ARMY MOTOR TRANSPORT UNITS AND OPERATIONS

HEADQUARTERS, DEPARTMENT OF THE ARMY

Change No. 1

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, DC,

ARMY MOTOR TRANSPORT UNITS AND OPERATIONS

This change replaces Chapter 2 to the basic manual. This change also includes an updated Glossary listing.

1. Change FM 55-30, 27 June 1997, as follows:

Remove pages	Insert pages
i and ii	i and ii
2-1 through 2-16	2-1 through 2-20
Glossary-1 through Glossary-4	Glossary-1 through Glossary-5

2. A star ( ) marks new or changed material.

3. File this transmittal sheet in front of the publication.

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Field Manual
HEADQUARTERS
55-30 **DEPARTMENT OF THE**
ARMY

Washington, DC,

ARMY MOTOR TRANSPORT UNITS AND OPERATIONS

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PREFACE

In a theater of operations, all modes of transport--air, rail, inland waterways, and motor--are used to move personnel, cargo, and unit equipment. Of these modes, motor transport is the most flexible. Motor transport supports movement requirements ranging from port clearance, tactical displacement, and distribution and retrograde of supplies and equipment throughout the depth of the battlefield. It also serves as the link between the other modes to support combat forces as far forward as possible.

This manual describes how motor transport units operate and the environment in which they operate. It incorporates changes to warfighting and support doctrine and equipment modernization. While this manual is designed primarily for motor transport units, the tactics, techniques, and procedures for convoy operations apply to most Army units under most operational conditions.

The Army's environmental strategy into the 21st century defines our philosophy and commitment in protecting and preserving the environment and natural resources for present and future generations. Sound environmental practices and considerations must be integrated into all Army documents, missions, and operations. In keeping with the Army's vision to be a national leader in environmental stewardship, commanders and leaders must ensure that all local, state, federal, and host nation laws and regulations pertaining to the environment are included in the planning process and strictly followed.

This publication implements the following international agreements:

- STANAG 2041 (Edition 4), Operation Orders, Tables and Graphs for Road Movement (see Appendix A).
- STANAG 2154 (Edition 7), Regulations for Military Motor Vehicle Movement by Road (see Appendix B).
- STANAG 2174 (Edition 4), Military Routes and Route/Road Networks (see Appendix C).
- STANAG 2176 (Edition 2), Procedures for Military Road Movement Across National Frontiers (see Appendix D).

The proponent of this publication is HQ TRADOC. Send comments and recommendations on DA Form 2028 (Recommended Changes to Publications and Blank Forms) to Commander, USACASCOM, ATTN: ATCL-AT, Fort Lee, VA 23801-6000.

Unless this publication states otherwise, masculine nouns and pronouns do not refer exclusively to men.

ACKNOWLEDGMENTS

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CHAPTER 1

ORGANIZATIONAL CONCEPTS FOR MOTOR TRANSPORT OPERATIONS

Army transportation units must be prepared to support US Armed Forces and their allies in a variety of operational environments, ranging from war to domestic support operations. These operations may be conducted anywhere in the world, and transportation units must be ready to deploy on short notice. Also, they must be prepared to remain after operations terminate to support the redeployment of other combat and support forces. Motor transport is the predominant mode of transportation for the reception, onward movement, and sustainment of forces. Motor transport units must be highly trained, rapidly deployable, and capable of sustaining themselves for a long time. This chapter addresses basic organizational and operational concepts from theater army level down through the division.

1-1. MOTOR TRANSPORT ORGANIZATION CONCEPT. Motor transport units are at each echelon: theater army, corps, and division. These units--together with other mode operators (water, rail, and air), terminal operators, and movement control units--form the backbone of the theater's transportation capability. Most of the Army's motor transport units are located above division level and are assigned to a transportation battalion (motor transport) or a CSB. Motor transport units are usually assigned to the following headquarters:

- Theater army (COMMZ):
  - Transportation command.
  - Transportation groups.
  - Transportation battalions.
  - Area support groups.

- Corps:
  - Support commands.
  - Support groups.
  - Support battalions.
  - Transportation battalions.

- Division: Main support battalion.

The Army will fight as part of a joint team. Motor transport units must be prepared to support the inland surface movement requirements of other services or nations and to integrate HN, LOGCAP, or other contract support. The Army will fight as a total force--active and reserve components and civilians. Army transportation headquarters units must be able to integrate all deployed mode operating units. The objective is a seamless transportation system that supports the movement requirements of the joint force and the Army.

The senior Army headquarters in a theater of operations is normally the Army component headquarters of the joint force. The Army component may be a theater army, corps, or division. Planners determine the transportation force structure that deploys to support an operation based on the following:

- Mission.
- Magnitude of transportation tasks.
- Size of the supported force.
- Availability and quality of HN support.
- Type and extent of LOGCAP support.

In any case, Army motor transport units will be deployed to support nearly all operations. The following missions must be performed regardless of the echelonment of forces or the type of transportation headquarters:

- Reception and onward movement of forces.
- Port clearance.
- Theaterwide distribution and retrograde of personnel, supplies, and equipment.
- Operational mobility.
- Tactical support to sustain combat operations.
- Environmental protection.

The operation dictates the transportation force structure required.

The Army's environmental vision requires that units at all levels integrate and practice effective environmental protection programs in all operations. Because motor transport units have the potential to make a major impact on the environment, training and operations must be conducted IAW applicable environmental laws and regulations.

1-2. THEATER ARMY. When the scope of operations warrants the deployment of a theater army headquarters, the appropriate support structure will usually also be deployed. From a transportation perspective, this includes a TRANSCOM as the senior mode and terminal operating headquarters and a TMCA as the senior movement control headquarters (Figure 1-1). Both the TMCA and TRANSCOM serve under the staff supervision of the theater army DCSLOG.

The senior logistics headquarters in the COMMZ is the TAACOM. The TAACOM provides logistics support through subordinate ASGs. ASGs have a variety of logistics units but usually do not have transportation units assigned when the TRANSCOM is deployed. The TRANSCOM provides direct support to the TAACOM and other units operating in the COMMZ. In operations where EAC logistics support is required short of a full capability, motor transport units may be assigned to an ASG or a transportation composite group.

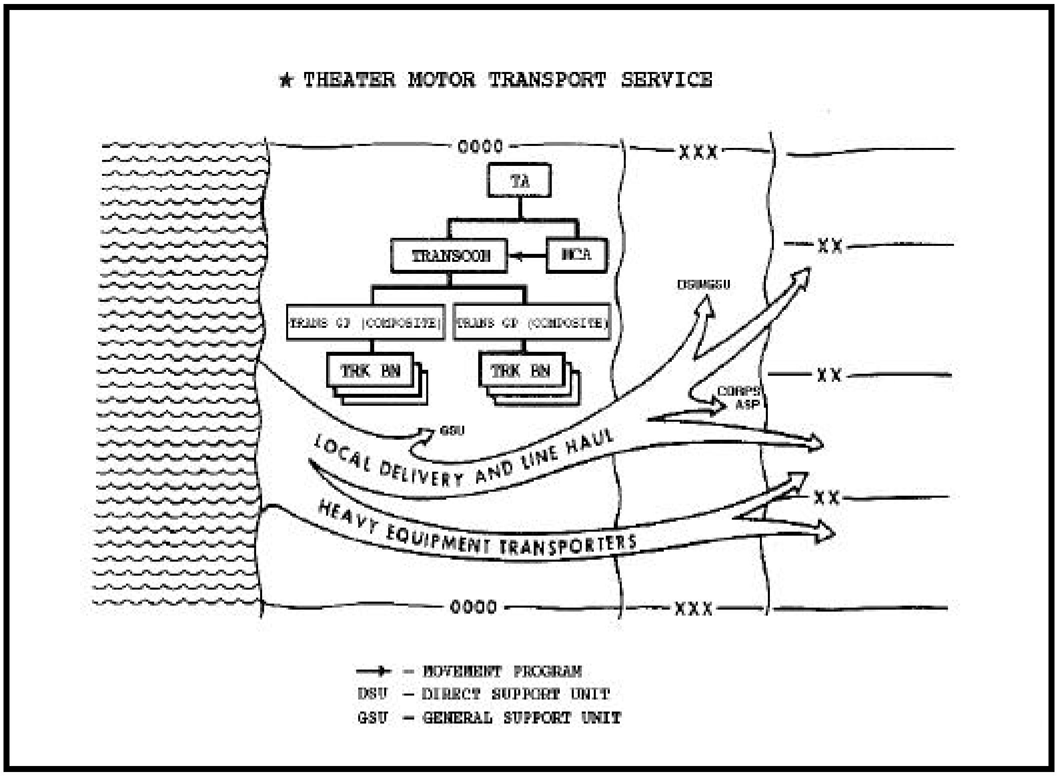

Figure 1-1. Theater motor transport service

The TRANSCOM provides theaterwide transportation services. It implements theater movement programs that include port clearance and local and line haul transportation to theater, corps, and division locations. The TRANSCOM has subordinate transportation groups and battalions with a variety of motor transport, cargo transfer, terminal service, watercraft, and rail units. These units are located to support transportation requirements.

a. **Transportation Group (Composite).** The mission of the transportation group headquarters is to command and control transportation units. The group may serve under the command and control of the TRANSCOM, if deployed, or operate as a major command of the theater army or as EAC augmentation to the corps. As a mode operator, the TRANSCOM or group:

- Commands and controls fleet assets.
- Operates inland intermodal and transfer points.
- Provides transportation assets as committed by a movement control organization.

Both have planning functions designed to complement movement control planning. They include organizational level planning--

- To evaluate motor transport requirements.
- To study conditions affecting road movement.
- To plan specific road movements.

b. **Battalion.** The battalion headquarters commands, controls, and supervises units engaged in all types of motor transport missions. The battalion supervises operating units that perform local and line haul operations, terminal clearance, or transfer operations. The battalion headquarters plans and schedules tasks to conform with the overall movement program. The battalion receives commitments for transportation from a movement control authority and translates these into specific vehicles or units required. It then passes taskings to its subordinate truck companies.

1-3. THEATER MOVEMENT CONTROL. Movement control is the planning, routing, scheduling, controlling, coordinating, and in-transit visibility of units, personnel, supplies, and equipment moving over the lines of communication. Movement control units commit transportation assets according to command planning directives. At theater army level, the normal movement control organization is the TMCA. The TMCA provides centralized movement control for the theater. This includes movement management services and highway traffic regulation. The TMCA also--

- Supports other allied and HN forces, as required.
- Prepares movement and port clearance plans and programs.
- Conducts liaison with higher, lower, HN, and foreign movement military movement control elements.
- Supervises the activities of subordinate transportation battalions (MC), movement control detachments, port detachments, and movement regulating detachments.

FMs 55-10 and 100-16 cover movement control and combat service support in the COMMZ.

1-4. CORPS. A corps may be deployed independently or as part of a theater organization. When the corps deploys independently, motor transport units perform many of the functions usually associated with the TRANSCOM. These include port and terminal clearance and interzonal transportation services. Normally, EAC augmentation is provided so that the corps can focus on its tactical mission.

The COSCOM provides combat service support to the corps (Figure 1-2). Motor transport units in the corps are assigned to the COSCOM and attached to subordinate CSGs. Like the ASG in the COMMZ, the CSG provides logistics support to the corps area on an area basis. Unlike the ASG, the CSG has transportation units as part of its organization. There are two types of CSG: forward and rear.

The CSG (forward) operates behind each division in the corps. Each has subordinate CSBs, forward and rear, with a variety of motor transport units. These normally include medium and light-medium truck companies. The main mission of motor transport units in the forward CSG is distribution of supplies and equipment in support of a division.

The CSG (rear) operates behind the CSG (forward) in the corps rear area. The CSG (rear) has both a TMT battalion and CSB (rear). The transportation battalion will have a variety of motor transport units. These may include combat HET companies, medium truck companies, light truck companies, and command transportation companies. It is a large battalion, and it focuses primarily on the following:

- Operational mobility.
- Corpswide distribution.
- Reinforcing support to the CSG (forward).

The necessary cargo and trailer transfer units may be attached to the battalion to support the battalion mission.

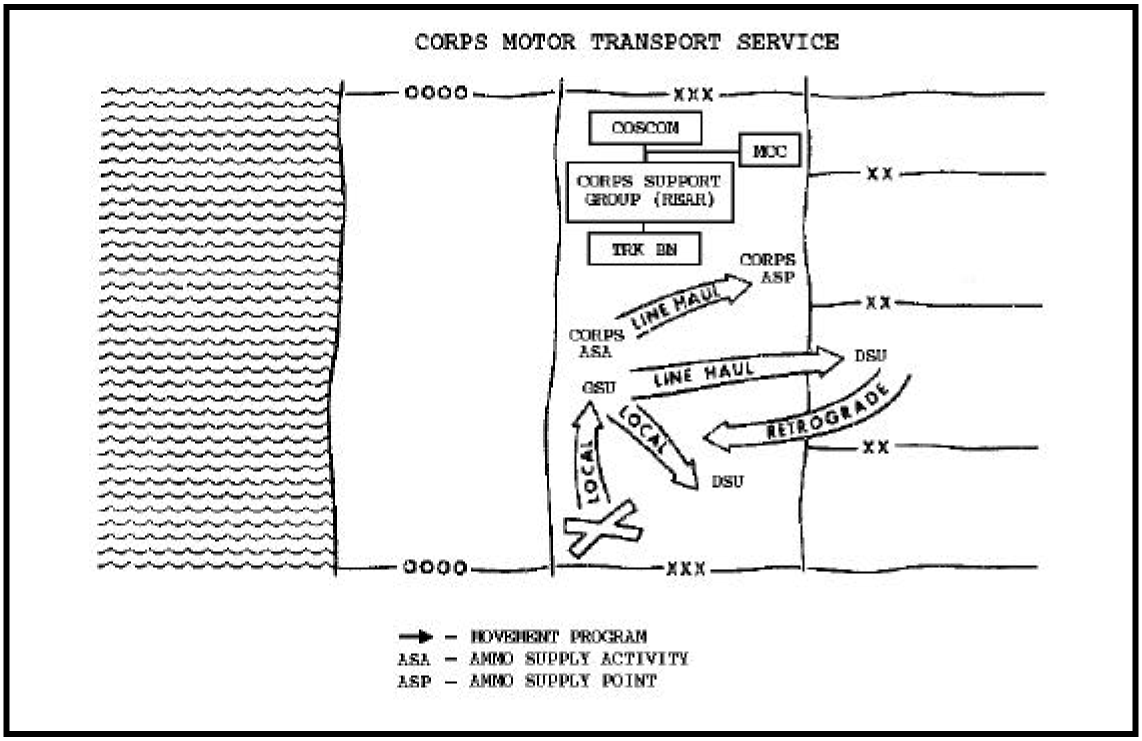

Figure 1-2. Corps motor transport service

1-5. CORPS MOVEMENT CONTROL. The transportation battalion (MC) provides centralized movement control for the corps, including movement management services and highway traffic regulation. The MC battalion also offers the following services:

- Supports allied and HN forces, as required.
- Prepares movement and port clearance plans and programs.
- Conducts liaison with higher, lower, HN, and foreign military movement control elements.
- Commands movement control, port, and movement regulating detachments.

Truck companies in the COMMZ or corps are normally employed in a general support role under operational control of their battalion. Their trucks are committed by the TMCA or MC battalion through the battalion headquarters. Companies may be assigned in a direct support role when the support unit requires full-time use of truck assets.

FMs 54-30, 55-10, and 63-3 cover movement control and combat service support in the corps.

1-6. DIVISION. A division is usually employed as part of a corps organization. The division's motor transport capabilities are limited, and it relies on corps transportation to deliver the bulk of its supplies and equipment. Corps will deliver to both the DSA and the BSAs.

A TMT company is assigned to the MSB of the division. The TMT company moves personnel, supplies, and equipment within the division area. Normally, the TMT company will not deliver Class I, III(B), or V. These commodities are usually throughput by corps. The four types of divisional TMT companies are TOE 55158 (airborne division), 55168 (air assault division), 55178 (light division), and 55188 (heavy division). The mission of each ground division motor transport unit is to distribute unit supplies and to supplement transportation available to other division elements. See Table 1-1 for SRC capability data.

Movement control in the division is a shared responsibility of the DTO on the division staff and the MCO on the DISCOM staff. The DTO coordinates with the division G3 on matters pertaining to tactical maneuver and movement and with the division G4 on logistical and nontactical transportation matters. The DTO assists the MCO in controlling motor transportation resources assigned or attached to the division for logistic support. The DTO is the communications link between the division and the COSCOM MC battalion. The DTO gives the DISCOM MCO broad policy guidance, basic plans and policies, staff supervision, and assistance.

The DISCOM MCO controls the employment of motor transport for CSS within the division. He coordinates priorities with the DTO. (For more on the responsibilities of the DTO and MCO, see FMs 55-2 and 55-10).

1-7. MOTOR TRANSPORT COMPANIES. Motor transport companies are the workhorses of motor transportation. They are basically organized in the same manner with a company headquarters, maintenance section, and three line platoons. See Table 1-2 (pages 1-8 and 1-9) for nondivisional SRC capability data.

1-8. MOTOR TRANSPORT TEAMS. Sometimes a transportation battalion or group headquarters may need added personnel and equipment to meet operational requirements. Motor transport teams can meet specialized requirements.

