

**Technical Report  
CMU/SEI-91-TR-28**

ESD-TR-91-028 (Appendices)



Carnegie-Mellon University  
Software Engineering Institute

# **Application of Feature-Oriented Domain Analysis to the Army Movement Control Domain (Appendices A – I)**

**Sholom G. Cohen  
Jay L. Stanley, Jr.  
A. Spencer Peterson  
Robert W. Krut, Jr.**

**June 1992**

A

**20100827172**

Carnegie Mellon University does not discriminate and Carnegie Mellon University is required not to discriminate in admission, employment or administration of its programs on the basis of race, color, national origin, sex or handicap in violation of Title VI of the Civil Rights Act of 1964, Title IX of the Educational Amendments of 1972 and Section 504 of the Rehabilitation Act of 1973 or other federal, state or local laws, or executive orders.

In addition, Carnegie Mellon University does not discriminate in admission, employment or administration of its programs on the basis of religion, creed, ancestry, belief, age, veteran status, sexual orientation or in violation of federal, state or local laws, or executive orders. While the federal government does continue to exclude gays, lesbians and bisexuals from receiving ROTC scholarships or serving in the military, ROTC classes on this campus are available to all students.

Inquiries concerning application of these statements should be directed to the Provost, Carnegie Mellon University, 5000 Forbes Avenue, Pittsburgh, Pa. 15213, telephone (412) 268-6684 or the Vice President for Enrollment, Carnegie Mellon University, 5000 Forbes Avenue, Pittsburgh, Pa. 15213, telephone (412) 268-2056.

Technical Report  
CMU/SEI-91-TR-28  
ESD-TR-91-028 (Appendices)  
June 1992

# Application of Feature-Oriented Domain Analysis to the Army Movement Control Domain ( Appendices A – I )



Sholom G. Cohen  
Jay L. Stanley, Jr.  
A. Spencer Peterson  
Robert W. Krut, Jr.

Feature-Oriented Domain Analysis

Approved for public release.  
Distribution unlimited.

**Software Engineering Institute**  
Carnegie Mellon University  
Pittsburgh, Pennsylvania 15213

This technical report was prepared for the

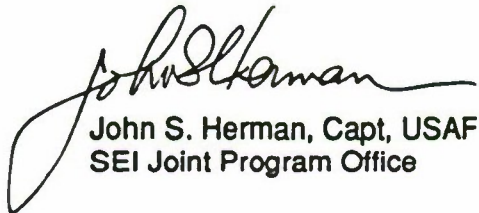
SEI Joint Program Office  
ESD/AVS  
Hanscom AFB, MA 01731

The ideas and findings in this report should not be construed as an official DoD position. It is published in the interest of scientific and technical information exchange.

### **Review and Approval**

This report has been reviewed and is approved for publication.

FOR THE COMMANDER



John S. Herman, Capt, USAF  
SEI Joint Program Office

The Software Engineering Institute is sponsored by the U.S. Department of Defense.

This report was funded by the U.S. Department of Defense.

Copyright © 1992 by Carnegie Mellon University.

This document is available through the Defense Technical Information Center. DTIC provides access to and transfer of scientific and technical information for DoD personnel, DoD contractors and potential contractors, and other U.S. Government agency personnel and their contractors. To obtain a copy, please contact DTIC directly: Defense Technical Information Center, Attn: FDRA, Cameron Station, Alexandria, VA 22304-6145.

Copies of this document are also available through the National Technical Information Service. For information on ordering, please contact NTIS directly: National Technical Information Service, U.S. Department of Commerce, Springfield, VA 22161.

Copies of this document are also available from Research Access, Inc., 3400 Forbes Avenue, Suite 302, Pittsburgh, PA 15213.

Use of any trademarks in this report is not intended in any way to infringe on the rights of the trademark holder.

# Table of Contents

<b>Appendix A. Movement Control Workshop Report</b>	<b>A-1</b>
<b>A.1. Working Group 1: Doctrine and Modeling</b>	<b>A-1</b>
<b>A.1.1. Goals</b>	<b>A-1</b>
A.1.1.1. Familiarize the participants with FODA project's work	A-1
A.1.1.2. Review the proposed FODA project's discussion topics	A-1
A.1.1.3. Retract inappropriate topics	A-2
A.1.1.4. Add pertinent new topics	A-2
A.1.1.5. Prioritize topics	A-2
<b>A.2. Working Group 1, Session 2 (7/10/91, 8:30a.m.–3:30p.m.)</b>	<b>A-3</b>
<b>A.2.1. Scope of movement control</b>	<b>A-3</b>
A.2.1.1. Establishing Main Supply Routes	A-3
A.2.1.2. Position determination	A-3
A.2.1.3. Loading of vehicles	A-4
A.2.1.4. Balancing Requirements vs.Capabilities	A-4
A.2.1.5. In-transit Visibility	A-5
<b>A.2.2. Aspects of the planning cycle needing software support</b>	<b>A-5</b>
<b>A.2.3. Time frame for movement planning</b>	<b>A-5</b>
<b>A.2.4. Effects of AirLand Operations on movement control</b>	<b>A-5</b>
<b>A.2.5. Other related work relevant to the domain</b>	<b>A-6</b>
<b>A.2.6. Movement control's fit within levels of command</b>	<b>A-6</b>
<b>A.2.7. Pertinent discussions outside of given scope</b>	<b>A-7</b>
<b>A.3. Working Group 2: Validation and Transition</b>	<b>A-7</b>
<b>A.3.1. Representation</b>	<b>A-7</b>
<b>A.3.2. Reuse Issues</b>	<b>A-8</b>
<b>A.3.3. Topics for Session 2</b>	<b>A-8</b>
<b>A.4. Working Group 2, Session 2 (7/10/91, 8:30a.m.–3:30p.m.)</b>	<b>A-9</b>
<b>A.4.1. Catalog of Systems and Features</b>	<b>A-9</b>
<b>A.4.2. Transition</b>	<b>A-10</b>
<b>A.4.3. Summary</b>	<b>A-12</b>
<b>Appendix B. Transportation School Training</b>	<b>B-1</b>
<b>B.1. Movement Management Organizations</b>	<b>B-1</b>
B.1.1. Definitions	B-1
B.1.2. Principles	B-1
B.1.3. Theater Organization	B-2
B.1.4. Movement Control Teams	B-3
<b>B.2. Host Nation Support</b>	<b>B-3</b>
B.2.1. Types	B-3
B.2.2. Standardization Agreements (STANAG)	B-3
B.2.3. Summary	B-4

<b>B.3. Transportation Intelligence</b>	<b>B-4</b>
B.3.1. Definitions	B-4
B.3.2. Doctrine	B-4
B.3.3. Objectives of Transportation Intelligence	B-4
<b>B.4. Movement Plans, Programs, and Procedures</b>	<b>B-5</b>
B.4.1. Definitions	B-5
B.4.2. Movement Procedures	B-5
<b>B.5. Transportation Movement Release</b>	<b>B-6</b>
B.5.1. Force Activity Designator (FAD)	B-6
B.5.2. Transportation Priorities	B-6
B.5.3. Transportation Movement Release Code (TMR)	B-6
B.5.4. Conclusion	B-6
<b>B.6. Utilization of Highway Networks</b>	<b>B-6</b>
B.6.1. Definitions	B-6
B.6.2. Highway Traffic Division	B-7
B.6.3. Highway Route Classification	B-7
B.6.4. Route Classification Formulas	B-8
<b>B.7. Modes of Transportation</b>	<b>B-8</b>
B.7.1. Types	B-8
B.7.2. Governing Factors	B-8
B.7.3. Mode Selection Criteria	B-9
B.7.4. Vehicle Classification	B-9
B.7.5. Convoy Management	B-9
B.7.5.1. Definitions	B-9
B.7.5.2. Road Movement Graphs	B-11
B.7.5.3. Convoy Organization	B-11
<b>Appendix C. Using Info Mode in GNU Emacs</b>	<b>C-1</b>
C.1. Formatting a File for Use in Info Mode	C-1
C.2. Invoking Emacs and Navigating in Info Mode	C-2
<b>Appendix D. The Entity-Relationship Model</b>	<b>D-1</b>
D.1. Orders	D-1
D.1.1. Fragmentary Order	D-2
D.1.2. Warning Order	D-2
D.1.3. OPLAN/OPORD	D-2
D.1.3.1. Road Movement Annex	D-3
D.1.4. Movement Order	D-3
D.1.4.1. Movement Table	D-3
D.2. Task Force	D-4
D.2.1. Mission	D-4
D.2.2. Structure	D-5

D.2.2.1. Headquarters	D-5
D.2.2.1.1. Commander	D-5
D.2.2.1.2. Staff	D-5
D.2.2.2. Subordinate Units	D-5
<b>D.2.3. Status</b>	<b>D-6</b>
<b>D.2.4. Units</b>	<b>D-6</b>
D.2.4.1. Mission	D-6
D.2.4.2. Structure	D-6
D.2.4.3. UIC-ent	D-7
D.2.4.4. Status	D-7
D.2.4.5. Assets	D-7
D.2.4.5.1. ASL Assets	D-7
D.2.4.5.1.1. Supplies	D-7
D.2.4.5.1.1.1. Ammunition	D-7
D.2.4.5.1.1.2. Food	D-7
D.2.4.5.1.1.3. POL	D-8
D.2.4.5.1.2. Usage Rate	D-8
D.2.4.5.2. TOE Assets	D-8
D.2.4.5.2.1. Personnel	D-8
D.2.4.5.2.2. Equipment	D-8
D.2.4.5.2.3. Vehicles	D-8
D.2.4.5.3. Unit Positions	D-8
D.2.4.5.3.1. Current	D-8
D.2.4.5.3.2. Planned	D-9
<b>D.3. Transportation</b>	<b>D-10</b>
<b>D.3.1. Support</b>	<b>D-10</b>
D.3.1.1. Services	D-10
<b>D.3.2. Method</b>	<b>D-10</b>
<b>D.3.3. Coordinating Instructions</b>	<b>D-10</b>
D.3.3.1. Security	D-11
D.3.3.2. Control Measures	D-11
<b>D.3.4. Order Of March</b>	<b>D-11</b>
D.3.4.1. Convoy Organization	D-11
D.3.4.1.1. Column	D-11
D.3.4.1.2. Serial	D-12
D.3.4.1.3. March Unit	D-12
D.3.4.1.4. Formation	D-13
D.3.4.1.4.1. Close	D-13
D.3.4.1.4.2. Open	D-14
D.3.4.1.4.3. Infiltration	D-14
D.3.4.1.5. Elements	D-14
D.3.4.1.5.1. Head	D-14
D.3.4.1.5.2. Main Body	D-14
D.3.4.1.5.3. Trail	D-15
D.3.4.1.5.4. Detached Party	D-15

<b>D.4. Distribution Plans</b>	<b>D-15</b>
D.4.1. Physical Distribution Network	D-15
D.4.2. Traffic Circulation Plan	D-16
D.4.2.1. Routes	D-16
D.4.2.1.1. Segments	D-17
D.4.2.2. Control Class	D-17
<b>D.5. Schedules</b>	<b>D-18</b>
D.5.1. Events	D-18
D.5.1.1. Event Times	D-18
D.5.1.2. Action	D-19
<b>D.6. Intelligence</b>	<b>D-19</b>
D.6.1. Technical Intelligence	D-19
D.6.1.1. Transportation Intelligence	D-20
D.6.1.1.1. Road Information	D-20
D.6.1.1.1.1. Checkpoints	D-21
D.6.1.1.1.1.1. Location	D-21
D.6.2. IPB	D-22
D.6.2.1. Terrain Analysis	D-22
D.6.2.2. Weather Analysis	D-23
D.6.2.3. Threat Evaluation	D-24
<b>Appendix E. Features Descriptions</b>	<b>E-1</b>
E.1. Operations	E-1
E.1.1. Planning	E-1
E.1.1.1. Route Classification	E-1
E.1.1.1.1. Enter Terrain Data	E-2
E.1.1.1.2. Mechanism	E-2
E.1.1.1.2.1. Automatic	E-3
E.1.1.1.2.2. Manual	E-3
E.1.1.2. Distribution Pattern	E-3
E.1.1.2.1. Mode Determination	E-3
E.1.1.2.1.1. Large Scale	E-4
E.1.1.2.1.2. Small Scale	E-4
E.1.1.2.2. Develop Plan	E-4
E.1.1.2.3. Site Selection	E-4
E.1.1.2.3.1. Change Position	E-4
E.1.1.2.3.2. Deconflict Position	E-5
E.1.1.2.3.3. Show Planned Positions	E-5
E.1.1.2.3.4. Determine Position	E-5
E.1.1.3. Assets	E-5
E.1.1.3.1. Classes	E-6
E.1.1.3.1.1. Vehicles	E-6
E.1.1.3.1.1.1. Organic	E-6
E.1.1.3.1.1.2. Non-Organic	E-6
E.1.1.3.1.1.2.1. Common User Asset	E-7



E.1.1.3.1.1.2.2. Preferred Availability	E-7
E.1.1.3.1.1.2.3. Alternative Availability	E-7
E.1.1.3.1.1.3. Reuse	E-7
E.1.1.3.1.2. Networks	E-8
E.1.1.3.1.3. Equipment	E-8
E.1.1.3.2. Priorization	E-8
E.1.1.4. Movement	E-8
E.1.1.4.1. Convoy Building	E-8
E.1.1.4.1.1. Column Formation	E-9
E.1.1.4.1.1.1. Column Length	E-9
E.1.1.4.1.1.1.1. Fixed	E-9
E.1.1.4.1.1.1.2. Governed	E-10
E.1.1.4.1.1.2. Enter Gap Data	E-10
E.1.1.4.1.1.3. Enter Groupings	E-10
E.1.1.4.1.1.4. Enter Composition Data	E-10
E.1.1.4.1.2. Defense Planning	E-10
E.1.1.4.2. Scheduling	E-11
E.1.1.4.2.1. Dependent Events	E-11
E.1.1.4.2.2. Backward Planning	E-11
E.1.1.4.2.3. Scheduling Ops	E-12
E.1.1.4.2.3.1. Calculate Travel Time	E-12
E.1.1.4.2.3.2. Determine Control Points	E-12
E.1.1.4.2.3.3. Determine Critical Time	E-12
E.1.1.4.2.3.4. Set Actual Time	E-12
E.1.1.4.3. Routing	E-13
E.1.1.4.3.1. Selection	E-13
E.1.1.4.3.1.1. Best	E-13
E.1.1.4.3.1.2. Satisfice	E-14
E.1.1.4.3.2. Routing Ops	E-14
E.1.1.4.3.2.1. Change Route	E-14
E.1.1.4.3.2.2. Determine Route	E-14
E.1.1.4.3.2.2.1. Auto-Routing	E-14
E.1.1.4.3.2.3. Enter Segment	E-14
E.1.1.4.3.3. Alternate Route	E-15
E.1.1.4.3.4. Primary Route	E-15
E.1.1.4.4. Highway Regulation	E-15
E.1.1.4.4.1. Highway Traffic Regulation	E-16
E.1.1.4.4.2. Deconfliction	E-16
E.1.1.4.4.2.1. Dependent Events	E-16
E.1.1.4.4.2.2. Independent Events	E-16
E.1.1.4.4.2.3. Parallel Events	E-16
E.1.1.5. Balance Requirements vs. Capabilities	E-17
<b>E.1.2. Directing</b>	<b>E-17</b>
E.1.2.1. Receive Inputs	E-17
E.1.2.1.1. Host Nation Guidance	E-18
E.1.2.1.2. Messages	E-18

E.1.2.1.2.1. Movement Order	E-18
E.1.2.1.2.2. Movement Request	E-18
E.1.2.1.2.3. Mvmt. Status Request	E-19
E.1.2.1.2.4. Mvmt. Status Response	E-19
E.1.2.1.2.5. Coordination Request	E-19
E.1.2.1.2.6. Coordination Response	E-19
E.1.2.1.2.7. Other	E-20
E.1.2.2. Generate Outputs	E-20
E.1.2.2.1. Produce Strip Map	E-20
E.1.2.2.2. Replies	E-20
<b>E.1.3. Executing</b>	<b>E-20</b>
E.1.3.1. Monitoring	E-21
E.1.3.1.1. Check Critical Times	E-21
E.1.3.1.2. Show Unit Movement Status	E-21
E.1.3.1.3. Show Moving Units Positions	E-21
E.1.3.2. In-Transit Visibility	E-22
E.1.3.3. Adjust	E-22
E.1.3.3.1. Maintain Movement Data	E-22
<b>E.2. Context</b>	<b>E-22</b>
<b>E.2.1. Mission</b>	<b>E-22</b>
E.2.1.1. Estimate	E-22
E.2.1.2. Operational Plan	E-23
E.2.1.3. Operational Order	E-24
<b>E.2.2. Control Strategy</b>	<b>E-24</b>
E.2.2.1. Centralized	E-24
E.2.2.2. Distributed	E-24
E.2.2.3. Global	E-25
<b>E.2.3. Regional CINC</b>	<b>E-25</b>
<b>E.2.4. Level of Command</b>	<b>E-26</b>
E.2.4.1. Joint	E-26
E.2.4.2. Theater Army	E-26
E.2.4.3. Corps	E-26
E.2.4.4. Division	E-26
E.2.4.5. Below	E-27
<b>E.2.5. Policy</b>	<b>E-27</b>
E.2.5.1. Types	E-27
E.2.5.1.1. Strategic	E-27
E.2.5.1.1.1. Deliberate	E-27
E.2.5.1.1.2. Crisis	E-27
E.2.5.1.2. Operational	E-28
E.2.5.1.2.1. Lateral	E-28
E.2.5.1.3. Tactical	E-28
E.2.5.1.3.1. Defense Option	E-28
E.2.5.1.3.1.1. Active	E-29
E.2.5.1.3.1.2. Passive	E-29

E.2.5.1.3.2. Posture	E-29
E.2.5.1.3.2.1. Offensive	E-29
E.2.5.1.3.2.2. Defensive	E-30
E.2.5.1.3.3. Operations Area	E-30
E.2.5.1.3.3.1. Close	E-30
E.2.5.1.3.3.2. Deep	E-30
E.2.5.1.3.3.3. Rear	E-30
E.2.5.1.3.4. Enemy Contact	E-31
E.2.5.1.3.4.1. Remote	E-31
E.2.5.1.3.4.2. Improbable	E-31
E.2.5.1.3.4.3. Imminent	E-31
E.2.5.2. Level of Conflict	E-31
E.2.5.2.1. High	E-32
E.2.5.2.2. Medium	E-32
E.2.5.2.3. Low	E-32
E.2.5.2.4. None	E-32
<b>E.2.6. Kind</b>	<b>E-32</b>
E.2.6.1. Unit	E-33
E.2.6.2. Logistical	E-33
<b>E.3. Representation</b>	<b>E-33</b>
E.3.1. Maps	E-33
E.3.2. Graphs	E-34
E.3.3. Schematics	E-34
E.3.4. Tables	E-34
E.3.5. Text	E-34
<b>Appendix F. Features Catalog</b>	<b>F-1</b>
<b>Appendix G. Movement Control Terminology Dictionary</b>	<b>G-1</b>
<b>Appendix H Movement Control Domain Acronyms</b>	<b>H-1</b>
<b>Appendix I MoveCon Vehicle and Sample Road Data</b>	<b>I-1</b>



## List of Figures

<b>Figure B-1</b>	Generic Theater Organization	B-2
<b>Figure B-2</b>	Road Movement Graph	B-11
<b>Figure C-1</b>	File Format for GNU Emacs Info	C-2
<b>Figure C-2</b>	The “da-browser” Function Text	C-2
<b>Figure D-1</b>	Top-Level Entities for Movement Control	D-1
<b>Figure D-2</b>	Decomposition of the Orders Entity	D-1
<b>Figure D-3</b>	Decomposition of the Task Force Entity	D-4
<b>Figure D-4</b>	Decomposition of the Structure Entity	D-5
<b>Figure D-5</b>	Decomposition of the Unit Entity	D-6
<b>Figure D-6</b>	Decomposition of the Vehicle Entity	D-9
<b>Figure D-7</b>	Decomposition of the Transportation Entity	D-9
<b>Figure D-8</b>	Decomposition of the Column Entity	D-12
<b>Figure D-9</b>	Decomposition of the Formation Data Entity	D-13
<b>Figure D-10</b>	Decomposition of the Distribution Plans Entity	D-16
<b>Figure D-11</b>	Decomposition of the Schedules Entity	D-18
<b>Figure D-12</b>	Decomposition of the Time Entity	D-19
<b>Figure D-13</b>	Decomposition of the Intelligence Entity	D-20
<b>Figure D-14</b>	Decomposition of the Road Information Entity	D-21
<b>Figure D-15</b>	Decomposition of the Location Entity	D-22
<b>Figure E-1</b>	Top-Level Features for Movement Control	E-1
<b>Figure E-2</b>	Decomposition of the Operations Feature	E-1
<b>Figure E-3</b>	Decomposition of the Planning Feature	E-2
<b>Figure E-4</b>	Decomposition of the Assets Feature	E-6
<b>Figure E-5</b>	Decomposition of the Movement Feature	E-8
<b>Figure E-6</b>	Decomposition of the Convoy Building Feature	E-9
<b>Figure E-7</b>	Decomposition of the Scheduling Feature	E-11
<b>Figure E-8</b>	Decomposition of the Routing Feature	E-13
<b>Figure E-9</b>	Decomposition of the Highway Regulation Feature	E-15
<b>Figure E-10</b>	Decomposition of the Directing Feature	E-17
<b>Figure E-11</b>	Decomposition of the Messages Feature	E-18
<b>Figure E-12</b>	Decomposition of the Executing Feature	E-21
<b>Figure E-13</b>	Decomposition of the Context Features	E-23
<b>Figure E-14</b>	Decomposition of the CINC Parameters Feature	E-25
<b>Figure E-15</b>	Decomposition of the Tactical Feature	E-29
<b>Figure E-16</b>	Decomposition of the Representation Feature	E-33
<b>Figure I-1</b>	Road Segment Map	I-4



# List Of Tables

<b>Table 1</b>	Common System Features	A-11
<b>Table 2</b>	List of Info Mode Commands	C-3
<b>Table 3</b>	List of Logistical Vehicles	I-1
<b>Table 4</b>	List of Vehicles for Sample Field Artillery Unit Move	I-2
<b>Table 5</b>	List of Route Segment Characteristic Data	I-3





# Appendix A. Movement Control Workshop Report

**Abstract:** The Army Movement Control Workshop was held at the Software Engineering Institute (SEI) on July 9–10, 1991. The purpose of the workshop was to bring domain experts from the Army together with the SEI, Industry, and Academia to discuss related systems, system requirements, and related problems in the area of movement control. The following is a summary of the workshop findings.

## A.1. Working Group 1: Doctrine and Modeling

### Working Group 1, Session 1 (7/9/91, 3:30p.m.–5:00p.m.)

#### A.1.1. Goals

The five goals of this session were to:

1. Familiarize the workshop participants with SEI movement control work.
2. Review the proposed FODA project's discussion topics.
3. Retract inappropriate topics.
4. Add pertinent new topics.
5. Prioritize topics.

Each of these goals is elaborated in the paragraphs below.

##### A.1.1.1. Familiarize the participants with FODA project's work

In accomplishing the first goal, the SEI participants presented a general description of the type of information features and entity relationship models capture. The group also discussed the interaction between these models, and an overview of the Movement Control Models developed at the SEI.

The entity-relationship model generated little discussion, the group agreed that the model captured the information needed for the vast majority of functionality within the movement control domain.

The features model, on the other hand, generated a great deal of discussion and questions. It was decided that the model would serve as a focal point for any subsequent discussions. The model also served as a mechanism for capturing new system requirements.

##### A.1.1.2. Review the proposed FODA project's discussion topics

The six SEI proposed topics were:

1. Scope of movement control and where each developer fits?
2. What aspects of the movement planning cycle should the software support?

3. What is the time frame for performing movement planning?
4. What commonality exists among the models of movement control embodied in existing systems (KBLPS, TPFD, CASCOM, SEI, AFATDS, etc.)?
5. What effects would the Air Land operation have on movement control?
6. What other related work, e.g., electronic maps, is relevant to the domain?

Participants were presented this list and an explanation of the topics. The rationale for the selection of these topics was also provided.

#### **A.1.1.3. Retract inappropriate topics**

Only one topic was retracted, which was Topic 4: "What commonality exists among the models of movement control embodied existing system?" The group extracted this topic because the participants felt more suited for discussing characteristics of a movement control system, not system to system commonality. The group also felt commonality issues were more appropriate for the participants within Group 2.

#### **A.1.1.4. Add pertinent new topics**

There were two new topics added to the list:

1. "Balancing Requirements versus Capabilities"
2. "How do the various movement control (sub)systems to be fielded (AFATDS, MCS, DAMMS-R) fit within the levels of command in a theater of operations?"

Balancing requirements with capabilities means that within any given theater of operation, there are a limited number of transportation capabilities available for moving supplies and personnel within that theater. More often than not, move requirements exceed the capability of the transportation assets. The focus of this topic will be whether this problem is within the scope of the movement control domain. If so, what are the issues surrounding a solution to this problem?

How do the various movement control (sub)systems fit within the levels of command in a given theater of operation? This new topic is concerned with which command structures (Theater, Corp, Division, etc.) are best suited for a particular software system and what type of interaction would be needed in order to provide a consistent picture of the transportation system.

Per collaboration with the other working group, the feature 'In-transit Visibility' was suggested as a topic for discussion within this working group.

#### **A.1.1.5. Prioritize topics**

The prioritizing process consisted of weighting the importance of each of the topics and listing them according to their importance. The purpose for this was to ensure that the most important issues were addressed in lieu of the workshop timing constraints.

The group felt that the order prescribed by the SEI was appropriate and the new topics were added accordingly. Listed below are the resulting six discussion topics to be addressed in Session 2.

1. What is the scope of movement control and where does each developer fit?
  - Establishing Main Supply Routes
  - Position determination
  - Loading of vehicles
  - Balancing Requirements versus Capabilities
  - In-Transit Visibility
2. What aspects of the movement planning cycle should the software support?
3. What is the time frame for performing movement planning?
4. What effects would the Air Land Operation have on movement control?
5. What other related work, e.g., electronic maps, is relevant to the domain?
6. How do the various movement control (sub)systems fit within the various levels of command?

## **A.2. Working Group 1, Session 2 (7/10/91, 8:30a.m.–3:30p.m.)**

### **A.2.1. Scope of movement control**

#### **A.2.1.1. Establishing Main Supply Routes**

This was determined to be an important part of movement control as viewed at the theater and corps level. MSR's are determined using each mode of transportation, based upon supply requirements obtained from requirements schematics, and the transportation capabilities obtained from mode schematics. A movement program is compiled listing all of the planned movements needed prior to the start of, and during, the operation. From the movement program, movement control software will generate main supply routes (Chapter 6 of [FM 55-15] describes this process in some detail).

#### **A.2.1.2. Position determination**

There were two points of view for this topic:

1. According to Major Garhart, tactical units are given a general position (oval) by their commander. Within this general area, the tactical units are given the authority to position their assets. Exact position determination within this general area would be based on elevation, slopes, and other terrain characteristics. It was determined that the selection of these general areas

(ovals) is outside the scope of movement control. This was the responsibility of task force commanders and their superiors. But support of selection of exact positions within this oval would be a useful characteristic of movement control software.

2. From the logistician's point of view, Captain Boyle indicated that position determination or site selection was an important aspect of movement control. Site selection is the determination of logistics supply points within a given theater. The factors involved with the selection of these sites are: location of units receiving the supplies, location of the supplies, terrain characteristics, and availability of a transportation infrastructures.

After subsequent discussions it was determined that these were in fact similar processes, governed by a different set of rules, and that this was an important characteristic of movement control.

#### **A.2.1.3. Loading of vehicles**

Loading of vehicles has been automated only in a few specific instances; in particular, the Air Force has implemented a load planning system for its airlift operations for Army and Marine units. ALPS (Air Load Planning System) and CALMMS (Common Air Load Movement Management System) systems require large amounts of information about the size and weight of equipment. Such a system is essential in the proper planning and execution of airlift movements given the relatively high cost of aircraft usage.

Load planning systems for surface cargo are being proposed but may not be widely used for various reasons:

- For unit movements, the unit's transportation officer/NCO has a predetermined load plan for each vehicle in a convoy. The equipment being moved is almost a constant.
- For logistical movements, the amount and types of cargo to be moved and the destinations are so varied that load planning is a complex problem.

Currently under consideration is the institutionalization of standardized shipping containers. This would simplify the problem and make a software solution more viable.

The group agreed that load planning software lies within the scope of movement control. But when considering the effort involved with developing such a feature, load planning software was not considered to be a critical characteristic and would probably be an optional feature.

#### **A.2.1.4. Balancing Requirements vs.Capabilities**

Based on preliminary evaluation of the transportation system used in Desert Shield/Storm, balancing requirements with capabilities was not done effectively during this campaign. One factor that contributed to this was allotting units transportation assets that were not fully utilized much of the time. To gain perspective, a typical scenario might be that Battalion A has a requirement to move men/material and Battalion B has the transportation capabilities necessary to accomplish this task, but is reluctant to release these assets for fear of losing those assets entirely.

A proposed solution is to develop a centralized transportation broker, who would distribute these capabilities more effectively. The development of movement control software which would support this brokerage process would definitely be a high-priority consideration for movement control software.

One of the primary requirements that would be generated as a result of this feature would be *in-transit visibility*, which leads to the next discussion topic.

#### **A.2.1.5. In-transit Visibility**

The idea of centralizing the control of transportation assets brings one to the natural conclusion that in order to accomplish this task, a complete accounting of all the critical transportation assets must be provided. This is one aspect of in-transit visibility.

Another aspect is keeping track of where the cargo and personal are located within the transportation system. Major Garhart mentioned that as units are being deployed, they are typically separated into groups. One group might be responsible for preparing equipment for transport, another might be responsible for delivering that equipment, and yet another might proceed directly to the tactical assembly area. A critical piece of information for the commanders is where those units are and when they will be reassembled.

This is another important feature for movement control software.

#### **A.2.2. Aspects of the planning cycle needing software support**

The attendees concluded that the three aspects described above are useful features of a robust movement control system. Simulation capabilities would be particularly useful in course of action planning and analysis. What-if analysis is useful in performing the initial estimate necessary to ensure the gross feasibility of a planned concept of operations. Operations planning results in the detailed movement program, and the ability to control and schedule movements according to established priorities.

#### **A.2.3. Time frame for movement planning**

The time frame for movement at various levels of command is a definite factor in movement control. The time scale increases as the level of command rises due to the size of the units involved, the complexity of interaction with subordinate and lateral units, and the need for increased host nation support and coordination. Theater and corps commands must accommodate a planning cycle that looks ahead weeks in advance in many cases, whereas the brigade and battalion commander can measure their planning time frame in terms of hours.

#### **A.2.4. Effects of AirLand Operations on movement control**

The new AirLand Operations doctrine could have an impact on the way movement control is accomplished. The current doctrine assumes a linear battlefield with fairly fixed regions of control for each command echelon. The new doctrine allows for a more fluid battlefield. This will change standard operating procedures. The corp will exercise more direct control over forces.

The primary effects on a movement control system will be in the areas of deconfliction and defense-on-move options. Since the corp will exercise more control over a larger geographic region and more transportation assets, the amount of information that will have to be disseminated at any given time will increase. Deconfliction algorithms targeted for corp will have to be more robust. At the battalion level, movement control agents will be operating in less secure environments near combat operations and they will be more concerned in protecting themselves in the event of an unexpected enemy attack.

#### **A.2.5. Other related work relevant to the domain**

David Horner presented the Waterways Experiment Station's (WES) work on TerraCAMMS (Terrain and Condensed Army Mobility Model System). According to Mr. Homer, TerraCAMMS is much more than just an electronic map. The 'Terra' portion of the system provides a graphical display of Terrain characteristics while the CAMMS portion of the system provides Tactical Decision Aids (TDA) to the user of the system. Some of the TDAs are:

- Mobility information, how certain vehicles interact with certain types of terrain characteristics.
- Route Classification information, such as bridge classification, road width, and height restrictions.
- Line of site information, at certain elevations one can determine radar signal ranges.

The system was designed in order to easily provide interfaces to procedures and functions within TerraCAMMS for specific user application.

