display
FRAGO Sent message appears on CCD display

FEEDBACK CUES
FRAGO is displayed on CCD map display
FRAGO Sent message on CCD display

DEFENSE FREQUENCY
Regularly - Once per mission

OFFENSE FREQUENCY
Seldom - Every few missions

CRITICALITY 0.00%
Not available for this task
LEARNING DIFFICULTY
Average

REASONS FOR DIFFICULTY
Simultaneous task

DATA SOURCE
CVCC exercise observation
Task analysis

COMMENTS
None

SKILLS
Operate touch screen cursor on CCD display
Operate control handle cursor control

KNOWLEDGE
Know map size function
Know automated capabilities of system

PERFORMANCE TIME: 2 minutes, 0 seconds

Task Element Number 13.01

TASK ELEMENT TITLE: Operate CCD Function Keys

DISPLAYS
CCD display

CONTROLS
CCD function keys
Cursor control

Task Element Number 13.02

TASK ELEMENT TITLE: Select FRAGO Message

DISPLAYS
CCD display

CONTROLS
CCD function keys
Cursor control
Task Element Number 13.03

**TASK ELEMENT TITLE:** Post FRAGO to Map Display

**DISPLAYS**
- CCD display
- CCD map display

**CONTROLS**
- CCD function keys
- Cursor control

Task Element Number 13.04

**TASK ELEMENT TITLE:** Retransmit FRAGO to Other Units

**DISPLAYS**
- CCD display
- CCD map display

**CONTROLS**
- CCD function keys
- Cursor control
CVCC TASK AND TASK ELEMENT DATA FORM

Task Number 14

TASK TITLE: Search for Targets Using the CITV

DUTY POSITION
Company Commander
Platoon Leader
Platoon Sergeant
Tank Commander

CONDITIONS
Tactical or nontactical situation under all weather conditions
All types of terrain
May be performed in an NBC environment
M1A2 tank, simulator or stand alone situation
Use PDEP 9-2350-264-10-1 (M1A2)

PERFORMANCE MEASURES
Percent targets detected and reported

INITIATION CUES
Begin tactical movement
In defensive position

TERMINATION CUES
Target detected

FEEDBACK CUES
Target detected & identified as enemy on CITV display

DEFENSE FREQUENCY
Frequently - Several times per mission

OFFENSE FREQUENCY
Continuously - All during the mission

CRITICALITY 0.00%
Not available for this task

LEARNING DIFFICULTY
Average

B-65
REASONS FOR DIFFICULTY
Simultaneous task
Decision on which mode (manual or auto) to search dependent on situation (i.e., offensive or defensive mission)

DATA SOURCE
CVCC exercise observation

COMMENTS
None

SKILLS
Operate Commander's control handle in conjunction with CITV

KNOWLEDGE
Know what azimuth and elevation are
How to compute azimuth and elevation
Function of CITV

PERFORMANCE TIME: 3 minutes, 0 seconds

Task Element Number 14.01

TASK ELEMENT TITLE: Operate CITV Function Switches and Controls

DISPLAYS
CITV display

CONTROLS
CITV function switches

Task Element Number 14.02

TASK ELEMENT TITLE: Operate CITV in Auto Scan Mode

DISPLAYS
CITV display

CONTROLS
CITV function keys
Commander's control handle
Task Element Number 14.03

TASK ELEMENT TITLE: Operate CITV in Manual Search Mode

DISPLAYS
   CITV display

CONTROLS
   CITV function keys
   Commander's control handle

Task Element Number 14.04

TASK ELEMENT TITLE: Operate CITV in Gun Line of Sight (GLOS) Search Mode

DISPLAYS
   CITV display

CONTROLS
   CITV function keys
Task Number 15

**Task Title:** Identify and Prioritize Targets Using CITV

**Duty Position**
- Company Commander
- Platoon Leader
- Platoon Sergeant
- Tank Commander

**Conditions**
- Tactical or nontactical situation under all weather conditions
- All types of terrain
- May be performed in an NBC environment
- M1A2 tank, simulator or stand alone situation
- Use PDEP 9-2350-264-10-1 (M1A2)

**Performance Measures**
- Targets identified and prioritized
- Judgment
- Decisiveness
- Cognitive ability

**Initiation Cues**
- Target detected
- Enemy sighted

**Termination Cues**
- Target identification

**Feedback Cues**
- Confirmation by other tanks in area

**Defense Frequency**
- Frequently - Several times per mission

**Offense Frequency**
- Continuously - All during the mission

**Criticality** 25.10%
- 25.1 percent of the workload respondents ranked this task as their top priority task.
LEARNING DIFFICULTY
Somewhat above average

REASONS FOR DIFFICULTY
Simultaneous tasks
IFF detection is built on a table of probability rather than actual IFF transponder capabilities. Target stack capability may not receive enough emphasis during training. The tank commander is more inclined to use this capability during a defensive mission than an offensive mission due to time constraints.