1-9. HIGHWAY REGULATION. Movement requirements throughout the area of operations place a severe burden on the traffic and tonnage capabilities of the roads. Movement over roads must be controlled to--

- Ensure order.
- Prevent congestion.
- Support command priorities.
- Preclude any adverse effects on the environment.

Control of vehicular traffic is carried out by using clearances according to the highway regulation plan and the traffic circulation plan. These plans include directives, regulations, overlays, and estimates concerning control of MSRs. Motor transport units have specific responsibilities to comply with these plans.

Table 1-1. Divisional TC truck company SRC capability

13 Jul 95								
TOE	DISPATCHES PER DAY			SINGLE LIFT				REMARKS 1, 2
	TRK CGO	TRAC/ STLR	HET	TONS GEN	TONS AMMO	PAX	VEH	
LEVEL 1 CAPABILITY								
55138L000	34	25	5	224	391	1,577	5	3, 4
55158L000	34	10		135	174	801		3
55168L000	34	8		143	245	984		3
55178L000	28	7		117	200	804		3
55188L000	31	28	18	226	396	1,597	18	3, 4
LEVEL 2 CAPABILITY								
55138L000	32	24	5	212	370	1,491	5	3, 4
55158L000	32	10		127	164	921		3
55168L000	32	8		135	231	930		3
55178L000	27	6		110	189	760		3
55188L000	29	26	18	213	374	1,510	18	3, 4
LEVEL 3 CAPABILITY								
55138L000	29	22	5	191	333	1,344	5	3, 4
55158L000	29	9		115	148	830		3
55168L000	29	7		122	209	838		3
55178L000	24	6		99	171	685		3
55188L000	26	24	18	192	337	1,361	18	3, 4

Notes:
1. All data rounded to nearest whole number.
2. TMT companies generally do not perform line- or local-haul missions as defined in doctrine; they are organic to the division.
3. These units normally do not transport ammunition.
4. HETs used for evacuation missions--one tank per HET.

Table 1-2. Nondivisional TC truck company SRC capability data

13 Jul 95

TOE	CONTAINERS		CONTAINERIZED TONS/DAY GENERAL		CONTAINERIZED TONS/DAY AMMO		BB TONS/DAY		GALS/DAY		PAX PER LIFT	TRIPS PER DAY
	40 FT	20 FT	40 FT	20 FT	40 FT	20 FT	GEN	AMMO	POL	WATER		
LEVEL 1 LINE HAUL												
55719L000		17		110			336	576			1,155	
55727L100/200	105	210	1,619	1,359		2,919	737	1,324	787,500	479,850	2,625	
55728L100/200		102		658			487		508,200	304,920	1,779	
55728L300							611	1,911				
55739L100												86
LEVEL 1 LOCAL HAUL												
55719L000		34		219			673	1,151				
55727L100/200	210	420	3,238	2,717		5,838	1,474	2,648	1,575,000	959,700		
55728L100/200		203		1,315			974		1,016,400	609,840		
55728L300							1,222	3,823				
55739L100												NA
LEVEL 2 LINE HAUL												
55719L000		16		104			318	544			1,155	
55727L100/200	99	199	1,532	1,286		2,762	698	1,253	745,200	454,075	2,625	
55728L100/200		96		622			460		480,600	288,360	1,779	
55728L300							1,222	1,833				
55739L100												78
LEVEL 2 LOCAL HAUL												
55719L000		32		207			636	1,088				
55727L100/200	199	397	3,064	2,571		5,524	1,395	2,506	1,490,400	908,150		
55728L100/200		192		1,244			921		961,200	576,720		
55728L300							1,222	3,666				
55739L100												NA

Table 1-2. Nondivisional TC truck company SRC capability data (continued)

	CONTAINERS		CONTAINERIZED TONS/DAY				BB TONS/DAY		GALS/DAY		PAX PER LIFT	TRIPS PER DAY
			GENERAL		AMMO							
TOE	40 FT	20 FT	40 FT	20 FT	40 FT	20 FT	GEN	AMMO	POL	WATER		
LEVEL 3 LINE HAUL												
55719L000		14		93			287	490			985	
55727L100/200	90	181	1,393	1,169		2,512	634	1,139	677,700	412,945	2,259	
55728L100/200		87		561			415		433,200	259,920	1,516	
55728L300							1,222	1,675				
55739L100												69
LEVEL 3 LOCAL HAUL												
55719L000		29		187			573	981				
55727L100/200	181	361	2,787	2,339		5,024	1,269	2,279	1,355,400	825,890		
55728L100/200		173		1,121			830		866,400	519,840		
55728L300							1,222	3,350				
55739L100												NA

Notes:

1. The data in the cells for each SRC represent exclusive capability. For example, the Level 1 line haul capability for 55727L200 is 105 forty-foot containers per day or 210 twenty-foot containers per day or an intermediate value reflecting a combination. But, if the unit is carrying containers, it cannot carry breakbulk cargo. A POL unit (727L200) cannot carry any other type of cargo, and if the cargo trucks are equipped with SMFTs, the unit cannot carry any cargo other than water.
2. Semitrailers only carry passengers in emergency conditions. Cargo trucks routinely carry them. The pax data represents a single lift for each type unit using all the available trucks.
3. The data in this table is rounded. Normally, local haul capability for a unit is exactly double the line haul capability. When this data is recorded in a TOE section 1, it will be further rounded.

1-10. EQUIPMENT. Each type of motor transport company is equipped with different types of vehicles. These vehicles vary in type and design and in their capabilities to support operations under a variety of conditions. Planners must know the capability of each type of company when determining the proper mix to support any operation. Factors to consider include--

- Environmental factors of climate, weather, and terrain.
- Operational factors such as the roadnet and highway surfaces or trafficability.
- Tonnage requirements, type of cargo, and type or length of hauls.

1-11. LOGISTICS CIVIL AUGMENTATION PROGRAM. LOGCAP is a DA capstone program that employs contractor support to augment the Army's organic planning and CS/CSS capability. This program applies both in CONUS and overseas. Before implementing LOGCAP, the CINC/ASCC considers the use of active and reserve components, other services, and HNS. During a contingency, the CINC/ASCC commander normally establishes an acquisition review board to determine the best means of fulfilling requirements. Board considerations include criticality, timeliness, quality, administration, effort, and cost. LOGCAP is used when contractor support is determined to be the most effective, expeditious, or cost effective.

LOGCAP applies primarily in areas where no multilateral or bilateral agreements or treaties exist. However, it can be employed in areas with formal HN agreements, where contractors are involved, or peacetime support contracts exist. LOGCAP can also be used during mobilization to assist the CONUS support base and help units prepare for war or other contingencies.

LOGCAP resolves shortfalls; it does not replace force structure. It includes all preplanned logistics and engineering/construction oriented contingency contracts already awarded and peacetime contracts with contingency clauses. Preplanned weapon system sustainment contracts, ASCC contingency contracts, and the AMC Support Contract are examples of contracts that fall under this program.

The AMC Support Contract is an umbrella contract that focuses on prioritized contingency planning for augmenting logistics and engineering/construction services. Under its terms, commercial vendors prepare contingency management plans based on specific CINC/ASCC pre-identified requirements to provide expeditious logistic and engineering/construction augmentation support upon deployment. Support must be accomplished with reasonable assurance of success and within reasonable cost. The contract can be adjusted to respond to changing requirements. It reduces potential contingency problems identified in peacetime planning such as language, customs, geographic conditions, and infrastructure constraints. It provides an alternative contract capability to meet facility and logistic services shortfalls, as well as for a quick reaction to contingency or crisis requirements.

The core of the AMC Support Contract is basic/logistic camp construction, base/logistic camp operations, and field services. However, this contract also encompasses other traditional logistics functions such as weapon system maintenance, materiel management, and transportation and port operations and complements existing weapon system sustainment and ASCC contingency contracts. Overall, it gives CINCs and ASCC commanders a means to source sustainment requirements for military contingency operations when other means are not available.

The AMC LSE provides a single focal point in the theater responsible for central oversight management of the AMC Support Contract in both peacetime planning and upon deployment. The LSE also advises the CINC or ASCC commander and staffs on alternate means of accomplishing CS/CSS requirements and spreads the word about LOGCAP capabilities.

★CHAPTER 2

UNIT OPERATIONS

This chapter covers the duties of the staff and operating personnel that have a direct interest in the operation and training of motor transport battalions and companies. Guidance given here applies to battalion and company operations. Duties at higher echelons are of a more directive or supervisory nature (see FM 101-5).

2-1. BATTALION STAFF AND RESPONSIBILITIES. Battalions have a headquarters staff organized to meet unit requirements. A Transportation Motor Transport Battalion commands three to five companies. Staff activities focus on assisting the commander with mission accomplishment. Battalion staffs are structured to operate two 12-hour shifts and conduct 24-hour operations.

2-2. COMMAND SECTION. The Command Group consists of the Battalion Commander, Battalion Executive Officer, and the Command Sergeant Major. They have the overall responsibility for executing the battalion mission and supervision of all personnel and assets.

a. Battalion Commander. The commander commands and controls units that are assigned, attached, or under his operational control. He provides his subordinates with missions, taskings, and a clear statement of his intent. The commander's main concerns are accomplishing his mission and taking care of his soldiers. The battalion commander must also do the following:

- Provide his subordinates with a clear and concise vision that provides a single, unifying focal point for their efforts.
- Make timely and effective decisions.
- Understand the capabilities and limitations of his organization.
- Motivate and direct soldiers and their leaders into action to accomplish the mission.

b. Battalion Executive Officer. The XO is the battalion commander's principal staff officer. He is second in command. He directs staff tasks, conducts staff coordination, and ensures efficient and prompt staff response. He serves as the principal integrator of CSS in support of his mission. He is free to move to any point in the area of operations to accomplish his duties and responsibilities. The XO also performs the following:

- Transmits the commander's decision to staff sections and in the name of the commander, to subordinate units as needed.
- Keeps updated on the situation and future plans.
- Represents the commander during his absence, directing action IAW established policy and guidance.
- Checks attachments (for example, monitoring the nets and progress of supporting units), monitors overall operations, ensures reports are rendered as necessary, supervises planning of future operations, and provides the commander with situational assessments as needed.
- Receives and analyzes information from a wide variety of sources that might be useful to the commander.

c. Command Sergeant Major. The CSM is the senior NCO in the command. He is responsible for providing the commander with personal, professional, and technical advice on enlisted soldier matters and the NCO Corps as a whole. Though he is not an administrator, he must understand the administrative, logistical, and operational functions of the unit to which he is assigned. Since he is normally the most experienced soldier in the unit, his attention should be focused on operations and training and on how well the commander's decisions and policies are being carried out. He is the senior enlisted trainer in the organization. He works closely with company commanders when teaching and training first sergeants and platoon sergeants. He maintains close contact with subordinate and attached unit NCOs. The CSM must be tactically and technically proficient in motor operations at battalion, company, platoon, and squad levels. The CSM should act as the commander's representative, as determined by the commander and himself, in supervising aspects vital to an operation.

2-3. PRIMARY STAFF. The Primary Staff consists of the S1, S2/S3, and S4. They are responsible for staff planning and coordination to ensure execution of the battalion's mission and support of all assigned personnel and assets.

a. S1 (Adjutant). The S1 is the principal staff officer responsible for human resource management to include all personnel matters. The S1 performs the following:

- Maintains unit strength and personnel service support.
- Supervises medical, legal, safety, and civil affairs (including civilian labor) assets.
- Monitors postal services and public affairs.
- Coordinates religious support with the battalion UMT.
- Shares supervisory responsibility for logistical operations with the S4. They must cross train to be able to conduct continuous operations.
- Determines replacement policies and requirements.
- Compiles unit strength and loss estimation (casualty reporting).
- Supervises morale support functions.
- Supervises battalion administration functions.
- Coordinates administrative support of EPWs and civilian internees.
- Conducts staff supervision of casualty evacuation.
- Maintains retention/reenlistment files.

b. S2/S3 (Intelligence and Operations Officer). The S2/S3 is the principal staff officer responsible for security, intelligence, and operations. As the operations officer, the S2/S3 is responsible for training, operations and plans, and force development and modernization. The S2/S3 prepares and coordinates operational plans for the battalion and subordinate units and coordinates planning activities of subordinate units. In accomplishing these missions, the S2/S3 performs the following:

- Prepares operational SOPs and coordinates them with higher and subordinate units.
- Maintains visibility over all employed battalion truck assets and current roadnet data.
- Plans and coordinates with other staff sections. This results in published OPORDs, OPLANs, and training programs.
- Coordinates closely with the S4 to ensure plans and operations are logistically supportable.

- Considers information that affects the area of operations, which complements the XO's focus on the unit's area of interest.
- Works directly with elements of the command group to receive information and to analyze, integrate, and convey his assessment to the commander.
- Maintains operational records and statistical reports.
- Conducts liaison with supported agencies and activities.
- Inspects operational and unit dispatch areas.
- Establishes procedures for cargo documentation, dispatch, and security.
- Maintains centralized operational control over subordinate units.
- Studies plans and operations and prepares estimates, plans, and directives.
- Receives and screens requests for motor transport support (commitments).
- Assigns workloads and specific operational tasks to subordinate units.
- Assumes informal accountability for semitrailer equipment engaged in trailer transfer operations.
- Supervises and directs operation of the battalion communications services.
- Establishes priorities for communications to support operations.
- Plans and supervises training and soldier education programs for the battalion and subordinate units.
- Performs training inspections.
- Maintains contact and exchanges information with security and intelligence personnel of higher, adjacent, and subordinate units.
- Receives and distributes intelligence information.
- Directs and supervises OPSEC.
- Obtains and disseminates weather information and the probability of use and effects of enemy NBC weapons.
- Prepares and publishes security directives.
- Makes security inspections of battalion and subordinate units.
- Informs the XO about the enemy situation.
- Prepares and distributes security and intelligence estimates and SOPs.
- Coordinates and supervises, along with the XO, security and defense measures for the battalion and subordinate units.
- Requests road clearance for convoys and movement of oversize loads.
- Advises the commander on operational, security, and training matters.
- Coordinates and assesses subordinate unit environmental risk assessments and advises the commander on their status and outcome.
- Maintains unit readiness status of each subordinate unit.

The S2/S3 also has an operations section that requires a senior grade NCO as the Operations NCOIC. He is responsible for planning, coordinating, and staff operation facets of the battalion's missions. He is critical for synchronized and coordinated operations. A second operations sergeant or assistant operations sergeant (one grade lower than the 88Z50) is also required for developing and formulating plans that are critical to successful battalion operations. Both positions are required to ensure that senior 88M NCO leadership is present during 24-hour operations in the battalion TOC. They also supervise the duty performance of the section's enlisted personnel. Each operations sergeant, during their respective shifts, conducts the following duties:

- Assists the operations officer and ensures that administrative policies and procedures are properly carried out.
- Coordinates the functions of the operations section.
- Assists in preparing and maintaining highway reconnaissance data.
- Coordinates, with dispatch control personnel in the section and subordinate units, daily task vehicle availability data, vehicle requirements, and commitments.
- Maintains statistics on operational capabilities and performance of subordinate units.
- Setups and operates, in a proper and timely manner, the Battalion Tactical Operations Center.
- Establishes and maintains liaison with supported units and activities.
- Supervises documentation and report procedures.
- Performs other duties as directed by the operations officer.

The operations section also performs task vehicle commitment and maintains visibility of all employed battalion assets and personnel. Note that at both Corps and at EAC, a motor transport battalion HQ is likely to have a Cargo Transfer Company attached. Therefore, it will coordinate commitments for and commit the Cargo Transfer Company for appropriate missions. It also receives transportation requests from the senior transportation echelon or directly from the movement control battalion if the motor transport battalion is the senior transportation command in the area. Requests should include the following information:

- Brief description of the operation.
- Type of cargo.
- Weight and cube.
- Priority.
- Origin and destination.
- Date movement required.
- Special handling or outsize load data.
- Security classification.
- Other pertinent cargo information that may assist the transportation planners and operators.

Getting trucks to the right destination can be a major problem. The operations section can resolve this problem by doing the following:

- Ensuring that the requester gives accurate and complete information about when, to where, and to whom the requested transportation should report.
- Furnishing strip maps to column commanders and to drivers when on independent commitments.
- Ensuring that the requester names a point of contact at a central location to whom truck drivers can report.

Information from the requester on the type and number of vehicles needed to meet an operational requirement is acceptable but only as a recommendation. The final decision rests with the battalion operations section and is based on the following data:

- Overall battalion tasks.
- Differences of cargo and/or operating conditions in the specific operation.
- Task vehicles available to meet the assigned battalion tasks.