One concern that several participants had coming into this workshop was what type of standardized mapping capability would be selected for the ATTCS systems. Mr. Homer mentioned that the personnel at the WES met with General Harmon, Program Executive Officer-Command and Control Systems (PEO-CCS), a week before the Movement Control Workshop. General Harmon stated in that meeting that TerraCAMMS would be the Geographical Information System (GIS) for the ATCCS systems.

From preliminary discussions with WES, the TerraCAMMS possibly contains many of the lower level features required for a movement control system.

Just a note to illuminate any confusion. ALBE-GIS (Air Land Battle Environment - Graphical Information System) and TerraCAMMS are different names for the same system.

#### **A.2.6. Movement control's fit within levels of command**

Within a theater, AFATDS and other systems for various BFAs coordinate movement for their units for internal needs but all tactical movements are also coordinated with MCS at the brigade level and below. This is because MCS is the system that the tactical commander and his immediate staff have access to, and he is the final authority on all movement within his area of operations. At higher levels of command, the Division, Corps, and Theater/Joint commands

also have specific movement control organizations that schedule operational movements and coordinate the use of controlled routes within their zones through the use of the DAMMS-R software.

### **A.2.7. Pertinent discussions outside of given scope**

The *kind* of movement (unit or logistical) was determined to be a modifying feature rather than an operational feature and hence was moved to the appropriate diagram.

Several changes were made to the *types* of movement feature, particularly under the *tactical (maneuver)* sub-feature.

A point was raised that most of the sub-features listed under Planning were applicable on a smaller scale during execution of movement control. The Operational Features diagram will be modified to reflect a 'copy' (not depicted graphically) of the Planning feature/sub-features under Adjust.

Numerous items were renamed to more closely fit the attendees' experiences and knowledge. A modified feature model and the features descriptions are available in Appendix E of this report.

## **A.3. Working Group 2: Validation and Transition**

### **Working Group 2, Session 1 (7/9/91, 3:30p.m.–5:00p.m.)**

#### **A.3.1. Representation**

Mr. Cohen inquired as to the range of representations that could be used to represent a development, such as DAMMS-R: Whether several types of tools could provide information to support all the users? The following responses were made to Mr. Cohen's inquiry:

- Mr. Black felt that there are actually too many aspects of a development to look at and that you may need several different representations to understand the domain.
- Mr. Cope, of DAMMS-R, expressed the view that too many representations only confuse the final product. Mr. Valentine said that DAMMMS-R had gone back to the basics of data flow diagrams to represent their convoy planner.
- Mr. Johnson suggested a tool like Teamwork may be used to represent these basic data flow diagrams.
- It was suggested that an object-oriented development may possibly express the information in a common way.
- It was felt, however, that a key question to representing the information was how you would be presenting the product to an agency.
- Mr. Valentine felt that a demonstration of the prototype software would enable the customer to pick and choose what they desire from the system.

### **A.3.2. Reuse Issues**

The representation discussion quickly progressed to a discussion of common versus unique tailoring of software. The questions asked and comments made were:

- How is the software provided and is it reusable? Would this become part of a working, reusable library?

Mr. Black, Mr. Silva, Mr. Valentine, and Mr. Johnson didn't feel that any of the software would be reusable. They felt that there were too many approaches, clients, and systems to have a realistic reuse library.

- Were software products being written with reuse, libraries, and modularity in mind? Who was going to maintain the libraries?

Mr. Black felt that changes to user interfaces and databases prohibit reuse and that people were not really learning to write code to be reused. Mr. Johnson stated that his organization encouraged reuse within house. But, Mr. Johnson also cited proprietary rights as a problems with reuse libraries. Mr. Fragale discussed the topics of configuration management and the awareness of the reusable modules. Mr. Fragale also suggested that the Army may have a centralized database in the future; however, Mr. Silva did not feel that the database would be visible to all the possible users.

### **A.3.3. Topics for Session 2**

The working group decided to discuss their representation and reuse issues using the following topics as an outline:

1. Who are movement control users?
  - ATCCS (AFATDS, CSSCS, MCS)
  - CASCOM (DAMMS-R)
  - ACCIS
  - Others
2. What are their needs?
  - Movement capabilities
  - Logistics capabilities
  - Course-of-action planning
  - In-transit visibility
3. How to deliver capabilities - Representations?
  - Abstract models
  - English text
  - Object/package libraries



- Prototypes
- Data dictionary (element definitions, standard abbreviations and terminology, and entity relationship information)
- Control/data flow

#### 4. How to get from Abstract Representation to Production System?

- Refining prototype through customization
- Use of model as basis of development
- Building from package or object libraries
- Marketing stand-alone system

#### 5. What are barriers to common solutions?

- Standard languages
- Reusable software (rewrite interface, rewrite application)
- GFE and proprietary core
- Common versus unique tailoring

### **A.4. Working Group 2, Session 2 (7/10/91, 8:30a.m.–3:30p.m.)**

#### **A.4.1. Catalog of Systems and Features**

The second meeting of the working group began with Mr. Valentine providing an in-depth description of the convoy planner and highway regulation functions of the DAMMS-R project. This included the procedures for planning and requesting a move; the responsible groups within the theater, corps, and divisions; the concept of road networks; and the act of deconfliction.

Mr. Valentine, Mr. Silva, and Mr. Black attempted to identify the similarities and differences between the movement concepts of the DAMMS-R, CSSCS, and AFATDS systems. For example, DAMMS-R is concerned with a road network that is defined in the Traffic Circulation Plan (TCP) and the controlled Main Supply Routes (MSR) of the Highway Regulation Plan (HRP), whereas the AFATDS system is only concerned with tactical routes for unit movement. The DAMMS-R system will perform deconfliction by identifying a conflict and attempting to resolve it, the AFATDS system will only detect a conflict, and the CSSCS system will only establish a set of priorities if a conflict exists. Table 1 lists the similarities and differences of the highway regulation and convoy planning functions of DAMMS-R, AFATDS, and CSSCS as well as those for the systems developed by the Carnegie Group (CGI) and Martin Marietta (SAFORS).

Mr. Valentine and Mr. Silva agreed that the contents of convoys will eventually need to be supplied to both DAMMS-R and AFATDS. CSSCS currently has in-transit visibility on certain control items within supply and transportation units and DAMMS-R uses a container transportation

control number (TCN) to follow a container, but there is nothing in place to follow the contents of the container.

#### **A.4.2. Transition**

The final discussion for the working group dealt with getting a model/prototype to production system. The key point is the ability to communicate the information that must be exchanged between developers and users. Mr. Silva felt that the information should be provided to the staff planners and concept planners rather than the users. Mr. Johnson felt that the ability to demonstrate various levels of functionality in prototype form is a very important part of product introduction. In addition, he felt that the ability to estimate where the product will be, at a given time, in reference to the willingness of an end users acceptance to the product, is very important. The group felt that it is impossible to predict the end users openness to a product or prototype. Mr. Johnson felt that in the early stages of the product, developers should limit the number of diverse inputs to avoid ballooning of the requirements.

	DAMMS-R	AFATDS	CGI	CSSCS	SAFORS
<b>System Users</b>					
Road Network & Status	TCP	Tactical	TCP	MSR	Tactical
Required Receipt & Approval	✓	Manual	} Implicit in Plan	} Coordinate via Cmd & DAMMS-R	✓
Deconfliction	✓	Detection			✓
Monitoring	✓	✓	---	✓	✓
<b>Convoy Planning</b>					
Convoy Building	✓	Partial	✓	---	Partial
Routing	✓	✓	✓	---	Partial
Schedule	✓	✓	✓	---	Partial
Request	✓	✓	Implicit	---	Partial

Table 1 Common System Features

### **A.4.3. Summary**

The group developed a high-level catalog of common features (Table 1), that also showed key differences among the related systems. The group also defined key areas where joint efforts can lead to common solutions. These efforts apply to software to support movement control as well as other Army systems. The areas needing common solutions include:

- Graphic Information Systems and a common binding for movement related applications.
- Army organization representation.
- User interface standards.
- Vehicle classification and characteristics.
- Standard terminology.

The group also determined several steps necessary to assure smooth transition from abstraction to production:

- A clear statement of requirements for a system. Commonality and reusability are not a substitute for formal agreement between developer and customer.
- Feeding back results to identify gaps in the abstract model.
- Using new solicitations as a basis for improving the model and assuring its applicability in an evolving domain.
- Knowing the infrastructure of customer organizations.
- Attending briefings, seminars, etc., to assure knowledge of marketplace.
- Developing the ability to pull new technology into the development organization and push new ideas into the community.

## Appendix B. Transportation School Training

Abstract: The information contained in this section is a summary of a two-week block of instruction entitled "Transportation in a Theater of Operations." The course is geared for the armies Captains and Majors who will assume the responsibility of transportation-related issues during peacetime and in war.

### B.1. Movement Management Organizations

#### B.1.1. Definitions

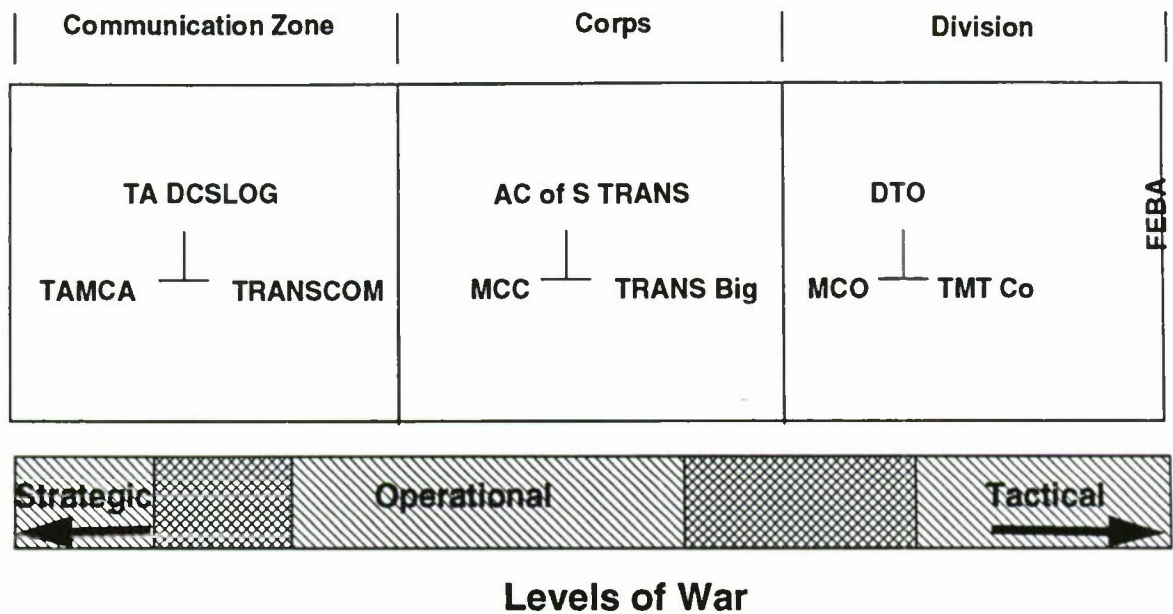
- **Transportation Management.** The performance of command and/or staff functions related to planning, coordination, evaluation, and analysis of all aspects of water, rail, highway, and air transportation systems; development of transportation policies and doctrine; assessment of capabilities in terms of current and projected transportation requirements; allocation and monitoring the use of transportation resources in accordance with established priorities; and preparation of contingency transportation plans.(AR 310-25)
- **Traffic Management.** The direction, control, and supervision of all functions incident to the procurement and use of freight and passenger transportation services.
- **Movement Control.** The planning, routing, scheduling, control, and in-transit visibility of personnel, units equipment, and supplies moving over lines of communication in accordance with the directives of command planning. It is a continuum involving the synchronization and integration of movement information and programs spanning the strategic, operational, and tactical levels of war. Movement control is guided by a system of balancing requirements against capabilities and allocating resources based on the combat commanders priorities.
- **Movement Requirement.** The request to transport personnel or material that has been approved by the appropriate commander.
- **Movement Capability.** The sum total of the capabilities of the shipping and receiving agencies and the transport services.
- **Movement Program.** A command directive prepared by the transportation movements elements and issued in the names of the commander.
- **Throughput Distribution.** The shipment of supplies from point of origin as far forward into the combat zone as possible, bypassing intermediate supply activities.

#### B.1.2. Principles

The four principles of movement control operations are:

1. **Control of Movements will be Centralized at the Highest Level.** Exercised by the commander charged with supplying logistical support and who is in a position to see the complete transportation system.
2. **Fluid and Flexible.** The transportation system will adapt to continuously changing demands.
3. **Maximum use of Carrying Capacity.** Transportation cannot be stored, full utilization of transportation assets.
4. **Movements will be Regulated.** A movement will *not* be initiated if it is known that any part of the transportation net cannot support the move. Movements will be regulated according to their priorities.

### B.1.3. Theater Organization



**Figure B-1 Generic Theater Organization**

1. Communication Zone
  - Supervisors: Theater Army Deputy Chief of Staff Logistics (TA DCSLOG).
  - Coordinators/Controllers: Theater Army Movement Control Agency (TAMCA).
  - Mode Operators: Transportation Command (TRANSCOM).
2. Corps
  - Supervisors: Assistant Chief of Staff Transportation (AC of S Trans).

- Coordinators/Controllers: Movement Control Center (MCC).
- Mode Operators: Transportation Brigade (Trans Bde).

### 3. Division

- Supervisors: Division Transportation Officer (DTO).
- Coordinators/Controllers: Movement Control Office (MCO).
- Mode Operators: Transportation Motor Transport Company (TMT Co).

#### **B.1.4. Movement Control Teams**

These organizations are designed to help accomplish transportation management and transportation control. There five types of Movement Control Teams: Regional, Air Terminal, Highway, Highway Traffic Point Team, and Branch. The TAMCA and MCC provide command and control over the MCTs. The teams are organized with special types of transportation skills and placed at locations where these skills can be fully utilized.

## **B.2. Host Nation Support**

The provision of support (Manpower, Equipment, and Facilities) by a host nation (Korea, UK, Germany, etc.) mainly in the administrative and logistics areas of operations.

### **B.2.1. Types**

- Government Agency
- Host Nation Civilians
- U.S. Contractors and Third Nation
- Host Nation Military Units
- Host Nation Facilities
- Supplies and Equipment

### **B.2.2. Standardization Agreements (STANAG)**

The Standardization agreement is an agreement among several or all of the NATO member nations to adopt like or similar operational, logistical, and administrative procedures. The main advantage of standardization is that the system and documentation requirements in use today would also be good in time of war. The most important transportation standard agreements are listed below.

#### 1. STANAG 2155.

- Road movement and credit
- Mode: Road

## 2. STANAG 2156.

- Surface transport request and resupply to surface transport request
- Mode: Road/Rail/Sea

### **B.2.3. Summary**

At the beginning of Desert Shield the allied forces estimated that the amount of Host Nation Support to be provided by the Saudi government would be on the order of 25%. Prior to Desert Storm the actual figure of Host Nation Support provided by the Saudi's was 75%. With the purposed cutbacks to the military spending in the years to come, the U.S. military will rely heavily on Host Nation Support to provide transportation assets.

## **B.3. Transportation Intelligence**

### **B.3.1. Definitions**

- **Intelligence.** The product resulting from the collection, processing, integration, analysis, evaluation, and interpretation of available information that concerns one or more aspects of foreign nations or areas of operations that are immediately or potentially significant to military planning and operations.
- **Technical Intelligence.** Intelligence concerning foreign technological developments and operational capabilities of foreign material that have or may have practical applications for military requirements. It is the end product resulting from the processing and collation of technical information.
- **Transportation Intelligence.** A facet of technical intelligence, it is the product resulting from the collection, evaluation, interpretation, analysis, and integration of all available information about the air, land, and water transportation systems of foreign areas of operation that are of immediate or potential military significance. This intelligence includes data on the characteristics, condition, development, organization, material operation, maintenance, and construction of transportation system facilities.

### **B.3.2. Doctrine**

- FM 55-1: Transportation Services in a Theater of Operations.
- FM 34-1: Intelligence and Electronics warfare operations.
- FM 34-3: Intelligence Analysis.
- FM 34-54: Battlefield Technical Intelligence.

### **B.3.3. Objectives of Transportation Intelligence**

- Determine foreign transportation capabilities and limitations.
- Provide information from which military countermeasures are developed.



- Permit use of foreign transportation equipment and facilities by U.S. forces.
- Exploit new transportation development for Military needs.
- Provide input on a continuous basis to the overall national integrated technical and scientific intelligence program in consonance with theater policy.
- Provide tactical, operational, and strategic studies on characteristics, capabilities, and limitations of foreign transportation equipment, facilities, and installations.
- Transportation intelligence is always essential to successful military operations. Now, with the development of highly complex weapons systems and the necessity of rapidly deploying our troops to remote areas and then keeping them supplied, technical intelligence has assumed a more critical role in military planning.

## **B.4. Movement Plans, Programs, and Procedures**

### **B.4.1. Definitions**

- **Operational Plan.** A plan for a single or series of operations to be carried out simultaneously or in succession. It is usually based upon stated assumptions and is the form of directive employed by higher authority to permit subordinate commanders to prepare supporting plans and orders.
- **Movement Plan.** A command directive that the TAMCA plans and the division prepares with input from all movement control levels. The plan allots available transportation to support requirements based on tactical priorities that the operational commander sets the supply and movement priorities for unit commanders. The plan provides transportation priorities to resolve competition, traffic, and mode management decisions so that available transportation assets are best used and comply with any Host Nation-imposed restrictions.
- **Movement Program.** An authorized movement program.

### **B.4.2. Movement Procedures**

The seven step procedure for movement planning is:

1. Develop a distribution pattern
2. Determine what must be moved.
3. Determine what transportation resources are available.
4. Balance requirements against the capabilities.
5. Determine shortfalls, critical points, and recommended priorities.
6. Coordinate the plan.
7. Prepare, publish, and distribute the movement program.

## **B.5. Transportation Movement Release**

### **B.5.1. Force Activity Designator (FAD)**

The Force Activity Designator is used for logistics supplies before that are in-transit. It is used to specify a relative priority of one logistic item to another. They are used to map logistics priorities to transportation priorities.

### **B.5.2. Transportation Priorities**

Transportation priorities are use to specify the relative degrees of transportation urgencies from one transported item to another. There are five levels of transportation priorities: TP1, TP2, TP3, 999, and ALOC.

1. **TP1.** If the request for transportation with designation of TP1 is made before 9:00 a.m., the total transit time will be 6 days, otherwise the total transit time is 7 days.
2. **TP2.** If the request for transportation with designation of TP2 is made before 9:00 a.m., the total transit time will be 7 days, otherwise the total transit time is 8 days.
3. **TP3.** The total transit time for a TP3 will be a minimum of 11 days.
4. **999.** The item will be delivered within 24 hours.
5. **ALOC (Air Line of Communication).** The item will be delivered within 24 hours.

### **B.5.3. Transportation Movement Release Code (TMR)**

The TMR is a unique alpha numeric code that specifies a specific cargo movement or represents usage of a transportation asset directed through movement control channels. Standard TRMs (STRMs) also exist, which are TRM codes that are assigned to recurring moves (i.e., movements of the same supplies to the same locations on a routine basis).

### **B.5.4. Conclusion**

TMRs are a means of tracking transportation assets within a theater of operations. Contained in these TMR's are TPs which provide a means of specifying degrees of urgency. The Transportation Priorities are also used as one of the criteria for selecting a mode of transportation.

## **B.6. Utilization of Highway Networks**

### **B.6.1. Definitions**

- **Highway Traffic Regulations.** The coordination and the actual use of the road network by vehicles, personnel, and animals needed to meet military requirements. It consists of planning, routing, scheduling, and diverting movements on the available road networks in accordance with priorities.

- **Traffic Control.** Includes enforcing traffic laws and regulations, investigating traffic accidents, and directing traffic. It is a function of the Military Police.
- **Highway Regulation Plan.** A staff plan which combines pertinent information from standard operating procedures, directives, regulations, traffic circulation overlays, and staff estimates of the capabilities of the existing road network to handle the traffic that must go over it.
- **Critical Point.** A roadway structure or feature which limits road width, overhead clearance, or vehicle load class as well as any feature which interferes with the meeting or crossing of two or more streams of traffic.

### **B.6.2. Highway Traffic Division**

The Highway Traffic division is located with the MCA and MCC. It provides Liaison Support to personnel, intelligence, tactics, logistics, and military planning.

- **Functions/Operations.** Provide efficient highway regulation.
  - Planning
  - Routing
  - Scheduling
  - Directing
- **Responsibilities.**
  - Maintenance of a situation map.
  - Adherence to established priorities.
  - Receipt of all requests for highway routing.
  - Issuance of Schedules, Road Movement Tables, Movement Credits, and Traffic Circulation Maps.
  - Coordinate with other Highway Traffic Divisions.
  - Coordination with engineer construction activities.
- **Road Maximization Techniques.**
  - Balance: Matching vehicle characteristics with those of the roads.
  - Separation: Non-conflicting routes to concurrent movements.
  - Distribution: Spreading traffic over many routes.

### **B.6.3. Highway Route Classification**

The classification of a route takes five parameters into consideration: width, type, class, clearance, and obstructions. More details are provided in [FM 5-36].

1. **Width.** The width of the minimum traveled way along the route.
2. **Type.** There are three alphabetic codes used to designate a route type:
  - a. Type 'X' is an all-weather route. This is a route that with reasonable maintenance is passable throughout the year to maximum capacity traffic.
  - b. Type 'Y' is a limited all-weather route. This is any route that with reasonable maintenance can be kept open in all weather, but is sometimes open to less than maximum capacity traffic.
  - c. Type 'Z' is a fair weather route. This is any route that quickly becomes impassable in adverse weather and cannot be kept open by maintenance, short of major construction.
3. **Class.** The military load classification. This is usually a bridge classification, but it could also be a culvert or a weak part of the road surface, such as an embankment.
4. **Clearance.** This indicates the minimum overhead clearance for a particular route. If there is an unlimited overhead clearance, '00' is used.
5. **Obstructions.** Route obstructions are factors which restrict the type, amount, or speed of traffic flow. There are two special types of obstructions which carry their own special character code: Snow Blockage (T) and Flooding (W).

#### **B.6.4. Route Classification Formulas**

Route classifications are usually specified with Route Classification Formulas. A typical formula might look like 7.0m/X/50/9.2m/T. This would indicate the route has a minimum width of 7 meters, an all-weather route, a military load classification of 50, an overhead clearance of 9.2 meters, and there is snow blockage somewhere along the route.

### **B.7. Modes of Transportation**

#### **B.7.1. Types**

- Animals
- Road
- Water
- Rail
- Aircraft Fixed Wing
- Aircraft Rotary Wing

#### **B.7.2. Governing Factors**

- Transportation Priority (TP)
- Required Delivery Date (RDD)

- Weight and size
- Nature of material
- Cost of transportation
- Distance to be shipped
- Modes of transportation available

### **B.7.3. Mode Selection Criteria**

- **Priority Requirements.** The theater commander determines priorities.
- **Security Requirements.** These include Nuclear, Biological, and Chemical (NBC) considerations, and the security classification of the cargo or movement.
- **Political Requirements.** The types of cargo and anti-U.S. Sentiment.
- **Guidelines.**
  - Allocating capability for the largest shipments the longest distance.
  - Use the full capacity of each mode in relative economy.

### **B.7.4. Vehicle Classification**

Vehicle classification takes the following factors into account: weight/load classification of the vehicle, its height, and its width. This information can be found in [FM 5-36] and [FM 55-15]. Special consideration needs to be exercised when towing vehicles or when loading equipment on top of vehicles.

### **B.7.5. Convoy Management**

#### **B.7.5.1. Definitions**

- **Convoy.** Six or more vehicles moving together over the same march route, or ten or more in one hour.
- **March Column.** All vehicles in a convoy.
- **Serial.** A group of vehicles within a march column.
- **March Unit.** A group of vehicles within a serial.
- **Functional Elements.** The Head, Main Body, and Trail are functional elements within a group of vehicles.
- **Road Distance.** Distance from point to point usually expressed in miles or kilometers.
- **Time Distance.** Time required to move from one point to another point at a given rate of speed.
- **Lead.** Linear spacing between heads of elements in a column/serial.

- **Time Lead.** Time measured between the head of one element or vehicle and the head of the next as they pass a given point.
- **Gap.** Space between the rear of one element to the front of the following element.
- **Time Gap.** The time measure between the rear of one element and the front of the next as they move past a given point.
- **Length.** Length of roadway occupied from front to rear
- **Time Length, Pass Time, or Time Space.** The time of a column or element to pass a certain point.
- **Road Clearance Distance.** Total distance that the head of the convoy must travel for the entire column to clear a section of road.
- **Road Clearance Time.** Total time a column or element requires to travel over and clear a section of road.
- **Road Space.** Total length of roadway occupied by a column or element and any space added to the length that may be required for safety or to maintain flexibility.

### B.7.5.2. Road Movement Graphs

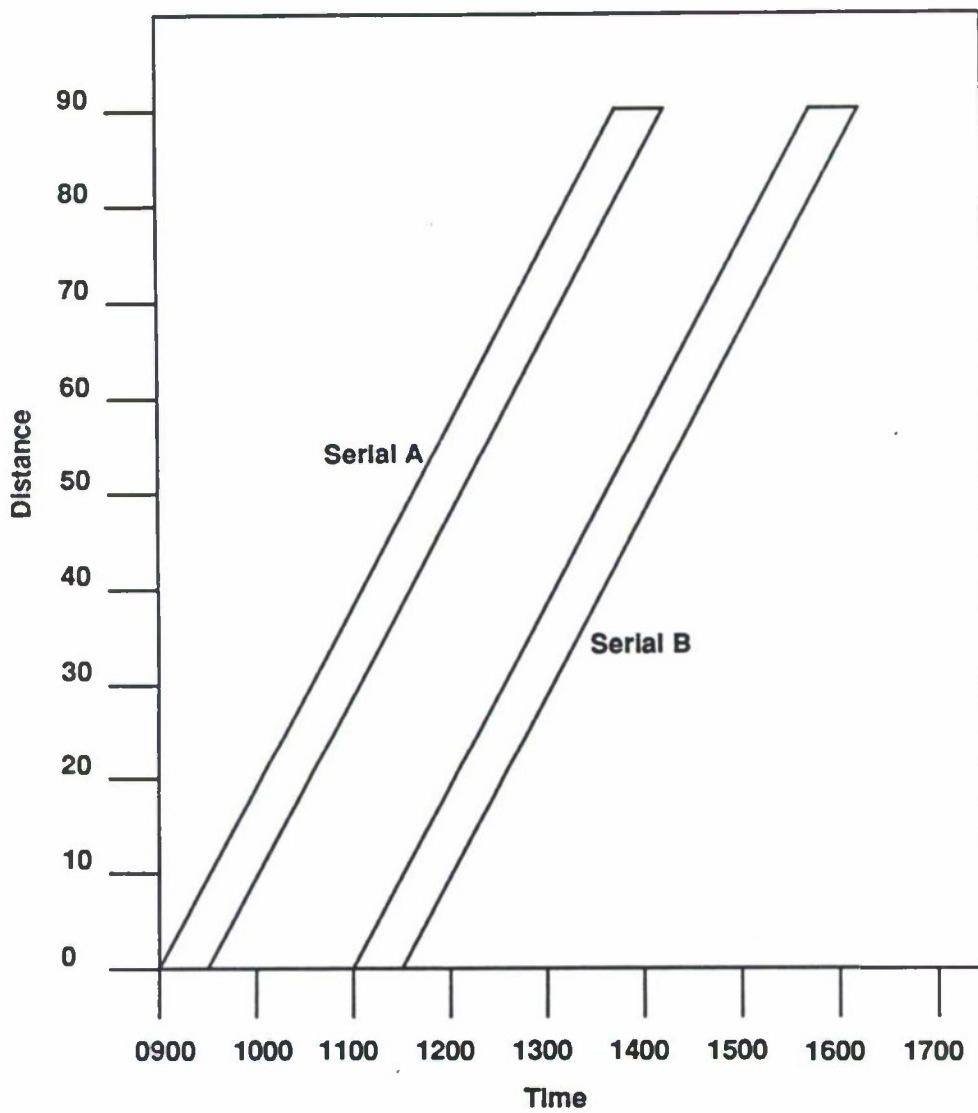


Figure B-2 Road Movement Graph

### B.7.5.3. Convoy Organization

Guidelines for vehicle densities within a march unit and the gap distances between march units and serials can be found in [FM 101-5]. Guidelines for convoy speeds over different road classification formulas can also be found in [FM 101-5].





## Appendix C. Using Info Mode in GNU Emacs

### C.1. Formatting a File for Use in Info Mode

All information in an Info file (see [STALL87] for complete information on GNU Emacs) is stored in one of more logical *nodes*. The start of a node is delineated in a file by placing two special characters in succession on an otherwise empty text line. These two characters are unprintable, but they are seen on a screen display as `^_^\L` where the `^` stands for use of the 'Control' key. The next important piece of information is the node name. It is delineated by the use of the text symbol `Node:` at the start of a line with a space and then a identifying name that must be **unique** from all other identifying names in the file. Multiple word identifiers, i.e., spaces, are allowed. Other fields that can occur on this line are `Next:`, `Up:`, and `Previous:`. `Next` and `Previous` names refer to sibling nodes at the same conceptual level in a hierarchical structure and `Up` refers to the parent of a node. The top node in the hierarchy is `Top`.

Children of a node are usually created using the *Menu* capability. A menu is created by first signifying the start of a menu. This is done by creating a line with the text `* Menu:` on it. Menu items are designated by separate lines using the form `*<Name>:` where `<Name>` is an identifying name as discussed. The menu list is ended whenever a text line is seen that does not begin in the menu item format. A brief description of the menu item can be entered on the line starting one space after the colon.

The third way to create a reference from one node to another is using the *Note* capability. This capability is used to create the non-hierarchical links between nodes in an Info file. For example, it is used in the domain information files to allow the user to quickly access the definition of a term when it is used in the explanation of a feature or an entity. A note reference can be created anywhere in a textual line (that does not interfere with another Info marker) using the form `*note <Name>::`. Figure C-1 shows a sample node, which contains an example of each of the important usages described above formatted in the basic style used in our domain Info file for movement control.

The last step to perform whenever an Info file is created or modified is to invoke a special operation within Emacs to create a tag table for the nodes in the file. The tag table is a list of internal pointers that Emacs can use to quickly locate nodes within the files. The operation is invoked by typing `<Meta>X Info-tagify`<sup>1</sup>. This operation should be invoked at the end of any editing session when changes have been made because the Info-tagify operation uses the position of the node within as its index and the position of nodes changes as text is entered or deleted.

<sup>1</sup> `<Meta.>` refers to the use of the Meta key, which is different depending upon the keyboard in use. The GNU Emacs manual discusses the binding of logical and physical keyboard keys in detail.

```

^_^L
Node: A Node,Next: Node-3, Up: Parent Name, Prev: Node-1

Some text(optional) about the node as desired.

* Menu: One line describing the overall choices.

* Child A:
* Child B:
* Child C: a description of this menu choice is OK here.

See *note Other Node:: for further related information.

```

Figure C-1 File Format for GNU Emacs Info

## C.2. Invoking Emacs and Navigating in Info Mode

To use an Info mode file within Emacs, it must be informed where your Info files reside (the default location is where the Emacs Help Info files reside). To do this, a special function to locate and load your Info `dir` file should be incorporated into a `.emacs` file in your home directory. The `.emacs` file is read when Emacs is invoked and serves to initialize your editing session. The `dir` file is a special top-level Info file into which the names for a set of Info files are entered. Thus, a common location can be maintained for accessing information on all domains. Figure C-2 depicts the information to be incorporated into the `.emacs` file.

The domain Info file can be invoked directly by typing `emacs -e da-browser` at the UNIX shell level. The `-e` option executes the named function at start-up, which puts the user directly into the Info mode under Emacs and reads in the `dir` file to begin the browsing session.

```

;;; Define an alternate Info browser for DA information
(defun da-browser ()
  "Browse through the available information about a domain."
  (set-variable 'Info-directory "<Info directory path>")
  (find-file "<Info directory path>/dir")
  (delete-other-windows)
  (load "info")
  (Info-mode)

;;; Invoke the proper major mode for the Info browser.
(setq auto-mode-alist'(("\\.inf$" . info-mode)))

```

Figure C-2 The "da-browser" Function Text

The commands used to navigate through the Info nodes are listed below. Most are single key entries that execute immediately. Others will require the use of the Return key after entering a name or confirming a selected choice.