DATA SOURCE
CVCC exercise observation
Workload data analysis

COMMENTS
This task consists of two parts: (a) the identification of the targets, and (b) the prioritization of the targets.

SKILLS
Operate control handle in conjunction with CITV
Operate laser rangefinder

KNOWLEDGE
IFF detection
Engagement procedures
Threat conditions

PERFORMANCE TIME: 3 minutes, 0 seconds

Task Element Number 15.01

TASK ELEMENT TITLE: Target Detection

DISPLAYS
CITV display
IFF display

CONTROLS
CITV function switches
Commander's control handle
Task Element Number 15.02

TASK ELEMENT TITLE: Operate CITV Function Switches and Controls

DISPLAYS
  CITV display

CONTROLS
  CITV function switches
  Commander's control handle

Task Element Number 15.03

TASK ELEMENT TITLE: Operate CITV Laser Rangefinder

DISPLAYS
  CITV display
  IFF display

CONTROLS
  CITV function switches
  Commander's control handle

Task Element Number 15.04

TASK ELEMENT TITLE: IFF Designation

DISPLAYS
  CITV display
  IFF display

CONTROLS
  CITV display
  Commander's control handle

Task Element Number 15.05

TASK ELEMENT TITLE: Prioritization of Targets

DISPLAYS
  CITV display

CONTROLS
  CITV function switches
Task Element Number 15.06

TASK ELEMENT TITLE:  Engagement of Targets in Target Queue

DISPLAYS
  CITV display
  IFF display
  Commander's cupola vision blocks

CONTROLS
  CITV function switches
  Gunner's function switches
  Commander's control handle
CVCC TASK AND TASK ELEMENT DATA FORM

Task Number 16

TASK TITLE: Control Map Display Functions Using CCD

DUTY POSITION
Company Commander
Platoon Leader
Platoon Sergeant
Tank Commander

CONDITIONS
Tactical or nontactical situation under all weather conditions
All types of terrain
May be performed in an NBC environment
M1A2 tank, simulator or stand alone situation
Use PDEP 9-2350-264-10-1 (M1A2)

PERFORMANCE MEASURES
Terrain identification
Determining coordinates

INITIATION CUES
Target detected
Enemy sighted

TERMINATION CUES
Map overlay not visible on display
Overlay partially visible
Terrain features missing

FEEDBACK CUES
Overlay is visible on CCD display
Terrain features are present on display

DEFENSE FREQUENCY
Frequently - Several times per mission

OFFENSE FREQUENCY
Regularly - Once per mission

B-73
CRITICALITY 0.00%
Not available for this task

LEARNING DIFFICULTY
Average

REASONS FOR DIFFICULTY
Selection of appropriate map size
Positioning of overlay on CCD map display

DATA SOURCE
CVCC exercise observation
Task analysis

COMMENTS
None

SKILLS
Operate CCD cursor control

KNOWLEDGE
Know different map sizes
Understand scrolling function

PERFORMANCE TIME: 1 minute, 30 seconds

Task Element Number 16.01
TASK ELEMENT TITLE: Operate CCD Function Keys

DISPLAYS
CCD display

CONTROLS
CCD function keys

Task Element Number 16.02
TASK ELEMENT TITLE: Store Overlays in Memory

DISPLAYS
CCD display
CCD map display

CONTROLS
CCD function keys
Task Element Number 16.03

**TASK ELEMENT TITLE:** Delete Overlays from Map Display and Memory

**DISPLAYS**
- CCD display
- CCD map display

**CONTROLS**
- CCD function keys

Task Element Number 16.04

**TASK ELEMENT TITLE:** Set Up Map Display Features

**DISPLAYS**
- CCD display
- CCD map display

**CONTROLS**
- CCD function keys

Task Element Number 16.05

**TASK ELEMENT TITLE:** Exit Map Menu

**DISPLAYS**
- CCD Display

**CONTROLS**
- CCD function keys
APPENDIX C

FLOW CHARTS
PREPARE AND SUBMIT SPOT REPORT USING CCD

START

1. Perform pre-op checks
   - No
   - Yes

   Select report function key with cursor

2. Select spot report from menu options with cursor
3. Select new key for new report with cursor
4. Select enemy unit type with cursor
5. Select number of damaged units from menu keyboard with cursor
6. Select number of destroyed units from menu keyboard with cursor