The battalion operations section screens and consolidates requests. It determines the number and type of vehicles needed to meet operational requirements, then directs subordinate truck companies to furnish these vehicles. Unit integrity should be preserved when allocating and assigning commitment tasks to subordinate units. Tasks are assigned in company, platoon, or squad-size elements. This allows truck units to operate in organizational elements and is more efficient. The battalion operations section normally uses locally reproduced formats to receive requests for vehicle commitments and to task subordinate units. A commitment worksheet (Figure 2-1, page 2-8) is suitable for both purposes and can be used to record more than one commitment. It is normally used when requests are received and passed out telephonically. Columns 2 through 5 and column 8 are used to receive requests. The other columns are completed when the tasks for subordinate units are determined. The form is then used to pass on commitments to subordinate units. A second type of worksheet (Figure 2-2, page 2-9) may be used to forward in writing an individual commitment to a subordinate unit. There is probably going to be very little, if any "locally reproduced forms" because everything will be electronic.

c. S4 (Logistics Officer). The S4 is the principal staff officer responsible for maintenance, transportation, and supply and services for the battalion. He is responsible for developing logistical policy. He maintains accountability for operation and maintenance funds. Other duties include coordinating supply activities with higher headquarters and with supporting services and preparing and coordinating supply SOPs and directives. The S4 also plans, coordinates, and supervises the logistical effort. The S4 also performs the following:

- Prepares and develops CSS plans and annex to current and future operations.
- Establishes the requirements for civilian labor and the collection and disposal of excess property.
- Conducts operational and tactical logistics planning to support mode operations.
- Coordinates with the S1 and S2/S3 on transporting replacement personnel.
- Coordinates special transport requirements to move the headquarters.
- Coordinates field sanitation.
- Coordinates actions for establishing an organizational clothing and individual equipment operations for exchange and for replacing personal field equipment.
- Coordinates the requisition, acquisition, and storage of supplies and equipment and the maintenance of materiel records.
- Coordinates with the G5 to support foreign nation and host nation support requirements.
- Monitors priorities assigned to requisitions by battalion units and monitors submission of requests to supporting supply activities.
- Consolidates requisitions submitted by subordinate units, as required.
- Receives supplies, establishes schedules for issue, and issues supplies, as appropriate.
- Plans, directs, and supervises the supply economy program.
- Designates POL points and makes distribution of POL.
- Supervises and inspects subordinate unit supply procedures and records.
- Establishes, supervises, and directs the food service program.

- Establishes and maintains liaison with supporting services and activities to expedite supply matters.
- Prepares and supervises the maintenance of battalion property records and accounts.
- Procures, allocates, and releases billet areas, buildings, and other facilities used by all battalion elements.
- Acts as the primary POC for all contracting requirements within the battalion.

The S4 advises the commander concerning the following:

- Supply, mess, and real estate matters.
- Property accountability within the battalion.
- Contracting requirements.
- Matters pertaining to transportation of ammunition and hazardous materials.
- Coordination for water purification, mortuary affairs, laundry, shower, and clothing repair.

d. Battalion Maintenance Officer. This officer heads the battalion maintenance section. His duties are normally to advise and coordinate. However, if a consolidated maintenance facility is established at battalion level, he assumes an operational role with duties parallel to those of a unit maintenance officer. In this case, the battalion maintenance officer performs the following:

- Exercises general supervision over the equipment maintenance activities of subordinate units.
- Inspects maintenance activities and procedures for efficiency of operations in subordinate units.
- Establishes and maintains liaison with the appropriate supporting services.
- Coordinates with the battalion supply section for the expeditious supply of parts and tools.
- Establishes, directs, and supervises procedures for turn-in, receipt, and exchange of repair parts and accessories.
- Advises and assists in the organization and development of maintenance procedures in subordinate units.
- Plans and supervises the maintenance policies of the battalion and subordinate units.
- Ensures that environmental protection procedures, to include spill response plans, are established and followed in all maintenance activities. Ensures that adequate supplies of spill response materials are on hand.
- Ensures that safety programs are in place and adhered to by all personnel.
- Prepares the battalion maintenance SOP.
- Establishes and operates, when directed, a battalion consolidated maintenance facility.
- Advises the commander on maintenance matters.
- Monitors fund expenditures for repair parts in coordination with the supply officer.

e. S6 (Battalion Signal Officer). The S6 serves as the principal staff officer for all matters concerning the installation and use of communication systems and the activities of communications personnel. The battalion S3 directs his specific duties. The S6 also performs the following:

- Recommends retransmission equipment employment.
- Establishes messenger services and schedules.
- Monitors COMSEC.
- Monitors the procurement, allocation, and service of the battalion's ADP software and hardware.
- Serves as the network manager and information security officer.

At battalion level, an enlisted signal specialist fills the position of communications chief. The communications chief provides communication services for the battalion headquarters. In doing so, he supervises and operates a 24-hour message center and establishes and maintains liaison with supporting communication services. The battalion's communications chief also performs the following:

- Directs and supervises the installation and operation of subordinate unit communication systems.
- Plans, supervises, and inspects communication procedures of subordinate units.
- Prepares, maintains, distributes, and secures the battalion signal operating instructions.
- Establishes and directs communication training, maintenance, and repair facilities in the battalion headquarters and subordinate units. Advises the commander on communication matters.

2-4. PERSONAL STAFF (BATTALION CHAPLAIN). The personal staff consists of those positions that are primarily advisory in nature and have direct access to the battalion commander. In the motor transport battalion the chaplain is the only personal staff member assigned. The battalion chaplain serves as the principal staff officer for coordinating religious services and personal counseling. As a special staff officer, he provides the commander with an in-depth view of the esprit de corps, spiritual well being, and morale of the unit. Although he has a personal staff relationship with the commander, he coordinates his special staff actions through the S1. The chaplain advises the commander on the following:

- Impact of the faith and practices of different religious groups in the area of operations.
- Implementation of the commander's religious support program.

VEHICLE COMMITMENT WORKSHEET

20th Trans Bn (Trk)

24th Sep XX

(1)	(2)	(3)	(4)		(5)		(6)	(7)	(8)		(9)
Commitment number	Date	Pri	Origin		Destination		Cargo	Unit	Vehicles		Remarks
			Location	Report to	Location	Report to			Type	No.	
9-108	25Sep	2	Q200	Maj Eason Whse 19 0730 hrs	Q166 Ludw' sb' g	Trans OH Bldg A8	Rations 77T	86th	12T	7	No return load Refuel at Q166

Figure 2-1. Type master commitment worksheet, truck battalion (suggested format for field use)

20th Transportation Battalion (Truck)
APO 0000

Date 24 Sep XX

Subject: Vehicle Commitment

To: CO, 86th Trans Co. Mdm (Cgo)

Commitment No 9-108

1. Vehicles w/drivers 7-12|T S&P

Report to: Major Eason

Location: Q200, Warehouse 19

Time: ____________ **Date:** 25 Sep XX

To transport: 77 tons dry rations

Destination: Q166, Ludwigs'b'g - Trans Off.

Bldg. A8

2. Remarks: No return load scheduled. POL available at Q166 for refueling.

SAMPLE

C.A. Mitchell
(Signature)

SFC OPs NCO
(Rank & Title)

Figure 2-2. Vehicle commitment worksheet for a single commitment,

truck battalion (suggested format for field use)

2-5. MOTOR TRANSPORT COMPANIES. All motor transport task units are organized and operate about the same. Variations occur only in the type of task vehicles authorized and the capabilities of the units. All key personnel, truck drivers, mechanics, and administration personnel have the same duties and responsibilities. Motor transport companies are structured to operate two 12-hour shifts and conduct 24-hour operations. Company operations are explained here by telling how key personnel in a truck company carry out their responsibilities.

a. Company Commander. The company commander is responsible for the training, safety, security, and discipline of his soldiers. He is also responsible for mission accomplishment. He directs and supervises all phases of operations and employment of the unit. He maintains visibility of employed company assets and personnel. He is assisted and advised by his officers and key noncommissioned officers in performing his duties. The following are among the commander's most important duties and responsibilities:

- Leads the company by planning, directing, and supervising company operations to accomplish the mission. He guides the unit in carrying out its primary mission of providing efficient transportation services for its customers.
- Establishes maintenance and care of individual and organizational equipment and material.
- Establishes unit policies, procedures, and SOPs.
- Establishes and maintains a high degree of operations security.
- Initiates and ensures adherence to the unit safety program.
- Ensures that unit readiness is maintained.
- Initiates unit environmental self-assessments and ensures compliance with all federal, state, and local regulations on pollution prevention.
- Conducts periodic inspections to determine unit readiness.
- Stresses the principles of supply economy through the proper use, care, accountability, and maintenance of equipment.
- Instructs and cross-trains subordinates in their duties.

b. First Sergeant. The first sergeant is the senior noncommissioned officer in the company and assists the company commander in the execution of the unit's mission. The first sergeant must understand the company's mission and be able to adjust administrative requirements to aid in accomplishing that mission. The first sergeant performs the following:

- Forms the company, at direction of commander or as required, to organize and inform personnel for duty.
- Manages the company headquarters.
- Coordinates company activities.
- Acts as the intermediary between the company commander and the unit's enlisted personnel.
- Assumes the duties of the company commander, in the absence of all company officers.
- Supervises the preparation of company correspondence.
- Plans and posts daily company details, coordinating with the operations section.
- Maintains duty rosters.

- Supervises maintenance of the personnel status board.
- Exercises supervisory responsibility over housekeeping, work details, police, maintenance, and construction projects in the company areas.
- Assists the company commander in advising enlisted personnel on personal matters.
- Advises the company commander on personnel and morale problems.
- Supervises company training as the senior trainer.

c. Operations Section. The operations section provides coordination between operating elements of the truck platoons, maintenance platoon, and tasking unit. The operations section consists of an operations officer, truckmaster, and dispatcher. The following describes their positions and duties.

(1) Operations officer. The operations officer prepares and executes operational plans for the company. The truckmaster, assistant truckmaster, and two dispatchers assist the operations officer. He then assists the commander in coordinating, supervising, and controlling company mission operations. The operations officer coordinates logistics, maintenance, medical, and mess support. He takes command in the absence of the commander. For modular/split-base operations, he takes command of the portion of the company remaining in the rear location. He coordinates directly with the battalion S3 and operating elements of the truck platoons, maintenance platoon, and tasking unit. He also performs the following:

- Prepares operational SOPs and coordinates them with higher headquarters units.
- Maintains visibility over all employed company assets and personnel and current roadnet data.
- Maintains operational readiness data for all platoons in the company.
- Maintains operational records and statistical reports.
- Conducts liaison with supported units.
- Inspects operational and unit dispatch areas.
- Establishes procedures for dispatching and security.
- Maintains centralized operational control over subordinate platoons.
- Studies plans and operations continuously and prepares estimates, plans, and directives.
- Receives requests for motor transport support (commitments).
- Assigns workloads and specific operational tasks to subordinate platoons.
- Supervises and directs operation of the company's communications services.
- Plans and supervises training and soldier education programs for the company.
- Performs training inspections.
- Maintains contact and exchanges information with security and intelligence personnel of higher and adjacent units.
- Receives and distributes intelligence information.
- Directs and supervises OPSEC.
- Prepares and publishes security directives.
- Makes security inspections.
- Prepares and distributes security and intelligence SOPs.
- Coordinates and supervises security and defense measures for the company.
- Requests road clearance for convoys and movement of oversize loads.

- Advises the commander on operational, security, and training matters.
- Assesses unit environmental risk assessments and advises the commander on their status and outcome.

(2) Truckmaster. The truckmaster is the operations assistant to the operations officer and/or the company commander. He assists in the coordinating, supervising, and controlling of company mission operations. A second truckmaster or assistant truckmaster of equal grade is also required for developing and formulating plans that are critical to successful company operations. Both positions are required to cover day and night shift operations in the company TOC. Among their duties, each truckmaster performs the following:

- Organizes and supervises driver training.
- Organizes and supervises the unit motor pool (includes assisting in the preparation of unit maintenance and operational SOPs).
- Conducts training and testing of drivers.
- Trains personnel in driver preventive maintenance, documentation, and the loading and securing of cargo.
- Coordinates with platoon sergeants and the maintenance sergeant to ensure complete knowledge of personnel status and vehicle availability.
- Supervises and checks vehicle operations.
- Maintains visibility of employed company assets and personnel.
- Reports evidence of vehicle neglect, abuse, or operator carelessness.
- Enforces safety rules and techniques.
- Records safe driving mileage accumulated by unit drivers and advises the company commander of personnel eligible for safe driving awards.
- Maintains a file of unit accident reports.
- Coordinates with the maintenance sergeant and platoon sergeants on all maintenance matters (such as vehicles due for scheduled maintenance, vehicles being repaired, and vehicles deadline awaiting repair).
- Enforces environmental laws and regulations.
- Supervises, through the dispatcher, all dispatching and routing of company vehicles to ensure that dispatching procedures conform to unit policy.
- Supervises the dispatcher in keeping records necessary for the operation of motor vehicles to include operational data and fuel consumption.
- Assists, when required, in making inspections.
- Assists the operations officer and/or company commander in preparing operational reports.
- Assists in preparing the motor pool portion of the unit SOP.
- Maintains custody of DA Form 348 on unit personnel.
- Selects tactical motor pool sites.
- Reconnoiters routes.
- Participates in convoy planning and enforces march discipline during convoy operations.
- Requests road clearances for convoys and movement of oversize loads to the S3.

The truckmasters should also be familiar with the following:

- Civil laws and military regulations governing the operation of individual motor vehicles in convoy.
- Standardization agreements affecting motor vehicle operations.

(3) Dispatcher. The dispatcher, under the supervision of the truckmaster, operates the company vehicle operations center. Dispatchers assemble transportation requests and assign these requests to the company as a commitment. Dispatchers are normally the custodians of vehicle logbooks. They verify entries and ensure that records are maintained as prescribed by DA Pamphlet 738-750 (manually or electronically (ULLS)) and local directives. The dispatcher also performs the following:

- Receives and fills requests from authorized persons for motor transport support.
- Checks the time of departure and return of each vehicle.
- Issues, collects, and ensures completion of trip records.
- Reports discrepancies in trip records to superiors.
- Reports mechanical failures that require corrective action to the maintenance sergeant.
- Maintains records of vehicle miles traveled, fuel and oil consumed, trip frequency and elapsed time, type cargo and tons moved, and such other records as may be directed by higher headquarters.
- Receives operational trip records and TCMDs from drivers on their return, recording significant data on the appropriate manual or automated form.
- Examines each operational trip record for completeness of all actions.
- Initials operational trip records in the space provided and files these records pending disposition IAW current directives.
- Maintains visibility of employed company assets and personnel.

After receiving a validated request for transportation, the dispatcher will note the following:

- Who is making the request.
- What type and quantity of cargo is being moved.
- The number of vehicles needed.
- The length of time the vehicles are required.
- When, where, and to whom drivers report.

To process transportation requests, each dispatcher performs the following:

- Selects the vehicles and drivers to be used and completes the initial entries on appropriate manual or automated form.
- Posts all operational records to the appropriate manual or automated form at the time of issue.
- Maintains a vehicle dispatch board.

The vehicle dispatch board (Figure 2-3) makes record keeping easier. It is an efficient way of locating and determining the availability of vehicles and drivers. At a minimum, the dispatch board shows the following:

- Numbers of each assigned vehicle.
- Names of assigned drivers.
- Status of each vehicle in the motor pool.

The status board should show which vehicles are deadlined in the company motor pool or at a higher-level maintenance facility. The commander may designate other pertinent information. The vehicle dispatch board is not organizational equipment. It must be made locally. It usually has removable labels for each vehicle and each driver. Pegs of different colors can be used opposite each label to show the status of vehicles (in, out, or deadlined). More elaborate boards display the following:

- Show the location of dispatched vehicles.
- Indicate the expected time of return.
- Show projected vehicle availability.

2-6. MAINTENANCE PLATOON. The unit maintenance platoon provides maintenance on organic vehicles and equipment. The motor sergeant, enlisted maintenance personnel, and wrecker and POL vehicle operators assist the maintenance technician. The maintenance platoon provides command and control, supervision, and technical guidance to unit and direct-support maintenance sections performing maintenance on organic vehicles and equipment. The motor sergeant assists the platoon leader.

a. Maintenance Platoon Leader. The maintenance platoon leader of a transportation truck company is responsible for the training and discipline and ensuring that the company commander's instructions are carried out by the members of his platoon. He assists and advises the company commander in assigning capable maintenance personnel. He plays a major role in maintenance training and advises the company commander and operating personnel on maintenance matters and problems. He is also the officer responsible for the overall maintenance of unit automotive equipment. The platoon leader also performs the following:

- Supervises the training of mechanics in all phases of their duties.
- Inspects platoon member's individual clothing and equipment for serviceability and availability.
- Trains and supervises maintenance personnel.
- Coordinates with maintenance support units and manages the unit shop.
- Inspects platoon billets and areas to ensure that proper standards of cleanliness, police, and sanitation are kept.
- Prepares a daily availability report of platoon personnel and submits a copy to the company operations center (as prescribed by the unit SOP).
- Conducts the preliminary investigation and prepares reports when platoon personnel are involved in accidents.
- Enforces environmental laws and regulations.
- Instructs the platoon or company as prescribed by the unit training schedule.

- Organizes, in coordination with other platoons, defense of the platoon's area of responsibility in bivouac; prepares and submits sketches of the defense plan to the company commander.
- Undertakes additional duties (such as security officer, investigating officer, and summary court officer) as may be assigned by the company commander.
- Informs the company commander of all phases of maintenance platoon training and operations; discusses with and advises the commander on matters pertaining to training and operations.