<b>Command</b>	<b>Description</b>
n	Go to the Next: node (as seen in the node name line).
p	Go to the Previous: node.
u	Go to the Up: (parent) node.
m	Go to the Menu item pointed to by the current text cursor location. A Return is required to get to this choice.
f	Follow the reference to be named in the bottom command line. The space bar here serves as a name completion mechanism if the first character provide an unambiguous reference to a *note in the current node.
g	Go to the named node to be specified in the bottom command line. The space bar completion will NOT work here.
l	Go to the Last node you were at.
1 up to 5	For any Menu, the first five items can be accessed immediately by typing the appropriate numeric character.
Space bar	Go to the next page of a large Info node.
Delete	Go back to the previous page of a large Info node.
b	Go to the beginning of a node.

**Table 2 List of Info Mode Commands**



## Appendix D. The Entity-Relationship Model

What the entity-relationship model represents is a set of accepted conventions that most Army movement control system tend to follow—it is not a description of the full functionality of every movement system, which can include ideas not needed in commercial systems supporting movement.

Note: Relationships are represented as links between entity nodes. All names used in the figures to follow are either proper names used in the paragraph identifiers or the Alternate Names which can be found at the end of the entity descriptions, if applicable.

Alternate Name: environment

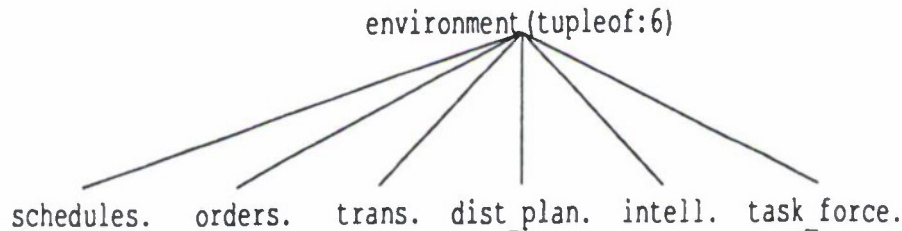


Figure D-1 Top-Level Entities for Movement Control

### D.1. Orders

Orders are the mechanism by which commanders get their subordinate units to perform functions or achieve objectives.

An order is always addressed to some Unit or Task Force commander. A movement related order usually contains some information about a selected mode of transportation.

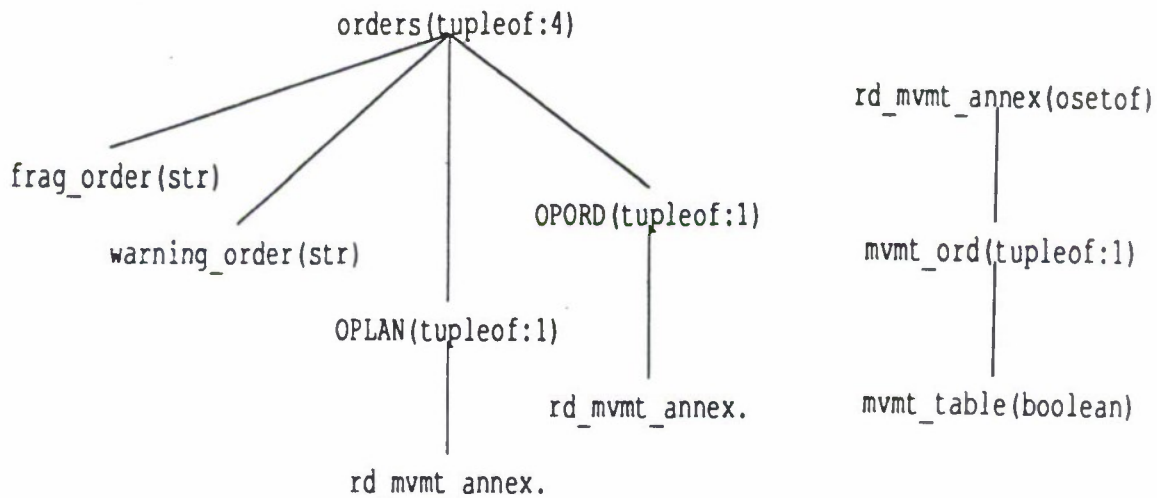


Figure D-2 Decomposition of the Orders Entity

See also: \*note Units::

\*note Transportation::

Definition: \*note order::

### **D.1.1. Fragmentary Order**

A fragmentary order is an abbreviated form of an operation order used to make changes in missions to units and to inform them of changes in the tactical situation. "A fragmentary order (FRAGO) provides pertinent extract from a more detailed order. It ... usually provide timely changes to existing orders. Those elements found in a complete order are omitted when they are not changed..."

Relationships: modifies an Order previously issued

Source: FM 101-5-1 and FM 101-5, p. 7-4

Alternate Name: frag\_order

### **D.1.2. Warning Order**

"A warning order gives subordinate units advance notice of a contemplated action or order which is to follow. Its purpose is to help units and their staffs initiate the preparations for execution of a mission by giving them the maximum warning and the essential details of impending operations including planning time available.

The warning order may include:

- Earliest time of move.
- Rendezvous (point) and time for assembly of a group (or task force).
- Regrouping of transport.
- Preliminary moves to assembly area.

The wording must show clearly what the ... recipient ... must act on (immediately) and what is a warning... Every warning order involving movement must state a time before which there is no move. This means a further order must be issued before that time giving actual move timings (a movement order), or extending the time before which there will be no move, or placing the troops at so many hours or minutes to move."

Relationships: is-a Order

Source: FM 101-5, p. 7-4

Alternate Name: warning\_order

### **D.1.3. OPLAN/OPORD**

"An operation order (OPORD) gives subordinate commanders the essential information to carry out an operation. When a operation is to be conducted at some future time, the OPORD may be an operation plan (OPLAN), which will be implemented by appropriate instructions..."

The difference between an OPLAN and an OPORD is usually only a matter of how times are used. See Event Times, paragraph D.5.1.1.

Relationships: is-a Order

has 1 \*note Road Movement Annex::

Source: FM 101-5, p. 7-2, G-51

#### **D.1.3.1. Road Movement Annex**

A road movement annex is a designated section of an OPORD/OPLAN. It contains the information about the planned movements of units needed to put forces into place at the correct time to accomplish some part of the plan. Pages G-51 and G-52 of FM 101-5 contain a precise outline of the information to be given in the annex for the movements covered by the plan. This outline is identical to that for a road movement order given to a single unit.

Relationships: has N \*note Movement Order::

may contain \*note Movement Table::

Source: FM 101-5, p. G-51/52

Alternate Name: rd\_mvmt\_annex

#### **D.1.4. Movement Order**

A movement order is the final step performed by a commander in preparing to have one or more of his subordinate units move from one location to another. It contains all of the information that a unit needs about routes, schedules, support to be provided, etc., for a unit to move without further coordination. A road movement order is a special kind of administrative/logistics order. Its format is identical to that for the \*note Road Movement Annex::

Relationships: is-a Order

contains \*note Routes::

\*note Schedules::

may contain \*note Movement Table::

See also: \*note operation order for road movement::

Source: FM 101-5, p. 7-3, G-19

Alternate Name: mvmt\_ord

#### **D.1.4.1. Movement Table**

A movement table is an optional appendix to a road movement annex or order. It is a mechanism for displaying the information about one or more road movements in a convenient and

readable form. The chief attribute of a movement table is the layout of the due and clear times for the critical points on the route(s) the unit is using for its move. Related movements are shown on the same table for easy comparison of times so that time constraints are more visible to commanders and logistics personnel. FM 101-5 provides the exact detail of the information to be supplied in a movement table.

Relationships: may be part of \*note Movement Order::

\*note Road Movement Annex::

Source: FM 101-5, p. G-141/142

Alternate Name: mvmt\_table

## D.2. Task Force

A task force is a temporary grouping of units, usually to carry out a specific operation or mission. It has many of the entities and attributes of a unit. However, it has no assets of its own; its assets come from the units that comprise the task force. It also does not have a UIC (see Section D.2.4.3.) due to its temporary nature.

Relationships: has temporary control of N \*note Units:

consists of \*note Mission::

\*note Structure::

\*note Status::

Definition: \*note Task Force::

Source: FM 101-5-1

Alternate Name: task\_force

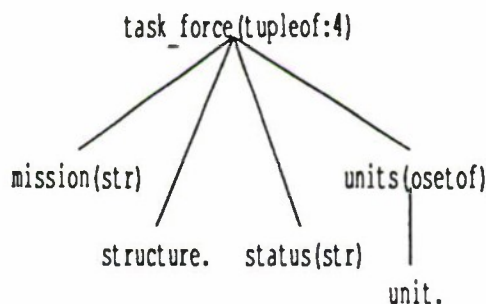


Figure D-3 Decomposition of the Task Force Entity

### D.2.1. Mission

A mission is the task or objective that a unit is to accomplish. A unit is assigned a generalized mission for which it receives the most appropriate assets and structure for achieving the mis-



sion. During operational planning, the mission is made specific for each instance of a task to be performed or objective to be attained.

A task force is organized with a specific mission already known to the commander formulating the task force. Usually a task force is comprised of many parts of one unit, augmented with other units of various types that have assets that the main unit is lacking.

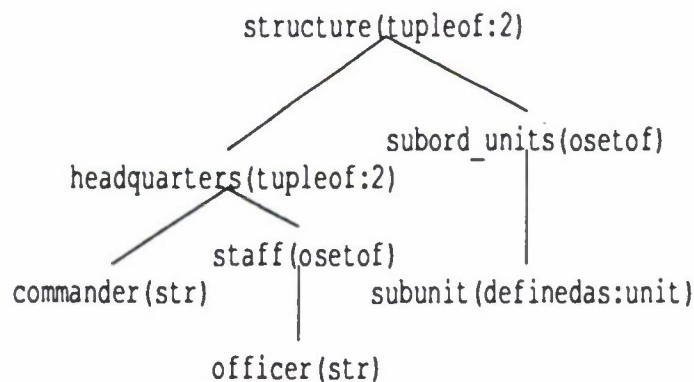
Definition: see \*note mission::

### D.2.2. Structure

The structure of a unit designates the allocation of personnel to the various functions within a unit. A unit's overall structure is designated by the appropriate Table of Organization and Equipment for that type of unit in FM 101-10. These tables standardize the structure of the various kinds of combat and support units found in most levels of the Army organizational hierarchy.

Relationships: has 1 \*note Commander::

has N \*note Subordinate Units::



**Figure D-4 Decomposition of the Structure Entity**

#### D.2.2.1. Headquarters

The location of the personnel assigned to perform the command function of a unit.

##### D.2.2.1.1. Commander

The chief commissioned officer in charge of a unit, regardless of his rank.

##### D.2.2.1.2. Staff

The officers designated to assist the commander in the performance of his duties.

Definition: see \*note staff::

#### D.2.2.2. Subordinate Units

The group of units that are subject to the authority or control of an officer.

Alternate Name: subord\_units

### D.2.3. Status

The status of a unit involves a description of the state of the personnel, equipment, and supplies that is used to determine the ability of a unit (or task force) to achieve present or future missions. This status information is an important part of the situation reports sent by unit (or task force) commanders to their superiors.

### D.2.4. Units

A unit is an entity that can go into combat or that provides support for combat in some fashion. It exists as a permanent part of the Army command hierarchy.

See also \*note Task Force::

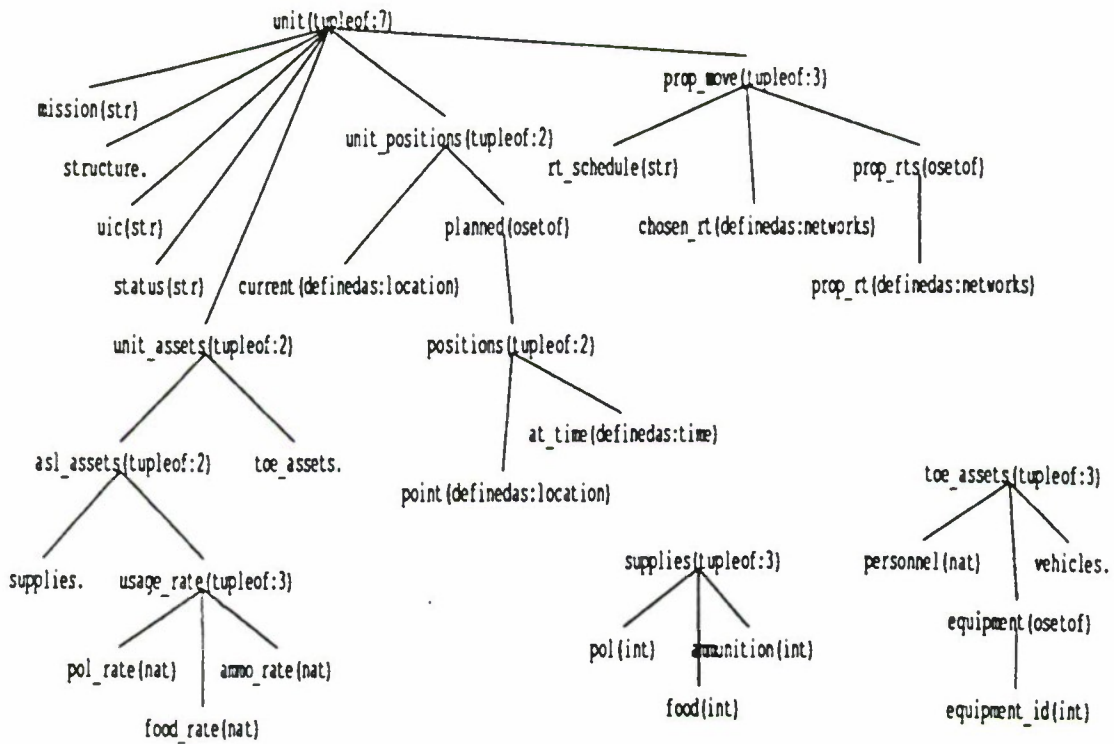


Figure D-5 Decomposition of the Unit Entity

#### D.2.4.1. Mission

See paragraph D.2.1.

#### D.2.4.2. Structure

See paragraph D.2.2.

### **D.2.4.3. UIC-ent**

A six-character alphanumeric code designating a unit that can be allocated to a specific mission.

Alternate Name: uic

### **D.2.4.4. Status**

See paragraph D.2.2.1.1.

### **D.2.4.5. Assets**

Assets are the physical objects that a unit has to work with.

#### **D.2.4.5.1. ASL Assets**

These are assets that are consumed or used by the unit's personnel and equipment, which are generally not reusable after they are used or otherwise disappear.

See also: \*note ASL::

Alternate Name: asl\_assets

##### **D.2.4.5.1.1. Supplies**

Various forms of consumable items form the basis for this abstraction.

The kinds of consumables and their Army designation are listed below.

Ammunition: Class V supplies

Food: Class I supplies

POL: Class III supplies

Relationships: part of \*note Support::

##### **D.2.4.5.1.1.1. Ammunition**

Ammunition includes bullets, bombs, rockets, grenades, mines, and generally any part of an explosive device listed in the Army Class V Supply group. These parts are generally useless after explosion or detonation occurs. The exceptions are bullet and shell casings.

Source: FM 101-5-1

##### **D.2.4.5.1.1.2. Food**

Subsistence items found in the Army Class I Supply group. These include meals ready to eat (MRE), T-rations, and fresh fruits and vegetables.

Source: FM 101-5-1

#### **D.2.4.5.1.1.3. POL**

Items found in the Army Class III Supply Group; in particular, the fuels needed to operate the vehicles used to conduct a movement.

Definition: \*note POL::

#### **D.2.4.5.1.2. Usage Rate**

This entity is a consumption rate for each of the class of supplies. These rates are used to compute the volume of supplies needed to sustain combat so that an adequate supply network can be implemented.

Alternate Name: usage\_rate

#### **D.2.4.5.2. TOE Assets**

The TOE assets are those items found within a unit that are not consumed or used by the personnel at a given rate during combat. FM 101-10 lists the class of supply items and the number of people assigned to various functions.

Alternate Name: toe\_assets

#### **D.2.4.5.2.1. Personnel**

The body of persons assigned to the unit being moved. The number of persons and the kinds of persons required are given in FM 101-10.

#### **D.2.4.5.2.2. Equipment**

The class of supplies needed by a unit to perform its ongoing mission. These may include Class II (clothes, tools, etc.), Class IV (construction materials), Class VII (weapons), Class VIII (medical materials), and Class IX (repair parts) supplies.

#### **D.2.4.5.2.3. Vehicles**

Vehicles are a part of the Class VII supplies. Depending upon the amount of mobility required by their ongoing mission, a unit may or may not have enough organic vehicles to move itself.

Important attributes of vehicles needed for convoy planning are seen in Figure D-6.

#### **D.2.4.5.3. Unit Positions**

The kinds of positions that are attributes of a unit are listed below.

Current: the present location of a unit.

Planned: one or more future locations/zones.

Alternate Name: unit\_positions

#### **D.2.4.5.3.1. Current**

The exact (as precise as possible) location of a unit at last report.

### D.2.4.5.3.2. Planned

A set of locations determined by the unit commander or his superior for use in implementing the later stages of a plan. Each position in the set may have a time associated with it for ensuring proper movement coordination.

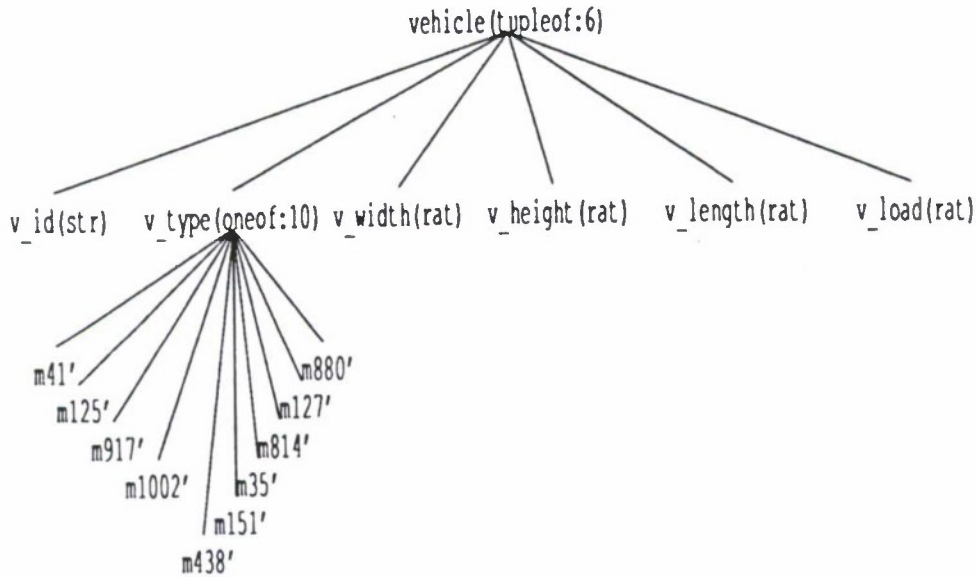


Figure D-6 Decomposition of the Vehicle Entity

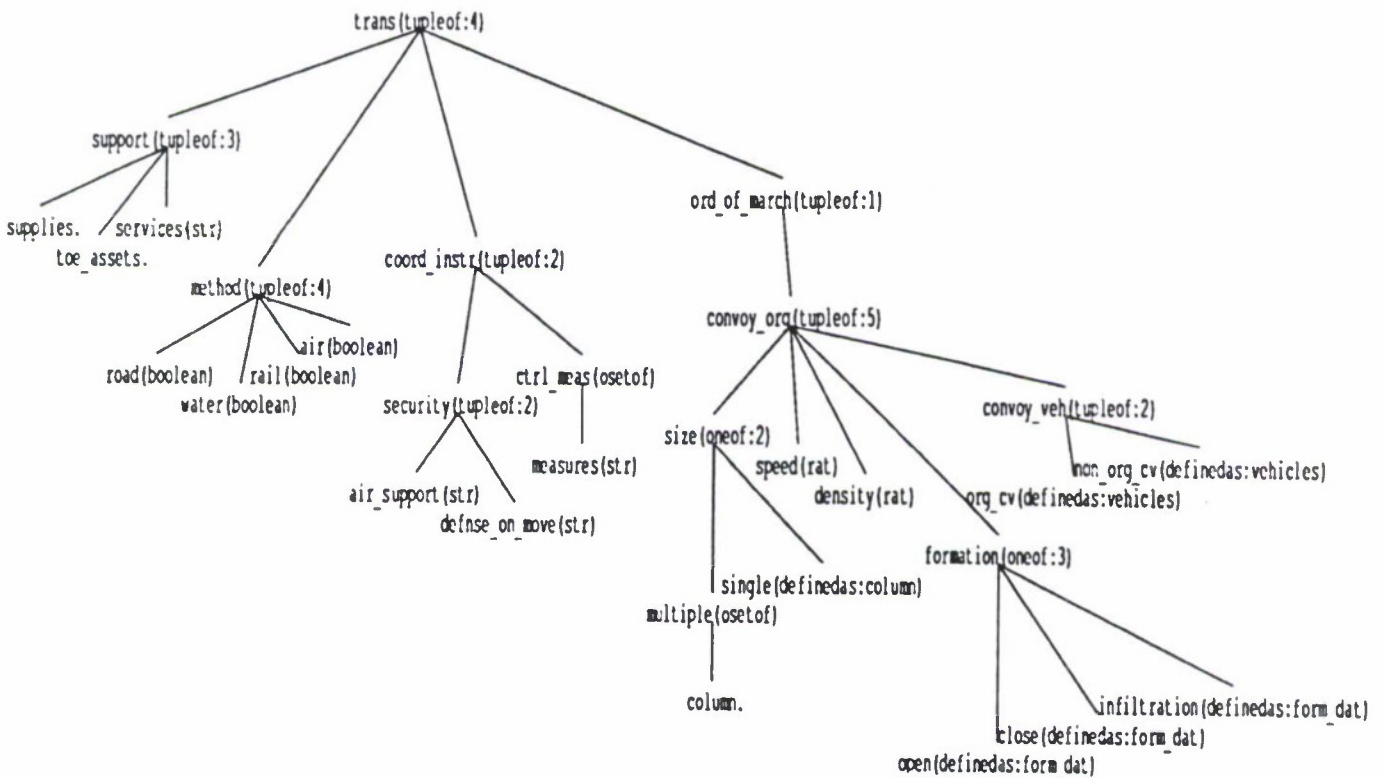


Figure D-7 Decomposition of the Transportation Entity

## **D.3. Transportation**

This entity is a collection of information about how a unit is to conduct its move. The breakdown of transportation information is listed below.

Support:	what outside help is needed.
Method:	medium of transport to be used.
Coordinating Instructions:	information other combat units may need.
Order of March:	how to organize the unit(s) for movement.

Other important information directly related to transportation/movement of a unit is given in the description of the \*note Routes:: and \*note Schedules:: entities.

Alternate Name: trans

### **D.3.1. Support**

The kinds of outside assistance that a unit may need to accomplish a move. Support can include services, supplies, and assets from other units. The units that provide this assistance are combat service support units.

See: \*note Services::

\*note Supplies::

\*note TOE Assets::

#### **D.3.1.1. Services**

Services are work performed by personnel not part of the units involved in the move.

### **D.3.2. Method**

Method refers to the medium of transportation used to accomplish a move. The four methods of transportation recognized for Army usage are:

Road: the primary method used in most units in tactical situations.

Water: used mostly for strategic movements, also includes amphibious operations.

Rail: used where available and when time allows for it, economical.

Air: high cost, fast, can support many mission types.

### **D.3.3. Coordinating Instructions**

Information or assistance that other units (not involved in the move directly) need to know to help or not to interfere with the movement.

The kinds of coordinating instructions are listed below.

**Security:** measures that help to ensure the moving unit's safety.

**Control Measures::** measures that minimize interference from other units.

Alternate Name: coord\_instr

#### **D.3.3.1. Security**

Security involves taking those measures to ensure the enemy does not hinder the planned movement. Measures that can be taken to provide security during a move include:

**Air Support:** keeping enemy aircraft away from the route and moving unit.

**Defense on Move:** how other ground and artillery units protect the movement.

#### **D.3.3.2. Control Measures**

Instructions given to ensure that this movement does not interfere with other operations and vice versa.

Alternate Name: ctrl\_meas

#### **D.3.4. Order Of March**

Some details of the important information on how the movement is to be organized and accomplished.

Alternate Name: ord\_of\_march

##### **D.3.4.1. Convoy Organization**

How the vehicles holding all of the men and equipment to be moved are organized to best accomplish the move under the given circumstances. The organization of a road movement follows a set pattern of generalized vehicle groups.

The information grouped under this entity is listed below.

Size	whether one or multiple columns are used.
Density	the spacing between individual vehicles and groups.
Speed	the rate of travel of the vehicles.

Alternate Name: convoy\_org

##### **D.3.4.1.1. Column**

The column consists of all the vehicles involved in a single move over the same route. Large groups of vehicles should be broken into manageable groups where possible, preferably along organizational boundaries. If a column is to be broken into serials, keep a reasonable time gap

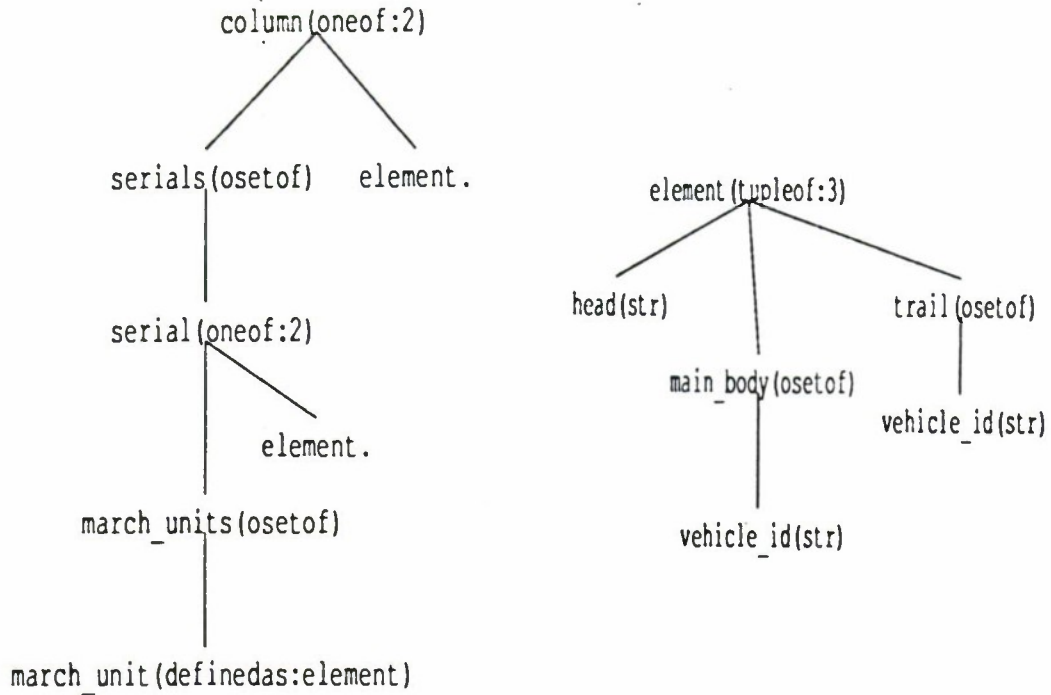
(15-20 minutes or more) between each serial to allow for other columns to proceed through intersection areas, to allow for halts, etc.

Relationships: has 1 \*note Routes::

has 1 \*note Schedules::

has N \*note Serial::

Source: FM 55-30, FM 55-10



**Figure D-8 Decomposition of the Column Entity**

**D.3.4.1.2. Serial**

A serial consists of elements of a march column moving from one area, over the same route, at the same rate. All of the elements move to the same new area and are grouped under one command.

Relationships: part of \*note Column::

has N \*note March Unit::

Source: FM 55-30

**D.3.4.1.3. March Unit**

A march unit is a small number (usually 7-12) of vehicles that move or halt on command or signal from one commander.

Relationships: part of \*note Serial::



has N \*note Vehicles::

Definition: See \*note march unit::

Alternate Name: march\_unit

#### D.3.4.1.4. Formation

The formation a column uses is dependent on the time of day during the march and the overall tactical situation. The selection of a formation type affects the gap sizes and speed determinations. The choice of Fixed or Governed column length is also needed.

The three types of column formations are listed below.

- Close            High density (40 per KM), low speed (16 KPH)
- Open            Medium density (12 per KM), high speed (24 KPH)
- Infiltration    Low density (10 or less per hour), variable speed

See feature \*note Column Length::

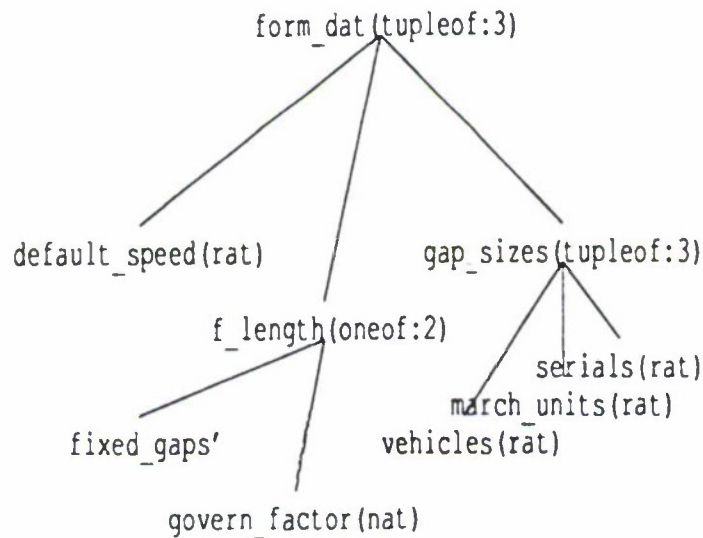


Figure D-9 Decomposition of the Formation Data Entity

##### D.3.4.1.4.1. Close

A close formation is used at night, on poorly marked routes, or in congested areas. Its advantages are that full traffic capacity can be used, control is better, and fewer guides, escorts, and route markers are needed. Its disadvantages are that quick dispersion is difficult, the column is easily detected, congestion may occur at the point of arrival, it requires careful scheduling and rigid control to avoid blocking at intersections, and causes driver fatigue.

Source: FM 55-30

#### **D.3.4.1.4.2. Open**

An open formation is used during normal daylight conditions. Its advantages are a lesser chance of enemy observation or attack, cargo moves faster, driver fatigue is reduced, fewer accidents occur, and its flexibility. Its disadvantages are that command and control are difficult and proper vehicle spacing is hard to maintain.

Source: FM 55-30

#### **D.3.4.1.4.3. Infiltration**

An infiltration formation is used during daylight hours in congested areas or where heavy traffic crosses the intended route. Its advantages are that it provides maximum security and deception, high speeds are possible, other traffic has little effect on individual trucks, and it does not hinder cross traffic. Its disadvantages are that more time is required to complete the move, column control is impossible, drivers can get lost and require specific details, halts are hard to arrange, and orders are not easily changed.

Source: FM 55-30

#### **D.3.4.1.5. Elements**

An element is a group of vehicles, each of which performs a particular job within the group. The first three of the element types are part of every column and its internal serials and march units. The last element type is optional.

The four different functional units are listed below.

Head: first vehicle in the order of march.

Main Body: bulk of the vehicles in the column.

Trail: last element where wreckers and other support vehicles are located.

Detached Party: not part of column, guard units.

Source: FM 55-30

##### **D.3.4.1.5.1. Head**

The head is the first task vehicle of the column in the order of march. The pace setter rides in this vehicle and sets the pace necessary to meet the schedule. The convoy commander also rides in a vehicle at the head, but he is free to move up and down the column to make adjustments as needed.

Source: FM 55-30

##### **D.3.4.1.5.2. Main Body**

The main body of the column follows immediately after the pacesetter. It consists primarily of vehicles carrying troops, equipment, and/or supplies. The main body of a column may be sub-

divided into serial and march units as needed. Each serial or march unit may also be organized into a head, body, and trail. Each head should have its own pacesetter.

Source: FM 55-30

Alternate Name: main\_body

#### **D.3.4.1.5.3. Trail**

The trail is the last element of a column or lower grouping. Wrecker, maintenance vehicles, and medical support vehicles/teams are located here. The trail element also assists in maintaining march discipline and final clearance at checkpoints.