   Enter enemy heading by touching map with cursor
   - Use laser rangefinder to obtain enemy location
   - Designate enemy location on map with cursor

   Set CITV/GPS switch to CITV position, indicator illuminates
   - Yes
   - No

   Laser with main gun to obtain enemy location
   - YES
   - NO

   Designate target with designate switch on commander's control handle

   Laser to enemy location with CITV LRF
   - YES
   - NO

   Enter enemy activity from menu options with cursor
   - Enter enemy activity from menu options with cursor
   - Enter own activity from menu options with cursor

   Select send key with cursor, reports action menu displayed
   - Select send key with cursor, reports action menu displayed
   - Select routing options from menu with cursor

   Post to Map
   - YES
   - NO

   Touch send key with cursor to transmit report

   Select post-to-map key with cursor

   Select item for correction with cursor, make correction

   Select next key as required to return to summary page

   Touch next key to select report page to be corrected

   Select data item on summary page requiring correction
   - YES
   - NO

   Select back key with cursor to move to page 2 or 1 of report
   - YES
   - NO

   Select send key with cursor, reports action menu displayed

   Touch next key with cursor, page two displayed on screen

   Enter previously entered data

   Indicates tasks performed automatically by the CVCC or performed by the user as part of a separate task.
PREPARE AND SUBMIT SHELL REPORT USING CCD

START

Pre-op checks performed

Perform pre-op checks

Described in separate task

Select report function key with cursor

Select shell report from menu options

Select new key to develop new report

Select number of shells from menu keyboard

As of menu appears automatically

Use interconnecting to obtain shell location

Designate shell location on map with cursor

Select time interval of report from current time

Select routing options from menu

Post to map

Select Post to Mic, key with cursor

Touch Send key with cursor to transmit report

END

[ ] Indicates tasks performed automatically by the CVCC or performed by the user as part of a separate task.
RECEIVE AND REVIEW ROUTE COORDINATES USING CCD

START

Pre-op checks performed

NO

YES

Perform pre-op checks

Described in separate task

Access routes from other units or previous routes saved in memory

Select NAV function key with cursor for route designation menu

Select file key with cursor from menu to call up routine file

Select route file from menu with cursor

Select active key with cursor to make selected route the active route

Route designated menu appears automatically with data from file selected

Select delete key with cursor, route designated menu is deleted

Select back key with cursor to return to next routine function

Route is displayed on map display

Select route file from route file memory

Select route file with cursor for deletion, route file highlighted

Select exit key with cursor to exit from NAV function

NO

YES

Indicates tasks performed automatically by the CVCC or performed by the user as part of a separate task.
Indicates tasks performed automatically by the CVCC or performed by the user as part of a separate task.
PREPARE AND SUBMIT AMMO REPORT USING CCD

START

Pre-op checks performed NO -> Perform pre-op checks

YES

Select report function key with cursor for report options

Select ammo report option from menu with cursor

Select new key with cursor for new report

Select ammo status with cursor for each type of ammo

Touch send key with cursor, report action menu is displayed

Select routing options for report with cursor

Touch send key with cursor to transmit report

STOP

Indicates tasks performed automatically by the CVCC or performed by the user as part of a separate task.
RECEIVE, REVIEW AND RETRANSMIT FRAGO REPORT USING CCD

START

Pre-op checks performed

YES

NO

Perform pre-op checks

Described in separate task

System indicates frago has been received

Select receive key with cursor to view frago report & overlay

Select report function key to view frago report & overlay if not in receive queue

Select frago in queue options with cursor

Select old key to view frago message file

Frugo message desired from receive queue or frago message queue with cursor

Frugo overlay is superimposed onto map display automatically when selected

Frugo overlay is not superimposed onto map display to a visible scale

Select map function key with cursor, map function menu is displayed

Select map scale option that will show overlay on map display

Select exit key with cursor, frago menu will be displayed

Retransmit frago to other elements

YES

NO

Select cancel key to exit from frago menu and return to report menu

STOP

Select send key with cursor, routing menu is displayed

Select routing option from menu with cursor

Select send key with cursor to transmit report

[ ] Indicates tasks performed automatically by the CVCC or performed by the user as part of a separate task.
CONTROL MAP DISPLAY FUNCTIONS USING CCD