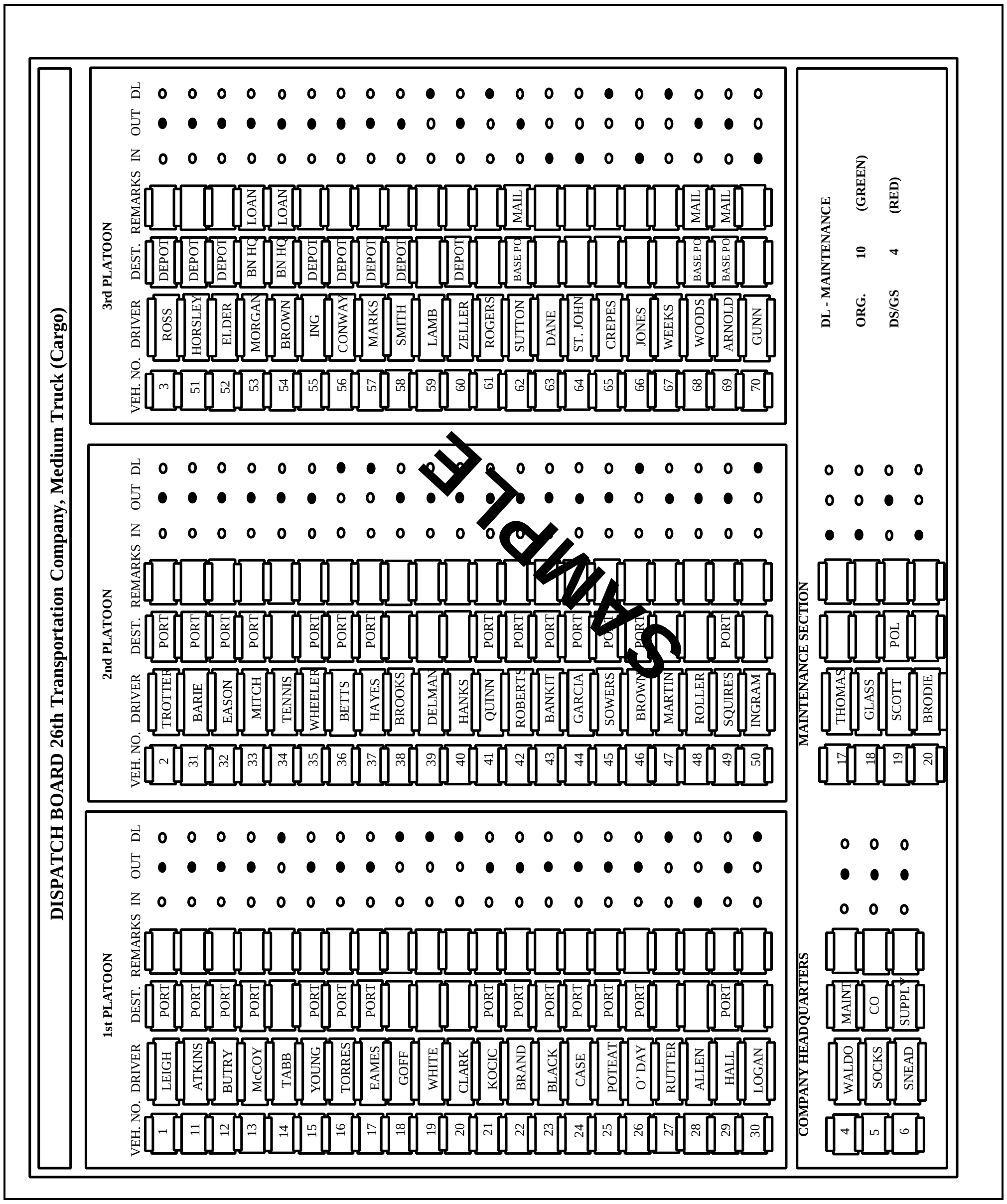

Figure 2-3. Vehicle dispatch board, transportation truck company (suggested format for field use)

b. Automotive Maintenance Technician. The automotive maintenance technician (maintenance warrant officer) is responsible for maintaining unit automotive equipment. The automotive maintenance technician also performs the following:

- Oversees and performs the routine maintenance and emergency repair of mechanical equipment.
- Oversees the basic and advanced instruction of vehicle drivers and the basic, technical, and military training of maintenance personnel in operational and organizational maintenance.
- Organizes the company maintenance shop, assigns repair tasks, and supervises the performance of unit mechanics through the motor maintenance sergeant.
- Conducts inspections to determine equipment repair requirements and the adequacy of repairs made.
- Prepares the maintenance portion of the company SOP.
- Establishes and enforces shop safety practices.
- Establishes and enforces shop environmental practices, especially those involving the handling of waste and hazardous material.
- Keeps informed about the location and availability of maintenance support units and facilities.
- Ensures that essential replacement parts are available or are on valid request.
- Conducts maintenance inspections as directed by the company commander and makes recommendations for the improvement of motor maintenance and/or transport operations, as appropriate.
- Ensures that maintenance records are maintained according to DA Pamphlet 738-750 and other pertinent directives and publications.

c. Motor Sergeant. The automotive maintenance technician supervises the motor sergeant. He is the chief assistant to the maintenance officer and is responsible for the proper maintenance of unit vehicles. He must have a thorough knowledge of DA Pamphlet 738-750. He must be familiar with vehicle technical manuals, technical bulletins, modification work orders, and lubrication orders. He must know Army vehicle operations, maintenance, inspection, and repair. He must be able to diagnose mechanical trouble in vehicles and to instruct maintenance personnel on corrective actions. The motor sergeant also performs the following:

- Assists in organizing the shop area and operates it according to sound shop procedure.
- Assigns tasks.
- Implements work schedules established by the maintenance officer.
- Inspects work performed by unit mechanics.
- Enforces shop safety practices.
- Controls and accounts for tools.
- Maintains equipment maintenance records.
- Supervises repair parts requests, receipt, issue, storage, and inventory.
- Trains mechanics.
- Advises operating platoon personnel on maintenance matters.
- Arranges for the evacuation of vehicles to maintenance support elements.
- Supervises the recovery, repair, and/or evacuation of a disabled or wrecked vehicle.

d. Mechanics. Company mechanics perform unit-level maintenance repairs on unit vehicles. They perform monthly and semiannual servicing of the company's vehicles according to DA Pamphlet 738-750 and the vehicle TMs. Within their capabilities, they also make repairs and replace parts and unit assemblies.

e. Recovery Vehicle Operator. The recovery vehicle operator drives and operates the recovery vehicle. The recovery vehicle is used in recovering disabled, damaged, mired, or abandoned vehicles.

f. Prescribed Load List Clerk. The PLL clerk is the supply clerk for the maintenance section. He requests, receives, stores, and issues motor vehicle equipment, accessories, repair parts, and tools to support the company maintenance function. He must be familiar with supply procedures and regulations governing accountability for government property.

2-7. MOTOR TRANSPORT PLATOONS. The truck platoon provides command and control, supervision, and technical guidance to truck squads in performance of motor transport taskers. The motor transport platoon provides personnel and equipment to the company to fullfill vehicle task requirements. The motor transport platoon contains a platoon leader, platoon sergeant, squad leaders, and drivers**.**

a. Platoon Leader. The platoon leader of a transportation truck company is responsible for training, discipline, and accomplishing the mission of his organization. The truck platoon leader is also an officer responsible for managing the hauling of cargo and/or personnel by motor transport. He instructs and supervises platoon personnel in the following:

- Truck and convoy operations.
- Driver maintenance.
- Methods of loading.
- Other specified subjects.

The truck platoon leader is responsible for ensuring that the company commander's instructions are carried out by the members of his platoon. The platoon leader should train his platoon with a dual purpose in mind:

- First, he is responsible to the company commander for the development and training of the platoon as part of the company team.
- Second, he must ensure that the platoon is fully deployable and self-reliant since it may be modularly deployed from the company and operated as a separate unit. In this situation, the platoon leader functions as commander of an independent detachment and is responsible for the administration, operation, supply, and security of the unit.

The platoon leader should be encouraged to act on his initiative to develop and exercise those command and leadership qualities required of his position. When the company operates as a unit, the platoon leader has additional duties assigned by the company commander. Among his duties, the platoon leader performs the following:

- Supervises the training of drivers in all phases of their duties, including maintenance services.
- Inspects platoon member's individual clothing and equipment for serviceability and availability.
- Inspects platoon billets and areas to ensure that proper standards of cleanliness, police, and sanitation are kept.
- Maintains visibility of employed platoon assets and personnel.
- Prepares a daily availability report of platoon personnel and submits a copy to the company operations center (as prescribed by the unit SOP).
- Inspects vehicles dispatched to using agencies to ensure their efficient use.
- Conducts spot checks on the loading of vehicles to detect and correct overloading or other improper loading practices.
- Patrols routes traveled by platoon vehicles to ensure drivers practice safe driving.
- Enforces discipline and internal control during convoy operations.
- Conducts the preliminary investigation and prepares reports when platoon personnel are involved in accidents.
- Enforces environmental laws and regulations.
- Instructs the platoon or company as prescribed by the unit training schedule.
- Organizes, in coordination with other platoons, defense of the platoon's area of responsibility in bivouac; prepares and submits sketches of the defense plan to the company commander.
- Undertakes additional duties (such as security officer, investigating officer, and summary court officer) as may be assigned by the company commander.
- Informs the company commander of all phases of platoon training and operations; discusses with and advises the commander on matters pertaining to training and operations.

b. Platoon Sergeant. The platoon sergeant is the senior noncommissioned officer in charge and is assistant to the platoon leader. He assists in training the platoon and supervises both its tactical and technical operations. Through his squad leaders, the platoon sergeant directs the drivers of the platoon in truck and convoy operations, driver maintenance, and vehicle loading. He must be able to train drivers in the operation and care of military motor vehicles. He must have a working knowledge of the capabilities and the proper use of the vehicles of his platoon. He must be thoroughly familiar with military regulations and civil laws pertaining to the operation of motor vehicles and vehicles in convoy. He is responsible to his platoon leader for march discipline. He must be prepared to assume the duties of the platoon leader as convoy commander when the organization is operating on a round-the-clock basis. In the absence of the platoon leader, the platoon sergeant assumes his duties. When the platoon is operating separately from the company, the platoon sergeant performs the added administrative duties usually performed by the first sergeant. He must be knowledgeable and capable of performing those duties. To perform his duties and to supervise the jobs of the men under him, the platoon sergeant must be familiar with this manual and the following publications:

- ARTEPs.
- FM 21-305.
- STP 55-88M-1/2/3/4.
- DA Pamphlet 738-750.

- Applicable TM and lubrication orders for unit task vehicles.
- Unit SOPs.

The platoon sergeant also performs the following:

- Coordinates the duties of his squad leaders.
- Inspects frequently, vehicles to ensure the performance of driver maintenance.
- Supervises, through his squad leaders, the performance of driver maintenance.
- Inspects frequently, vehicle's BIIs for accountability.
- Coordinates with the maintenance sergeant for the repair of vehicles that need service beyond the driver's capability.
- Coordinates squad training and operational activities.
- Coordinates platoon operations with other platoon sergeants and the truckmaster.
- Inspects the platoon defensive perimeter in bivouac and takes corrective action when appropriate.
- Enforces safety rules and techniques.
- Enforces environmental laws and regulations.
- Maintains visibility of employed platoon assets and personnel.

c. Squad Leader. Each truck squad provides supervisory and operating personnel to operate the tasking vehicles to perform mission tasks. Drivers assist each squad leader to perform required 24-hour operations. The squad leader is directly responsible to the platoon sergeant for the training, discipline, appearance, and performance of his drivers. He trains and directs squad personnel in driver maintenance, correct loading techniques, safe driving practices, and maintenance of equipment records. Among his other duties, the squad leader performs the following:

- Maintains a record of availability of personnel and equipment under his control. Also maintains visibility of employed platoon assets and personnel.
- Ensures that each driver is familiar with his route, destination, and mission.
- Inspects and, when necessary, corrects daily trip records maintained by the driver.
- Supervises the performance of driver maintenance.
- Reports to the platoon sergeant those mechanical defects that are beyond the driver's ability to repair.
- Ensures that squad member's quarters meet proper standards of cleanliness.
- Enforces environmental laws and regulations.

d. Drivers. Well-trained and responsible drivers are the backbone of an efficient motor transport unit. They must know their vehicle, driver maintenance, convoy operations, and proper loading. The driver is responsible for the operation of his vehicle and for the safe and prompt delivery of his loads. He must be familiar with his soldier's manual, FM 21-305, and the TM and lubrication order pertaining to his vehicle. Truck companies are required to have one driver per shift per task vehicle, or a total of two drivers per task vehicle. Note that if local policy requires two personnel in the cab any time a vehicle is dispatched for security or other reasons, and if the second driver performs this role, then the capability of the truck company is halved. Also note that HET operations require two HET drivers in the vehicle at all times. The assistant HET driver is the observer/advisor for the driver because of the peculiar handling characteristics of the steerable axle HET semitrailer. When used for damaged or otherwise non-operational combat vehicle evacuation, it is a two-person operation to load the HET semitrailer. In performing his duties, the driver must do the following:

- Operates vehicles safely in moving cargo or personnel between designated points, following the routes and instructions of the squad leader, platoon sergeant, and company officers. Backs a military vehicle only when using a ground guide.
- Supervises, loads, secures, and tarps cargo to prevent loss due to shifting, inclement weather, and pilferage. Double-checks tie-downs and security of loads prior to the mission and at all halts.
- Completes individual driver trip records (listing such information as mileage, trips, times, oil and fuel added, and malfunctions noted).
- Gathers information for and completes SF 91 when involved in an accident.
- Performs preventive maintenance on the assigned vehicle by conducting visual, manual, or auditory examination of the vehicle before, during (at halts), and after operations.
- Services the vehicle with oil, fuel, water, and other lubricants and coolants as may be prescribed and maintains the proper tire pressure.
- Keeps the vehicle clean, canvas cover tight, and spot-paints as needed.
- Changes tires.
- Prepares the vehicle for operations requiring the use of traction devices.
- Camouflages the vehicle as required.
- Complies with environmental laws and regulations.
- Waterproofs the vehicle as required.

All drivers must be trained for the class of vehicles they operate. They must also be examined for, and possess, a valid OF 346 for the class of vehicle they operate. They must be able to drive in convoy under blackout conditions and over difficult terrain. They must be able to operate the winch of the vehicle when it is so equipped. They must have a working knowledge of field expedients and emergency measures that will help them deliver their cargo and return to their units. During the training period, company officers must strive to constantly rotate the drivers with the squad leaders and mechanics. As part of their training, qualified mechanics and drivers should exchange jobs whenever practicable. By this method, the drivers learn the duties of the mechanics and the mechanics improve their skills as drivers. If personnel within either group are lost, the company can continue to function.

CHAPTER 3

OPERATIONAL ENVIRONMENT

The operational environment of a force projection army is as varied and complex as the combination of geography, terrain, weather, infrastructures, and threats that exist throughout the world. Motor transport units and soldiers must be versatile enough to cope with, and achieve success in, many different environments and various types of military operations.
Units may have to operate in mountains, jungles, or deserts; in cold, hot, or otherwise inclement weather; in urban or rural areas; on dry, wet, or snowy roads; or on rugged, cross-country terrain. They may be called on to support Army forces during war or during peace enforcement, peacekeeping, or disaster relief operations. This chapter discusses potential threats to motor transport units, operations security and defense, and operations in adverse terrain and climates
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3-1. THREAT. At any time, and on short notice, US forces may be called on to deploy anywhere in the world. As a member of this team, Army motor transport units and soldiers may be faced with a vast number of potential threats. Regardless of the environment or type of operation, they must be prepared to protect themselves and their equipment in base defense, in convoys, and at customer locations. They must be aware of the threat that exists in the area in which they operate.

Many potential adversaries consider logistics units and bases to be prime targets for their deep operations. Probable targets include ports, transfer points, and lines of communication such as roads and inland waterways. These areas are all supported and used by motor transport units. An adversary may employ airborne or airmobile forces, long-range artillery and rockets, and irregular or guerrilla forces. Terrorists may attempt to disrupt activities (even during periods not associated with combat) using ambushes, snipers, raids, or sabotage. These prime targets are also environmentally sensitive, increasing the challenge to protect--not only from operational damage, but from an adversary's ecological attack.

Given this challenging environment, motor transport soldiers must be fit, trained, and ready to respond. Leaders must prepare soldiers to serve in adverse conditions for extended periods by providing appropriate training and leadership skills. Leaders must build units with the courage to overcome odds to accomplish the mission and the determination to provide forward support to sustain combat or other operations. Leaders are also ultimately responsible for preparing their units and soldiers to survive in today's NBC environment.

3-2. OPERATIONS SECURITY. Operations security is an integral part of planning for operations, unit training, and day-to-day operations at all levels of command. Throughout the planning, preparation, and execution phases of an operation, every effort must be made to maintain security. Security measures should also be included in unit training programs. Unit S3s develop OPSEC protective measures. There are four steps in the OPSEC planning sequence:

- Determine enemy capabilities for obtaining information about motor transport operations.
- Determine what information obtained by the enemy can compromise the operation.

- Determine which actions taken by motor transport units before an operation, if known and analyzed by the enemy, would give the enemy the information he needs.
- Determine what protective measures are necessary and where they must be implemented to maximize operations security.