Source: FM 55-30

#### **D.3.4.1.5.4. Detached Party**

Detached parties (advance and follow-up) are not part of the main column. They are detailed to perform special duties such as quartering and reconnaissance. In some tactical situations, advance, flank, or rear guards may be required. Guides, escorts, and patrols may also be needed for heavily traveled routes and at busy intersections.

Source: FM 55-30

Alternate Name: detached\_party

### **D.4. Distribution Plans**

See Figure D-10 and the following sections for more information.

Alternate Name: dist\_plan

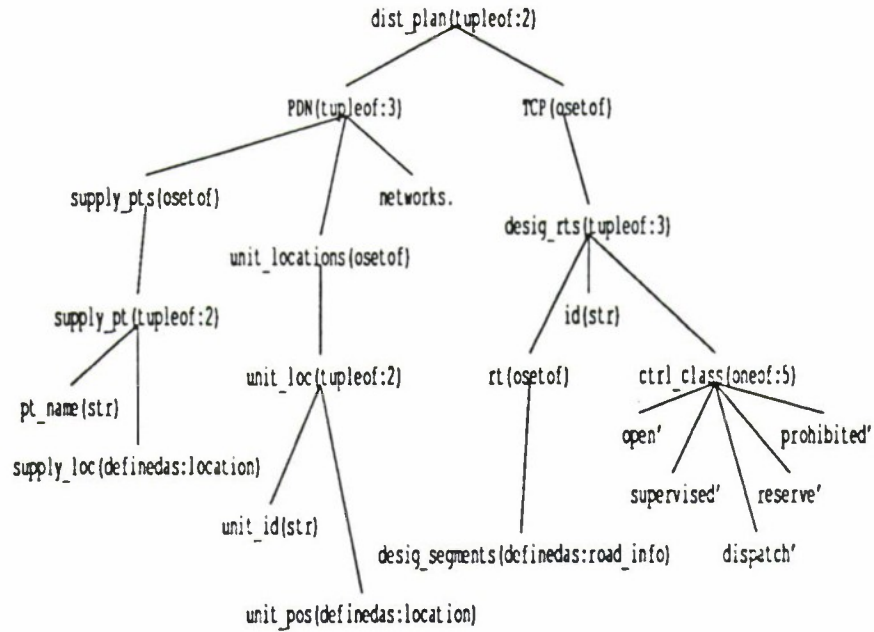
#### **D.4.1. Physical Distribution Network**

The Physical Distribution Network (PDN) is the collection of information used to make decisions about movement and supply transportation requirements. It consists of three important kinds of information:

1. The current or potential locations for supplies and transportation support points.
2. The current or planned locations of all combat and support units to be serviced via the network.
3. The links for all modes of transportation connecting points for 1 and 2 above.

Source: FM 55-10

Alternate Name: PDN



**Figure D-10 Decomposition of the Distribution Plans Entity**

#### D.4.2. Traffic Circulation Plan

The traffic circulation plan (TCP) is a specific overlay (or addition) to a map for an area of operations. It designates the MSRs and other controlled routes (by classification) for the area, indicates the potential traffic flow on those routes, and indicates where traffic control points are to be expected.

The development of a traffic circulation plan occurs after the Physical Distribution Network (PDN) has been derived by the G3 and G4 planners. The PDN shows all of the transportation flows needed to sustain the supply points designated for the current and planned locations of friendly forces.

After the TCP is completed, the Highway Regulation Plan is formed. It listed the specific classifications for the designated routes on the TCP overlays and other useful information.

Source: FM 101-5 p. G-140, and FM 55-10, Chapter 6

Relationships: refined from \*note Physical Distribution Network::

Alternate Name: TCP

##### D.4.2.1. Routes

A route is a planned path between the designated starting location (or current position) and the desired end location.

Relationships: has 1 \*note Control Class:: designation for its usage by vehicles

has 1 \*note Schedules:: for a moving unit's column(s) usage  
has 1 \*note Column::on designated portions of it at any time  
has N \*note Segments:: roadway between two points of interest  
part of a \*note Traffic Circulation Plan::

Alternate Name: rt

#### **D.4.2.1.1. Segments**

A segment is a significant portion of a route. It is denoted by two points. A segment may be designated for various reasons, such as the path between two important points, dominant feature on or about the roadway involved, etc. Important entities (and relationships) about Segments are listed below.

Checkpoint: a segment has two (the end points) .

Length: a segment has a length (distance in miles or kilometers).

Relationships: part of \*note Route::

consists of \*note Road Information::

#### **D.4.2.2. Control Class**

There are five distinct classifications for routes in an area of operations.

**Open:** a minimum of control is exercised. No movement credit (such as STANAG 2154) is required. Supervision is normally limited to military police traffic control at critical intersections.

**Supervised:** requires limited control by the highway traffic headquarters. The military police provide traffic control posts and patrols. Any column of 10 (depending on theater) or more vehicles or any vehicle of large size or weight will require a movement credit. Access to the route may be regulated.

**Dispatch:** full control is exercised. Priorities are set for use of this type route. A movement credit is required for movement of any vehicle or group of vehicles. Both organizational and area control are required.

**Reserve:** route set aside for the sole use of a certain unit, specified operation, or type of traffic. If a route is reserved for a certain unit, then the commander decides how much and what kind of control is required.

**Prohibited:** no traffic is allowed.

Source: FM 55-30, Pages 5-3 and 5-4.

Alternate Name: ctrl\_class

## D.5. Schedules

A schedule is a set of times, where each time is supposed to indicate the occurrence of something noteworthy (an event). For movement, the key events are the entry and exit of columns into or past critical points.

Relationships:

has 1 \*note Routes:: one Schedule determines the use of one Route

has 1 \*note Column:: by one Column during the Schedules time frame

has N \*note Events::

### D.5.1. Events

An event is a connection between the occurrence of something and the time when it occurs (or should occur).

#### D.5.1.1. Event Times

An event time is the single moment in measured time, distinct from any other. The important event times for movement are Due times (when the lead vehicle of a column crosses a critical point) and Clear time (when the last vehicle of a column crosses that same critical point).

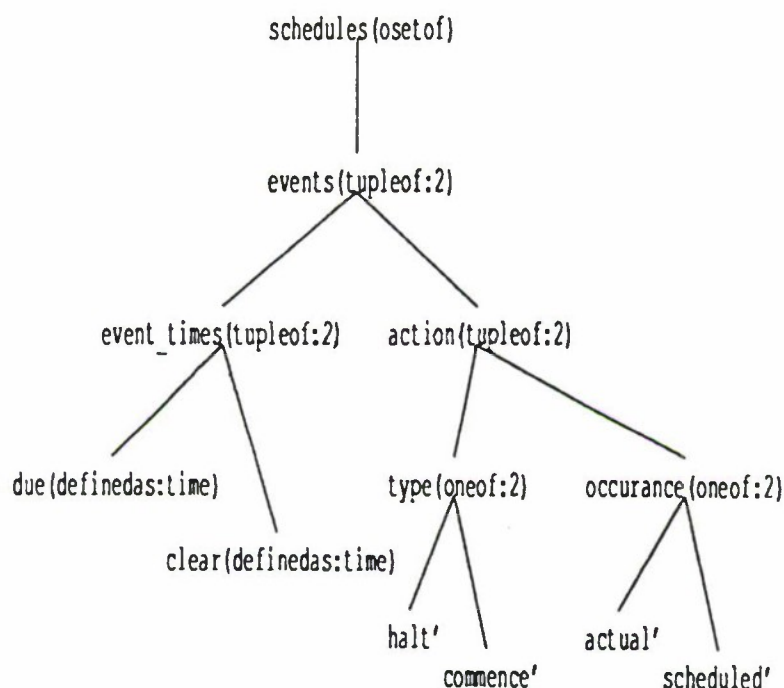


Figure D-11 Decomposition of the Schedules Entity

How time is expressed is also important. Time can be expressed in two ways. For planning purpose, time is usually measured in *relative* terms, relative to some point in time yet to be

given a specific value. Example are D-Day and H-hour values seen in OPLANs. Times can also be expressed in *absolute* terms where the values is given in clock time form.

Relationships: has 1 \*note Checkpoints:: (or Critical Point) associated with it

Alternate Name: event\_times

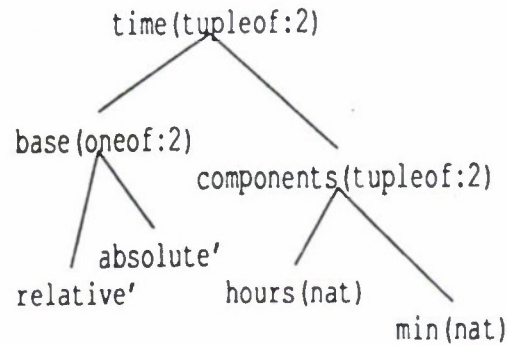


Figure D-12 Decomposition of the Time Entity

#### D.5.1.2. Action

A action is something that takes place, a change from a previous condition. The two *types* of action important to movement are Halt (the cessation of movement) or Commence (begin movement).

The *occurrence* of an action can be subdivided into two categories, Scheduled (but not yet occurred or past due) and Actual (something occurred, whether Scheduled or not). Any action that occurs not on schedule is a potential for reaction.

### D.6. Intelligence

Intelligence data for movement control covers a broad range of information, is collected from a wide range of sources, and different information is needed at various levels of command in planning movement at the strategic, operational, or tactical level.

See the feature \*note Level of Command::

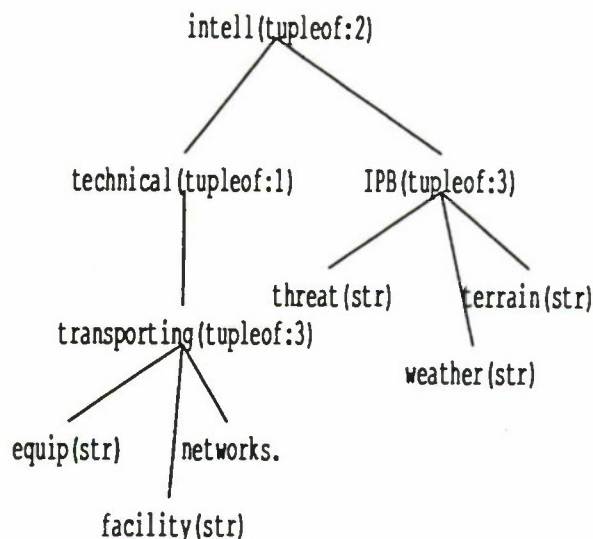
Definition: see \*note Intelligence::

Alternate Name: intell

#### D.6.1. Technical Intelligence

Technical Intelligence is the raw information about the capabilities of various groups of entities important to military planning. These include data about enemy weapons and vehicles, and an area's capacity to transport various loads and sustain combat. This last category is particularly important to movement planning.

Alternate Name: technical



**Figure D-13 Decomposition of the Intelligence Entity**

#### **D.6.1.1. Transportation Intelligence**

Transportation intelligence concentrates on information about the capabilities of an area of operations to support movement of friendly forces. This information falls into three major categories: Equipment, Facilities, and Networks. The information about networks is the most crucial to movement control, in particular, the data on roads, their bridges, tunnels, condition, etc.

Alternate Name: transporting

##### **D.6.1.1.1. Road Information**

Data about roads is stored in as much detail as possible, usually at the segment level. There are five pieces of information that are needed to compute the movement capability of a vehicle or group of vehicles.

**Load Class:** what kind of weight can the road or bridges on it bear.

**Minimum Width:** how wide can a vehicle be to fit on the roadway or how many lanes are available.

**Minimum Height:** what is the minimum clearance height of any bridges or tunnels on the roadway.

**Weather Restrictions:** rated by the letters X, Y, or Z.

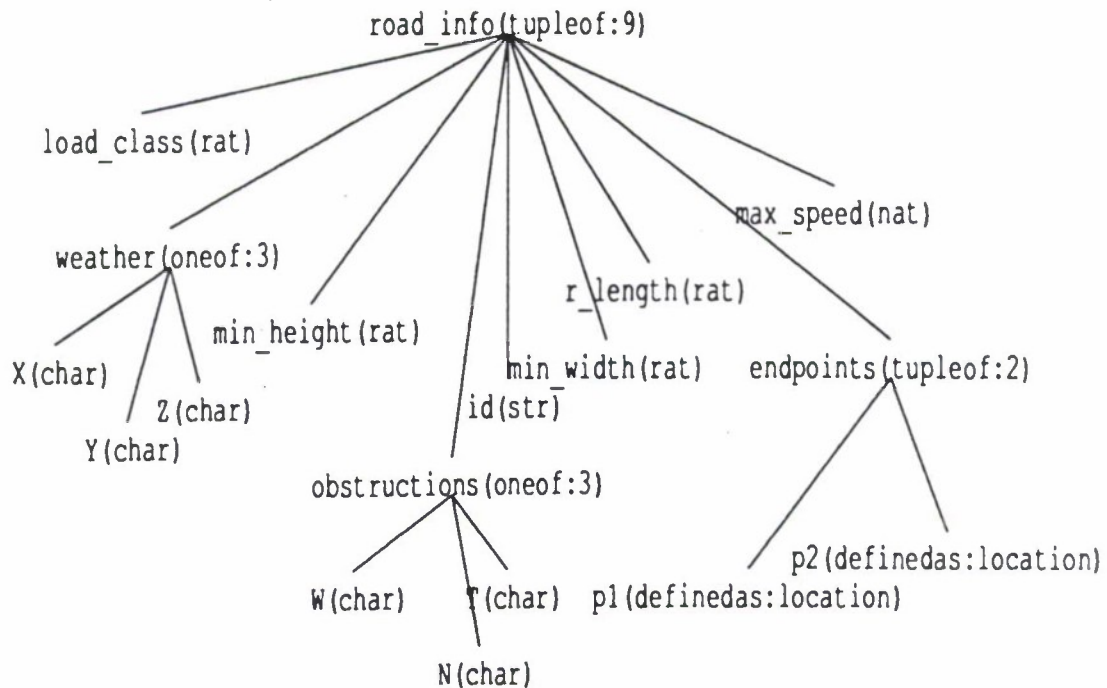
**X:** road is easily trafficable in all weather conditions.

**Y:** road is not good going but usable in inclement weather, lower speeds.

**Z:** road becomes impassable in heavy rain and/or snow.

**Obstructions:** are there any tight radius turns, severe grades, or current existing snow blockage (T) or flooding (W) on the route.





**Figure D-14 Decomposition of the Road Information Entity**

In addition, there are three additional pieces of information useful in routing and scheduling operations: End Points (described in the Checkpoints paragraph below), Length, and Speed.

Alternate Name: road\_info

#### **D.6.1.1.1.1. Checkpoints**

Checkpoints are where turns may need to occur or for other reasons, but they are primarily used to aid in the timing of vehicle passing time so that a schedule can be determined.

Special points that are Checkpoints include:

- Start Point                    the first checkpoint of a preplanned route.
- Release Point                the last checkpoint of a preplanned route.
- Critical Point                other specially designated points on a route.
- Harbor Area                  for halts and other functions.
- Refueling Point              for refueling vehicles during an extended movement.

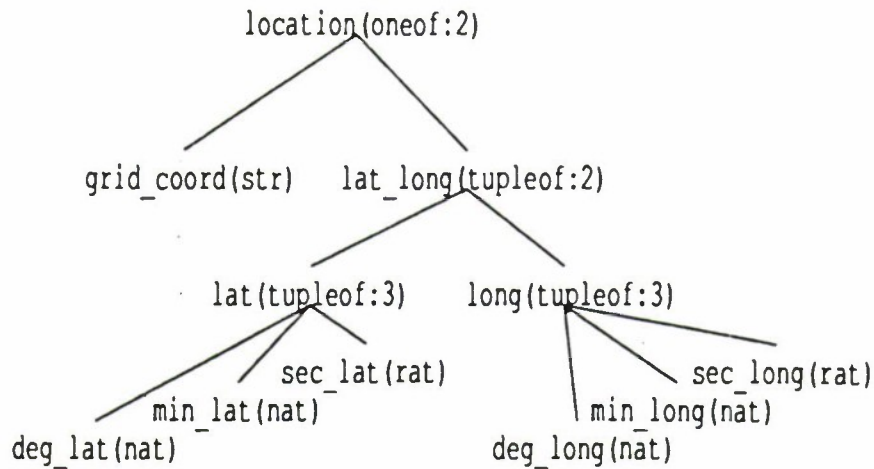
Relationships has 1 \*note Location::

has 2 \*note Events:: (one Due Time and one Clear Time)

#### **D.6.1.1.1.1.1. Location**

A location can be a set of coordinates on a map or an absolute position on the earth using latitude and longitude measurements.

Relationships: part of a \*note Check Point::



**Figure D-15 Decomposition of the Location Entity**

## D.6.2. IPB

Intelligence Preparation of the Battlefield (IPB) is done before battle to assess the operational and tactical situation and to allow the commander to understand the area of operations so that he can most effectively achieve the given mission. Various resulting templates are:

Doctrinal: how enemy will deploy without constraints.

Situation: how enemy will deploy within terrain and weather constraints.

Event: locations where critical events and activities will occur and where critical (high value) targets (HVT) will appear.

Decision Support: decision point and areas of interest keyed to Events.

Definition: see \*note IPB::

Source: FM 34-3

### D.6.2.1. Terrain Analysis

G2 has support from attached Engineer Terrain Teams or detachments from the theater Engineer Topographical Battalion. The Defense Mapping Agency is the chief source of terrain information which is available on two scales:

Planning terrain analysis: scale 1:250,000 (inches) [1 inch ~ 4 miles]

Tactical terrain analysis: scale 1:50,000 [1 inch ~ 3/4 mile]

DMA overlays available:

- Vegetation
- Surface materials (soils)
- Surface Drainage
- Surface configuration (topology)
- Obstacles
- Transportation
- Cross-country movement (wet and dry)
- Concealment (seasonal)
- Groundwater (planning DB only)

FM 5-33 provides process to be used if support is not provided.

The focus of Terrain Analysis for IPB is on OCAKA:

- Observation and fields of fire or Line of Sight.
- Concealment (not observable) and cover (protection from fire).
- Obstacles: features that stop, impede, or divert movement.
- Key terrain: seizure or control provides a marked tactical advantage.
- Avenues of approach and mobility corridors: routes that provide above.

Other items of interest include Drop or Landing Zones, Communication and EW Sites, and Main Supply Routes (MSRs).

Important entities derived from terrain analysis are listed below.

Obstacles: problem areas.

Mobility Corridors: the best paths for cross-country movement.

Combined Overlays: Synopsis of information at a higher level derived from several DMA overlays. For example, a terrain/weather overlay showing how weather conditions will affect various kinds of terrain.

Alternate Name: terrain

#### **D.6.2.2. Weather Analysis**

Weather has significant impact on terrain and ability to perform movement. The process begins with climate analysis in the area of operations, which provides climate information in an overall context. The important aspects of weather forecast data are:

Cloud coverage or fog: affects visibility, good for offensive, bad for defense, affects use of air assets.

Wind: windchill, blowing debris, NBC weapons usage.

Temperature: personnel, equipment problems.

Precipitation: state-of-the-ground, mobility.

Alternate Name: weather

#### **D.6.2.3. Threat Evaluation**

This is the understanding of enemy force characteristics such as composition and organization, tactical doctrine, weapons and equipment, and their support systems. The process results in Doctrinal and Situational (via Terrain and Weather data) templates. Important information from the effort includes:

Enemy Positions: where to avoid undefended movement.

Enemy Intentions: including data on their movement patterns and their usage on nuclear, biological, or chemical (NBC) weapons.

Alternate Name: threat

## Appendix E. Features Descriptions

Note: All names used in the figures to follow are either proper names used in the paragraph identifier or the Alternate Names which can be found at the end of the entity descriptions, if applicable.

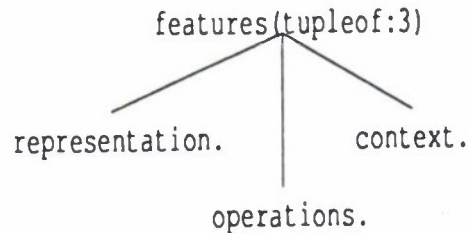


Figure E-1 Top-Level Features for Movement Control

### E.1. Operations

The major classes of operations for conducting movement are derived by analogy from the standard Army command and control process described in FM 101-5.

Type: mandatory

Source: FM 101-5

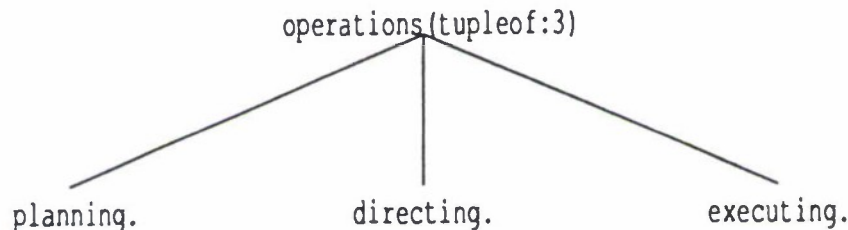


Figure E-2 Decomposition of the Operations Feature

#### E.1.1. Planning

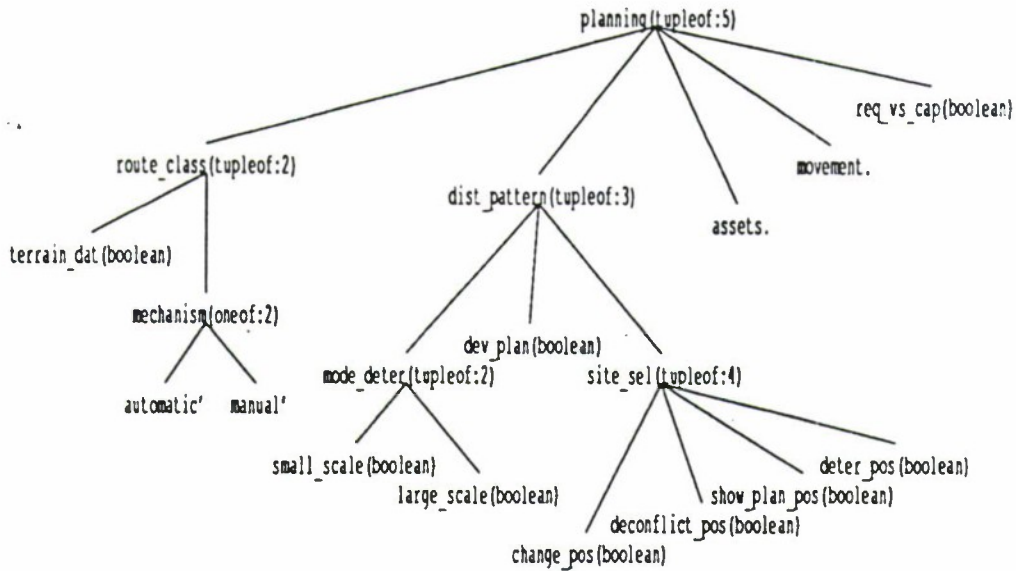
The commander receives a mission from headquarters or input from other groups and, with assistance from his staff, proceeds to derive a course of action that will accomplish the given mission.

Type: mandatory

Source: FM 101-5

##### E.1.1.1. Route Classification

Route classification is performed to assist in planning and executing military movement. The classification is given using a formula that briefly describes a specific route and is used on the route reconnaissance overlay or traffic circulation plan. The formula is made up of a series of numbers and letters that express, in a standardized sequence:



**Figure E-3 Decomposition of the Planning Feature**

- The route width
- Route type
- Lowest military load classification
- Overhead clearance
- Obstructions to traffic flow
- Special conditions on the route

Type: optional

Source: FM 5-36

Alternate Name: route\_class

#### **E.1.1.1.1. Enter Terrain Data**

This feature allows the user to enter or modify terrain information. The entered or modified terrain information may cause a need for a route or routes to be reclassified; in particular, a new obstruction may make a route unusable to some vehicles previously allowed on the route.

Type: optional

Source: AFATDS CEP B5 spec.

Alternate Name: terrain\_dat

#### **E.1.1.1.2. Mechanism**

This feature describes two ways for the route classification information to be entered or derived from existing online data.

Type: mandatory

Source: Movement Control Workshop

#### **E.1.1.1.2.1. Automatic**

This feature would allow the system to algorithmically determine or update the classification of any existing or proposed routes by analyzing all of the information about features or obstructions on the route and the surrounding terrain. This feature is not currently performed by any operational movement control software.

Type: alternative

Source: Movement Control Workshop

#### **E.1.1.1.2.2. Manual**

This feature allows the user to enter route classification data into the system for use in route selection.

Type: alternative

Source: Movement Control Workshop

#### **E.1.1.2. Distribution Pattern**

This feature addresses the analysis of various kinds of information to order to determine:

- What sizes of movement (especially supplies) will be occurring in the area of operations.
- What roads and other movement networks and facilities exist and what are their capacities.
- In what areas units or supplies should be located for best advantage.
- What mode of transportation should be utilized to implement a required movement.

The traffic circulation and control plans and the designation of Main Supply Routes are two results of this analysis.

Type: mandatory

Source: Movement Control Workshop

Alternate Name: dist\_pattern

#### **E.1.1.2.1. Mode Determination**

Type: mandatory

Source: Movement Control Workshop

Alternate Name: mode\_deter

#### **E.1.1.2.1.1. Large Scale**

Large-scale mode determination is performed as part of completing a movement program. It is the process of determining how to ship the various classes of supplies to the designated receiving and distribution sites effectively and economically.

Type: optional

Source: Movement Control Workshop

Alternate Name: large\_scale

#### **E.1.1.2.1.2. Small Scale**

Small-scale mode determination is performed as part of developing or fulfilling a single movement request. It is the process of determining what mode options are available and/or appropriate for a planned movement of material or of a unit.

Type: mandatory

Source: Movement Control Workshop

Alternate Name: small\_scale

#### **E.1.1.2.2. Develop Plan**

This feature allows for the completion of specialized movement control related plans, such as the Traffic Circulation Plan and the Highway Regulation Plan.

Type: optional

Source: FM 55-10

Alternate Name: dev\_plan

#### **E.1.1.2.3. Site Selection**

Site selection is a class of features that allows users to create and modify one or more locations suitable for the organization for use in movement planning.

Type: optional

Source: Movement Control Workshop

Alternate Name: site\_sel

##### **E.1.1.2.3.1. Change Position**

Allows the user to alter the selected input location manually.

Type: mandatory



Source: AFATDS CEP B5 spec.

Alternate Name: change\_pos

#### **E.1.1.2.3.2. Deconflict Position**

A candidate location may not be viable due to close proximity to other friendly or potential enemy location or actions. Deconflict Position is a feature that allows for such checks to be made based upon conflict parameters that vary depending on the unit or movement type involved.

Rules: requires Scheduling

Type: optional

Source: AFATDS CEP B5 spec.

Alternate Name: deconflict\_pos

#### **E.1.1.2.3.3. Show Planned Positions**

For tactical units, in particular Fire Support and Air Defense units, a commander may have pre-planned a series of fire locations to be used at various times and circumstances. It is this collection of locations that the user is to view.

Type: optional

Source: AFATDS CEP B5 spec.

Alternate Name: show\_plan\_pos

#### **E.1.1.2.3.4. Determine Position**

The Determine Position feature assists the user in determining the new location for a unit or supply handling point.

Type: mandatory

Source: AFATDS CEP B5 spec.

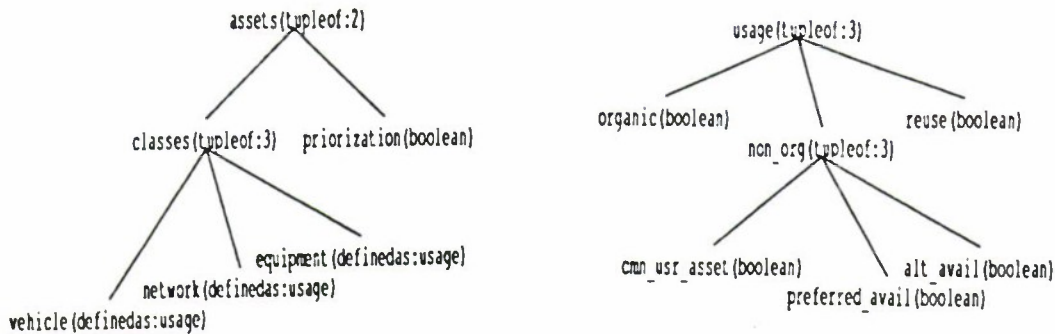
Alternate Name: deter\_pos

#### **E.1.1.3. Assets**

Assets are entities that have value which must be ascertained and managed. Assets have a set of utilization characteristics or attributes that are applicable to each of the three types of assets (vehicles, networks, and equipment). Each kind of asset may have different utilization characteristics. For example, a unit may "own" the vehicles it is using to perform a move but must request to use the road space from the command that "owns" (i.e., controls) the desired portion of the road network.

Type: mandatory

Source:



**Figure E-4 Decomposition of the Assets Feature**

### **E.1.1.3.1. Classes**

This feature captures the need for groups (classes) of assets with different characteristics.

Each of the usage features listed under Vehicles is similarly applicable to the Networks and Equipment asset classes.

Type: mandatory

Source:

#### **E.1.1.3.1.1. Vehicles**

This is the determination of vehicles needed to facilitate a move or a series of moves. Usage features primarily involve issues of ownership (who owns or controls the asset's utilization).

Type: mandatory

Source:

##### **E.1.1.3.1.1.1. Organic**

This utilization feature incorporates the use of entities that are permanently allocated to the unit (in the case of vehicles or equipment) or under the direct control of the moving unit.

Type: mandatory

Source: AFATDS CEP B5 spec.

##### **E.1.1.3.1.1.2. Non-Organic**

This feature incorporates the use of entities that are *not* allocated to the unit, but are provided by a transportation/movement control unit to augment the unit's supply or authorize usage of a route.

Type: optional

Source:

Alternate Name: non\_org

#### **E.1.1.3.1.1.2.1. Common User Asset**

Common User Assets are transportation vehicles, routes, and equipment set aside by a corps or division that are available to any of its subordinate units to assist in their movements. They are allocated on an as-needed basis to those units requesting movement assistance but are not attached to the moving unit.

Type: optional

Source:

Alternate Name: cmn\_usr\_asset

#### **E.1.1.3.1.1.2.2. Preferred Availability**

The availability of the most appropriate vehicles, routes, and equipment to perform the move. The preference may be due to size, i.e., a few large vehicles make the moving group smaller but may be restricted to certain routes, speed, or other considerations.

Type: mandatory

Source:

Alternate Name: preferred\_avail

#### **E.1.1.3.1.1.2.3. Alternative Availability**

The availability of vehicles, routes, and equipment that are sufficient to perform the move, but are not the assets most desirable for use. This availability needs to be considered when the preferred assets are not available.

Type: optional

Source:

Alternate Name: alt\_avail

#### **E.1.1.3.1.1.3. Reuse**

Depending upon the time frame of the movement and other factors, reuse involves transport vehicles making multiple trips to facilitate a move rather than using many vehicles making only one trip each.

Type: optional

Source:

#### E.1.1.3.1.2. Networks

This is the determination of the available transportation infrastructure assets, i.e., roads, water routes, air lanes, and rail lines that may be used to facilitate a move.

See all of the usage features previously given under Vehicles for the various potential choices.

Type: mandatory

Source:

#### E.1.1.3.1.3. Equipment

This is the determination of equipment (other than vehicles) needed to facilitate a move. These assets consist mainly of material handling equipment (MHE) needed to load and unload transport vehicles and do not affect movement unless such equipment is needed.

See all of the usage features previously given under Vehicles for the various potential choices.

Type: optional

Source:

#### E.1.1.3.2. Priorization

This is the notion of assigning a value to the importance (priority) of one movement to others. This priority value is used to resolve contention for resources (assets), including all of those named previously.

Type: optional

Source:

#### E.1.1.4. Movement

This feature addresses the “how” and “which way(s)” a unit or task force is to be moved. This is where the determination of resources occurs, the resources being the vehicles and equipment needed and the usages of designated routes or paths.