Operations security measures include:

- Countersurveillance.
- Signal security.
- Physical security.
- Information security.

a. **Countersurveillance**. Countersurveillance includes all active or passive measures taken to prevent threat forces from seeing your area, equipment, movements, and so forth. Countersurveillance techniques include--

- Camouflaging and toning down trucks, including the headlights and windshields, when they are not moving.
- Moving at night or during periods of reduced visibility using blackout lights.
- Using terrain as concealment.
- Maintaining noise, litter, and light discipline.

b. **Signal Security**. Signal security is the use of communications and electronics security techniques to prevent the disclosure of operational information. It includes the use of communications codes, secure voice equipment, and proper positioning of antennas. Techniques for motor transport units include--

- Keeping radio transmissions short.
- Maintaining signal silence whenever possible.
- Using wire communications when possible.
- Using low power in radios.

c. **Physical Security**. Physical security is the use of security forces, barriers, dispersal, concealment, and camouflage to deny enemy access to facilities, areas, equipment, materiel, and personnel. Physical security protects operational information or activities. Some practical techniques include--

- Employing security elements to the front and rear and, when required, to the flanks of convoys.
- Using listening and observation posts when in garrison and operations areas.
- Identifying avenues of approach and covering them with fields of fire.
- Employing obstacles that impede the enemy.
- Using challenge and passwords.
- Using early warning devices.

d. **Information Security**. Information security is the control of written, verbal, and graphic information to prevent the disclosure of operational information. To ensure information security--

- Never post information out in the open, such as on a vehicle windshield.
- Do not allow local civilians without clearances into work and assembly areas.
- Handle all classified and sensitive documents properly.

3-3. SECURITY AND DEFENSE PLANS. The motor transport commander must know what defensive measures are to be taken during ground, air, airborne/heliborne, guerrilla, and NBC attacks while conducting motor transport operations. The commander ensures that personnel are assigned specific duties with respect to security defense measures and makes sure they are familiar with these duties. The commander has his staff survey operations and make plans to lessen the possibility and effects of an attack. The staff uses all means available to include the OPSEC planning steps and the inclusion of OPSEC measures into operational plans and SOPs. Security and defense plans must be flexible. Operational commitments will reduce the number of personnel available for security and defense. Therefore, the plan should include support available from other sources (such as adjacent units and area support groups). The plan should be simple. Generally, the commander's main concern is defense against aircraft, airborne/ heliborne, guerrilla, nuclear, or chemical attacks. Ground attacks are of primary concern.

3-4. MOTOR TRANSPORT OPERATIONS UNDER ADVERSE TERRAIN CONDITIONS. Terrain creates the most common barriers affecting motor movement. Prepare for terrain obstacles through map studies and route reconnaissance. Adjust speeds and restrict vehicle loads as needed.

Standard military vehicles are designed and manufactured to lessen the effects of difficult terrain. Planners and operating personnel must recognize and make allowances for the limitations that the terrain imposes. Drivers should be trained on a variety of terrain to build confidence. This will enable them to negotiate natural or manmade obstacles with minimum delays. See Appendix F for hints for vehicle operations in difficult terrain.

a. **Hilly or Mountainous Terrain**. Plans for motor movements in hilly or mountainous regions must be based on a knowledge of current conditions of the area. Rugged terrain increases the need for specific information regarding grades, road characteristics, and bridge capacities. Available maps and information from reconnaissance and intelligence will indicate the type and maximum number of vehicles that can profitably be employed in any particular operation. In some cases, engineer assistance may be required to reinforce bridges and culverts and to maintain road surface during continued movement. On steep grades, normal loads may have to be drastically reduced to keep traffic moving at a reasonable rate. Many of the heavier vehicles with little off-road capability may be useless in bad conditions. Successful motor movement depends on--

- Selecting appropriate vehicles.
- Adequately training drivers.
- Knowing transport capability.

(1) ***Maintenance***. Maintenance, particularly operator maintenance, is of major importance in motor movement in mountainous terrain. Before and during operations in the

mountains, the safety devices of all vehicles must be thoroughly checked. On-the-spot adjustments must be made to ensure proper operation. Mechanical failures that might be considered of minor importance in other situations may cause serious accidents on steep grades and sharp curves. Proper inspection of the brake linkage and proper adjustment of brakes are critical. The emergency brake must be able to limit speed when descending steep slopes. The transmission must be properly maintained and in good operating condition.

(2) ***Planning considerations***. Steep grades are prevalent in mountainous terrain. The proper selection of vehicles for an operation will enable continued movement without resorting to winching. Drivers must be extremely careful at all times because of sharp, blind curves and dangerous grades. Either uphill or downhill grades should be taken in a gear ratio that will enable the vehicle to take the entire hill without shifting. When entering a short, steep grade, the driver may build up momentum on the approach so that this added momentum will carry him over; or, he may drop into a lower gear to allow for a long steady pull with maximum traction. Use caution to ensure that the speed of the vehicle does not exceed the speed (listed on the chart in the cab of the vehicle) for that particular gear ratio.

WARNING

All curves must be taken at a speed that enables the driver to stop the vehicle in half the road space visible to him.

During daylight operations, all vehicles will normally be in open column. Here, guard against bunching on the approaches to grades and curves. This is important because slow movement of columns in mountainous areas makes vehicles extremely vulnerable to enemy attack.

Blackout driving in mountains will often exceed the danger of enemy action. Therefore, driving without lights on narrow, winding mountainous roads should be held to a minimum. Blackout driving should be limited to those stretches of road subject to enemy observation. At these points, post signs and guides to give special instructions to each driver as he approaches. Trucks should be close-column for blackout operations. Descend hills with a combination of braking and engine power; neither should be used alone to bring a vehicle downhill.

b. **Swampy Ground and Water Obstacles**. Evidence of ground water (the presence of springs, pools, or characteristic plant growth) along a planned cross-country route presents a problem in the movement of wheeled vehicles. Swampy ground and water obstacles are generally associated with valleys or lowlands. However, sidehill bogs and ridgeline swamps may appear where ground water emerges. For planning and operational purposes, consider these barriers to be all-seasonal, although seasonal conditions will affect them as the water table is raised or lowered. Timely estimation of the size and characteristics of obstacles through map study, reconnaissance, and intelligence will aid in determining the--

- Amount and type of added equipment needed to effect the passage of a column.
- Probable delays and adjustments in the schedule to avoid congestion.
- Advisability of using an alternate route to bypass the obstacle.

(1) ***Mud and swamps***. Swamps, bogs, and mud caused by the nearness of the water table to the top of the ground should be avoided by all traffic, if possible. The surface crust may appear dry and well covered with vegetation, but any breakthrough may result in the vehicle becoming hopelessly stuck. The depth of soft mud below the surface is extremely difficult to determine. The depth may vary in the same swamp from between 1 to 2 feet.

When it is necessary to cross such barriers, make provisions to bridge the surface by suitable reinforcement with mats, brush, or special flotation materials. By increasing flotation in this way and by avoiding concentrated loads, traffic may cross otherwise impassable barriers without undue loss or delay. If support of a tactical operation requires movement over large areas of marsh or swampland, help from engineer personnel and equipment must be available. Vehicles with maximum flotation must be selected.

(2) ***Ditches and streams***. Drainage ditches and canals, gullies and ravines, and streams and rivers present obstacles to motor movement--especially if the obstacle is large and if the movement is open to enemy action. Map study, reconnaissance, and intelligence reports may supply all information necessary to planning personnel.

When there is doubt about the ease of crossing an obstacle, request an engineer reconnaissance. The engineers can determine what must be done to make the crossing. Small ditches, gullies, and streams will not cause serious delays, but, even here, approach and passage at reduced speeds require traffic control to avoid congestion. Canals, ravines, and rivers present serious obstacles to motor movement and require definite means for crossing.

Existing bridges and fords offer profitable targets for enemy artillery, bombing, sabotage, and guerrilla activities. Therefore, no movement should be made without a provision for changes in plans demanded by current intelligence.

Techniques of crossing, capabilities of vehicles, and requirements for the construction of temporary bridges or crossing expedients are covered in appropriate FMs and TMs. In general, the existence of canals, ravines, and rivers that cross a selected route requires added preparation by planners. Planners do this to--

- Avoid congestion in critical areas.
- Arrange for repair or construction at crossing sites.
- Furnish adequate instructions to operating personnel to ensure proper conduct of the operation.

See FM 20-22 for detailed information on vehicle recovery operations.

3-5. MOTOR TRANSPORT OPERATIONS UNDER ADVERSE CLIMATIC CONDITIONS. Adverse climatic conditions impose a variety of limitations and challenges on motor transport operations. The effects on personnel and equipment, as well as on methods of movement and maintenance, should be emphasized when planning and executing operations in areas where extreme conditions are the rule. See Appendix G for more guidance on vehicle operations in adverse weather.

a. **Desert Operations**. Desert environments occupy approximately one-fifth of the total land area of the earth. Their climate and terrain justify careful examination of the limitations imposed on military movement. Capabilities can be improved through training personnel and modifying equipment. Broad generalities must be avoided in describing desert environments. Wide variations occur with changing desert forms in the same general area. There are, however, some characteristics common to most. For example, most deserts have--

- Low rainfall creating a scarcity or total lack of water.
- Extensive barren areas of gravel or sand.
- A high sunshine percentage, exceeding 70 percent.
- Extreme daily temperature ranges, with low relative humidity during the day.
- Strong seasonal winds, with periodic sand and dust storms.
- A lack of vegetation, except for scattered scrubby bushes with small leaves and thorns.

Desert land forms are variable. They include sand dunes, rocky hills, steep cliffs, and broad level valleys covered with gravel or stones. They include areas of clay that may become impassable in rainy periods and gullies and dry stream beds that can suddenly become raging torrents.

Desert conditions reduce efficiency of personnel. They increase problems of maintenance of equipment and reduce mobility. They also cause tactical insecurity due to lack of cover and concealment. Successful motor movement in deserts requires added training and conditioning of personnel. It also requires specific adaptation of vehicles and modification of maintenance procedures. Combinations of terrain and climate vary greatly among the world's deserts. Therefore, general operational precautions and techniques must be modified to apply to any specific area. The information that follows may be used as a guide.

(1) ***Driving***. Due to the general absence of established roads in desert areas, desert driving calls for experience, individual skill, and physical endurance of the vehicle operator. Driver training should include as much off-road operation and night operation as possible. Driver training should be carried out under a variety of conditions similar to those found in a desert. This training should include orientation on land forms, soil, and climate using photographs, films, and discussions.

Driving in sand requires judgment in selecting proper gear ratios, determining suitable speeds, and choosing the best ground. The driver must recognize the limitations of his equipment, particularly the tendency of wheeled vehicles to dig in when forward momentum is lost. He must be able to employ proper recovery expedients immediately. Provisions should be made for added equipment on the vehicles or within a column. Added equipment will be needed for the rapid recovery of stuck vehicles.

Unit SOPs should be modified for desert operations. The SOP should include procedures necessary to keep the column moving without unnecessary congestion around a disabled or immobilized vehicle.

Driving in other desert land forms requires the application of a variety of driving principles. Driving in deserts demands sound judgment and experience on the part of both vehicle operators and command personnel. No simple formula or means of testing to determine soil trafficability in the desert has been developed. Therefore, each new situation must be evaluated in light of experience. In most desert areas, sand is the common obstacle.

(2) ***Maintenance***. Vehicular maintenance presents a major problem in all desert operations. Under the best conditions, movement of vehicles over desert terrain creates a great volume of dust. The dust factor alone demands constant unit-level maintenance to prevent abnormal wear and inoperable vehicles. Drivers must daily check and clean air filters (more often under extremely dusty conditions), check oil filters, and inspect steering knuckle boots for damage. Vehicle instruments should be sealed (using tape or sealing compound) to keep out dust. When servicing vehicles, care must be taken to ensure that no sand gets into fuel tanks and crankcases. Even with the best maintenance possible, wear will be greater in desert operations than in normal operations.

Excessive heat also creates maintenance problems. Overheating of vehicles, through long periods of operation in low gear and the rapid evaporation of coolants, requires more frequent rest periods to prevent or reduce engine damage. During these rest periods, vehicles should be faced into the wind to cool. During stops, be sure to inspect regularly the following--

- Fan belts, replacing immediately when excessive wear is noted.
- Radiators, to ensure free circulation of air and coolant.
- Batteries (daily), to maintain the proper level of electrolyte (water).

The combination of heat, sand, and rough ground in desert areas causes excessive wear to tires. The following guidelines will help drivers to maximize tire mileage:

- Maintain proper tire pressure to guard against rim slippage and broken tire fabric.
- With dual-wheeled vehicles, frequently inspect for stones wedged between the tires and remove them before damage is done to the side walls.
- When halted overnight or for any extended period, the rears of vehicles should be parked into the wind.
- Conduct night operations when possible to prolong tire life.

(3) ***March techniques***. Motor movement operational techniques must be modified for desert operations. The desert usually has no well-defined roads or trails. Therefore, normal methods of assigning routes, direction by signs and guides, and movement control do not work. Movement from place to place is usually made using navigational methods and equipment. Take care to maintain sufficient dispersion to prevent presenting favorable targets to the enemy. Deserts generally offer little or no natural concealment from aerial observation. However, unevenness in terrain may afford cover and concealment from direct ground observation. Camouflage nets and shadows in broken ground areas must be used to give some measure of security.

(4) ***Planning considerations***. Movement planning for desert operations involves looking at the influence of climate and terrain on movement. Planning personnel at all levels must be familiar with the capabilities and limitations of both personnel and equipment. Make necessary changes to the organization, training, and equipment as early as possible. Select vehicles most

suitable for the local climate and terrain. This will ensure maximum mobility and will lessen excessive supply and evacuation requirements of the vehicles themselves. Selecting and/or training operational personnel is a major factor in planning. The physical and psychological effects of climate reduce personnel efficiency; at the same time, operational and maintenance demands are at peak levels. Selection of personnel should include only those best qualified physically and mentally to endure hardship.

Motor movement in desert areas is also made difficult by terrain and the tactical situation. Dispersion is increased to achieve some degree of tactical security. This increases the time length of convoys. Also, the experience with time and space schedules developed in other terrains will not be very helpful. Routing must be general rather than specific. This is because point-to-point distances may be materially increased by local nontrafficability. Column control is another problem. Column control will normally be exercised from within the column by radio or visual signals. Supply and evacuation movements in the desert usually involve greater distances. This is because of the dispersion of installations and the greater volume of supplies/support required in desert operations.

Training should stress leadership, physical conditioning, operation of vehicles in desert environment, and principles of land navigation. See FM 21-305 for details on desert driving.

b. **Jungle and Forest Operations**. Jungle and forest conditions vary from the heavily forested areas of the North Temperate Zone to the impenetrable equatorial rain forests. Whatever the location, jungles and forests affect motor movements. Heavy annual rainfall, high relative humidity, and adequate soil fertility are characteristic of all such areas. In Temperate Zones, the forests have many large trees but little undergrowth. Northern forests limit cross-country motor operations, but the overhead cover they offer conceals military activity and equipment. On the other hand, equatorial rain forests present a definite obstacle to all military operations. All mobility, even for personnel traveling on foot, is hampered by a tangle of dense undergrowth that must be cleared to allow passage. Roads must be constantly maintained and are usually limited to unimproved trails.

Military motor movements in all heavily forested areas are open to enemy ambush and delay. Motor movements in areas of heavy vegetation are difficult. Again, climate and terrain are critical factors. Climatic factors include the type of vegetation in the area and its effect on movement. Also significant are the effects of climate on maintenance and human efficiency as well as the tactical effects of these conditions. Density of vegetation affects vehicle movement. Although roads and trails may be adequate for the movements planned, some off-road movement may be forced by enemy actions. Therefore, the movement organization should include the personnel and equipment necessary to ensure continued movement. Personnel must be capable of providing emergency bypasses, making highway repairs, or reducing roadblocks. Continued use of routes through these areas may require engineer road maintenance patrols to keep them open for wheeled traffic. Except in equatorial rain forests, tracked vehicles have sufficient off-road mobility to bypass damaged sections of road. However, compared to wheeled vehicles, tracked vehicles are limited in speed and cargo capacity and are less economical to operate.

(1) ***Driving***. March control must be modified for jungle or forest operations. March units should usually move as compactly as possible to ease control, improve security measures, and aid rapid movement. Close column formations permit easier following of trail; however, in tactical situations, such formations increase the danger of ambush. Open columns and

infiltration moves lessen the danger of a general ambush. However, the possibility for a small element or single vehicle being separated and ambushed is increased.
Base the desired formation on a careful evaluation of existing conditions. Always maintain close liaison between elements of the march. Avoid complete dependence on radio communication. Normal radio operating ranges are greatly reduced by dense vegetation and adverse operating conditions. In preparing movement orders or SOPs, be sure to arrange for alternate means of communication.

Reconnaissance must be provided both in advance of and during the movement. This is done to ensure adequate information on the selected route, provision of alternate routes, and timely warning of possible enemy interference. Reconnaissance units operating in these areas must be particularly well trained and alert. Maintain march discipline at all times and furnish adequate security at halts.

Aerial observation of ground movement is seriously restricted by overhead cover. By careful use of this overhead screen, large groups of vehicles may move or bivouac without danger of detection or attack from the air. Prescribed distances should be maintained at the cost of reduced speed.

(2) ***Maintenance***. Motor maintenance is increased in jungles because of the added strains of operating on unimproved roads, long periods of operation in lower gears, and rust and corrosion caused by high humidity. Human efficiency drops sharply in tropical areas of high humidity, and efficient maintenance becomes extremely difficult.

(3) ***Planning considerations***. Planning for movements in jungle or heavily forested areas requires early consideration of climate and terrain. Anticipate the need for added personnel and equipment to give timely support to movements. Distances involved may be comparatively short, but road speeds will usually be reduced. Allowances must also be made for route construction and maintenance. Supply and evacuation in jungle operations should be closely coordinated. The key is to make maximum use of trucks and to reduce traffic. Tropical conditions require increased protection for supplies against the effects of rain, high humidity, and heat from sunshine.

c. **Operations in Snow, Ice, and Extreme Cold**. Operations conducted in snow, ice, and extreme cold may be divided into two general categories:

- Arctic and subarctic operations.
- Winter operations in the North Temperate Zone.

Operations in the arctic and subarctic mainly involve the effects of low temperatures. Low temperatures recorded in this area are constant during the winter months and continue for long periods. See FMs 31-70, 31-71, and 90-6 for current doctrine on arctic and subarctic operations.

The secondary category, winter operations in the North Temperate Zone, directly affects the movement of most land armies. The North Temperate Zone includes a large portion of the civilized world. A knowledge of expected winter conditions and their influence on military operations is essential to the success of winter campaigns. In the North Temperate Zone, snow, ice, and extreme cold may restrict some movements while favoring others. Motor movement on highways is definitely restricted by heavy snowfalls or ice. In many cases, special equipment is necessary to make any movement possible. In all cases, highway speeds will be reduced. On the other hand, cross-country movement may be facilitated by the presence of deep frost. In the North Temperate Zone, snowfalls of over 2 feet are common. Sleet storms can glaze highways with clear ice in a matter of hours, and temperatures to -40^{o} F may be encountered.

All of these conditions demand organizational and individual operational modifications. Motor columns must travel at reduced speeds. They must be prepared to encounter sudden changes in highway trafficability. Accidents caused by road conditions may be common until drivers gain experience. However, providing emergency vehicles within the column will reduce delays. Personnel and equipment for snow removal or sanding will seldom be available except on regularly traveled routes.

Instruct all drivers to use extreme caution at all times. Drivers must put on tire chains when in doubt. They must test the traction of their vehicles while on the march. Temperature affects traction more than any other weather element. Traction for wheeled vehicles on snow and ice without the use of chains is improved by subzero temperatures. However, the presence of a light, dusting snow over glazed ice is extremely treacherous. In cases where moisture is present on the tires, chains should be used. Until better classification methods evolve to indicate snow trafficability, the judgment and experience of the driver must suffice. The driver must master techniques of smooth, gradual acceleration and deceleration. Sudden starts and stops will result in complete loss of traction.

In such conditions, the interval between vehicles should be greater than normal. Drivers should be instructed to maintain prescribed intervals since stopping distances are greatly increased.

(1) ***Maintenance***. In cold climates and during the winter months, motor maintenance becomes increasingly important and more difficult. Automotive equipment must be maintained in top mechanical condition to run efficiently in subzero weather. The conditions under which this maintenance must be performed are usually unfavorable. Seasonable preparation for cold weather is the most effective means of preventive maintenance. Inspect and winterize all vehicles before freezing temperatures are expected. Winterization includes--

- *Lubrication*. Lubricate vehicles thoroughly, using proper oil and grease for the expected temperatures as indicated in lubrication orders.
- *Ignition*. Clean spark plugs and adjust gaps. Check coil, generator, starter, voltage regulator, and distributor.
- *Battery*. Test cells, check electrolyte, clean terminals, and tighten cables and clamps. Battery efficiency drops in extreme cold when the heaviest output loads are required.
- *Cooling system*. Carefully inspect the cooling system for leaks, tighten connections, and replace worn hoses. Check the water pump, thermostat, and fan belt for proper operation. Drain and thoroughly flush the system and refill with the indicated solution of antifreeze.
- *Fuel system*. Check for fuel leaks and replace parts if necessary. Adjust the carburetor for cold weather operation. Check intakes and manifold gaskets. When extreme cold is expected, drain fuel tank sump to remove any water that may have accumulated and refill. Add 1 pint of Grade III denatured alcohol to every 10 gallons of gas to prevent freezing of fuel lines.
- *Brakes*. Check brake adjustment, fluid, linings, and connections.

- *Exhaust*. Check exhaust system for leaks. Carbon monoxide from a leaky exhaust system is deadly in a closed cab.
- *Vision*. Check lights, windshield wipers, mirrors, and defrosters.
- *Tire chains*. Make sure that tire chains are present, are the proper size, and are in good repair.

Driver duties and responsibilities in preventive maintenance are increased during cold weather operations. Each driver must be told that his comfort, safety, and perhaps his life, depend on preventive maintenance. Besides the normal before-, during-, and after-operation preventive maintenance, the driver must be careful to warm up his engine gradually before loading. He must be sure that the winterization of his vehicle is adequate and that it stays that way. He must know and apply the measures necessary to give him adequate vision in all kinds of winter weather. He must also be able to recognize the early symptoms of ignition failure or battery failure and take appropriate corrective action. Command supervision of maintenance activities in all categories is particularly important when heated facilities are inadequate or not available. Many times, only those items considered most important will receive attention from personnel whose discomfort is their major concern.

(2) ***Planning considerations***. The successful planning and conduct of winter motor movements in the North Temperate Zone is based on thorough familiarity with local weather and terrain. Movement plans must take into account maximum severity of weather for the season and be flexible to allow for sudden changes. A sudden rise in temperature accompanied by a warm rain will turn trafficable snow into mud and slush. Temperatures, while above freezing, will cause great discomfort to personnel. Midwinter thaws are followed just as suddenly by subzero temperatures, causing the freezing of deep ruts and dangerous ice. The accumulation of frozen slush on running gears and the undercarriage of a vehicle may cause failure of components. Accumulation may also become of such a size as to bind moving parts and/or wheels and lead to accidents. Sudden changes in weather will often have a bad effect on motor transport operations. Advance planning and preparation must include--

- Winterizing vehicles to meet the most severe weather.
- Instructing operating personnel in winter hygiene and first aid.
- Issuing suitable cold weather clothing and equipment.
- Requesting engineer personnel and equipment as indicated to expedite movement.

Route selection should be based on data resulting from a route and area reconnaissance. Alternate routes should be used to take advantage of changes in trafficability due to weather. In spite of reduced speeds, column formations will normally be open due to the intervals required for increased stopping distances. During periods of low visibility, columns will close up to maintain control. Schedule frequent halts to allow drivers to rest and personnel to move about to improve circulation.

3-6. THE HIGHWAY NET. When selecting routes over which cargo is to be hauled, consider the capabilities of the roads and bridges to sustain the operation. For example, the gross weight of the heaviest loaded vehicle should not exceed the rated tonnage capacity of the weakest bridge. See Appendix H for information on evaluating a highway net.

CHAPTER 4

MOTOR TRANSPORT OPERATIONS

The motor transport commander employs his assets to provide effective and efficient transportation support. To do this, he must have a thorough knowledge of all aspects of motor transport operations. This chapter contains detailed information on such operations.

4-1. MISSIONS. Motor transport unit missions vary based upon their location in a theater of operations. At the operational level, transportation is normally associated with EAC. Transportation support is provided by functionally oriented transportation mode operating organizations such as the TRANSCOM or a transportation composite group employed in the COMMZ. If the operational level does not include EAC transportation units, the COSCOM will provide transportation support. The primary mission of motor transport units at the operational level is to clear ports and move units and material forward. They also support units located in or passing through the COMMZ.

At the tactical level, transportation is normally associated with the corps and divisions. Motor transport units support multifunctional logistics organizations such as the COSCOM and the DISCOM by moving supplies, personnel, units, and equipment to arm, fuel, fix, and sustain the force. They also support units located in or passing through their areas of responsibility.

Whether at the operational or tactical level, motor transport units are usually employed in a general support role within a specified area or along specific routes. Placement should ensure efficient, responsive support, convenient to major customers and distribution operations. Motor transport units can expect to move frequently in response to changes in requirements. The combat HET company adds the dimension of operational and tactical relocation of combat units within the corps. The PLS offers greater mobility for movement of ammunition and other commodities. See Appendix I for conversion tables helpful in planning motor transport operations.

4-2. COMMAND RELATIONSHIPS. The mission drives the number and type of motor transport companies that are assigned to transportation or multifunctional battalions. Both types of battalions are organized to meet mission requirements. This is known as task organization. Task organization may change frequently based on the mission, phase of an operation, or priority of support. It usually requires changes in command relationships. Command and/or control is transferred from the headquarters, and the company is assigned to the unit it will be task-organized under. Unit integrity at company level should be maintained.

Two standard types of command relationships for task organization are operational control, or OPCON, and attachment. Operational control exists when temporary authority is granted to a commander to accomplish specific missions or tasks. Units are placed under the OPCON of the supported commander with the parent unit exercising command and providing administrative support. Under attachment, equipment and operators are placed on a temporary basis. (See FM 101-5 for a more detailed description of command relationships). Other instances that affect command relationships include attachment or assignment of HN, LOGCAP, or other contract support. In these circumstances, command relationships are determined by law, agreements, or policy on a case-by-case basis.

4-3. TRANSPORTATION SUPPORT REQUIREMENTS. Transportation support requirements are assigned to motor transport units through movement control channels using the commitment process. A commitment is the assignment of a support requirement. Although transparent to the mode operator, there are two types of transportation support requirements:

- *Programmed*--identified in advance; allow for allocation of transportation requirements among all available modes.
- *Immediate*--generated during the conduct of operations; cannot usually be anticipated within the movement program planning cycle.

Motor transport units can expect to receive both types of requirements. Movement managers, such as the TMCA, transportation battalion (MC), and MCO, develop movement programs within their area of responsibility and plan the allocation of movement requirements among all transportation modes. The movement program enables motor transport units to plan the optimum use of their assets in advance since they know in advance what most of the requirements are. Effective movement programming requires that motor transport unit commanders accurately report the projected availability of their vehicles to the movement manager.

Movement programs are developed in planning cycles. Shippers request transportation support through the movement manager. The movement manager consolidates all support requests and balances these requests against the capabilities of the mode operators in their area of operation. They assign the appropriate mode for each requirement and publish the movement program. The program is distributed to the shippers, mode operators, and movement control units. When requirements for trucks exceed capabilities, adjustments are made by the movement manager based on priorities for support. See FM 55-10 for more information on movement programming. The movement program may be changed when the movement requirement no longer exists, when origins or destinations change, when a different mode is required, or when priorities change.

When a shipper wants to change or delete a programmed movement, he informs the movement manager. The movement manager must adjust the movement program and inform the motor transport headquarters so it can adjust its planning. The motor transport headquarters relays the change or deletion to subordinate truck units. In-transit storage may be required on an exception basis at origin, destination, intermediate terminals, or TTPs. In-transit storage should be discouraged because it reduces the capability of motor transport units by delaying equipment longer than would ordinarily be required. It also increases the number of trucks required.

4-4. PRINCIPLES OF MOTOR TRANSPORT OPERATIONS. Motor transport operations are enhanced with the application of certain principles. Whether at the operational or tactical level, a significant advantage can be realized by reducing turnaround time between missions, maximizing the use of each vehicle's capacity, performing required maintenance, and assigning the proper vehicle type for each mission.

Even the proper application of these principles, however, does not guarantee effectiveness. When shippers and receivers are not prepared to load or unload cargo or are unable to do so, transportation effectiveness is decreased. Potential problems can be alleviated by close coordination between the mode operator, the supporting movement control organization, and the supported unit. Motor transport units rely on the supported unit for the following:

- MHE, personnel, and cargo (ready to load/unload at the time requested).
- Cancellation of requirement if no longer valid.
- Changes to spot times and locations prior to dispatch.
- Release of motor transport equipment immediately after off-loading.

When inefficiencies cause equipment shortages, total tonnage can be increased by decreasing turnaround time. This may include increasing the march rate over the routes or increasing the hours of operation. However, judgment must be used so that the end result does not cause unsafe operations or vehicle accidents.

4-5. OPERATIONAL PLANNING. A number of factors should be considered when planning motor transport operations. These include the following:

- Programmed movement requirements, types of cargo to be transported, locations of supported activities, and availability of MHE.
- Capabilities and availability of equipment and units to perform the required tasks. (FM 55-15 contains guidance on motor transport planning.)
- Capacities of the routes to be used.
- Safe march rates over each segment of the MSRs and ASRs.
- Available areas for truck units, truck terminals, and TTPs.
- Tactical situation, weather, and terrain.
- Requirements for support, such as fuel, military police escorts, security, medical, maintenance, and communications.
- Driver documentation, such as travel orders, driver's licenses, motor vehicle documents, and dispatch.

Units must properly plan road movements, prepare march tables, submit movement bids, and coordinate en route support. See Appendix J for information on road movement planning and FM 55-10 for information on movement bids.

4-6. CLASSES OF OPERATION. Motor transport operations are characterized as intrazonal or interzonal. Within each category, they may be further defined as local or line haul. Intrazonal truck operations are confined within the territorial boundaries and under the jurisdiction of one headquarters or command. Interzonal truck operations cross boundaries and operate under the area control of more than one headquarters or command. Boundaries are defined between division and corps, corps and theater army, or adjacent divisions and corps. These boundaries also correspond to movement control boundaries or movement regions.

a. **Types of Hauls**. Local (short) hauls have a short running time compared to loading and unloading time. They usually involve two or more intrazonal trips per operating shift per day. They occur within a movement region (for example, within the division, CSG, or ASG area of responsibility). Trucks used for local haul include the 2 1/2-ton and 5-ton cargo trucks.

Line (long) hauls have a long running time compared to the loading and unloading time. They usually involve one trip or a portion of a trip per operating shift. Line hauls are more frequently interzonal, commonly crossing movement control boundaries (for example, between COMMZ and corps or corps and division). Throughput operations from ports or theater storage areas to the corps and divisions are examples of line haul operations. Truck types used for line haul include the tractor trailer, HET, and PLS.

b. **Hauling Methods**. Four general methods are used in moving cargo and/or personnel by motor transport: direct haul, shuttle or relay, and hub and spoke.

(1) ***Direct haul***. A direct haul is a single transport mission completed in one trip by the same vehicles. It does not involve a transfer of supplies or exchange of equipment. It is most often used for local hauls. It can be used for line hauls, especially for operational movement of armor or mechanized forces. Direct hauls used for line haul operations are referred to as express operations. Express operations are established before trailer transfer or cargo transfer points have been set up. They may also be used when there is a need for rapid movement of tonnage over long distances and when normal line haul operations cannot meet the requirement. Sustained express operations are inefficient for both drivers and equipment. They can also result in loss of control by the parent unit.

(2) ***Shuttle or relay***. A shuttle is a single transport mission completed in repeated trips by the same vehicles between two points. This method is commonly used in local hauls. A relay is a single transport mission completed in one trip by multiple vehicles without transferring the load. It involves the continuous movement of supplies or troops over successive segments of a route. It is done by changing drivers, powered vehicles (tractors), or both for each segment. This method is most commonly used in line hauls because it is the most efficient method of hauling. Containerized cargo increases the effectiveness of this system and better uses the tonnage capabilities of the trucks. In addition to rapid throughput of cargo, the relay system allows for command supervision and supporting services in each segment of the route. Figure 4-1 illustrates both the shuttle and relay methods.

(3) ***Hub and spoke***. A hub and spoke is similar to a relay in that it is a single transport mission completed in one trip by multiple vehicles without transferring the load. It involves moving supplies or troops through a hub terminal between segments of multiple routes. Like a relay, it is done by changing drivers, powered vehicles (tractors), or both at the hub. This method is used in local and line haul operations.

c. **Intermodal Operations**. Part of the theater transportation system may involve intermodal operations. Intermodal operations combine the capabilities of more than one mode for a movement requirement. Motor transport may be combined with other transportation modes to reduce cargo handling and thereby speed delivery. Intermodal decisions are made in movement control channels.

(1) ***Piggyback or TOFC***. In this operation, semitrailers are moved in local haul to a rail head, placed on railcars, and moved by rail to the railhead servicing the destination area (Figure 4-2). They are then unloaded from the railcars, coupled to suitable towing vehicles, and delivered to their destination. Piggybacking combines the economy of rail hauls with the door-to-door service of the truck. Where large amounts of cargo are involved, the piggyback operation becomes one segment of a relay.

(2) ***Container on flatcar***. The COFC operation parallels the TOFC method except that containers are involved instead of semitrailers. Containers may be either mounted on chassis and then loaded on flatcars or loaded directly onto the deck of the transporting flatcars.