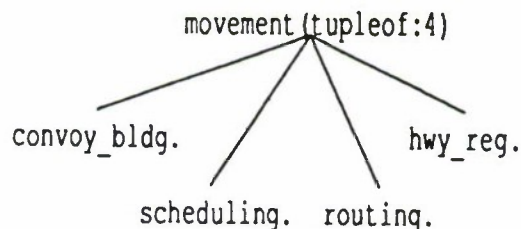


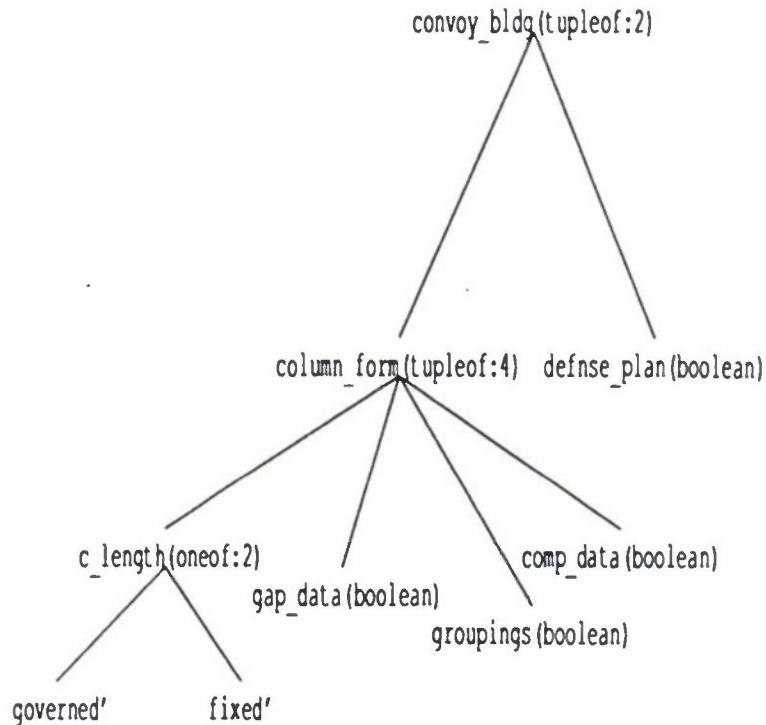
Figure E-5 Decomposition of the Movement Feature

#### E.1.1.4.1. Convoy Building

Type: mandatory

Source:

Alternate Name: convoy\_bldg



**Figure E-6 Decomposition of the Convoy Building Feature**

#### **E.1.1.4.1.1. Column Formation**

This is the process of selecting the vehicles and organizing them into various groups depending on the number and types of vehicles, the route selected, and other considerations.

Alternate Name: column\_form

##### **E.1.1.4.1.1.1. Column Length**

The Column Length feature controls the distance between vehicles and groups of vehicles in a convoy.

Type: mandatory

Source: FM 55-30, Chapter 5

Alternate Name: c\_length

##### **E.1.1.4.1.1.1.1. Fixed**

A fixed column uses a prescribed distance between vehicles that is maintained at all rates of speed. This allows the length of the convoy to remain fixed. A fixed column is used in parade formations, for short trips, or when closing the highway to other traffic.

Type: alternative

Source: FM 55-30, Chapter 5

#### **E.1.1.4.1.1.2. Governed**

A governed column uses its speed to regulate the distance between vehicles. A speedometer multiplier (a factor of 1, 2, 3, or higher) is used to multiply the speedometer reading to arrive at the distance in meters or yard between vehicles. A governed column is used in almost all motor moves on open highways or over poor routes. In areas where road conditions are unreliable, a minimum distance should be set to prevent bunching of vehicles at low speeds.

Type: alternative

Source: FM 55-30, Chapter 5

#### **E.1.1.4.1.1.2. Enter Gap Data**

This feature allow the user to enter distance data between each vehicle in a group and between group of vehicles.

Type: optional

Source: FM 55-30, Chapter 5

Alternate Name: gap\_data

#### **E.1.1.4.1.1.3. Enter Groupings**

This feature allow the user to group the vehicles in his convoy in columns, serials, and march units as needed.

Type: optional

Source: FM 55-30, Chapter 5

Alternate Name: groupings

#### **E.1.1.4.1.1.4. Enter Composition Data**

This feature allows the user to enter the vehicle type and other characteristics (height, width, and weight) that are particularly important for each vehicle in the convoy.

Type: optional

Source: FM 55-30, Chapter 5

Alternate Name: comp\_data

#### **E.1.1.4.1.2. Defense Planning**

Defense planning is considering the effect that the enemy may have upon a proposed movement. This includes selecting a route that the enemy cannot easily intervene upon, organizing the convoy to place guard forces at appropriate locations, requesting and coordinating fire support, and other considerations.

Type: optional

Source: FM 55-30, Chapter 6

Alternate Name: defense\_plan

#### E.1.1.4.2. Scheduling

This feature addresses the “when” of moving a unit or task force. Scheduling of a movement can be critical because the timing of other movements and the arrival time may be important factors in gaining surprise in an attack or ensuring that momentum is maintained.

Type: mandatory

Rules: requires Routing

requires Convoy Building

Source:

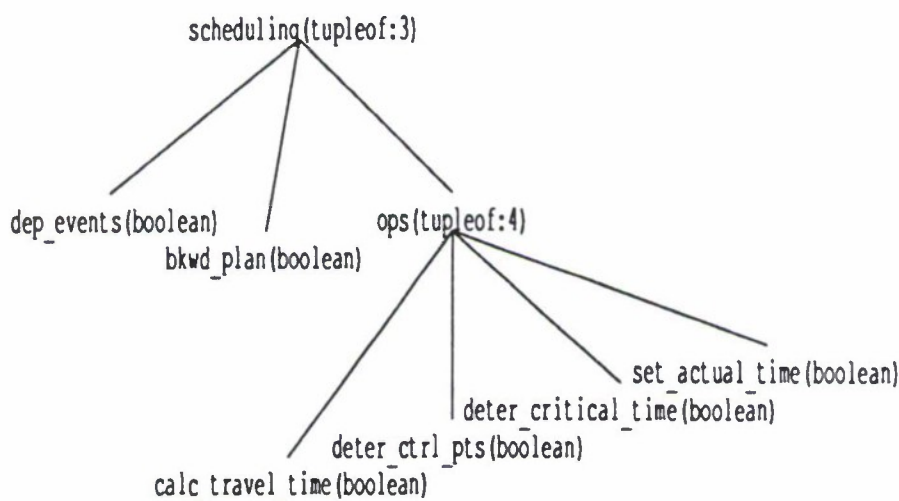


Figure E-7 Decomposition of the Scheduling Feature

##### E.1.1.4.2.1. Dependent Events

The ability of a scheduling or deconflicting system to adequately determine that an event has some connection to other events and that a change to such an event in a schedule requires changes to any dependent events.

Type: mandatory

Source:

Alternate Name: dep\_events

##### E.1.1.4.2.2. Backward Planning

In some situations, the arrival time at the destination is the critical factor in a movement. Backward planning allows the sequence of events to be specified in reverse order so that the last value determined is the start time that will ensure the moving unit(s) arrive at the proper time.

Type: mandatory

Source:

Alternate Name: bkwd\_plan

#### **E.1.1.4.2.3. Scheduling Ops**

Scheduling options available to the user of the system.

Type: mandatory

Source: AFATDS CEP B5 spec.

Alternate Name: ops

##### **E.1.1.4.2.3.1. Calculate Travel Time**

After a convoy has been built, a route selected, a critical time selected, and control points noted, the remainder of the movement schedule can be calculated.

Type: mandatory

Source: AFATDS CEP B5 spec.

Alternate Name: calc\_travel\_time

##### **E.1.1.4.2.3.2. Determine Control Points**

After a route has been determined, the user is allowed to enter data on the durations of rest and refuel stops at appropriate points and to designate his usage of critical points, control (reporting) points, or other indicated points on a traffic control plan.

Type: mandatory

Source: AFATDS CEP B5 spec.

Alternate Name: deter\_ctrl\_pts

##### **E.1.1.4.2.3.3. Determine Critical Time**

This operation allows the user to set either the time of leaving the old location or the time to arrive at the new location as the critical time for scheduling the remainder of a move.

Type: mandatory

Source: AFATDS CEP B5 spec.

Alternate Name: deter\_critical\_time

##### **E.1.1.4.2.3.4. Set Actual Time**

Often a plan or order is issued without stating the true times for movements to occur; the times are given in terms relative to some initial event time. When a message or order is received that



sets the time of start, the 'H-hour', this operation allow the user to enter this time and calculate the true time that other planned movements are to occur.

Type: mandatory

Source: AFATDS CEP B5 spec.

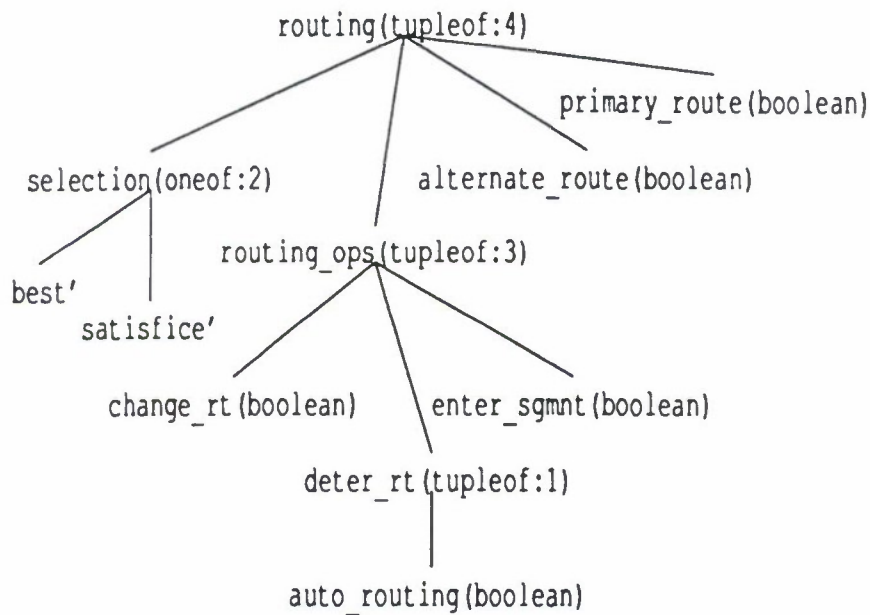
Alternate Name: set\_actual\_time

#### E.1.1.4.3. Routing

Routing is the determination of the path between a unit's current position or other designated start point and its ultimate destination or release point.

Type: mandatory

Source:



**Figure E-8 Decomposition of the Routing Feature**

##### E.1.1.4.3.1. Selection

The amount of work to select an optimal route may be too time-consuming (computationally intensive). This feature allows route selection to be less than optimal if desired.

###### E.1.1.4.3.1.1. Best

The best option will find the optimal route for a given starting and ending location. The time to find the best route may be long because many different paths may need to be checked.

Type: alternative

Source:

#### **E.1.1.4.3.1.2. Satisfice**

This feature allows the selection process to stop after one route is found that meets the given requirements for load class of vehicles, width, etc. Note: this requires a kind of deconfliction separate from the time space deconfliction performed by a coordinating command.

Type: alternative

Source: AFATDS CEP B5 software

#### **E.1.1.4.3.2. Routing Ops**

Source: AFATDS CEP B5 spec.

Alternate Name: routing\_ops

##### **E.1.1.4.3.2.1. Change Route**

This feature allow the user to modify a route already created.

Type: mandatory

Source: AFATDS CEP B5 spec.

Alternate Name: change\_rt

##### **E.1.1.4.3.2.2. Determine Route**

Determine Route allows the user to select a path between two points using predefined route segments.

Type: mandatory

Source: AFATDS CEP B5 spec.

Alternate Name: deter\_rt

##### **E.1.1.4.3.2.2.1. Auto-Routing**

This feature allows the user to let the system select the route based upon a starting and ending location, sufficient information about possible segments that can be used, and the characteristics of the vehicles to be used.

Type: optional

Source: DAMMS-R preliminary requirements

##### **E.1.1.4.3.2.3. Enter Segment**

Enter Segment allows the user to add or delete a segment to or from a list of defined route segments.

Type: mandatory

Source: AFATDS CEP B5 spec.

Alternate Name: enter\_sgmnt

#### E.1.1.4.3.3. Alternate Route

One or more paths that are acceptable for movement but are not as desirable as the primary route. One of them is selected and allocated for use if the primary route is unavailable for some reason.

Type: optional

Source:

Alternate Name: alternate\_route

#### E.1.1.4.3.4. Primary Route

This is the preferred path from a starting point to a destination. It may be preferred due to its length (shortest), available cover, or other considerations.

Type: mandatory

Source:

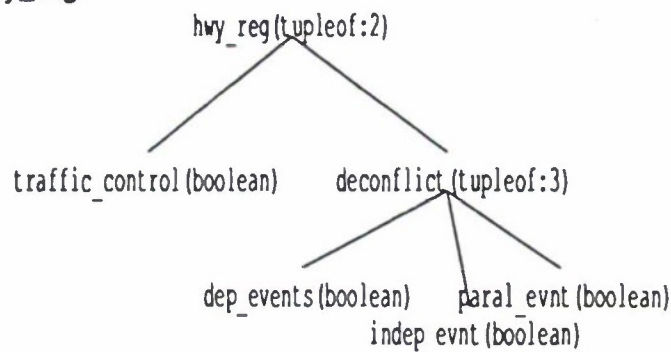
Alternate Name: primary\_route

#### E.1.1.4.4. Highway Regulation

Highway regulation is the centralization of certain functions to one echelon of command so that subordinate commands request and receive approvals for operations that the superior command will be responsible for in terms of command and control.

Type: optional

Alternate Name: hwy\_reg



**Figure E-9 Decomposition of the Highway Regulation Feature**

#### **E.1.1.4.4.1. Highway Traffic Regulation**

The coordination and the actual use of the road network by vehicles, personnel, and animals needed to meet military requirements. It consists of planning, routing, scheduling, and diverting movements on the available road networks in accordance with priorities.

Type: optional

Rules: requires Develop Plan  
requires Prioritization

Source: FM 55-10

Alternate Name: traffic\_control

#### **E.1.1.4.4.2. Deconfliction**

The proposed schedule for a moving unit must be compared against the schedules of all other units that may be using the same route (or any part thereof) or that may otherwise interfere with already planned movements. This is the time space deconfliction that must be performed by a designated unit within a specified chain of command.

Type: mandatory

Rules: requires Scheduling  
Source: AFATDS CEP B5 spec.

Alternate Name: deconflict

##### **E.1.1.4.4.2.1. Dependent Events**

See paragraph E.1.1.4.2.1.

##### **E.1.1.4.4.2.2. Independent Events**

The ability of a scheduling system to adequately determine that an event has no connection with some other events and thus, a change to that event in a schedule does not affect any independent events.

Type: mandatory

Source:

Alternate Name: indep\_evnt

##### **E.1.1.4.4.2.3. Parallel Events**

The ability to schedule and deconflict multiple events that occur at the same point or period in time. These events may be independent (only coincidence is the time relationship) or dependent (these events need to occur together).

Type: mandatory

Source:

Alternate Name: paral\_evnt

### E.1.1.5. Balance Requirements vs. Capabilities

This input occurs when the commander is attempting to determine an appropriate course of action based upon the mission as he perceives it, and he needs to know if his transportation assets can support the movement of troops and their sustainment. It occurs at the beginning of mission planning and whenever circumstances change enough that initial type planning is needed.

Type: optional

Rules: requires Mode Determination

Source: Movement Control Workshop, FM 55-10

Alternate Name: req\_vs\_cap

### E.1.2. Directing

After a course of action has been established by the commander, it is transformed into orders for his subordinate units.

Type: mandatory

Source: FM 100-15

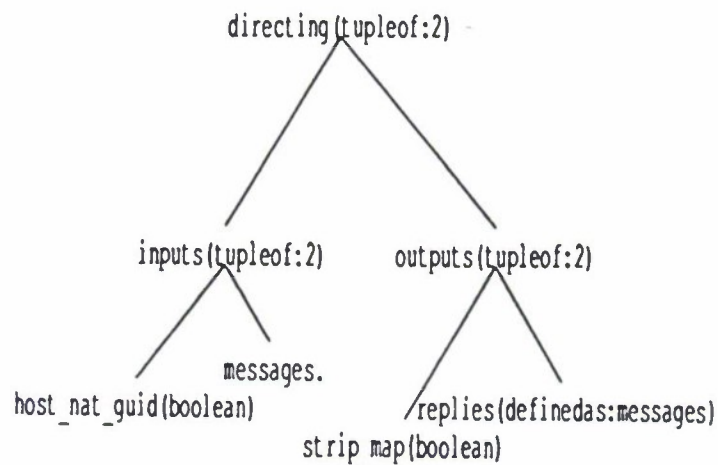


Figure E-10 Decomposition of the Directing Feature

#### E.1.2.1. Receive Inputs

The system must be able to receive inputs such as orders requiring movement and the results of requests sent to other agencies for approval.

Type: mandatory

Source:

Alternate Name: inputs

#### E.1.2.1.1. Host Nation Guidance

This input occurs when the local authorities in a region where the Army is located impose restrictions and/or rules about the use of roads in the area.

Type: optional

Source: Movement Control Workshop, FM 55-10

Alternate Name: host\_nat\_guid

#### E.1.2.1.2. Messages

This feature allows for systems to get inputs from interfaces to other systems.

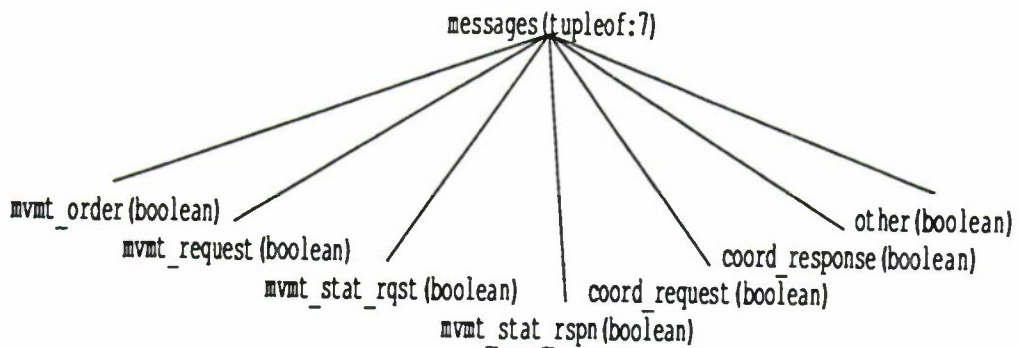


Figure E-11 Decomposition of the Messages Feature

##### E.1.2.1.2.1. Movement Order

This is the final authority for a unit to proceed with a movement. The receipt of this order presumes that all coordination with lateral and outside organizations has been performed.

Type: optional

Source: AFATDS CEP B5 spec.

Alternate Name: mvmnt\_order

##### E.1.2.1.2.2. Movement Request

This message is for a higher echelon unit. It contains the details of a proposed movement by one of its subordinates. Alternately, a superior unit can inform its subordinate of its preliminary approval of a move prior to final coordination and issuance of a movement order.

Type: optional

Rules: requires Movement Order

Source: AFATDS CEP B5 spec.

Alternate Name: mvmt\_request

#### **E.1.2.1.2.3. Mvmt. Status Request**

A command unit wants to know the current status of movement being performed by the receiving unit.

Type: optional

Rules: requires Movement Status Response

Source: AFATDS CEP B5 spec.

Alternate Name: mvmt\_stat\_rqst

#### **E.1.2.1.2.4. Mvmt. Status Response**

A subordinate unit has reported its current movement status to the appropriate superior.

Type: optional

Source: AFATDS CEP B5 spec.

Alternate Name: mvmt\_stat\_rspn

#### **E.1.2.1.2.5. Coordination Request**

In the battlefield, maneuver units need to coordinate their movements with lateral commands in other BFAs (fire support, air defense, etc.) and vice versa. This message is from a lateral BFA command requesting concurrence for a movement request.

Type: optional

Rules: requires Coordination Response

Source: AFATDS CEP B5 spec.

Alternate Name: coord\_request

#### **E.1.2.1.2.6. Coordination Response**

In the battlefield, maneuver units need to coordinate their movements with lateral commands in other BFAs (fire support, air defense, etc.) and vice versa. This message is from a lateral BFA command acknowledging a movement or providing information to alter a movement request.

Type: optional

Source: AFATDS CEP B5 spec.

Alternate Name: coord\_response

#### **E.1.2.1.2.7. Other**

This feature allows for input messages other than those indicated above.

Type: optional

Source: Movement Control Workshop

#### **E.1.2.2. Generate Outputs**

The ability to format movement information in the ways needed for inclusion into the appropriate sections and annexes (appendices) of an OPLAN or other orders dealing with movement.

Type: mandatory

Source: Movement Control Workshop

Source: AFATDS CEP B5 spec.

Alternate Name: outputs

##### **E.1.2.2.1. Produce Strip Map**

A strip map is a map of a route, showing only the roads or other segments to be used and the immediate surrounding terrain (along with checkpoints and times), which provides the minimal necessary information for a driver to proceed with the movement.

Type: optional

Source: AFATDS CEP B5 spec.

Alternate Name: strip\_map

##### **E.1.2.2.2. Replies**

This feature allows for the sending of any message needed for movement purposes.

See Messages (Para. E.1.2.1.2.) and its subparagraphs.

Source: Movement Control Workshop

#### **E.1.3. Executing**

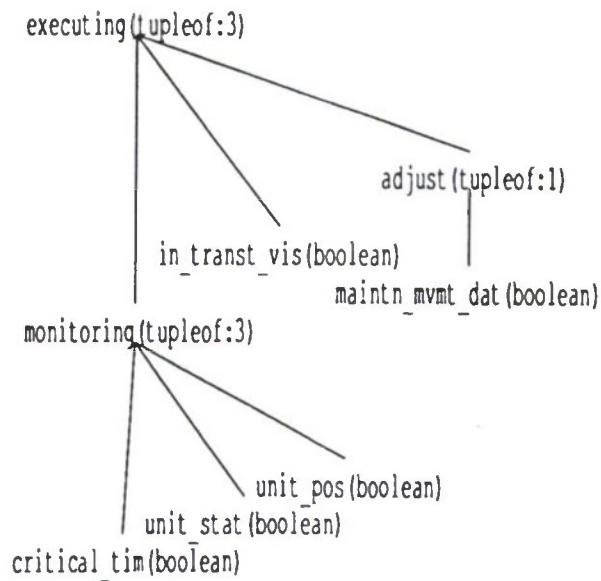
Here the current situation is monitored. Plans are changed and new orders based upon perceived need are issued.

Type: optional

Rules: require Scheduling

Source: FM 100-15





**Figure E-12 Decomposition of the Executing Feature**

### **E.1.3.1. Monitoring**

The commander and staff must monitor the reports coming in about both the situation of his own troops and that of the enemy.

Type: mandatory

Source: FM 100-15

#### **E.1.3.1.1. Check Critical Times**

This feature allow the user to check the current time against critical times in the movement file and indicate if a unit has not reported passing a critical point within a given range of the planned time.

Type: optional

Alternate Name: critical\_tim

Source: AFATDS CEP B5 spec.

#### **E.1.3.1.2. Show Unit Movement Status**

This feature allows the user to view the collected status information of all moving units.

Type: optional

Source: ATATDS CEP B5 spec.

Alternate Name: unit\_stat

#### **E.1.3.1.3. Show Moving Units Positions**

This features displays the current known location of all units under movement orders.

Type: optional

Source: AFATDS CEP B5 spec.

Alternate Name: unit\_pos

### **E.1.3.2. In-Transit Visibility**

This feature allows supply and logistics personnel to ascertain the location of shipments without knowing the transportation method or vehicle used. This is done by integrating data about the location of vehicles with the contents listings of the vehicles.

Type: optional

Source: Movement Control Workshop

Alternate Name: in\_transit\_vis

### **E.1.3.3. Adjust**

The commander modifies his plans and issue new orders to take advantage of unforeseen enemy actions or to remedy existing or potential problems unaccounted for previously. This adjustment will utilize most of the features as seen under the Planning feature of this feature set.

Type: mandatory

Source: Movement Control Workshop

#### **E.1.3.3.1. Maintain Movement Data**

The user must be able to delete old information from movement files and update movement data as updates and new information come in.

Type: mandatory

Source: AFATDS CEP B5 spec.

Alternate Name: maintn\_mvmt\_dat

## **E.2. Context**

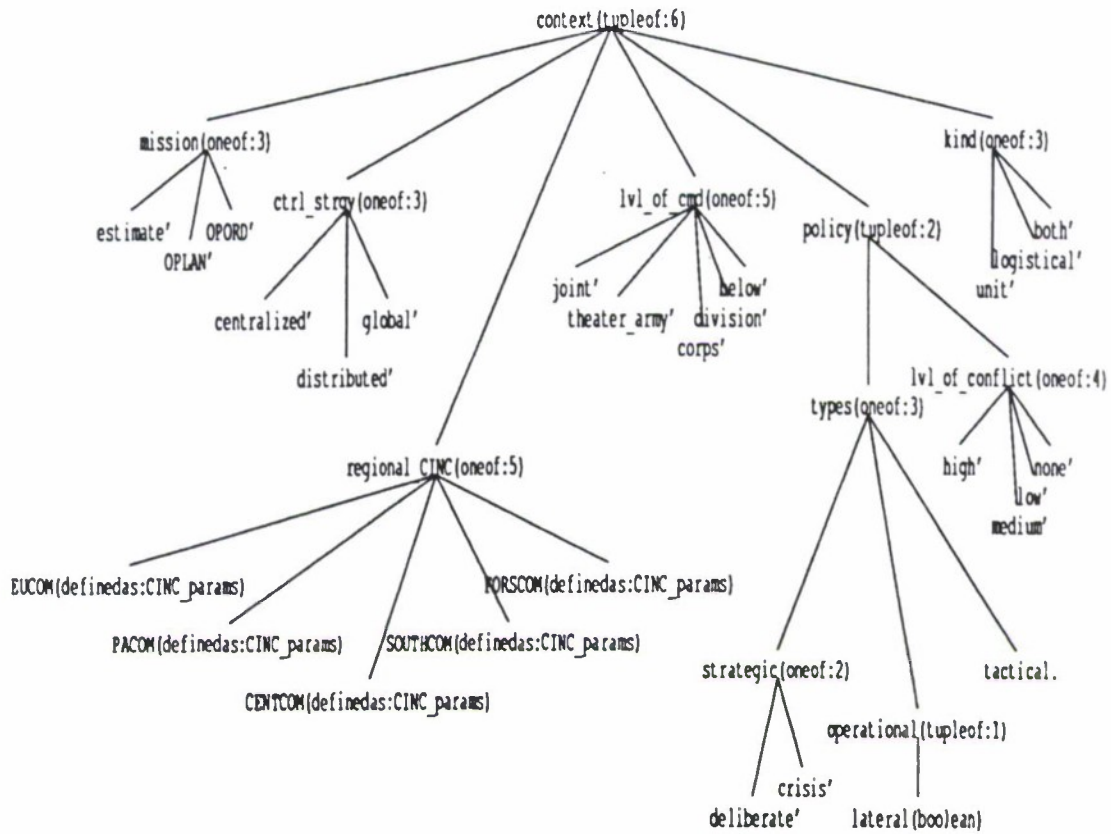
This set of features relates the objectives of movement to the steps needed to accomplish movement. These features are intended to provide 'context' to the Operations features.

### **E.2.1. Mission**

#### **E.2.1.1. Estimate**

An estimate is a guess made about the feasibility of a movement to see if a unit or force can be moved to support a mission or a course of action under consideration by the commander. It involves a quick check of the unit/force's location, status, and the overall situation without doing all of the detailed planning to know exactly how the movement will be performed. It usu-

ally results in a yes or no decision. The feasibility of a movement may be checked by the organization approving a request to move or that issues the order that necessitates a movement. Developing a movement estimate is an important part of developing a course of action.



**Figure E-13 Decomposition of the Context Features**

This alternative is not currently supported by any automated movement control system.

Type: alternative

Source: Movement Control Workshop

**E.2.1.2. Operational Plan**

This feature signifies that a more complete set of calculations be performed to determine the routes, schedules, and mode allocations to be used to implement the movement program for inclusion into OPLANS, etc.

Type: alternative

Source: Movement Control Workshop

Alternate Name: OPLAN

### **E.2.1.3. Operational Order**

This feature signifies that the complete set of calculations be performed to determine the exact route, schedule, and convoy organization to be used to implement a specific movement for inclusion into OPORDs, movement requests, etc.

Type: alternative

Source: Movement Control Workshop

Alternate Name: OPORD

### **E.2.2. Control Strategy**

This feature describes how movement control is implemented in terms of how organizations participate in the movement process and what effects their decisions can have on others.

Type: mandatory

Source:

Alternate Name: ctrl\_strgy

#### **E.2.2.1. Centralized**

In a centralized movement control system, all functionality is placed (with the exception of some limited convoy planning aids) with a single organization that is responsible for coordinating all movement with a region. No unit or logistical movement can take place without this central organization being cognizant of it because no one else has the ability to analyze the effects of a new potential moves on ones already in progress or scheduled.

Type: alternative

Source:

Alternate Name: central

#### **E.2.2.2. Distributed**

In a distributed movement system, various aspects of movement functionality are capable of being handled at multiple sites. A unit planning a move can gain access to current conditions and plans in order to understand what options (modes, roads, etc.) are available and what cannot be done.

Type: alternative

Source:

Alternate Name: dist

### E.2.2.3. Global

In a global movement system, an attempt is made to optimize a large number of unit and materiel movements to achieve the maximum throughput possible in a theater. This kind of system is intended to have cognizance of all movement requirements and capabilities within its scope.

Type: alternative

Source:

### E.2.3. Regional CINC

A Regional CINC is a major geographic area of the world in which the Army has a preexisting command structure and set of procedures coordinated with the nations in the region as to certain conditions and constraints upon planned movement in that area. These conditions and constraints will affect movement operations.

The Commander in Chief (CINC) for a region must identify a value for the following location-dependent parameters: name (for the command), convoy size (the number of vehicles that, if traveling together, must request a convoy clearance), measure (whether sizes and weights are measured in English or metric units), and map usage (whether Army grid maps or maps using latitudes and longitudes are to be used to determine locations).

Examples of Regional CINCs are FORSCOM (Force Command, U.S.), EURCOM (European Command), CENTCOM (Central Command), PACOM (Pacific Command) and SOUTHCOM (Southern Command).

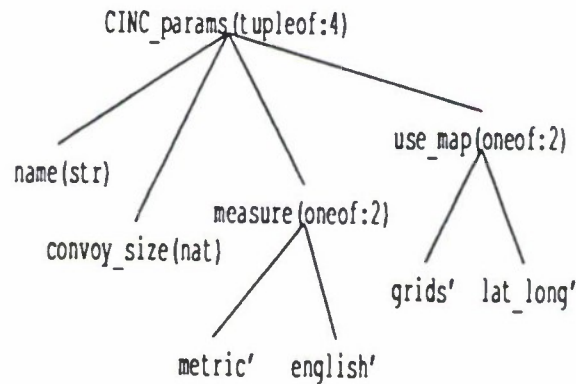


Figure E-14 Decomposition of the CINC Parameters Feature

Type: mandatory

Source: Movement Control Workshop

Alternate Name: regional\_CINC

## **E.2.4. Level of Command**

The level of command or echelon of forces of the commander planning a movement has a direct influence on the type (scope) of movements he will consider noteworthy.

Type: mandatory

Source: FM 55-10, Chapter 1, Section 2

Alternate Name: lvl\_of\_cmd

### **E.2.4.1. Joint**

Commands operating in a multinational or multiservice force environment are most concerned with strategic movement.

Type: alternative

Rules: requires Strategic  
mutex-with Tactical

Source: FM 55-10, Chapter 1, Section 2

### **E.2.4.2. Theater Army**

At this high level of command, the emphasis is on strategic movement but some levels of operational movement can be considered.

Type: alternative

Source: FM 55-10, Chapter 1, Section 2

Alternative Name: theater\_army

### **E.2.4.3. Corps**

At the corps level, the emphasis is on operational movement. Some inputs are needed into strategic movement and an overview of the tactical movement considerations are needed.

Type: alternative

Source: FM 55-10, Chapter 1, Section 2

### **E.2.4.4. Division**

Divisions are concerned with both operational and tactical movement. Tactical movement is the primary concern due to the need to coordinate the movements of subordinate units on the battlefield.

Type: alternative

Source: FM 55-10, Chapter 1, Section 2

#### **E.2.4.5. Below**

Any movement to be performed by a brigade or lower level unit is in all likelihood tactical in nature.