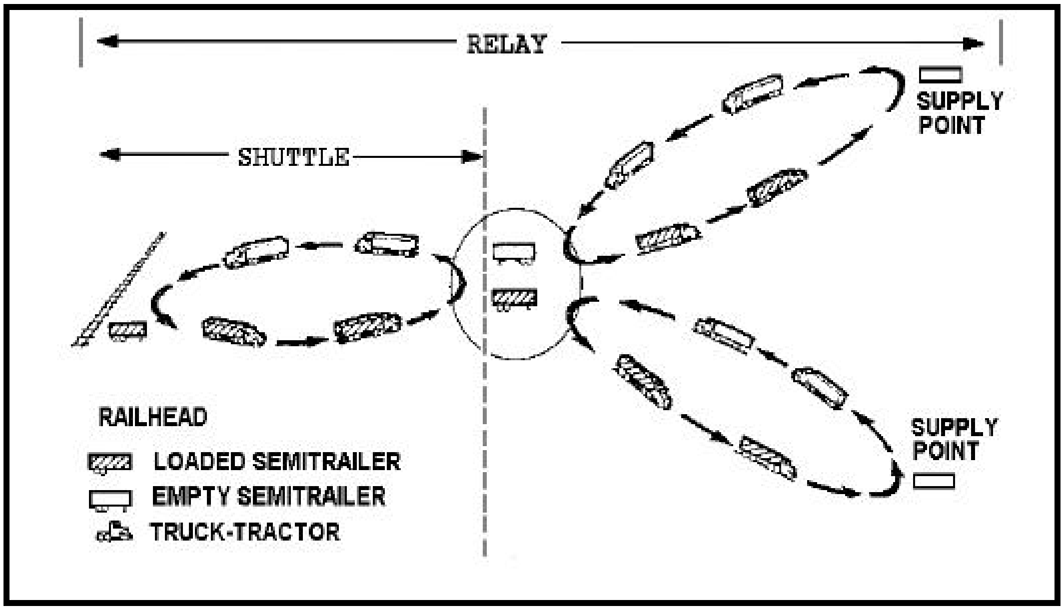


Figure 4-1. Shuttle and relay operations

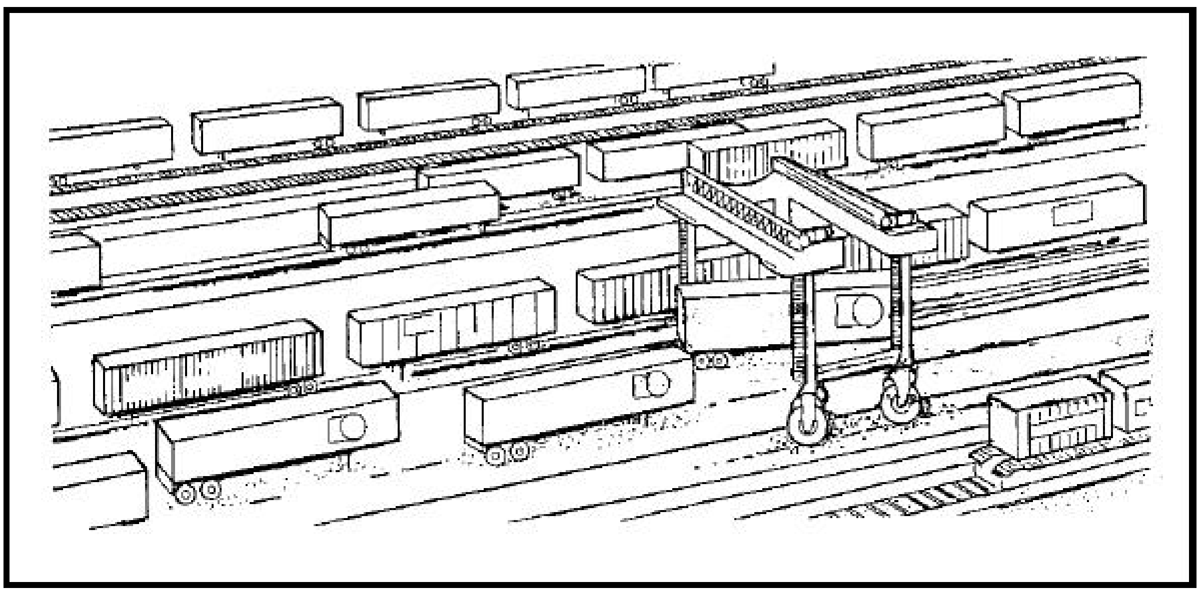


Figure 4-2. Piggyback operation

(3) ***Roll-on, roll-off***. In RORO operations, vehicles or semitrailers are loaded aboard RORO watercraft and moved to a destination water terminal. At the destination terminal, they are coupled to towing vehicles while still aboard ship and moved by highway to their destination (Figure 4-3, page 4-6).

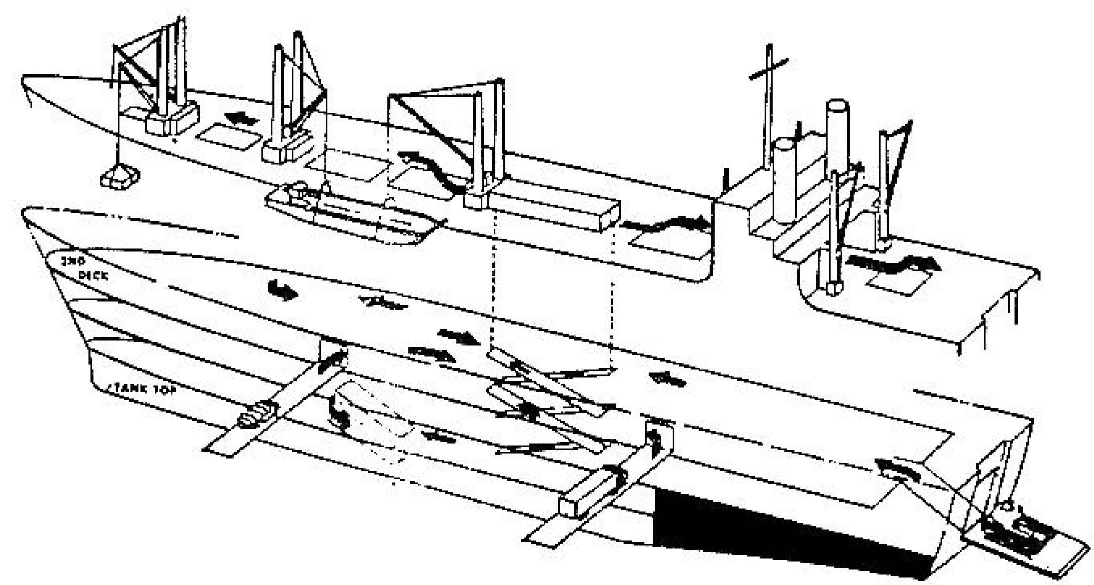


Figure 4-3. Roll-on, roll-off

(4) ***Lift-on, lift-off***. In LOLO operations, loaded trailers or containers are moved to a water terminal, uncoupled from their prime movers, and crane-loaded aboard ship (Figure 4-4). Upon arrival at the destination terminal, the trailers are unloaded by crane, coupled to prime movers, and moved to their destination by highway.

(5) ***Air***. During CSS air movement operations, vehicles move cargo to the origin air terminal or airfield log pad. The cargo is moved by air to the destination air terminal or airfield, offloaded, and loaded on trucks for movement to its final destination.

(6) ***Lighter aboard ship***. In LASH operations, semitrailers or containers aboard lighters are launched from ships. They are especially useful where deep water port facilities are not available.

(7) ***Palletized load system***. The PLS is a tactical wheeled vehicle with a truck bed and flatrack that has a 16 1/2 ton maximum weight capacity. It can pull a PLS trailer that also has a 16 1/2 ton weight capacity for a total carrying capacity of 33 tons. The PLS truck has a hydraulic lifting system that loads and unloads both truck and trailer flatracks. The corps level transportation medium truck company (PLS) is authorized 48 trucks, 48 trailers, and 96 flatracks. The PLS company's primary mission is to transport ammunition from the CSA to the ASP and the ATP(s) as doctrinally outlined in the MOADS. Its secondary mission is to transport general cargo and 20-foot containerized cargo within the corps and division rear areas. NOTE: The PLS can be fitted with a CLK attachment to load and unload the 20-foot container without using a flatrack. The self-load/unload capability of PLS, coupled with potential variations of the flatrack configuration, makes the system well-suited for a number of potential missions. These missions

include cargo and shelter transport, unit mobility and resupply, ASL/PLL mobility, recovery and evacuation, liquid cargo transport, and engineer bridge transport.

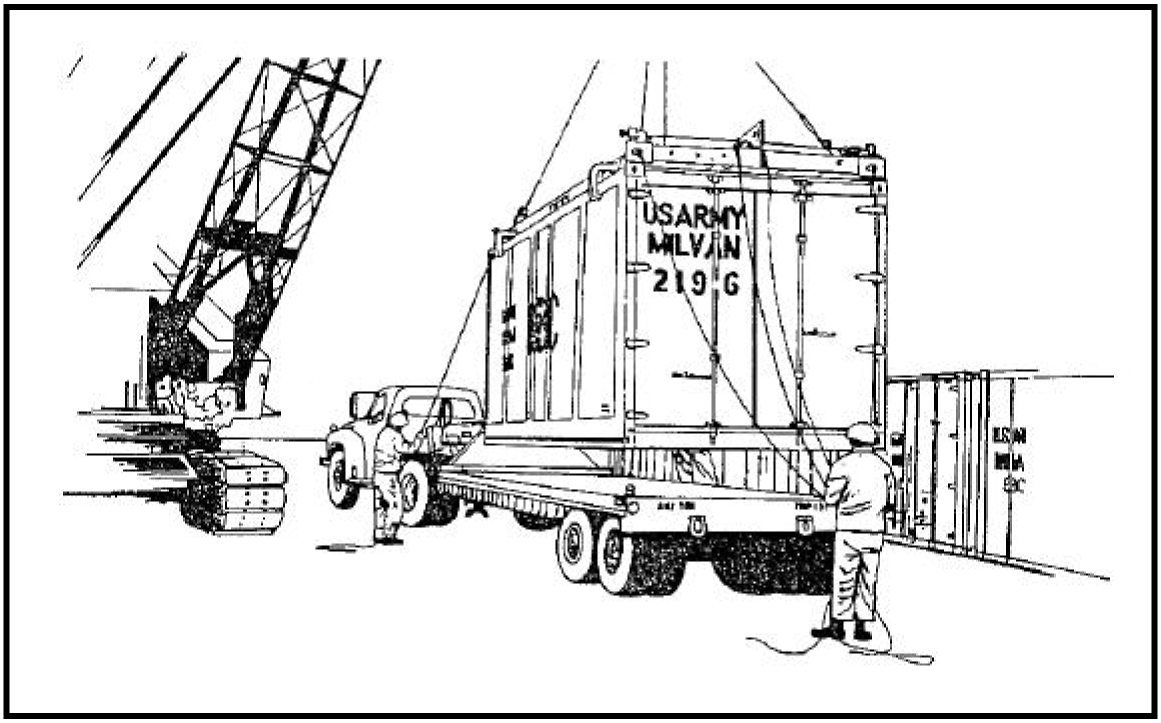


Figure 4-4. Lift-on, lift-off

4-7. TYPES OF OPERATIONS. Motor transport units perform a number of missions that require movement control and traffic control support. These missions include:

- Terminal (water and air) clearance.
- Interzonal motor transport service.
- Truck terminal/TTP operations.
- Area support operations.
- Transfer operations.
- Drive-away operations.
- Container transport operations.
- Retrograde operations.

Routes should be planned to accommodate the traffic volume anticipated during these operations. Some MSRs can be reserved for line haul operations if adequate routes are available for other movements. Movements crossing movement control boundaries should be inbound-cleared in advance with the movement control organization serving the destination area. Routes must be well-marked to assist drivers. Driver training should include route familiarization. Drivers should have strip maps or other maps showing the route to be followed. See FM 55-10 for details on highway regulation. Routes should be the MSRs. These roads should be paved and have good connecting and access roads. The motor transport headquarters must work closely with its servicing movement control headquarters to make sure that--

- Adequate routes and control measures are established for line haul operations.
- Planning for line haul operations supports movement and distribution requirements.

At the same time, the motor transport headquarters should evaluate all available route information and, when possible, conduct ground reconnaissance to determine--

- Critical points and the ability of vehicles to negotiate difficult grades, defiles, bridges, tunnels, or terrain.
- Route capacity.
- Feasible march rates over each segment.
- Time distances between TTPs.
- Average travel time.
- Route maintenance and upgrade requirements before operations begin.

The movement control organization establishes HRPs along MSRs. Reports from the HRPs enable the movement control organization and motor transport staff to maintain control of movements. Reports help to effect priorities, to make adjustments in routing, and to coordinate travel over the route in response to changing tactical situations. Highway regulation points may be established at movement control boundaries, terminals, TTPs, and other locations as necessary.

The motor transport unit committed to the move normally affords security and/or reconnaissance support required for movements. However, when convoys need security and reconnaissance support beyond organic resources, it may be furnished on a mission basis by commanders of the areas through which the convoys operate. Coordination should be made with the division/corps rear operations center.

Traffic control using MPs or HN police should be set up at critical points and congested areas. Close coordination between the movement control organization, truck headquarters, military police, and division/corps rear operations center is essential.

a. **Terminal Clearance**. Motor transport units move personnel and cargo out of air and water terminals. Rapid clearance allows for continuous discharge of aircraft or ships that may otherwise be hampered by congestion within the terminal area. The terminal operator (military, civilian, or joint operation) is responsible for off-loading the ships or planes. A movement control detachment should be located at the terminal to plan and coordinate clearance. The motor transport headquarters may assist in planning, setting up truck operations, and regulating the flow of vehicles in the terminal area.

Ideally, heavy maneuver units move their tracked vehicles from the port of debarkation to forward assembly areas by means of nondivisional HETs. The division MCO coordinates for these assets through the corps movement control battalion. Nondivisional HETs are allocated IAW mission priorities. They may be augmented by divisional HETs when needed. Throughout movement operations, emphasis should be placed on preserving unit integrity.

If HET assets are not sufficient to complete the mission, heavy maneuver units should use division or corps medium trucks to move lighter tracked vehicles. Coordination to obtain these assets is made through the division MCO.

Use of division or higher HET assets may be augmented by other transportation modes. When tactical considerations are not paramount, it may be ideal to move heavy units by rail. However, in a tactical environment in which flexibility and responsiveness are essential, the use of HETs should be maximized.

(1) ***Logistics over the shore***. LOTS is a special type of clearance operation. It may be executed through a major port that has been denied deep-draft shipping, through a minor port that cannot accommodate deep-draft ships, or over a beach in the event no port facilities are available. This manual discusses the most difficult of LOTS operations--the over-the-beach. Because of poor roads and temporary facilities, beach clearance is more difficult than clearance at a major or minor port. Effective control is needed for rapid clearance and to prevent congestion on the beach. To obtain effective control and rapid clearance--

- Establish truck parks for rapid assignment and dispatch of vehicles.
- Provide adequate communications.
- Coordinate highway regulation planning with the servicing movement control organization and make maximum use of access and exit routes.
- Coordinate engineer assistance to build and/or maintain roads and to provide pierced planking or other similar expedients in soft or sandy areas.

(2) ***Beach truck park***. The beach truck park is a centralized area established to route, dispatch, and control vehicles engaged in beach clearance operations. It includes a dispatch facility, parking area, and other appropriate support facilities. A truck park operates in a manner similar to that of a truck terminal in a line haul operation. All vehicles supporting beach clearance operations move into and out of the beach site through the truck park. Several truck parks may be required in a beach clearance operation. The number established depends on--

- Size and other characteristics of the beach area.
- Availability and condition of roads into and from the beach.
- Area or areas suitable for establishing a truck park.
- Number of vehicles supporting the beach operation.

Empty vehicles arriving for loading or vehicles carrying return (retrograde) loads for unloading at the beach are checked in through the truck park dispatcher. These vehicles are dispatched directly to a loading or unloading site on the beach or directed to a holding area within the park. Departing loaded vehicles are also checked in at the truck park dispatcher before onward movement. Based on route control measures and capabilities of the receiving unit to off-load, vehicles may be dispatched directly to their destination either individually or in convoys. If tractor trailers are used in the beach clearance operation, a shuttle system can be used. Shuttle tractors move empty semitrailers between the motor park and beach sites and return loaded semitrailers to the motor park. They spot the loaded semitrailers for onward movement. Line haul tractors then move the loaded semitrailers from the motor park to their destination and return.

Truck park personnel should maintain charts and prepare reports that record operational data to aid in control measures and account for semitrailers. If required, the individual in charge of the terminal will establish semitrailer receipting arrangements with the supported units. Truck park personnel operate the dispatch and marshaling activities of the terminal and prepare or check all cargo and vehicle documentation. They inspect incoming and outgoing semitrailers for maintenance and damage, completeness of equipment, and condition of the cargo load. They prepare and submit periodic yard checks and operational reports on exchange activities and perform all the other duties incidental to operation of a truck terminal. The type of vehicles used in a beach clearance operation directly influences the success of the operation. Tactical all-wheel drive vehicles with the highest flotation have primary consideration. However, semitrailers should be used as the beach area is improved and facilities, roads, and hardstands are constructed. Use of semitrailers is recommended if the original beach conditions allow their use.