Type: alternative

Rules: requires Tactical  
mutex-with Strategic

Source: FM 55-10, Chapter 1, Section 2

#### **E.2.5. Policy**

##### **E.2.5.1. Types**

Type: mandatory

Source: FM 100-5

##### **E.2.5.1.1. Strategic**

Strategic missions and their movements involve transporting a large volume of personnel and equipment into the general area where combat is occurring or will occur. Generally, this entails moving a large number of units from their bases in the United States into the theater of operations, i.e., InterTheater movement. This is a precursor to a unit's ultimate deployment to a specific area.

Type: alternative

Source: FM 55-10, Chapter 1

##### **E.2.5.1.1.1. Deliberate**

Deliberate strategic movement is performed when time is not critical and the economical utilization of movement assets is the prime concern.

Type: alternative

Source:

##### **E.2.5.1.1.2. Crisis**

Crisis strategic movement occurs when timely relocation of troops and/or equipment from one major land mass to another is needed. Quick response and completion by whatever available means is the guiding force in this situation.

See parallel definition in \*note administrative::

Type: alternative

Source:

### **E.2.5.1.2. Operational**

Operational movement involves movement from the debarkation point (ending the strategic movement) into an area of operations appropriate for the units, or from one area of operations to another in the same theater.

Operational movement is commonly referred to as administrative movement. An administrative movement is “one in which troops and vehicles are arranged to expedite their movement and conserve time and energy when no enemy interference, except by air, is anticipated.... elements are organized to ... maximize transportation resources. Usually ... planned and organized by the G4...”

Type: alternative

Source: FM 100-15, p. 7-11

#### **E.2.5.1.2.1. Lateral**

Movement across the width of the battlefield (for example, relocation of a reserve force or the maneuver of a counterattack force) requires additional attention to planning. Extra considerations include best utilization of transportation, adequacy of the transportation network, weather influences, security, and organization to meet tactical requirements.

Type: optional

Source: FM 100-15

### **E.2.5.1.3. Tactical**

Tactical movement involves the relocation of a force from one location to another within the same area of operations.

“A tactical movement is a movement ... to contact with the enemy or during which contact is anticipated ... In a tactical movement, elements are organized to facilitate combat ... the G3 plans a tactical movement.”

Type: alternative

Source: FM 100-15, p. 7-11

#### **E.2.5.1.3.1. Defense Option**

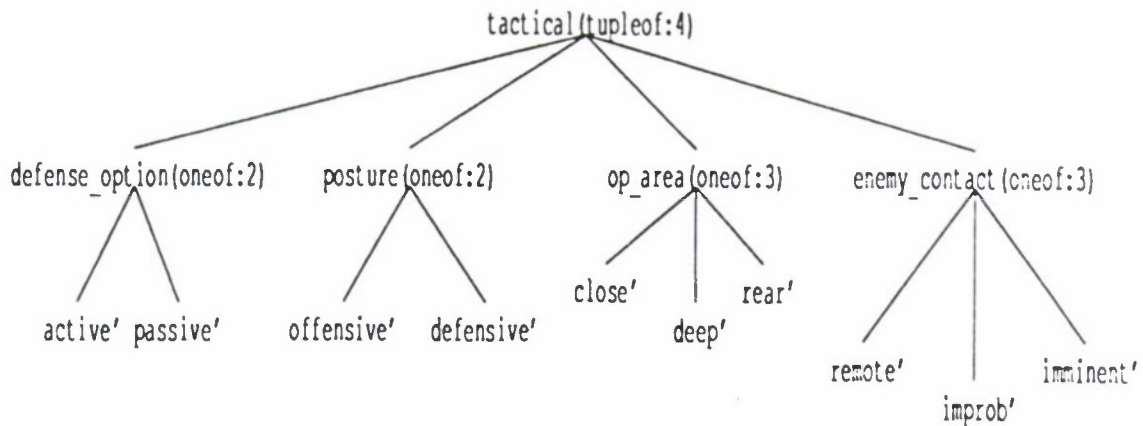
Type: mandatory

Source: FM 55-30, Chapter 6

Rules: requires Defense Planning

Alternate Name: defense\_option





**Figure E-15 Decomposition of the Tactical Feature**

#### **E.2.5.1.3.1.1. Active**

An active defense during movement uses its guard and advance forces to attempt to destroy any enemy forces it may encounter. If speed is essential or surprise is intended by the moving force, then active defense is inappropriate.

Type: alternative

Source: FM 55-30, Chapter 6

#### **E.2.5.1.3.1.2. Passive**

A passive defense during movement places its highest priority on convoy protection and security rather than confrontation with enemy.

Type: alternative

Source: FM 55-30, Chapter 6

#### **E.2.5.1.3.2. Posture**

Posture involves the overall intention of the movement and its mission.

Type: mandatory

Source: FM 100-5, Chapters 6 & 8

#### **E.2.5.1.3.2.1. Offensive**

An offensive posture assumes that the force is attempting to take control of an area currently held by enemy forces.

Type: alternative

Source: FM 100-5, Chapter 6

#### **E.2.5.1.3.2.2. Defensive**

A defensive posture assumes that the force is only attempting to maintain its hold in an area or prevent the enemy from controlling an area important to the friendly force.

Type: alternative

Source: FM 100-5, Chapter 8

#### **E.2.5.1.3.3. Operations Area**

The battlefield is divided into three areas for conducting three different classes of operations or mission types.

Type: mandatory

Source: FM 100-15

Alternate Name: op\_area

##### **E.2.5.1.3.3.1. Close**

The close operations area is that area where “the current battles and engagements of major maneuver units, together with its combat support and combat service support activities presently supporting them” are located.

Type: alternative

Source: FM 100-15, p. 3-0

##### **E.2.5.1.3.3.2. Deep**

The deep operations area is that area where “those activities which are directed against enemy forces not currently engaged in close operations, but capable of engaging or influencing future close operations” are located.

Type: alternative

Source: FM 100-15, p. 3-0

##### **E.2.5.1.3.3.3. Rear**

The rear operations area is that area where “those activities from the rear boundary” of the operations area “forward to the rear boundaries of committed maneuver units, that assure the freedom of maneuver and continuity of operations, including sustainment and command and control” are located.

Type: alternative

Source: FM 100-15, p. 3-3

#### **E.2.5.1.3.4. Enemy Contact**

There are three phases during a tactical movement to contact. Each of them usually occurs in the order specified below.

Type: mandatory

Source: AR310-25, Army Standard Dictionary of Terms

Alternate Name: enemy\_contact

##### **E.2.5.1.3.4.1. Remote**

In the early stage of a movement to contact, the possibility of contact with enemy forces is remote, thus more emphasis can be placed on economical usage of transportation assets.

Type: mandatory

Source: FM 100-5, Chapter 7

##### **E.2.5.1.3.4.2. Improbable**

In the middle stage of a movement to contact, the possibility of contact with enemy forces is improbable but reasonably possible, thus some planning for positioning of an advance guard and other security forces should occur while conducting movement of this kind.

See also \*note tactical column::

Type: mandatory

Source: FM 100-5, Chapter 7

Alternate Name: improb

##### **E.2.5.1.3.4.3. Imminent**

In the last stage of a movement to contact, meeting enemy resistance is to be expected and anticipated and the moving force must be ready to engage in battle as much as possible.

Type: mandatory

Source: FM 100-5, Chapter 7

#### **E.2.5.2. Level of Conflict**

The scale of effort and armaments to be used in achieving the objectives of an actual or potential conflict between opposing forces in a "political-military confrontation between contending states or groups."

Type: mandatory

Source: FM 100-5, Chapter 1 and JCS Pub. 1, p. 212 (quoted material)

Alternate Name: lvl\_of\_conflict

#### **E.2.5.2.1. High**

All out war where all means of engagement and weaponry are potentially usable, including Nuclear, Biological, and Chemical (NBC) weaponry. Confrontations between opposing forces may extend into land, sea, and air and the battlefield is “likely to be chaotic, intense, and highly destructive.”

Type: alternative

Source: FM 100-5, p. 2

#### **E.2.5.2.2. Medium**

Warfare where fighting is often intense, but whose scale is below that of High. Medium-level conflict is usually restricted to conventional weaponry.

Type: alternative

Source: FM 100-5

#### **E.2.5.2.3. Low**

A state of conflict requiring “special forces composition and organization, rapid deployment, and restraint in the execution of military operations” due to political and economic considerations. At this level, Army forces are typically pitted “against irregular or unconventional forces, enemy special operations forces, and terrorists.”

Type: alternative

Definition: see LIC

Source: FM 100-5, p. 4

#### **E.2.5.2.4. None**

Normal peacetime contingency or peacekeeping operations. Force is used only in cases of self-defense.

Type: alternative

Source: FM 100-5, p. 4

#### **E.2.6. Kind**

This feature is used to determine “what” (in terms of thing) is needed to be moved in order to accomplish a mission.

Type: mandatory

Source: Movement Control Workshop

### E.2.6.1. Unit

A unit movement is the relocation of the personnel, equipment, and supplies that constitute it. A unit movement can either be specifically ordered by a superior commander, implied by the mission given to the unit commander, or otherwise indicated by combat conditions. A unit movement is usually planned by the unit itself and is performed by the unit if it already has the appropriate transportation assets or is allocated them.

Type: alternative

Source: Movement Control Workshop

### E.2.6.2. Logistical

A logistical sustainment movement is the relocation of supplies and equipment to a requesting unit or to a depot. This kind of movement is planned by the organization in charge of the material or the unit ordered to move the material. The requesting unit only asks that the material be brought to its location or taken from it to some other location. The transportation organization allocates the vehicle resources and plans the route taken and the schedule for the movement.

Type: alternative

Source: Movement Control Workshop

## E.3. Representation

The representation features are needed to describe the different forms that movement information may take, both as input to movement functions and various types of output that users need. The representation features do not include the concept of internal message formats (bits and bytes) needed to input or output information between software systems or the particular format of textual output, such as the various formats of road clearances (STANAG 2155, Form 1255, etc.).

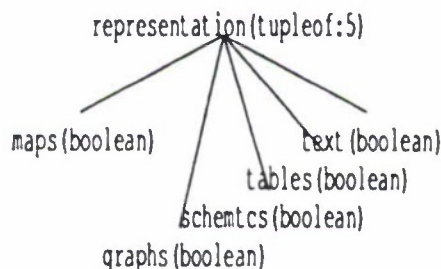


Figure E-16 Decomposition of the Representation Feature

### E.3.1. Maps

Maps are an integral part of portraying the information needed to make movement decisions. Maps can show existing terrain, roads, the positions of units and supply points, and many oth-

er useful kinds of information. Few software systems, until recently, had maps available on-line to assist in the movement control planning process.

Type: optional (mandatory for most new systems)

Source: ATCCS Map Requirements memorandum [PEOCCS90].

### **E.3.2. Graphs**

Graphs are a useful method for portraying or condensing large amounts of numerical data. For movement control, the road movement graph is an essential output of a highway scheduling system used to show the passing of multiple convoys over the designated critical points in the highway network.

Type: optional

Source: FM 55-10

### **E.3.3. Schematics**

Schematics are used for more effective movement planning and management. Their purpose is to portray total shipping requirements and available transportation capabilities as they relate to the actual distribution system. Schematics are prepared requirements (in tons of supply classes) and each available mode. They show the various shipping and receiving points and the various flows needed between each point.

Type: optional

Source: FM 55-10, Pages 98-99

Alternate Name: schemtcs

### **E.3.4. Tables**

Tables are another useful method for portraying large amounts of numerical data. The road movement table is a listing of the important points on a route and the times for which a convoy is due to arrive and clear each point. This information, along with a map of the roads to be used, is usually given to each driver in a convoy.

Type: optional

Source: FM 55-10

### **E.3.5. Text**

Text is the primary medium through which movement control systems interact with their users. The inputs and outputs are both usually textual forms whose format is dependent on the theater area, as each theater can define its own format and operating procedures for movement.

Type: mandatory

Source: FM 55-10

# Appendix F. Features Catalog





	TCACCIS	DAMMS-R	AFATDS	CAMMS	ALBE-GIS	MOBCOM
<b>Operational Features</b>						
<b>Planning</b>						
<b>Route Classification</b>						
Enter Terrain Data	No	Yes	Yes	Yes	Yes	Highway
Mechanism	N/A	Automatic	Manual	No	Auto/Man	Auto/Man
<b>Distribution Pattern</b>						
Mode Determination	No	Yes	No	No	No	No
Develop Plan	No	Yes	No	No	No	No
<b>Site Selection</b>						
Show Planned Position	No	???	Yes	Yes	Yes	Yes
Deconflict Position	No	???	Yes	No	Planned	Yes
Change Position	No	???	Yes	No	Yes	Yes
<b>Movement</b>						
<b>Convoy Building</b>						
<b>Assets</b>						
Organic	Yes	Yes	Yes	No	Planned	No
Non-Organic	TBD	Yes	No	No	Manual	No
Prioritization	TBD	Yes	No	No	N/A	No
Reuse	TBD	Yes	N/A	No	N/A	No
Common User	TBD	Yes	N/A	No	N/A	No
Preferred Availability	TBD	Yes	N/A	No	N/A	No
Alternative Availability	TBD	Yes	N/A	No	N/A	No
<b>Column Formation</b>						
Composition	Yes	Yes	No	Yes	Yes	Yes
Groupings	Yes	Yes	No	Yes	Yes	Yes
Gap Distance	Yes	Yes	Yes	Yes	Yes	Yes
Length	Yes	Both	Fixed	Yes	Yes	Yes
<b>Scheduling</b>						
<b>Operation</b>						
Set Absolute Time	TBD	Yes	Yes	No	TBD	Yes
Determine Critical Time	TBD	Yes	Yes	Yes	Yes	Yes
Determine Control Points	TBD	Yes	Yes	No	Yes	Yes

	TCACCIS	DAMMS-R	AFATDS	CAMMS	ALBE-GIS	MOBCOM
Calculate Travel Time(s)	Yes	Yes	Yes	Yes	Yes	Yes
Backward Planning	TBD	Yes	Yes	Yes	Yes	Yes
Dependent Events	TBD	Yes	Yes	No	Yes	Yes
<b>Routing</b>						
<b>Operations</b>						
Enter Segment	Yes	Yes	Yes	Yes	Yes	Yes
Determine Route	No	Auto	Man	Auto	Auto	Auto
Change Route	No	Yes	Yes	Yes	Yes	Yes
Selection	S/B	S	B	S/B	S/B	
Primary	Yes	Yes	Yes	Yes	Yes	
Alternate	Yes	No	No	TBD	Yes	
Prioritization	Yes	No	No	TBD	Yes	
<b>Highway Regulation</b>						
Traffic Control	Yes	No	No	No	Yes	
<b>Deconfliction</b>						
Parallel Events	Yes	Yes	No	Yes	Yes	
Independent Events	Yes	Yes	No	Yes	Yes	
Dependent Events	Yes	Yes	No	Yes	Yes	
<b>Directing</b>						
<b>Receive Inputs</b>						
Host Nation Guidance	US/EUR	Yes	No	No	Yes	US Only
Req. vs. Cap. Balance	No	Yes	No	No	Yes	No
<b>Messages</b>						
Movement Orders	Yes	Yes	No	Yes	Yes	
Movement Request	Yes	Yes	Yes	No	Yes	Yes
Mvmt Status Request	TBD	???	Yes	No	No	No
Mvmt Status Response	TBD	???	Yes	No	No	No
Coordinate Request	No	No	Yes	Yes	No	No
Coordinate Response	No	Yes	Yes	No	No	No
Other	TBD	No	No	No	No	No
<b>Generate Outputs</b>						
Movement Orders	Yes	Yes	Yes	No	Yes	Yes

	TCACCIS	DAMMS-R	AFATDS	CAMMS	ALBE-GIS	MOBCOM
Movement Request	TBD	Yes	Yes	No	Yes	Yes
Status Request	TBD	???	Yes	No	No	Future
Status Response	TBD	???	Yes	No	No	No
Strip Map	No	Yes	Yes	No	Yes	Yes
Coordinate Request	TBD	Yes	Yes	No	No	No
Coordinate Response	TBD	Yes	Yes	No	No	No
Other	TBD	No	No	No	No	???
<b>Execute</b>						
<b>Monitoring</b>						
Unit Movement Status	No	Yes	Yes	No	No	No
Moving Units Positions	No	Yes	Yes	No	No	No
Check Critical Time	No	Yes	Yes	No	No	No
In-Transit Visibility	Yes	Yes	???	No	No	Yes
<b>Adjust</b>						
Maintain Movement Data	No	Yes	Yes	No	No	No
<b>Context Features</b>						
<b>Mission</b>						
Estimate	TBD	No	No	Yes	Yes	Yes
OPLAN	TBD	Yes	No	No	Yes	Yes
OPORD	TBD	Yes	Yes	No	Yes	Yes
Regional CINC	US/EUR	Yes	N/A	N/A	Yes	US Only
<b>Level of Command</b>						
Joint	No	Yes	No	No	TBD	Yes
Theater Army	No	Yes	No	No	Yes	Yes
Corp	Yes	Yes	Yes	No	TBD	Yes
Division	Yes	Yes	Yes	Yes	Yes	Yes
Below	Yes	No	Yes	Yes	Yes	No
<b>Policy</b>						
<b>Types</b>						
<b>Strategic</b>						
Deliberate	TBD	No	No	No	No	Yes
Crisis	TBD	No	No	No	No	Yes

	TCACCIS	DAMMS-R	AFATDS	CAMMS	ALBE-GIS	MOBCOM
Operational		Yes	No	No	TBD	Yes
Lateral	TBD	???	No	No	TBD	Yes
Tactical						
Defense Option	TBD	No	???	No	No	No
Posture	TBD	No	???	No	No	No
<b>Level of Conflict</b>						
High	Yes	Yes	No	Yes	Yes	
Medium	Yes	Yes	No	Yes	Yes	
Low	Yes	Yes	No	Yes	Yes	
None	Yes	No	No	Yes	Yes	
<b>Kind</b>						
Unit	Yes	Yes	Yes	N/A	Yes	Yes
Logistical	Yes	Yes	No	N/A	No	Yes
<b>Representations</b>						
<b>Maps</b>		<b>Yes</b>	<b>Yes</b>	<b>Yes</b>	<b>Yes</b>	<b>Yes</b>
<b>Graphs</b>		<b>Yes</b>	<b>No</b>	<b>No</b>	<b>Yes</b>	<b>No</b>
<b>Schematics</b>		<b>Yes</b>	<b>No</b>	<b>No</b>	<b>No</b>	<b>No</b>
<b>Tables</b>		<b>Yes</b>	<b>Yes</b>	<b>No</b>	<b>Yes</b>	<b>Yes</b>
<b>Text</b>		<b>Yes</b>	<b>Yes</b>	<b>Yes</b>	<b>Yes</b>	<b>Yes</b>

# Appendix G. Movement Control Terminology Dictionary

Except where noted in the Source: field, the terms and definitions in this dictionary are drawn verbatim from authoritative Army documents, most notably AR 310-25 (Dictionary of Army Terms) and FM 101-5-1 (Operational Terms and Symbols).

- abatis** A vehicular obstacle constructed by felling trees 1-2 meters above the ground on both sides of the road so that they fall, interlocked, toward the expected direction of enemy approach. The trees should remain attached to the stumps, be at a 45-degree angle to the roadway, and the obstacle itself should be at least 75 meters in depth to be most effective.
- administrative unit** Unit organically able to do its own interior management. It may be both administrative and tactical.
- advance by bounds** Move forward in a series of separate advances, usually from cover to cover or from one point of observation to the next.
- advance by echelon** Advance by separate elements of a command moving at different times.
- advance depot** Supply point in the forward part of the communications zone of a theater of operations, ahead of the intermediate and base depots.
- advance detachment** The leading element of an advance guard. It is set out from the advance guard.
- advance guard** The security element operating to the front of a moving force.
- advance officer** An officer designated by the commander to precede the column by a distance sufficient to reconnoiter the route of march and to select alternate routes or detours if required; to instruct and place guides and route markers, where appropriate; to notify authorities of approach of column and receive instructions or changes to instructions at highway regulation points. This officer may also command the advance party.
- advance party** A security element of an advance guard. It is sent out from, and precedes, the advance guard support on the march. It sends forward and is preceded by the advance guard point.

**air assault** Operations in which air assault forces (combat, combat support [CS], and combat service support [CSS]), using the firepower, mobility, and total integration of helicopter assets in their ground and air roles, maneuver on the battlefield under the control of the ground or air maneuver commander to engage and destroy enemy forces.

**airborne operation** An operation involving the movement of combat forces and their logistic support into an objective area by air.

**airborne units** Units organized, equipped, and trained primarily for making assault landings from the air.

**airhead** 1. A designated area in a hostile or threatened territory which, when secured, permits the delivery (airdropped or airdropped) of forces and supplies and provides maneuver space for operations. Normally it is the area seized in the assault phase of an airborne or air assault operation.

2. A designated location in an area of operations used as a base for supply and evacuation by air.

See also beachhead and bridgehead

**alternate position** The position given to a weapon or unit to be occupied when the primary position becomes untenable or unsuitable for carrying its task. The alternate position is so located that the weapon or unit can continue to fulfill its original task.

**area of influence** A geographical area wherein the commander is directly capable of influencing operations by maneuver or fire support systems normally under his command or control.

**area of interest** That area of concern to the commander, including the area of influence, areas adjacent thereto, and extending into enemy territory to the objectives of current or planned operations. This area also includes areas occupied by enemy forces who could jeopardize the accomplishment of the mission.

**area of operations**

That portion of an area of conflict necessary to conduct military operations. Areas of operations are geographical areas assigned to commanders for which they have responsibility and in which they have authority to conduct military operations.

**area of responsibility**

A defined area of land in which responsibility is specifically assigned to the commander of the area for the development and maintenance of installations, control of movement, and the conduct of tactical operations involving troops under his control along with parallel authority to exercise these functions.

**armor**

A fighting combined arms team consisting of tanks and armored cavalry reconnaissance/security units, supported on the battlefield by Army aviation, a flexible and rapid communications network, and a mobile logistics system, all trained and equipped for mounted ground combat.

**armor group**

A field army unit designed to exercise command control and supervision of one or more separate tanks, armored infantry, and armored cavalry battalions, assigned to a corps or field army.

**armor sweep**

A raid or other limited attack without terrain objective by a rapidly moving armor unit through or across enemy controlled territory. An armor sweep may be conducted for reconnaissance in force, destruction or capture of personnel or material, or to harass or disrupt enemy plans and operations.

**armored cavalry** Combat units characterized by a high degree of mobility, firepower, shock action, and multiple flexible communications. The units are especially designed to execute reconnaissance, security, combat, or economy of force operations utilizing organic surface and air mode of transport.

**armored infantry** A field Army unit designed to close and destroy the enemy by fire and maneuver, to repel hostile assault in close combat, and to provide support for tanks.

**army**

The largest administrative unit of the forces consisting of two or more Army corps and supporting troops; field army.

**asset**

A useful or valuable quality or thing (soldiers, machines, arms, and ammunition are common Army assets).

Source: American Heritage Dictionary (with SEI annotation)

**avenue of approach**

An air or ground route of an attacking force of a given size leading to its objective or to key terrain in its path.

**basic load**

For other than ammunition, basic loads are supplies kept by using units for use in combat. The quantity of each item of supply in the basic load is related to the number of days in combat the unit may be sustained without resupply.

For ammunition, it is that quantity of nonnuclear ammunition authorized and required to be on hand in a unit to meet combat needs until resupply can be accomplished. The basic load for ammunition is specified by the theater army and is expressed in rounds, units, or units of weight as appropriate.

**basic tactical unit**

Fundamental unit capable of carrying out an independent tactical mission, such as a rifle company in the infantry or a battery in artillery.

**battalion**

Unit composed of a headquarters and two or more companies or batteries. It may be part of a regiment and be charged with tactical functions only, or it may be a separate unit and be charged with both administrative and tactical functions.

**battery**

The basic tactical artillery unit, corresponding to the company in the infantry.

Source: American Heritage Dictionary

**battle position**

Position on which the main effort of the defense is concentrated. A battle position is made up of defensive sectors that support one another.

**beachhead**

A designated area on a hostile shore which, when secured, ensures the continuous landing of troops and material, and provides maneuver space requisite for subsequent projected operations ashore. The beachhead is the physical objective of an amphibious operation.

See also airhead and bridgehead

**bound**

1. Single movement, usually from one covered and concealed position to another by dismounted troops or combat vehicles.



2. Distance covered in one movement by a unit which is advancing by bounds.

See also advance by bounds

**boundary**

A control measure normally drawn along identifiable terrain features and used to delineate areas of tactical responsibility for subordinate units. Within their boundaries, units may maneuver within the overall plan without close coordination with neighboring units unless otherwise restricted. Direct fire may also be placed across boundaries on clearly identified enemy targets without prior coordination, provided friendly forces are not endangered. Indirect fire also may be used after prior coordination.

Lateral boundaries are used to control combat operation of adjacent units.

Rear boundaries are established to facilitate command and control.

**bridgehead**

1. An area of ground held or to be gained on the enemy's side of an obstacle.

2. In river crossing operations, an area on the enemy's side of the water obstacle that is large enough to accommodate the majority of the crossing force, has adequate terrain to permit defense of the crossing sites, and provides a base for continuing the attack. As a minimum, ground must be secured which eliminates direct and observed indirect fires on the crossing site.

See also airhead and beachhead

**brigade**

1. A unit consisting of a variable number of combat battalions.

2. Formerly, a unit of the Army composed of two or more regiments commanded by a brigadier general.

Source: America Heritage Dictionary

**brigade support area**

A designated area in which combat service support (CSS) elements from division support command (DISCOM) and corps support command (COSCOM) provide logistic support to a brigade. It normally is located 20 to 25 kilometers behind the forward edge of the battle area (FEBA).

- checkpoint** A predetermined point on the ground used as a means of coordinating friendly movement. Checkpoints are not used as reference points in reporting enemy locations.
- close air support** Air action against hostile targets that are in close proximity to friendly forces and that requires detailed integration of each air mission with the fire and movement of those forces.
- coil** An arrangement of vehicles forming a circle.
- column formation** An arrangement of vehicles or dismounted troops which (1) provides good security and permits maximum fire to the flanks; (2) facilitates control; (3) facilitates rapid deployment into any other formation; (4) is used in road marches, night movements, and when passing through defiles or dense woods.
- combat arm** Branch of the Army whose officers are directly involved in the conduct of actual fighting. They are Aviation, Infantry, Field Artillery, Air Defense Artillery, Armor, and Corps of Engineers.
- combat orders** Orders pertaining to operations in the field. They include operation orders, administrative orders, and letters of instruction.
- combat service support** A grouping of branches and officers primarily concerned with providing combat service support and/or administration to the Army as a whole. They are Adjutant General, Finance, Ordnance, Quartermaster, and Transportation. Engineer, Signal, and Military Police are both services and arms.
- combat support arm** Branch of the Army whose officers provide operational assistance to the combat arms. They are Corps of Engineers, Signal Corps, Chemical Corps, Military Police Corps, and Military Intelligence. Certain branches are both an arm and a service.
- combined arms** More than one tactical branch of the Army used together in operations.

**command** A specifically designated linetype organization with direct line authority from the next higher commander or the Chief of Staff, United States Army. It must have a clearly identifiable headquarters and an organization structure composed of a variety of units.

**commander's estimate**

The procedure whereby a commander decides how to best accomplish the assigned mission. It is a thorough consideration of the mission, enemy, terrain and weather, troops available, time (METT-T), and other relevant factors. The commander's estimate is based upon personal knowledge of the situation and upon staff estimates.

See also staff estimate

**commander's intent**

Commander's vision of the battle - how he expects to fight and what he expects to accomplish.

See concept of operations

**command post** The principal facility employed by the commander to command and control combat operations. A CP consists of those coordinating and special staff activities and representatives from supporting Army elements and other services that may be needed to carry out operations. Corps and division HQ are particularly adaptable to organization by echelon into a tactical CP, a main CP, and a rear CP.

See also tactical command post, main command post, rear command post

**commitment** Assignment of units and/or resources to given courses of actions or uses.

**communications**

Routes and transportation for moving troops and supplies, especially in a theater of operations.

**company** Basic administrative and tactical unit in most branches of the Army. A company is on a command level below the battalion and above a platoon and is equivalent to a battery of artillery, etc.

**compartment of terrain**

Terrain area bounded on at least two sides by terrain features such as woods, ridges or villages, which limit observation and observed fire into the area from points outside the area.

**concentration** Assembly of troops in a given locality for purposes of offense or defense.

**concept of operation**

A graphic, verbal, or written statement in broad outline that gives an overall picture of a commander's assumptions or intent in regard to an operation or series of operations; includes at a minimum the scheme of maneuver and fire support plan. The concept of operations is embodied in campaign plans and operations plans particularly when the plans cover a series of connected operations to be carried out simultaneously or in succession. It is described in sufficient detail for the staff and subordinate commanders to understand what they are to do and how to fight the battle without further instructions.

**constraint** Something that restricts, limits, or regulates.

Source: American Heritage Dictionary

**control** Authority or ability to direct or regulate.

Source: American Heritage Dictionary

**control measures**

Directives given graphically or orally by a commander to subordinate commands in order to assign responsibilities, coordinate fires and maneuver, and to control combat operations. Each control measure can be portrayed graphically. A minimum number of control measures should be used so that the operation progresses according to the concept of the operation. Less restrictive control measures are used, as much as possible, to permit subordinate commanders the freedom of action in executing assigned missions. In general, all control measures should be easily identified on the ground. Examples of control measures include boundaries, objectives, coordinating points, contact points, lines of departure, assembly areas, axis of advance, and direction of attack.

**control point** A conspicuous terrain point which is given a name or number as a means of control of traffic movement.

**convoy** A group of 10 or more vehicles organized for the purpose of control and orderly movement with or without escort protection.

**corps** A tactical unit of ground forces between a field army and a division commanded by a lieutenant general and composed of two or more divisions and auxiliary service troops.

Source: American Heritage Dictionary

**coordinating point**

A control measure that indicates a specific location for the coordination of fires and maneuver between adjacent units. They usually are indicated whenever a boundary crosses the forward edge of the battle area (FEBA), and may be indicated when a boundary crosses report lines or phase lines used to control security forces. In NATO, physical contact between adjacent units is required.

**corridor** Compartment of terrain, the longer axis of which is parallel to, or extends in, the direction of movement of a force.

- course of action**
1. Any sequence of acts that an individual or unit may follow.
  2. A possible plan open to an individual or commander that would accomplish or is related to accomplishment of the mission.
  3. A feasible way to accomplish a task or mission which follows the guidance given, will not result in undue damage/risk to the command, and is noticeably different from other actions being considered.

**covered approach**

1. Any route that offers protection against enemy observation or fire.
2. Approach made under protection of other forces or by natural cover.

**covered movement**

A movement of troops when adequate security is provided by other friendly forces.

**covering barrier** A barrier located beyond the forward edge of the battle area which is elected by field army, corps, or division to assist in delaying actions of covering and security forces.

**critical point** 1. A roadway structure or feature which limits road width, overhead clearance, or vehicle load class as well as any feature which interferes with the meeting or crossing of two or more streams of traffic.

2. A selected point along a route used for reference in giving instructions. It includes start points, release points, and other points along a route where interference with movement may occur or timings are critical.

See also start point, release point, harbor area

Source: FM 55-10, FM 101-5, Page G-162

**cross compartment**

Compartment of terrain, the longer axis of which is perpendicular or oblique to the direction of movement of a force.

**cross-country movement**

The movement of military vehicles (usually tactical) across terrain without using roads and bridges.

**crossing site** A crossing point or site used for vehicles and equipment to cross a restrictive terrain feature.

**debarkation** The loading of troops with their supplies and equipment from ships and/or aircraft.

**dedicated battery**

A cannon battery whose total fire power is immediately available to suppress enemy direct fire weapons that threaten a designated company/team during a movement to contact.

**deep battle** All actions that support the friendly scheme of maneuver and which deny the enemy commander the ability to employ his forces not yet engaged at the time, place, or in the strength of his choice.

**defense area** Area assigned to a given unit to be protected from, and held against, enemy attack.

**defense in place** System of defense based upon firm resistance without retreat, as opposed to delaying action in successive positions.

**deferred unit** A unit whose required delivery date in support of a specific operation plan has been postponed.

**defile** A narrow passage that tends to restrict the movement of troops.

**delaying position**

Position taken to slow the advance of the enemy without being decisively engaged.

**detached unit** A unit that is serving away from the organization to which it is organic and to which it remains assigned. A detached unit may function as an independent organization, or it may be attached to or serve with or under another organization.

See also operational control

**direct** To give orders or commands.

Source: American Heritage Dictionary.

**direct support** 1. A mission requiring a force to support another specific force and authorizing it to answer directly the supported force's request for assistance.

2. In NATO, the support provided by a unit or formation not attached to, nor under command of, the supported unit or formation, but required to give priority to the support required by that unit or formation.

See also general support

**division** An administrative and tactical unit that is smaller than a corps but is self-contained and equipped for prolonged combat activity.

Source: American Heritage Dictionary.

**double envelopment**

A form of enveloping maneuver executed by three principal tactical groups; a secondary attack force which attacks the enemy frontally, and two enveloping attack forces which move around the flanks of the enemy position to attack the flanks or objectives in the rear of the enemy front line.

**double staggered column**

Two-lane column of vehicles moving in the same direction, so spaced that the vehicles in one lane are opposite the space between vehicles in the other lane.

**earliest arrival time**

The earliest date a unit should arrive "in theater" in support of a specific operation plan.

**echelon**

1. Subdivision of a headquarters (such as forward echelon, rear echelon).
2. Separate level of command. As compared to a brigade, a division is a higher echelon; a battalion is a lower echelon.
3. A fraction of a command in the direction of depth to which a principal combat mission is assigned (such as attack echelon, support echelon, reserve echelon).
4. A formation in which its subdivisions are placed one behind another, with a lateral and even spacing to the same side.

**echelons above corps**

Army headquarters and organizations that provide the interface between the theater commander (joint or combined) and the corps for operational matters, and between the continental United States (CONUS)/host nation and the deployed corps for combat service support (CSS). Operational EAC may be US only or allied headquarters while EAC for CSS will normally be US national organizations.

**embarkation**

The loading of troops with their supplies and equipment into ships and/or aircraft.

**engineer**

Member of the Corps of Engineers; soldier who performs engineer duties, including construction, demolition, surveying, road and bridge building, and camouflage.

**execute**

To perform or carry out what is required by orders.

Source: American Heritage Dictionary.



- external control** In highway transportation, the control exercised by a higher headquarters, such as a highway traffic regulation headquarters, and/or by military police, over a convoy, serial or march unit.
- field artillery** A basic branch of the Army. The branch name identifies personnel and units which employ cannons, rockets and missiles systems, with target acquisition means assisting in land combat operations.
- final coordination line**  
A line close to the enemy position used to coordinate the lifting and shifting of supporting fires with the final deployment of maneuver elements. It should be recognizable on the ground.
- final protective line**  
Line selected where an enemy is to be checked by interlocking fires from all available weapons. A final protective line may be parallel with, or oblique to, the front of the position.
- fire direction** Tactical employment of fire power; the exercise of tactical command of one or more units in the selection of targets, the concentration or distribution of fire, and allocation of ammunition for each mission.
- fire support** Assistance to those elements of the ground forces that close with the enemy (such as infantry and armor units), rendered by delivering field artillery fire, naval gun fire, and close air support.
- flow cycle** The complete sequence of phase movement through a traffic point.
- flow phase** Nonconflicting movement of traffic through a traffic point.
- follow-up element**  
Elements following a march column whether for cleanup, prevention of straggling, maintenance and recovery of equipment, or other purposes.
- forward command post**  
Station of a unit's headquarters where the commander and staff work. In combat, a unit's headquarters is often divided into a forward and rear echelon.
- forward echelon** That part of a headquarters which is principally concerned with the tactical control of battle.

See also rear echelon

**free maneuver** Practice maneuver in which each force acts as it chooses, and is limited only by the field orders received, by restrictions of area and time, and by the actions of the opposing force.

**general support** Support that is given to the supported force as a whole and not to any particular subdivision thereof.

See also direct support

**going** The classification of terrain according to its ability to support the passage of vehicles.

**grid coordinates** The easting and northing value (of a grid) that designate the location of a point with respect to the grid. Coordinates usually are expressed to the nearest 100, 10, or 1 meter, with the easting and northing values combined into a single expression.

Examples: 329378 (nearest 100 meters); 32943785 (nearest 10 meters), 3294837853 (nearest 1 meter).

**guide on me** Order given by a battery commander for a unit to follow his movements. This unit then becomes the guide for the other units.

**harbor area** An area designated for normal halts, for traffic control, and to avoid congestion in emergencies. Example applications are: to hold vehicles at both ends of a crossing or defile; to effect changes in density, especially at first or last light; to use as spillover areas in case of serious delay, which are likely to be caused by enemy air attack or its results; to use as areas where columns can rest and carry out maintenance and decontamination that may be necessary; to allow elements to change position in column if there is a change in priorities.

See also defile and critical point

Source: FM 101-5, Page G-20

**headquarters company**

Administrative and tactical element of battalion or larger unit, with personnel used for the purposes of administration, intelligence, communications, and other necessary activities.

**headquarters detachment**

Administrative and tactical element of a battalion or larger unit. In this meaning, a headquarters detachment differs from a headquarters company in that it has fewer personnel.

**heavy level of operations**

Operations involving more than 60 percent of all force maneuver echelons and all fire support means engaged in all-out combat demanding total strength application over a period of time to include possible employment of next higher echelon resources to assure accomplishment of the force mission.

**highway capacity**

Maximum traffic flow obtainable on a given roadway using all available lanes.

**highway regulation**

Planning, routing, and scheduling the actual use of highways by vehicles, personnel afoot (including troops, refugees, and civilians), and animals to utilize highway transportation facilities and equipment most effectively in order to meet operational requirements.

**highway regulation plan**

A staff plan which combines pertinent information from standard operating procedures, directives, regulations, traffic circulation overlays, and staff estimates on the capabilities of the existing road network to handle the traffic that must go over it.

**highway regulation point**

Point on the highway at which the highway transport service records and reports the arrival and departure of, and regulates elements of, highway movement by issuing instructions for the continuance of the march, detours, diversions, schedules, etc.

**highway traffic regulations**

The coordination and the actual use of the road network by vehicles, personnel, and animals needed to meet military requirements. It consist of planning, routing, scheduling, and diverting movements on the available road networks in accordance with priorities.

**holding force**

Forces assigned to hold a place or position; force that carries out a holding attack.

<b>infantry</b>	Infantry is a basic branch of the Army. The branch name identifies personnel and units who close with the enemy by means of fire and maneuver in order to destroy or capture him, or to repel his assault by fire, close combat, and counterattack. Personnel and units so identified fight dismounted or mounted according to the mobility means provided.
<b>intelligence</b>	The product resulting from the collection, processing, integration, analysis, evaluation, and interpretation of available information which concerns one or more aspects of foreign nations or of areas of operations that is immediately or potentially significant to military planning and operations.
<b>lane</b>	<ol style="list-style-type: none"> <li>1. A clear route through an obstacle. A single lane is normally 8 meters wide and suitably marked; a double lane is 16 meters wide.</li> <li>2. Strip of roadway intended to accommodate the forward movement of a single line of vehicles, usually 8 feet to 13 feet in width.</li> </ol>
<b>length of column</b>	The length of roadway occupied by a column in movement including the gaps inside the column for the front of the leading vehicle to the rear of the last vehicle.
<b>letter of instructions</b>	Form of order by which superior commanders give information as to broad aims, policies, and strategic plans for operations in large areas over a considerable period of time. It is issued to large units of a command and has the same authority as an operations order. A letter of instruction is intended for the guidance and control of the operations of a large command.
<b>line of departure</b>	In ground operations, a line, ordinarily located on or behind the last available terrain mask which can be reached without exposure to hostile observation and small arms fire; suitable, clearly defined terrain features such as roads, edges of woods, and friendly front lines may be used.
<b>logistics</b>	The planning and carrying out of the movement and maintenance of forces. In its most comprehensive sense, those aspects of military operations which deal with (1) design and development, acquisition, storage, movement, distribution, maintenance, evacuation, and disposition of material; (2) movement, evacuation, and hospitalization of personnel; (3) acquisition or construction, maintenance, operation, and disposition of facilities; and (4) acquisition or furnishing of services.

**logistic support** Provision of adequate material and services to a military force to assure successful accomplishment of assigned missions.

**main command post**

The main command post consists of those staff activities involved in controlling and sustaining current operations and in planning future operations. The main CP normally operates under the control of the chief of staff. In addition to the chief of staff, the main CP consists of G1, G2, G3, and G4 elements; fire support and chemical elements, tactical air control party (TACP) element, and an Army airspace command and control (A2C2) element consisting of air defense artillery (ADA) and Army aviation staff elements. The main CP exercises command and control of the current operations in case where a tactical CP is not employed.

See also rear command post, tactical command post

**main defense area**

The area in which the main defensive battle is fought. For any particular command, this area extends from the forward edge of the battle area to the rear boundaries of those units comprising its main defensive forces.

**maneuver**

The movement of forces supported by fire to achieve a position of advantage from which to destroy or threaten destruction of the enemy. A principle of war (from FM 100-5).

**maneuver control**

Employing forces on the battlefield through movement in combination with fire or fire potential to achieve an advantage over the enemy in order to accomplish the mission. The tactical commander is responsible for this function.

Source: FM 55-10

**maneuvering force**

Element of a combat unit that seeks to seize an attack objective through movement to a more advantageous position with respect to the enemy.

**march column**

Consists of all elements using the same route for a single movement of troops. March columns, regardless of size, are composed of three elements: a head, a main body, and a trail party, which perform various functions.

See also functional unit

**march unit** Unit which moves and halts at the order of a single commander. The march unit normally corresponds to one of the smaller troop units such as a squad, section, platoon, company, or battery.

**metalled road** Road constructed of gravel, crushed stone, slag, or similar material with a binder of fine aggregate tar or cement.

**mission** 1. The primary task assigned to an individual, unit, or force. It usually contains the elements of who, what, where, and the reason therefor, but seldom specifies how.

2. The dispatching of one or more aircraft to accomplish one particular task.

**mobile unit** A unit equipped with sufficient organic vehicles for the purposes of transporting all assigned personnel and equipment from one location to another at one time.

**moderate level of operations**

Operations involving 30-60 percent of all force maneuver echelons and over 50 percent of all fire support means engaged in continuous combat over a period of time, during which the employment of next higher echelon resources to assure accomplishment of the force mission is not anticipated.

**motor march** Controlled movement of troops in which all elements move by motor.

**movement** A change in the location of military troops.

Source: American Heritage Dictionary.

**movement capacity**

The sum total of the capabilities of the shipping and receiving agencies and the transport services.

**movement control**

The planning, routing, scheduling, control, and in-transit visibility of personnel, units, equipment, and supplies moving over lines of communication in accordance with the directives of command planning. It is a continuum involving the synchronization and integration of movement information and

programs spanning the strategic, operational and tactical levels of war. Movement control is guided by a system of balancing requirements against capabilities and allocating resources based on the combat commander's priorities.

Source: FM 55-10

**movement instructions**

Detailed instructions for the execution of a movement. They are issued by a transportation officer as an implementation of the movement programs, and represent accepted procedure to be followed by the shipper or receiver and transport services.

**movement plan** 1. Up-to-date logistics data reflecting a summary of transportation requirements, priorities, and limiting factors incident to the movement of one or more units or other special grouping of personnel by highway, marine, rail, or air transportation.

2. A command directive that the TAMCA plans and plans division prepares with input from all movement control levels. The plan allots available transportation to support requirements based on tactical priorities that the operational commander sets the supply and movement priorities for unit commanders. The plan provides transportation priorities to resolve competition, traffic, and mode management decisions so that available transportation assets are best used and comply with any Host Nation-imposed restrictions.

**movement program**

A plan prepared by a transportation movements section and issued in the name of the commander for the accomplishment of required movement by available transportation facilities projected over a stated period of time.

**movement requirement**

The request to transport personnel or material that has been approved by the appropriate commander.

**movement to contact**

Ground movement which is conducted in a theater of operations preliminary to combat to place troops in position to close with the enemy. Movement to contact is usually conducted in three phases: a. Contact remote; b. Contact improbable; c. Contact imminent.

**objective area** 1. A defined geographical area where an objective is to be captured or reached by the military forces.

2. In airborne, air assault, and amphibious operations, it is the proposed area of operations and includes the airhead or beachhead.

**oblique compartment**

Compartment of terrain, whose long axis is diagonal to the direction of march or to the front.

**obstacle**

1. Any obstruction that stops, delays, or diverts movement. Obstacles may be natural: deserts, rivers, swamps, or mountains; or they may be artificial: barbed wire entanglements, pits, concrete or metal antimechanized traps, and they may be issued ready-made or they may be constructed in the field.

2. A definable terrain feature that inhibits intervisibility or movement.

**offensive**

1. Condition of a force when it is attacking.

2. Attacking; ready to attack.

3. Suitable for attack; used for attack. Gun and tanks are often offensive weapons.

**open column**

A motor column in which distance between vehicles is increased to accomplish greater dispersion.

**open route**

Roadway over which a minimum of supervision is exercised.

**operation order for road movement**

Instructions issued for movement of personnel and prescribed equipment for one location to another within a stated period of time. These orders are issued by the authority having jurisdiction over the personnel involved in the order.

**operational control**

The authority delegated to a commander to direct forces assigned so that the commander may accomplish specific missions or tasks that are usually limited by function, time, or location; to deploy units concerned; and to retain or assign tactical control of those units. It does not of itself include administrative or logistic control. In NATO, it does not include authority to assign separate employment of components of the units concerned.



**operational plan**

A plan for a single or series of operations to be carried out simultaneously or in succession. It is usually based upon stated assumptions and is the form of directive employed by higher authority to permit subordinate commander to prepare supporting plans and orders.

**option**

Something chosen or available as a choice.

Source: American Heritage Dictionary.

**order**

A communication, whether written, oral, or by signal, that conveys instructions from a superior to a subordinate. In a broad sense, the terms "order" and "command" are synonymous. However, an order implies discretion as to the details of execution whereas a command does not.

**organic**

Assigned to and forming an essential part of a military organization; an element normally shown in the unit's table of organization and equipment (TOE).

**plan**

1. Formulate a scheme or program for the accomplishment of tactical objectives.

2. The results of the formulation in 1.

Source: American Heritage Dictionary.

**prescribed load**

The quantity of combat essential supplies and repair parts (other than ammunition) authorized by major commanders to be on hand in units and which is carried by individuals or on unit vehicles. It is normally a 15-day level. The prescribed load is continuously reconstituted as used.

**primary road**

A linear surface feature making an open way for vehicles on an artificially made surface of bitumen or concrete, of a width greater than 6 meters.

**probable line of departure**

A line previously selected on the ground where attacking units deploy prior to beginning an assault under conditions of limited visibility.

**rear area**

For any particular command, that area extending rearward from the rear boundary of its main defense area to that command's rear boundaries. The area primarily provided for the performance of administrative and logistic functions.

**rear command post**

The rear CP consists of those staff activities concerned primarily with combat service support (CSS) of the force, administrative support of the HQ, and other activities not immediately concerned with current operations. Typical representatives within the rear echelon are elements of the G1 and G4 sections, G5, Adjutant General (AG), Staff Judge Advocate (SJA), Inspector General (IG), Provost Marshal (PM), supporting Military Intelligence (MI) elements concerned with counterintelligence and prisoner of war interrogation (IPW) activities, and the tactical airlift representative of the tactical air control party (TACP). Normally, rear CPs are near or collocated with CSS units (for example, COSCOM).

See also main command post, Gx, COSCOM

**rear echelon** That part of a headquarters which is principally concerned with administrative and logistical matters.

**reconnaissance in force**

A limited objective operation by a considerable force to discover and test the enemy's dispositions and strengths, or to develop other intelligence.

**regiment** Administrative and tactical unit, on a command level below a division or brigade and above a battalion, the entire organization of which is prescribed by table of organization. The commanding officer of a regiment is usually a colonel.

**regulating officer**

Officer in command of a regulating station responsible for the smooth, orderly movement of troops and material within the area controlled.

**regulating unit** Unit within the marching column that sets the pace for the rest of the column.

**release point** A clearly-defined control point (or critical point) on a route at which specific elements of a column of ground vehicles or flight of aircraft revert to their respective commanders, each one of these elements continuing its movement towards its appropriate destination.

2. In dismounted attacks, that point at which a commander releases control of subordinate units to their commanders/leaders.

See also critical point, start point

- request** Ask an entity to do something.
- Source: American Heritage Dictionary.
- restricted traffic** Limited traffic, traffic over a route controlled by regulations limiting speeds, types of vehicles permitted maximum weight allowed, and hours at which the route may be open to different types of traffic.
- retirement** A retrograde operation in which a force out of contact moves away from the enemy.
- retrograde** An organized movement to the rear or away from the enemy. It may be forced by the enemy or may be made voluntarily. Such movements may be classified as withdrawal, retirement, or delaying operations.
- road clearance distance**  
The total distance the head of a motor column must travel for the entire column to clear a given section of road.
- road movement graph**  
Time space diagram used in planning and controlling marches, both road and foot, and in preparing or checking road movement tables.
- road movement table**  
A composite list showing the general organization and time and space schedule for march movement. It is generally published as an annex to an operation order for road movement.
- road reconnaissance report**  
A report which contains detailed information necessary for classification of a road.
- road screen** Anything that is used to conceal movement along a road from enemy observation, especially artificial concealment or camouflage.
- route** The prescribed course to be traveled from a specific point of origin to a specific destination.
- route classification**  
Classification assigned to a route indicating the heaviest vehicle that can be accepted. It is based on the weakest bridge or portion of the route.

**route column** 1. Close order formation of troops, suitable for marching.

2. A flexible formation adopted for contact remote phase of movement to contact. During this phase, troops need not be tactically grouped, and may move by various means of transportation and by different routes.

**routes of communication**

Network of roads, etc., over which supplies are carried and combat movements are made. Routes of communication include navigable waters, aircraft landing, and rail facilities.

**schedule control system**

System of traffic control in which truck column and troops are dispatched over fixed routes at given rate of speed according to a time schedule.

**secondary road** A linear surface feature making an open way for vehicles on an artificially made surface of gravel, bitumen, or concrete, and of a width between 4 and 6 meters.

**signal axis** Line or route on which lie the starting and probable future locations of the command post of a unit during a troop movement; main route along which messages are relayed or sent to and from combat unit in the field.

**single envelopment**

Maneuver made against one flank, around one flank against the rear, of the initial disposition of the enemy.

**staff**

Officers who are specially ordered or detailed to assist the commander in his exercise of command. The staff provides information for the commander, makes a continuing study of the situation for anticipatory planning, submits recommendations as to plans and orders on its own initiative or in response to directives, translates decisions of the commander into orders, provides for dissemination thereof, and supervises, as directed, the execution of orders to insure adherence to and successful execution of the intentions and policies of the commander.

**staff estimate**

The staff officer's evaluation of how factors in his particular field of interest will influence the courses of action under consideration by the commander.

See also commander's estimate, Gx

**start point** A clearly defined initial control point (or critical point) on a route at which specified elements of a column of ground vehicles or flight of aircraft come under the control of the commander having responsibility for the movement.

See also critical point, release point

**strategic** Pertaining to the overall planning and conduct of large-scale combat operations.

Source: American Heritage Dictionary.

**supplementary position**

That location which provides the best means to accomplish a task that cannot be accomplished from the primary or alternative positions.

**support echelon** 1. Those elements that furnish logistical assistance to combat units.

2. Those units that support, by fire, the commander's plan of maneuver.

**support unit** Unit that acts with, and assists or protects, another unit, but does not act under the orders of the commander of the protected unit of which it is not an organic part.

**tactical** Pertaining to the employment of units in combat.

**tactical column** Contact improbable phase of movement to contact during which troops are tactically grouped to facilitate prompt adaptation of combat formations.

**tactical command post**

The tactical CP is the forward echelon of a headquarters. The tactical CP may consist of G2, G3, fire support, tactical air control party (TACP), air defense artillery (ADA), and combat service support (CSS) liaison (G1, G4) elements. It is located well forward on the battlefield so that the commander is in proximity to subordinate commanders and can directly influence operations. At division, the tactical CP is located within FM radio range of the committed brigades.

See also command post, main command post, Gx

**tactical communications**

Communications provided by, or under the operational control of, commanders of combat forces, combat troops, combat support troops, or forces assigned a combat service support mission.

**tactical high mobility**

The highest level of mobility designating the requirements for extensive cross-country maneuverability characteristic of operations in the ground-gaining and fire support environment.

**tactical logistics** The provision of logistics support to combat forces deployed within a theater of operations.

**tactical movement**

Movement of troops and equipment with a tactical mission under combat conditions when not in direct ground contact with the enemy.

**tactical plan** Plan for a particular combat operation, exclusive of arrangements for supply, evacuation, maintenance, or administration.

**tactical standard mobility**

The second highest level of mobility designating the requirement for occasional cross-country movement.

**tactical support mobility**

A level of mobility designating the requirement for infrequent off-road operations over selected terrain with the preponderance of movement on primary and secondary roads.

**task force**

1. Based upon mission, a temporary grouping of units under one commander formed to carry out a specific operation or mission, or a semipermanent organization of units under one commander to carry out a continuing single task. Units may be designated as a TF, regardless of attachments, whenever they are on a semi-independent mission. Brigades and higher units normally are not designated as TFs unless the mission requires joint airborne, amphibious, or other special, semi-independent operations.

2. Based upon organization, a battalion-sized unit of the combat arms consisting of a battalion control headquarters, with at least one of its major subordinate elements (a company), and the attachment of at least one company-sized element of another combat or combat support arm. An example is an infantry battalion headquarters; one or more of its organic companies; and the attachment of one or more of the following: a tank company, an armored cavalry troop, or an engineer company.

See also task organization

**task organization**

A temporary grouping of forces designed to accomplish a particular mission. Task organization involves the distribution of available assets to subordinate control headquarters by attachment or by placing assets in direct support (DS) or under the operational control of the subordinate.

**technical intelligence**

Intelligence concerning foreign technological developments, and the performance and operational capabilities of foreign material, which have or may have a practical application for military purposes.

**terrain**

The total of all natural or man-induced non-meteorological phenomena that influence the performance of vehicles, personnel, or other systems.

**terrain analysis**

The process of interpreting a geographic area to determine the effect of the natural and man-made features on military operations.

**terrain evaluation**

The evaluation and interpretation of an area of probable military operations to determine the effect of the terrain on the lines of action open to opposing forces in the area.

**terrain factor**

Any attribute of the terrain that can be adequately described at any point (or any instant of time) by a single measurable value; for example, slope or obstacle height.

**tertiary road**

A linear surface feature making an open way for vehicles or persons on a natural treated surface to improve its trafficability or gravel surface (including footpaths) less than 4 meters wide.

**throughput distribution**

The shipment of supplies from point of origin as far forward into the combat zone as possible, bypassing intermediate supply activities.

**thrust line**

Line forming the base of all coordinates in the thrust line system locating the position of objects on a map. It is a line designated by the commander, and located on the map by two reference points, or by a reference point and a direction. Somewhere along the thrust line is a base point, designated by the commander, from which all coordinates are measured. Points are located by giving their distance along the thrust line, forward or back of the base point, and their distance perpendicular to the thrust line.

**time distance**

Time required for any one vehicle to travel between two given points at a given rate of speed.

**time gap**

The sum of the intervals between columns and elements of the columns. It is expressed in minutes.

**time interval**

The time that elapses between successive elements of a column as they move past a given point.

**traffic control**

Includes enforcing traffic laws and regulations, investigating traffic accidents and directing traffic. It is a function of the Military Police.

**traffic control point**

A place at which traffic is controlled either by military police or by mechanical means.

**traffic headquarters**

Headquarters exercising highway traffic regulation, which is planning, routing, scheduling, and directing the actual use of the highway by vehicles, personnel afoot (including troops, refugees, and other civilians), and animals to utilize highway transportation facilities and equipment most effectively in accordance with assigned tasks.

**traffic management**

The direction, control, and supervision of all functions incident to the procurement and use of freight and passenger transportation services.

**traffic map**

Map used in planning and regulating the flow of traffic. It includes routes, road data, the direction of movement, and the amount of traffic moving.



**transportation engineering**

The science of evaluating the requirements for and planning the layout and functional aspects of transportation facilities; and of developing the most efficient relationships with respect to transportation equipment, transportation facilities, and traffic movement patterns so as to ensure adequate, safe, and efficient movement by all means of transportation.

**transportation intelligence**

A facet of technical intelligence, it is the end product resulting from the collection, evaluation, interpretation, analysis, and integration of all available information about the air, land, and water transportation systems of foreign areas of operations that are of immediate or potential military significance. This intelligence includes data on the characteristics, condition, development, organization, material operation, maintenance, and construction of transportation systems facilities.

**transportation management**

The performance of command and/or staff functions related to planning, coordinating, evaluating, and analyzing all aspects of water, rail, highway, and air transportation systems; development of transportation policies and doctrine; assessment of capabilities in terms of current and projected transport requirements; allocation and monitoring the use of transportation resources in accordance with established priorities; and preparation of contingency transportation plans.

**transportation movements**

The management of the movement capability to ensure maximum accomplishment of movement requirements.

**troop**

A subordinate unit of the cavalry squadron. The troop has both administrative and tactical functions. It is equivalent to a company or battery.

**uncover**

Expose or leaved unprotected by movement or maneuver.

**uncovered movement**

A movement made when security normally provided by other friendly forces is lacking.

**withdrawal**

A retrograde operation in which a force in contact with the enemy frees itself for a new mission.



## Appendix H Movement Control Domain Acronyms

The acronyms in this appendix are drawn from those used in various documents. If the acronym's meaning is not given elsewhere in this report, a definition is given as well as the full name of the acronym.

**A2C2** *Army Airspace Command and Control*

**ACCS** *Army Command and Control Systems*

The acronym for referring to the grouping of command and control systems used at all levels of command, including AWIS and others for strategic purposes and ATCCS for tactical usage.

**ACP** *Air Control Point*

**ACR** *Armored Cavalry Regiment*

**ADA** *Air Defense Artillery*

**AFATDS** *Advanced Field Artillery Tactical Data System*

The node of the ATCCS system for the Fire Support BFA.

**AO** *Area of Operations*

**ASAS** *All Source Analysis System*

The node of the ATCCS system for the Intelligence and Electronic Warfare BFA.

**ASL** *Authorized Stockage List*

A list of items from all classes of supplies to be stocked at a specific echelon of supply.

**ATCCS** *Army Tactical Command and Control System*

An integrated system consisting of five functional nodes, one supporting each BFA, that constitutes a FLCS for use at the ECB level.

**ATMCT** *Air Terminal Movement Control Team*

<b>AWIS</b>	<i>Army WWMCCS Information System</i>
	A system used by the Army which is part of the WWMCCS system used by all three military services.
	See WWMCCS
<b>BFA</b>	<i>Battlefield Functional Area</i>
	One of the areas of interest for controlling tactical assets in a combat situation. The BFAs for the ATCCS domain are 1) Maneuver, 2) Air Defense, 3) Fire Support, 4) Intelligence and Electronic Warfare, and 5) Combat Service Support.
<b>BMCT</b>	<i>Branch Movement Control Team</i>
<b>BMNT</b>	<i>Beginning Morning Nautical Twilight</i>
	Begins when the sun is 12 degrees below the horizon. It is the start of that period where, in good conditions and in the absence of other illumination, enough light is available to identify the general outlines of ground objects, conduct limited military operations, and engage in most types of ground movement without difficulty.
<b>CAS</b>	<i>Close Air Support</i>
<b>CMCC</b>	<i>Combined Movement Control Center</i>
<b>COMMZ</b>	<i>COMMunications Zone</i>
<b>COSCOM</b>	<i>COrps Support COMmand</i>
<b>CS</b>	<i>Combat Support</i>
<b>CSS</b>	<i>Combat Service Support</i>
<b>CSSCS</b>	<i>Combat Service Support Control System</i>
	The node of the ATCCS system for the Combat Service Support BFA.
<b>CTMC</b>	<i>Combined Transportation Movement Center</i>

<b>CTO</b>	<i>Corps Transportation Officer</i>
<b>DAMMS-R</b>	<i>Department of the Army Movement Management System - Redesign</i>
<b>DISCOM</b>	<i>Division Support COMmand</i>
<b>DODAAC</b>	<i>Department Of Defense Activity Address Code</i>
<b>DS</b>	<i>Direct Support</i>
<b>DTG</b>	<i>Date Time Group</i>
<b>DTO</b>	<i>Division Transportation Office(r)</i>
<b>EAC</b>	<i>Echelons Above Corps</i>
<b>ECB</b>	<i>Echelons Corps and Below</i>

Those command entities at the Corps level or below. For example, Division, Brigade, Regiment, Battalion, etc.

**EENT** *End Evening Nautical Twilight*

Occurs when the sun has dropped 12 degrees below the horizon, and is the instant of last available daylight for the visual control of limited ground operations. At the EENT, there is no further sunlight available.

**FAADC3I** *Forward Area Air Defense Command, Control, Communications, and Intelligence*

The node of the ATCCS system for the Air Defense BFA.

**FEBA** *Forward Edge of Battle Area*

The front line of the combat area where enemy units are in close proximity.

**FLCS** *Force Level Control System*

A system for coordinating the usage of Army units and their assets at various levels of command. For example, ATCCS is a FLCS for Corps, Division, and Brigade level units with planned extensions to include the maneuver Battalion level units. WWMCCS is a FLCS at the EAC level.

<b>FLOT</b>	<i>Forward Line of Own Troops</i>
	The line showing the position of all friendly forces who are closest to the enemy.
<b>FRAGO</b>	<i>FRAGmentary Order</i>
<b>GS</b>	<i>General Support</i>
<b>Gx</b>	<i>General's staff, area x</i>
	Members of a command staff organization headed by an general officer whose responsibilities are designated by the numeral following the G. They include:
	G1: Administration and Personnel
	G2: Intelligence
	G3: Operations and Plans
	G4: Logistics
	G5: Civil Affairs
<b>HET</b>	<i>Heavy Equipment Transporter</i>
<b>HHC</b>	<i>Headquarters and Headquarters Company</i>
<b>HHD</b>	<i>Headquarters and Headquarters Detachment</i>
<b>HMCT</b>	<i>Highway Movement Control Team</i>
<b>HNS</b>	<i>Host Nation Support</i>
<b>HQ</b>	<i>HeadQuarters</i>
<b>HRP</b>	<i>Highway Regulating Point</i>
<b>HRPT</b>	<i>Highway Regulating Point Team</i>
<b>HTD</b>	<i>Highway Traffic Division</i>

**IEW** *Intelligence/Electronic Warfare*

**IPB** *Intelligence Preparation of the Battlefield*

A systematic approach to analyzing the enemy, weather, and terrain in a specific geographic area. It integrates enemy doctrine with the weather and terrain as they relate to the mission and the specific battlefield environment. This is done to determine and evaluate enemy capabilities, vulnerabilities, and probable courses of action.

**Jx** *Joint force staff, area x*

Staff officer to a joint force commander (multination and/or multiservice), with the responsibilities designated by the numeral x. See Gx

**JOPES** *Joint Operational Planning and Execution System*

**LIC** *Low-Intensity Conflict*

Political-military confrontation between contending states or groups below conventional war and above the routine, peaceful competition among states. It frequently involves protracted struggles of competing principles and ideologies. Low-intensity conflict ranges from subversion to the use of armed force. It is waged by a combination of means employing political, economic, informational, and military instruments. Low-intensity conflicts are often localized, generally in the Third World, but contain regional and global security implications.

**LOC** *Lines Of Communication*

**MBA** *Main Battle Area*

**MCA** *Movement Control Agency*

**MCC** *Movement Control Center*

**MCO** *Movement Control Officer*

**MCS** *Maneuver Control System*

The node of the ATCCS system for the Maneuver BFA.

<b>MCT</b>	<i>Movement Control Team</i>
<b>METT-T</b>	<i>Mission, Enemy, Terrain, Troops, and Time available</i>
<b>MHE</b>	<i>Material Handling Equipment</i>
<b>MI</b>	<i>Military Intelligence</i>
<b>MP</b>	<i>Military Police</i>
<b>MSR</b>	<i>Main Supply Route</i>
<b>MTMC</b>	<i>Military Traffic Management Center</i>
<b>OPCON</b>	<i>OPerational CONtrol</i>
<b>OPORD</b>	<i>OPerational ORDer</i>
<b>OPLAN</b>	<i>Operational PLAN</i>
<b>PDN</b>	<i>Physical Distribution Network</i>
<b>POD</b>	<i>Port Of Debarkation</i>
<b>POE</b>	<i>Port Of Embarkation</i>
<b>POL</b>	<i>Petroleum, Oil, and Lubricants</i>
<b>RAOC</b>	<i>Rear Area Operations Center</i>
<b>RCAS</b>	<i>Reserve Component Automation System</i>
<b>RMCT</b>	<i>Regional Movement Control Team</i>
<b>RMMT</b>	<i>Rail Movement Management Team</i>
<b>RP</b>	<i>Release Point</i>
<b>Sx</b>	<i>Staff, area x</i>

Staff officer to a commander not of general rank, with the responsibilities designated by the numeral x. See Gx



<b>S&amp;S</b>	<i>Supply and Service, or Service and Support</i>
	Also abbreviated as S/S.
<b>SOP</b>	<i>Standard Operating Procedure</i>
<b>SP</b>	<i>Start Point</i>
<b>TAACOM</b>	<i>Theater Army Area COMmand</i>
<b>TACCS</b>	<i>Tactical Army Combat Service Support Computer System</i>
<b>TAMCA</b>	<i>Theater Army Movement Control Agency</i>
<b>TCMD</b>	<i>Transportation Control and Movement Document</i>
<b>TCN</b>	<i>Transportation Control Number</i>
<b>TCP</b>	<i>Traffic Control Post or Plan</i>
<b>TMR</b>	<i>Transportation Movement Release</i>
<b>TMT</b>	<i>Transportation Movement Transport</i>
<b>TOA</b>	<i>Transportation Operating Agency</i>
<b>TOE</b>	<i>Table of Organization and Equipment</i>
<b>TP</b>	<i>Transportation Priority</i>
<b>TPFDL</b>	<i>Time-Phased Force Deployment List</i>
<b>TR</b>	<i>Transportation Request</i>
<b>TRANSCOM</b>	<i>TRANSportation COMmand</i>
<b>UIC</b>	<i>Unit Identification Code</i>

**WWMCCS***World Wide Military Command and Control System*

The agency that provides the national command authorities with the information on world situations needed for accurate and timely decisions, to include the communications required for reliable transmission of those decisions with a minimum of delay under all conditions of peace and war for the national direction of US military forces. It consists of the facilities, equipment, communications, procedures, and personnel that provide technical and operational support involved in the function of command and control of U.S. military forces.

## Appendix I MoveCon Vehicle and Sample Road Data

Id	Type	Length	Width	Height	Load	Description
101a	M151	6.5	5.5	4.5	3	Utility vehicle, $\frac{1}{4}$ ton, 4x4 "Jeep"
102a	M151	6.5	5.5	4.5	3	Utility vehicle, $\frac{1}{4}$ ton, 4x4 "Jeep"
103a	M151	6.5	5.5	4.5	3	Utility vehicle, $\frac{1}{4}$ ton, 4x4 "Jeep"
110c	M151	6.5	5.5	4.5	3	Utility vehicle, $\frac{1}{4}$ ton, 4x4 "Jeep"
206a	M880	9.5	6.5	6.0	4	Cargo truck, $1\frac{1}{4}$ ton, 4x4
208a	M880	9.5	6.5	6.0	4	Cargo truck, $1\frac{1}{4}$ ton, 4x4
209b	M880	9.5	6.5	6.0	4	Cargo truck, $1\frac{1}{4}$ ton, 4x4
222b	M35	11.5	7.5	7.5	10	Cargo truck, $2\frac{1}{2}$ ton, 6x6
226b	M35	11.5	7.5	7.5	10	Cargo truck, $2\frac{1}{2}$ ton, 6x6
227b	M35	11.5	7.5	7.5	10	Cargo truck, $2\frac{1}{2}$ ton, 6x6
231b	M35	11.5	7.5	7.5	10	Cargo truck, $2\frac{1}{2}$ ton, 6x6
310c	M814	14.0	7.0	8.25	21	Cargo truck, 5 ton, 6x6, w/winch
314c	M814	14.0	7.0	8.25	21	Cargo truck, 5 ton, 6x6, w/winch
317c	M814	14.0	7.0	8.25	21	Cargo truck, 5 ton, 6x6, w/winch
322d	M814	14.0	7.0	8.25	21	Cargo truck, 5 ton, 6x6, dropside
323d	M814	14.0	7.0	8.25	21	Cargo truck, 5 ton, 6x6, dropside
324d	M814	14.0	7.0	8.25	21	Cargo truck, 5 ton, 6x6, dropside
404b	M127	40.5	8.4	10.4	25	Trailer, platform, $12\frac{1}{2}$ ton w/M818 tractor
405b	M127	40.5	8.4	10.4	25	Trailer, platform, $12\frac{1}{2}$ ton w/M818 tractor
408b	M127	40.5	8.4	10.4	25	Trailer, platform, $12\frac{1}{2}$ ton w/M818 tractor
414b	M127	40.5	8.4	10.4	25	Trailer, platform, $12\frac{1}{2}$ ton w/M818 tractor
452f	M871	43.0	8.8	11.5	35	Trailer, container, $22\frac{1}{2}$ ton w/M818 tractor
457f	M871	43.0	8.8	11.5	35	Trailer, container, $22\frac{1}{2}$ ton w/M818 tractor
462f	M871	43.0	8.8	11.5	35	Trailer, container, $22\frac{1}{2}$ ton w/M818 tractor
465g	M871	43.0	8.8	11.5	35	Trailer, container, $22\frac{1}{2}$ ton w/M818 tractor
513a	M872	53.2	9.1	12.2	46	Trailer, container, 34 ton w/M915 tractor
517a	M872	53.2	9.1	12.2	46	Trailer, container, 34 ton w/M915 tractor
519b	M872	53.2	9.1	12.2	46	Trailer, container, 34 ton w/M915 tractor

**Table 3 List of Logistical Vehicles**

<b>Id</b>	<b>Type</b>	<b>Length</b>	<b>Width</b>	<b>Height</b>	<b>Load</b>	<b>Description</b>
711a	M151	6.5	5.5	4.5	3	Utility vehicle, $\frac{1}{4}$ ton, 4x4 "Jeep",
712a	M151	6.5	5.5	4.5	3	Utility vehicle, $\frac{1}{4}$ ton, 4x4 "Jeep"
713a	M151	6.5	5.5	4.5	3	Utility vehicle, $\frac{1}{4}$ ton, 4x4 "Jeep",
714a	M151	6.5	5.5	4.5	3	Utility vehicle, $\frac{1}{4}$ ton, 4x4 "Jeep"
722b	M35	28.0	7.5	8.2	11	Truck, $2\frac{1}{2}$ ton towing 105 mm howitzer
724b	M35	28.0	7.5	8.2	11	Truck, $2\frac{1}{2}$ ton towing 105 mm howitzer
725b	M35	28.0	7.5	8.2	11	Truck, $2\frac{1}{2}$ ton towing 105 mm howitzer
726b	M35	28.0	7.5	8.2	11	Truck, $2\frac{1}{2}$ ton towing 105 mm howitzer
727b	M35	28.0	7.5	8.2	11	Truck, $2\frac{1}{2}$ ton towing 105 mm howitzer
728b	M35	28.0	7.5	8.2	11	Truck, $2\frac{1}{2}$ ton towing 105 mm howitzer
729b	M814	31.5	8.2	8.6	22	Truck, 5 ton towing 155 mm howitzer
731c	M814	31.5	8.2	8.6	22	Truck, 5 ton towing 155 mm howitzer
732c	M814	31.5	8.2	8.6	11	Truck, 5 ton towing 155 mm howitzer
791c	M35	22.0	7.5	9.5	12	Truck, $2\frac{1}{2}$ ton towing water tank
794b	M35	28.0	7.5	8.2	12	Truck, $2\frac{1}{2}$ ton towing MKT75 kitchen
742c	M35	22.5	7.5	11.5	12	Truck, $2\frac{1}{2}$ ton towing antenna/shelter
743c	M35	22.5	7.5	11.5	12	Truck, $2\frac{1}{2}$ ton towing antenna/shelter
746c	M35	22.5	7.5	8.2	12	Truck, $2\frac{1}{2}$ ton towing diesel generator
747c	M35	22.5	7.5	8.2	12	Truck, $2\frac{1}{2}$ ton towing diesel generator
751b	M814	28.5	9.2	10.2	15	Truck, 5 ton towing FC TCA trailer
752b	M814	28.5	9.2	10.2	15	Truck, 5 ton towing FC TCA trailer
755c	M127	38.5	8.8	10.3	25	Truck/trailer w/FIST team vehicle
756c	M127	38.5	8.8	10.3	25	Truck/trailer w/FIST team vehicle
757c	M127	38.5	8.8	10.3	25	Truck/trailer w/FIST team vehicle
795a	M814	26.5	8.2	9.8	22	Truck, 5 ton towing 4000 gal. gasoline tank

**Table 4 List of Vehicles for Sample Field Artillery Unit Move**

Seg. Id.	Endpoints	Length	Speed	Width	Weather	Load	Height	Obst.
A	0217, 0631	14.5	55	9.5	X	90	100.0	N
B	0217, 1225	12.8	40	9.2	Y	30	12.5	N
C	0217, 1113	9.8	35	8.8	Y	55	13.3	N
D	0217, 0604	13.6	55	9.3	X	90	100.0	N
E	0631, 2031	14.0	55	9.5	X	90	100.0	N
F	0631, 1225	8.7	45	8.4	Y	40	11.9	N
G	0604, 1402	8.2	55	9.5	X	90	15.2	N
H	1225, 1924	7.1	40	9.2	Y	25	13.8	N
I	1113, 1924	13.6	45	9.8	Y	40	12.9	N
J	1113, 2813	17.0	55	9.3	X	90	100.0	N
K	1113, 1905	11.3	55	9.7	X	90	100.0	N
L	1402, 1905	5.8	55	9.8	X	90	12.9	N
M	1402, 2802	14.0	55	9.5	X	90	100	N
N	1924, 3122	12.1	55	9.3	X	90	100.0	N
O	2031, 3731	17.0	55	9.5	X	90	100.0	N
P	2031, 3824	19.3	45	8.8	X	40	12.2	N
Q	1905, 3208	13.3	55	9.2	X	90	13.4	N
R	2813, 3122	15.8	55	9.0	X	90	14.8	N
S	2813, 3208	6.4	45	8.8	Y	45	13.5	N
T	2802, 3208	6.4	45	8.8	Y	35	13.0	N
U	2802, 3603	8.1	55	9.2	X	90	100.0	N
V	3122, 3824	7.3	45	8.8	X	90	100.0	N
W	3122, 3717	7.1	45	9.0	X	90	12.5	N
X	3208, 3717	10.3	55	9.2	X	90	100.0	N
Y	3603, 4505	9.2	55	9.2	X	35	12.8	N
Z	3731, 3824	7.1	55	9.0	X	90	100.0	N
AA	3731, 4429	7.3	55	9.2	X	90	100.0	N
AB	3824, 4516	10.6	45	8.5	Y	45	12.5	N
AC	3717, 4516	8.1	55	9.0	X	90	100.0	N
AD	3717, 4505	14.4	55	9.5	X	50	13.2	N
AE	4429, 4516	13.1	55	9.5	X	90	100.0	N
AF	4506, 4516	10.0	55	9.5	X	90	100.0	N

**Table 5 List of Route Segment Characteristic Data**

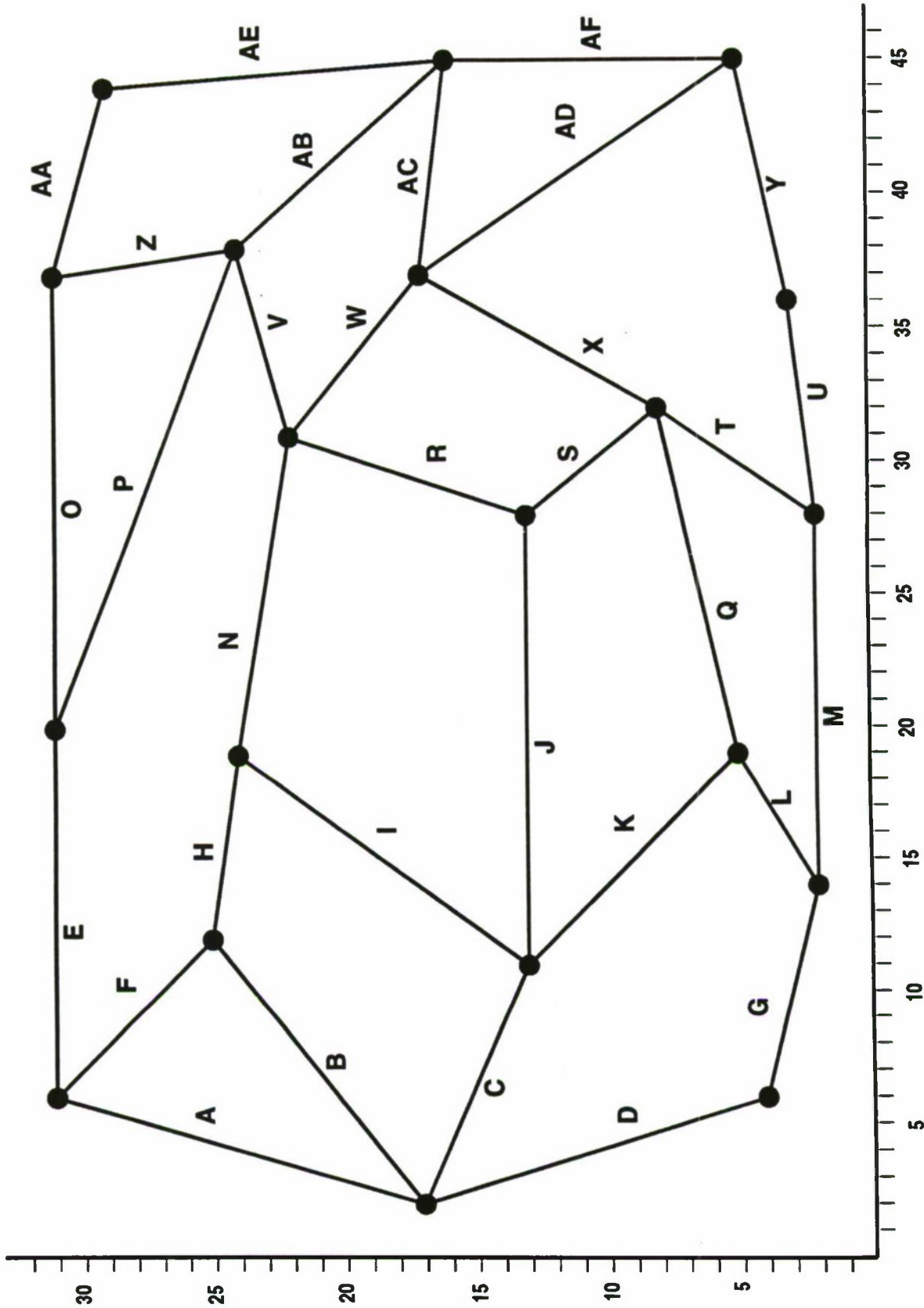


Figure I-1 Road Segment Map

## References

- [AFATDS89] *Final Computer Program Development Specification for the Movement Control CPCI for the Fire Support System/Fire Support Terminal for AFATDS.*  
Maganvox Electomic Systems Division, Fort Wayne, IN, March 31, 1989.
- [ACAM86] *Army Command and Management, Theory and Practice.*  
US Army War College, Carlisle Barracks, PA, August 19, 1986.
- [AR 310-25] *Army Regulation AR 310-25, Dictionary of United States Army Terms.*  
Headquarters, Department of the Army, Washington, DC, May 1986.
- [FM 5-36] *Army Field Manual FM 5-36, Route Reconnaissance and Classification.*  
Headquarters, Department of the Army, Washington, DC, March 1985.
- [FM 34-1] *Army Field Manual FM 34-1, Intelligence and Electronic Warfare Operations.*  
Headquarters, Department of the Army, Washington, DC, July 1987.
- [FM 34-3] *Army Field Manual FM 34-3, Intelligence Analysis.*  
Headquarters, Department of the Army, Washington, DC, January 1986.
- [FM 55-1] *Army Field Manual FM 55-1, Transportation Services in a Theater of Operations.*  
Headquarters, Department of the Army, Washington, DC, July 1985.
- [FM 55-10] *Army Field Manual FM 55-10, Movement Control in a Theater of Operations.*  
Headquarters, Department of the Army, Washington, DC, November 1990.
- [FM 55-15] *Army Field Manual FM 55-15, Transportation Reference Data.*  
Headquarters, Department of the Army, Washington, DC, June 1986.
- [FM 55-30] *Army Field Manual FM 55-30, Army Motor Transport Units and Operations.*  
Headquarters, Department of the Army, Washington, DC, December 1984.
- [FM 100-5] *Army Field Manual FM 100-5, Operations.*  
Headquarters, Department of the Army, Washington, DC, May 1986.
- [FM 100-15] *Army Field Manual FM 100-15, Corps Operations.*  
Headquarters, Department of the Army, Washington, DC, September 1989.
- [FM 101-5] *Army Field Manual FM 101-5, Staff Organization and Operations.*  
Headquarters, Department of the Army, Washington, DC, May 1984.
- [FM 101-5-1] *Army Field Manual FM 101-5-1, Organizational Terms and Symbols.*  
Headquarters, Department of the Army, Washington, DC, October 1985.

- [FM 101-10-1] Army Field Manual FM 101-10-1, *Staff Officers' Field Manual Organizational, Technical, and Logistical Data*.  
Headquarters, Department of the Army, Washington, DC, October 1987.
- [JCS 1-02] Joint Publication 1-02, *Department of Defense Dictionary of Military and Associated Terms*.  
Joint Chiefs of Staff, Department of Defense, Washington, DC, December 1989.
- [PEOCCS90] US Army Combined Arms Combat Development Agency.  
*Army Tactical Command and Control System (ATCCS) Map Background and Terrain Analysis Requirements*.  
Memorandum for Program Executive Officer, Command and Control Systems,  
Fort Monmouth, NJ, June 6, 1990.
- [SEI90a] Kyo C. Kang, Sholom G. Cohen, James A. Hess, William E. Novak, & A. Spencer Peterson.  
*Feature-Oriented Domain Analysis (FODA) Feasibility Study (CMU/SEI-90-TR-21, ADA235785)*  
Software Engineering Institute, Pittsburgh, PA, November 1990.
- [SEI91a] A. Spencer Peterson & Sholom G. Cohen.  
*A Context Analysis of the Movement Control Domain for the Army Tactical Command and Control System (ATCCS) (CMU/SEI-91-SR-3)*  
Software Engineering Institute, Pittsburgh, PA, April 1991.
- [STALL87] Richard Stallman.  
*GNU Emacs Manual, Sixth Edition, Version 18*.  
Free Software Foundation, Cambridge, MA, March 1987.
- [ST2155] NATO Military Agency for Standardization.  
*Road Movement Clearance and Road Movement Credit*.  
STANAG 2155, Edition 4, Brussels, Belgium, March 1988.
- [ST2156] NATO Military Agency for Standardization.  
*Surface Transport Request and Surface Transport Reply*.  
STANAG 2156, Edition 4, Brussels, Belgium, March 1988.



# Index of Feature and Entity Names

Action D-19  
Active E-29  
Actual D-19  
Adjust E-22  
Air D-10  
Air Support D-11  
alt\_avail E-7  
Alternate Route E-15  
alternate\_route E-15  
Alternative Availability E-7  
Ammunition D-7  
ASL Assets D-7  
asl\_assets D-7  
Assets D-7, E-5  
Automatic E-3  
Auto-Routing E-14

Backward Planning E-11  
Balance Requirements vs. Capabilities E-17  
Below E-27  
Best E-13  
bkwd\_plan E-12

c\_length E-9  
calc\_travel\_time E-12  
Calculate Travel Time E-12  
central E-24  
Centralized E-24  
Change Position E-4  
Change Route E-14  
change\_pos E-5  
change\_rt E-14  
Check Critical Times E-21  
Check Point D-22  
Checkpoint D-17, D-19  
Checkpoints D-21  
Classes E-6  
Close D-13, E-30  
Column D-11, D-12, D-17, D-18  
Column Formation E-9  
Column Length D-13, E-9  
column\_form E-9  
Commander D-5  
Commence D-19

Common User Asset E-7  
comp\_data E-10  
Context E-22  
Control Class D-16, D-17  
Control Measures D-11  
Control Strategy E-24  
Convoy Building E-8, E-11  
Convoy Organization D-11  
convoy\_org D-11  
coord\_instr D-11  
coord\_request E-19  
coord\_response E-19  
Coordinating Instructions D-10  
Coordination Request E-19  
Coordination Response E-19  
Corps E-26  
Crisis E-27  
critical\_tim E-21  
ctrl\_class D-17  
ctrl\_meas D-11  
ctrl\_strgy E-24  
Current D-8

deconflict E-16  
Deconflict Position E-5  
deconflict\_pos E-5  
Deconfliction E-16  
Deep E-30  
Defense on Move D-11  
Defense Option E-28  
Defense Planning E-10, E-28  
defense\_option E-28  
defense\_plan E-11  
Defensive E-30  
Deliberate E-27  
Density D-11  
dep\_events E-11  
Dependent Events E-11, E-16  
Detached Party D-14, D-15  
detached\_party D-15  
deter\_critical\_time E-12  
deter\_ctrl\_pts E-12  
deter\_pos E-5  
deter\_rt E-14  
Determine Control Points E-12

Determine Critical Time E-12  
Determine Position E-5  
Determine Route E-14  
dev\_plan E-4  
Develop Plan E-4, E-16  
Directing E-17  
Dispatch D-17  
dist E-24  
dist\_pattern E-3  
dist\_plan D-15  
Distributed E-24  
Distribution Pattern E-3  
Distribution Plans D-15  
Division E-26

Elements D-14  
End Points D-21  
Enemy Contact E-31  
enemy\_contact E-31  
Enter Composition Data E-10  
Enter Gap Data E-10  
Enter Groupings E-10  
Enter Segment E-14  
Enter Terrain Data E-2  
enter\_sgmnt E-15  
environment D-1  
Equipment D-8, E-8  
Estimate E-22  
Event Times D-18  
Events D-18, D-21  
Executing E-20

Fixed E-9  
Food D-7  
Formation D-13  
frag D-2  
Fragmentary Order D-2

gap\_data E-10  
Generate Outputs E-20  
Global E-25  
Governed E-10  
Graphs E-34  
groupings E-10

Halt D-19  
Head D-14  
Headquarters D-5  
High E-32  
Highway Regulation E-15  
Highway Traffic Regulation E-16  
Host Nation Guidance E-18  
host\_nat\_guid E-18  
hwy\_reg E-15

Imminent E-31  
improb E-31  
in\_transit\_vis E-22  
indep\_evnt E-16  
Independent Events E-16  
Infiltration D-13, D-14  
inputs E-18  
intell D-19  
Intelligence D-19  
In-Transit Visibility E-22  
IPB D-22

Joint E-26

Kind E-32

Large Scale E-4  
large\_scale E-4  
Lateral E-28  
Length D-17, D-21  
Level of Command D-19, E-26  
Level of Conflict E-31  
Load Class D-20  
Location D-21  
Logistical E-33  
Low E-32  
lvl\_of\_cmd E-26  
lvl\_of\_conflict E-32

Main Body D-14  
main\_body D-15  
Maintain Movement Data E-22

maintn\_mvmt\_dat E-22  
Manual E-3  
Maps E-33  
March Unit D-12  
march\_unit D-13  
Mechanism E-2  
Medium E-32  
Messages E-18  
Method D-10  
Minimum Height D-20  
Minimum Width D-20  
Mission D-4, D-6, E-22  
Mode Determination E-3  
mode\_deter E-4  
Monitoring E-21  
Movement E-8  
Movement Order D-3, D-4, E-18  
Movement Request E-18  
Movement Status Response E-19  
Movement Table D-3  
Mvmt. Status Request E-19  
Mvmt. Status Response E-19  
mvmt\_ord D-3  
mvmt\_order E-18  
mvmt\_request E-19  
mvmt\_stat\_rqst E-19  
mvmt\_stat\_rspn E-19  
mvmt\_table D-4

Networks E-8  
non\_org E-7  
None E-32  
Non-Organic E-6

Offensive E-29  
op\_area E-30  
Open D-13, D-14, D-17  
Operational E-28  
Operational Order E-24  
Operational Plan E-23  
Operations E-1  
Operations Area E-30  
OPLAN E-23  
OPLAN/OPORD D-2  
OPORD E-24

ops E-12  
ord\_of\_march D-11  
Order Of March D-11  
Order of March D-10  
Orders D-1, D-2, D-3  
Organic E-6  
outputs E-20

paral\_evnt E-17  
Parallel Events E-16  
Passive E-29  
PDN D-15  
Personnel D-8  
Physical Distribution Network D-15, D-16  
Planned D-8, D-9  
Planning E-1  
POL D-7, D-8  
Policy E-27  
Posture E-29  
Preferred Availability E-7  
preferred\_aval E-7  
Primary Route E-15  
primary\_route E-15  
Prioritization E-16  
Priorization E-8  
Produce Strip Map E-20  
Prohibited D-17

Rail D-10  
rd\_mvmt\_annex D-3  
Rear E-30  
Receive Inputs E-17  
Regional CINC E-25  
regional\_CINC E-25  
Remote E-31  
Replies E-20  
Representation E-33  
req\_vs\_cap E-17  
Reserve D-17  
Reuse E-7  
Road D-10  
Road Information D-17, D-20  
Road Movement Annex D-3, D-4  
Route D-17  
Route Classification E-1

route\_class E-2  
Routes D-3, D-12, D-16, D-18  
Routing E-11, E-13  
Routing Ops E-14  
routing\_ops E-14  
rt D-17

Satisfice E-14  
Scheduled D-19  
Schedules D-3, D-12, D-17, D-18  
Scheduling E-5, E-11  
Scheduling Ops E-12  
Schematics E-34  
schemtcs E-34  
Security D-11  
Segments D-17  
Selection E-13  
Serial D-12  
Services D-10  
Set Actual Time E-12  
set\_actual\_time E-13  
Show Moving Units Positions E-21  
Show Planned Positions E-5  
Show Unit Movement Status E-21  
show\_plan\_pos E-5  
Site Selection E-4  
site\_sel E-4  
Size D-11  
Small Scale E-4  
small\_scale E-4  
Speed D-11, D-21  
Staff D-5  
Status D-4, D-6, D-7  
Strategic E-26, E-27  
strip\_map E-20  
Structure D-4, D-5, D-6  
subord\_units D-6  
Subordinate Units D-5  
Supervised D-17  
Supplies D-7, D-10  
Support D-7, D-10

T D-20  
Tables E-34  
Tactical E-26, E-27, E-28

task D-4	Weather Analysis D-23
Task Force D-4, D-6	
TCP D-16	
technical D-19	X D-20
Technical Intelligence D-19	
terrain D-23	Y D-20
Terrain Analysis D-22	
terrain_dat E-2	
Text E-34	Z D-20
Theater Army E-26	
theater_army E-26	
threat D-24	
Threat Evaluation D-24	
TOE Assets D-8, D-10	
toe_assets D-8	
Traffic Control Plan D-16, D-17	
traffic_control E-16	
Trail D-14, D-15	
trans D-10	
Transportation D-1, D-10	
Transportation Intelligence D-20	
transporting D-20	
type D-19	
Types E-27	
UIC D-7	
uic D-7	
Unit E-33	
unit D-8	
Unit Positions D-8	
unit_pos E-22	
unit_stat E-21	
Units D-1, D-4, D-6	
usage D-8	
Usage Rate D-8	
Vehicles D-8, D-13, E-6	
W D-20	
warning D-2	
Warning Order D-2	
Water D-10	
Weather D-20	
weather D-24	



## REPORT DOCUMENTATION PAGE

<b>1a. REPORT SECURITY CLASSIFICATION</b> Unclassified		<b>1b. RESTRICTIVE MARKINGS</b> None																	
<b>2a. SECURITY CLASSIFICATION AUTHORITY</b> N/A		<b>3. DISTRIBUTION/AVAILABILITY OF REPORT</b> Approved for Public Release Distribution Unlimited																	
<b>2b. DECLASSIFICATION/DOWNGRADING SCHEDULE</b> N/A																			
<b>4. PERFORMING ORGANIZATION REPORT NUMBER(S)</b> CMU/SEI-91-TR-28		<b>5. MONITORING ORGANIZATION REPORT NUMBER(S)</b> ESD-TR-91-028 (Appendices)																	
<b>6a. NAME OF PERFORMING ORGANIZATION</b> Software Engineering Institute	<b>6b. OFFICE SYMBOL (if applicable)</b> SEI	<b>7a. NAME OF MONITORING ORGANIZATION</b> SEI Joint Program Office																	
<b>6c. ADDRESS (City, State and ZIP Code)</b> Carnegie Mellon University Pittsburgh PA 15213		<b>7b. ADDRESS (City, State and ZIP Code)</b> ESD/AVS Hanscom Air Force Base, MA 01731																	
<b>8a. NAME OFFUNDING/SPONSORING ORGANIZATION</b> SEI Joint Program Office	<b>8b. OFFICE SYMBOL (if applicable)</b> ESD/AVS	<b>9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER</b> F1962890C0003																	
<b>8c. ADDRESS (City, State and ZIP Code)</b> Carnegie Mellon University Pittsburgh PA 15213		<b>10. SOURCE OF FUNDING NOS.</b> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 5px;"> <tr> <td style="width: 25%;">PROGRAM ELEMENT NO</td> <td style="width: 25%;">PROJECT NO.</td> <td style="width: 25%;">TASK NO</td> <td style="width: 25%;">WORK UNIT NO.</td> </tr> <tr> <td>63756E</td> <td>N/A</td> <td>N/A</td> <td>N/A</td> </tr> </table>			PROGRAM ELEMENT NO	PROJECT NO.	TASK NO	WORK UNIT NO.	63756E	N/A	N/A	N/A							
PROGRAM ELEMENT NO	PROJECT NO.	TASK NO	WORK UNIT NO.																
63756E	N/A	N/A	N/A																
<b>11. TITLE (Include Security Classification)</b> Application of Feature-Oriented Domain Analysis to the Army Movement Control Domain, APPENDICES A - I																			
<b>12. PERSONAL AUTHOR(S)</b> Sholom G. Cohen, Jay L. Stanley, Jr., A. Spencer Peterson, and Robert W. Krut, Jr.																			
<b>13a. TYPE OF REPORT</b> Final	<b>13b. TIME COVERED</b> FROM TO	<b>14. DATE OF REPORT (Yr., Mo., Day)</b> June 1992	<b>15. PAGE COUNT</b> 154 pp.																
<b>16. SUPPLEMENTARY NOTATION</b>  																			
<b>17. COSATI CODES</b> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 5px;"> <thead> <tr> <th style="width: 33%;">FIELD</th> <th style="width: 33%;">GROUP</th> <th style="width: 33%;">SUB. GR.</th> </tr> </thead> <tbody> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> </tbody> </table>			FIELD	GROUP	SUB. GR.													<b>18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number)</b> common Army terminology and requirements domain analysis <span style="float: right;">tool support</span> movement control	
FIELD	GROUP	SUB. GR.																	
<b>19. ABSTRACT (Continue on reverse if necessary and identify by block number)</b> This report documents an analysis of the army movement control domain performed by the Software Engineering Institute (SEI) and a team of movement control experts from the Army. This report includes common terminology and requirements extracted from Army doctrine, experts in the field, and movement control systems. The report also describes the potential for prototyping of systems using domain analysis products and the tool support needed.																			
(please turn over)																			
<b>20. DISTRIBUTION/AVAILABILITY OF ABSTRACT</b> UNCLASSIFIED/UNLIMITED SAME AS RPTDTIC USERS		<b>21. ABSTRACT SECURITY CLASSIFICATION</b> Unclassified, Unlimited Distribution																	
<b>22a. NAME OF RESPONSIBLE INDIVIDUAL</b> John S. Herman, Capt, USAF		<b>22b. TELEPHONE NUMBER (Include Area Code)</b> (412) 268-7631	<b>22c. OFFICE SYMBOL</b> ESD/AVS (SEI)																

ABSTRACT —continued from page one, block 19