(3) ***Port truck park***. Motor transport operations in support of the clearance of a port parallel the conduct of operations in beach clearance. A line haul operation may be established in conjunction with the port clearance. A line haul operation allows the throughput movement of cargo as far forward as feasible. Vehicles are loaded at the port, proceed to the destination where they are unloaded, and then return to the port to repeat the cycle. Truck parks exercise and maintain control over the port clearance motor transport operation. See FM 55-60 for details on marshaling yard operations at ocean ports. Fixed-port operations are usually more efficient than bare beach operations. This is based on the availability of berthing facilities, cargo-handling equipment, staging and parking areas, and improved roads. A greater flow of cargo tonnage into and through the port can be expected over that experienced in a bare beach operation. If a port sustains damages, tonnage capability and the movement of vehicles within the port area may be substantially reduced.

b. **Interzonal Motor Transport Service**. Interzonal operations are line haul movements operated for extended distances over MSRs. They usually cross boundaries and can serve the entire theater. Interzonal operations require centralized control provided by a TRANSCOM and/or a COSCOM. The appropriate command and control for line haul operations depends on the mission. Command and control is normally assigned to a motor transport battalion or group. The headquarters may be responsible for operating specific segments of the route or the entire route. The mission drives the number and type of motor transportation, cargo transfer, and trailer transfer units required.

Medium truck companies should be used for line haul operations because tractor trailers are the most effective equipment for line hauls. The combat HET company is also effective in supporting operational mobility. It moves armor and mechanized units and other heavy or outsize equipment.

The semitrailer relay method is usually used in line haul operations. This type of line haul operation includes an origin and destination truck terminal and a TTP(s) located at intermediate point(s) along the route. The motor transport headquarters segments the route to allow near-equal-time distances between TTPs or terminals.

At the origin terminal, shuttle (terminal) tractors move empty semitrailers from the terminal to the supported units where they are loaded. The shuttle tractors return loaded semitrailers to the origin terminal where they are staged and prepared for onward movement. Line haul tractors from the unit assigned to operate the first segment of the route picks up these loaded semitrailers at the origin terminal and moves them forward to the first TTP. Here, the loaded semitrailers are exchanged for retrograde semitrailers that are returned to the terminal of origin for reuse. Line haul tractors of the unit assigned to the second segment of the route transport the forward moving semitrailers from the first TTP to the next TTP, where similar exchanges are made. The relay is continued until the forward-moving semitrailers arrive at the destination terminal. Shuttle tractors then move the loaded semitrailers from the destination terminal to their ultimate destination for unloading. If empty or return loaded semitrailers are available at the ultimate destination, the destination shuttle tractors should return them to the destination terminal. There they can be documented, staged, and prepared for retrograde relay movement.

Using a semitrailer relay creates a continuous flow of loaded semitrailers moving from GSUs and support agencies to forward areas. At the same time, retrograde semitrailers are moving rearward where they can be reloaded and sent forward again. Retrograde capability should be maximized and every effort made to obtain loads for returning empty semitrailers.

The relay system should be designed to provide the command, supervision, and support services the operation requires. This may include establishing facilities for messing, vehicle service and repair, quartering, administrative support, and logistic services. Mobile maintenance teams and recovery service should be located at strategic points to repair and recover disabled vehicles. Often, the direct support maintenance unit in the area supports the operation, as described in FMs 43-11 and 43-12.

c. **Truck Terminal/Trailer Transfer Point Operations**. Truck terminals and/or TTPs (Figure 4-5) are established with line haul or relay operations. They provide space and facilities for motor transport equipment assembly, dispatch, maintenance, and servicing, as well as for driver rest and comfort.

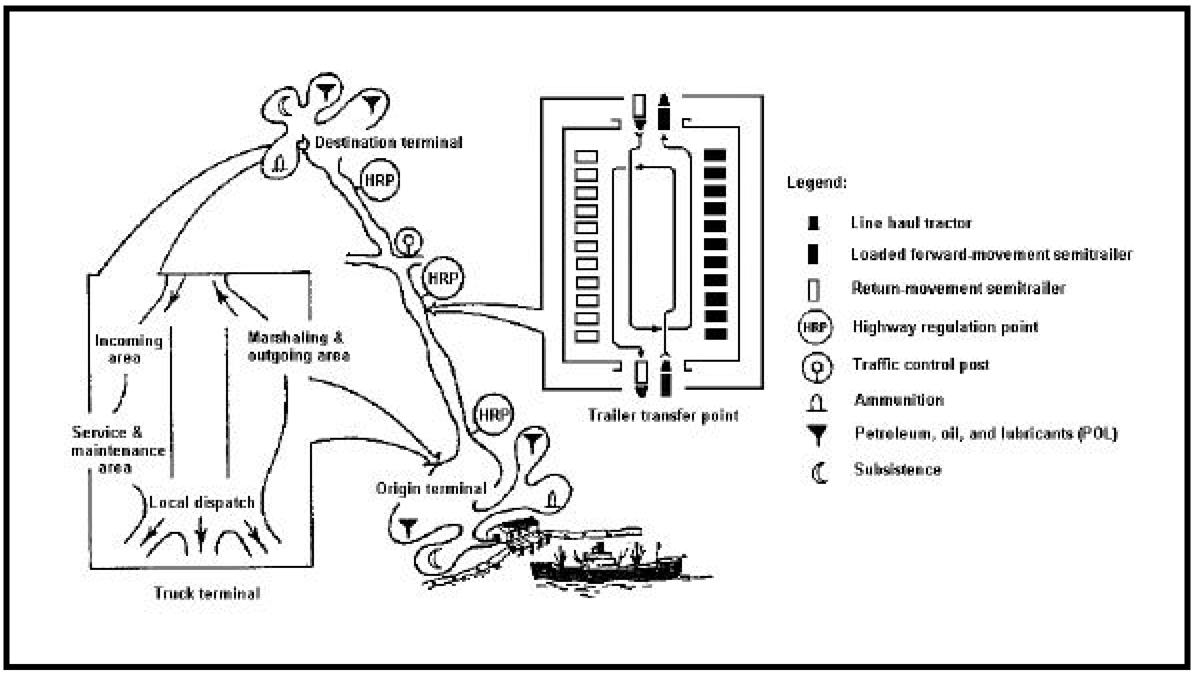


Figure 4-5. Line haul operation with one intermediate TTP

(1) ***Truck terminal operations***. Truck terminals are usually located in or near centers of concentrated trucking activities at both ends of a line haul or at intermediate locations (Figure 4-6). They form the connecting link between local pickup and/or delivery service to support units and the line haul operation. They constitute assembly points and dispatch centers for motor transport equipment used in line haul operations. They should not be used for in-transit storage or freight sorting. They are usually located forward of cargo pickup points and to the rear of delivery points. Consider the following factors in selecting terminal sites:

- The size, complexity, and duration of the operation.
- The number and type of vehicles to be employed in the operation.
- Facilities required at the terminals and transfer points.
- Any anticipated backlog of semitrailers at these sites.

The area should be large enough and have an acceptable internal roadnet to allow space for parking and marshaling incoming and outgoing semitrailers and prime movers. The area should be level and well-drained. It should have a suitable hardstand that can withstand heavy vehicular traffic. The truck park should be located near supported activities and the MSR. Space requirements may make it infeasible to establish truck terminals and TTPs adjacent to the MSR. If this is the case and if good feeder routes are available, they may be established off the MSR. Truck parks may also be co-located with motor transport units in motor park areas. Security must be provided for both the operating area and the vehicles and cargo handled within the area. The motor transport unit at the location provides security for Level I threats. When the terminal is part of a base or base cluster, the base or base cluster commander coordinates added security based on the threat level.

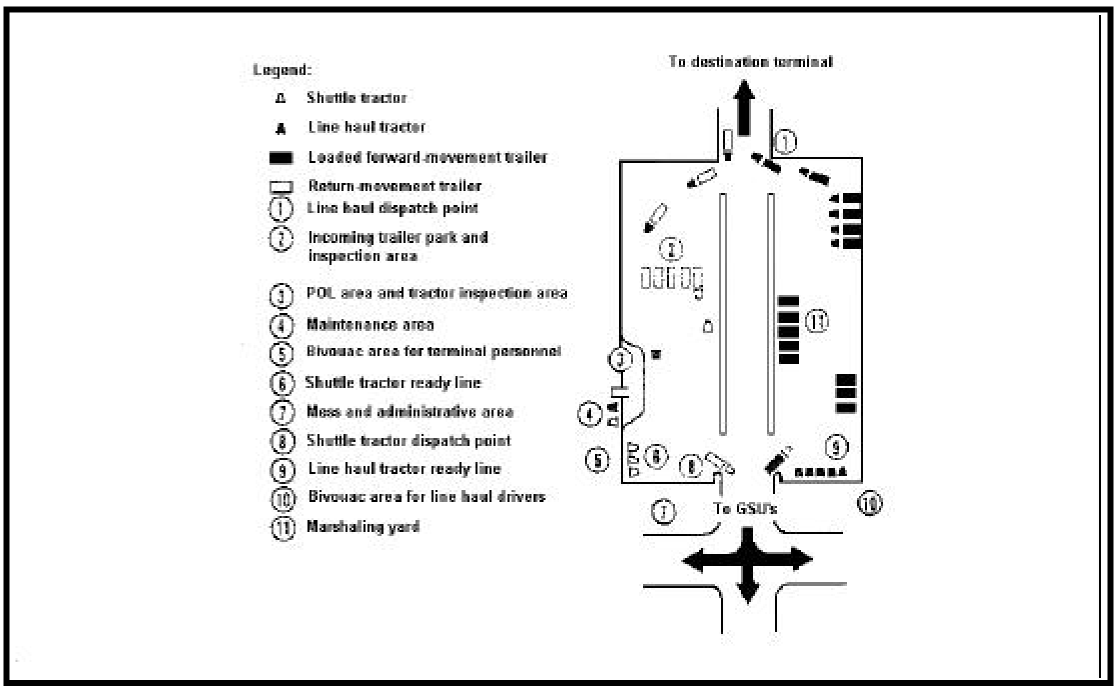


Figure 4-6. Typical truck terminal

One or more truck terminals may be established at intermediate points along the line haul route. The location(s) and number of these terminals depend upon the organization of the line haul operation and the location of supported units. The truck terminals deliver cargo to supply support activities near the line haul route. When this occurs, they function in a dual capacity:

- As a truck terminal that manages delivery of cargo to destination in the vicinity of the terminal.
- As a TTP that processes cargo loads moving through the facility to destinations further forward on the line haul route.

The truck terminal is usually commanded and operated by a motor transport battalion. The battalion either supports or coordinates support to the terminal. Terminals need facilities for dispatch, messing, maintenance, servicing, fueling, and sleeping. If refrigeration vans and/or containers are used in the system, electrical facilities and refrigerator unit maintenance services will be needed.

(2) ***Trailer transfer points***. TTPs are established along the line haul system to divide the line haul into legs (segments). At TTPs, semitrailers are exchanged between line haul tractors operating over adjoining segments of a line haul route. TTP functions also include reporting, vehicle and cargo inspections, documentation, and dispatching. Based on the availability of local support, TTPs may provide mess, maintenance, and other support for TTP personnel and line haul drivers.

Line haul tractors arriving from rear areas deliver loaded semitrailers at a TTP and pick up empty or retrograde semitrailers for return movement. Line haul tractors coming in from forward areas drop their empty or return-loaded semitrailers and pick up the forward-moving loads for further movement toward ultimate destinations. Shuttle tractors may be used within the TTP to spot and prepare semitrailers for movement. This action reduces turnaround time of line haul tractors and makes the operation more efficient. TTPs are not used for pickup and delivery of cargo.

The distance of a line haul leg is based on a 10-hour shift per driver and 1 hour of delay. Therefore, the optimum one-way travel time between TTPs is 4.5 hours. Using this planning factor, each driver can complete one round trip per shift. This eliminates the need for billeting drivers away from their assigned unit, provides rested drivers for each trip, and allows for vehicle maintenance.

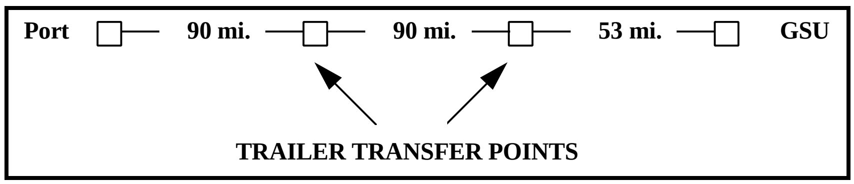
The distance between TTPs is calculated by using the 10-hour shift and 1-hour delay, factoring the march rate into the equation. In this example, the planners determine that 40 KMIH march rate can be sustained on the route:

$$\text{Distance} = \frac{(\text{10 hours per operating shift - 1 hour delay}) \times \text{20 MPH}}{\text{2 trips per day}}$$

$$= \frac{(10-1) \times 20}{2}$$

$$= \text{90 miles between the TTPs}$$

The same formula is used to determine the distance between each successive TTP. The distance will change if the sustained march rate over the segment increases or decreases from the segment before it. If the march rate over the entire route is the same, then the distance between TTPs will be relatively equal. There will be variations because of finding suitable sites for the TTPs. When there is a leftover distance or short leg, the short leg should be placed forward. This is to allow for rapid expansion of the operation:



(3) ***Assignment of semitrailer equipment***. Efficient use of motor transportation assets enables company-size units to perform a variety of tasks under different circumstances. Units are often separated geographically from their parent headquarters.

The medium truck company may be assigned flatbed, bulk petroleum, or other types of semitrailers to perform its assigned mission. This variety of semitrailers enables the company to move general cargo, bulk liquid petroleum, refrigerated cargo, and/or containerized cargo without a change in basic organization or operation procedures.

The ratio of semitrailers to truck tractors in a line haul relay operation depends on the ratio of travel time to loading and unloading time. The number of semitrailers assigned is based on the maximum operating time for the tractors used in the line haul.

(4) ***Accounting procedures for semitrailers***. Accounting for semitrailers can be solved in one of several ways. If relay operations are of short duration, semitrailers can remain assigned to companies and accounting procedures established to retain control. Another method is to transfer accountability to a higher headquarters and to maintain property books and control records at that level.

AR 710-2 authorizes the transport group or battalion to assume informal accountability for the semitrailers of assigned companies when a relay operation is established. When the provisions of AR 710-2 are in effect, the truck company commander is relieved of accountability for semitrailers assigned to his unit. However, the truck company commander is charged with direct responsibility for the semitrailers with which he is operating. Adequate care must be given to all semitrailers in the custody of the truck company.

The motor transport headquarters in charge of relay operations must establish accountability for all semitrailers used. It maintains property records in its supply section. Through its operations section, this headquarters must also establish report and control procedures. To pinpoint the location of semitrailers within the system, the headquarters must be able to identify and establish the responsibilities of a unit or person having custody of the equipment at any time.

The headquarters unit in charge of the relay operation establishes a trailer accounting office within its supply section. Data is recorded in a consolidated trailer property book. Upon completion of the operation, return of a unit to routine operations, or transfer of a unit to another command, the property book is adjusted to reflect the change in status. Hand receipts are also adjusted by reassigning on-hand semitrailer equipment to the companies.

(5) ***Control of semitrailer equipment***. In the centralized relay operation, accountability and control of semitrailer equipment are vested in the commander of the headquarters unit operating the relay operation. The supply section of the headquarters unit assumes property responsibility for the equipment, and the operations section of the headquarters assumes responsibility for operational control. Control is maintained through reports from units and maintenance of those records. Maximum use of reliable communications is imperative to maintaining control.

At the operating level, the unit or convoy commander is directly responsible for the semitrailer equipment employed in the relay operation. Reports forwarded to the headquarters operations section from TTPs, truck terminals, airfields, and other customers provide a daily check on the location of all semitrailer equipment and on the status and condition of that equipment. See Appendix K for records and reports used in the control of trailers.

(6) ***Maintenance and repair services***. Vehicles engaged in line haul/relay operations may operate up to 20 hours a day over extended periods. Such heavy usage increases maintenance requirements. To provide maintenance services at truck terminals, battalions (or appropriate motor transport headquarters) may detach the required maintenance personnel, tools, and equipment from assigned companies or request augmentation maintenance teams. Under certain circumstances, available nondriver personnel may be used as mechanics' helpers.

Battalions may establish consolidated maintenance facilities, which pool unit maintenance skills and resources, to either supplement or support unit-level maintenance operations. Depending on the situation, a consolidated maintenance facility may be established by--

- Consolidating all unit maintenance personnel into one centralized area or pool under battalion supervision.
- Tasking only the mechanics required to perform certain consolidated maintenance tasks under battalion supervision.
- Rotating company mechanics to the battalion maintenance service.

Semitrailers used in relay operations are away from the parent unit most of the time. Individual units cannot retain maintenance records and individual vehicle files for semitrailers used in the system. The central accounting office may maintain these files, and all other maintenance papers accompany the semitrailer. If no papers accompany the semitrailer, a maintenance schedule board may be stenciled on the tarp box for recording scheduled maintenance services.

d. **Area Support Operations**. In addition to clearance and line haul operations, motor transport supports local requirements that originate in and support the operations of bases and base clusters at each echelon. They may include ASGs and CSGs. These units provide DS/GS supply, maintenance, and services to units stationed in or passing through their respective areas. Requirements are passed through normal movement control channels.

These operations frequently involve the movement of small quantities of cargo and personnel to and from dispersed sites. As a result, light trucks up to 5 tons are probably most suitable for this function. Engineer construction requirements may entail the movement of heavy, outsize materials. In these cases, provisions must be made for specialized hauling equipment such as 60-ton semitrailers, 25-ton low-bed trailers, and pole trailers, as well as medium and heavy semitrailers.

e. **Transfer Operations**. Transfer points are used when conditions require transfer of cargo from one transportation mode or conveyance to another. Transfer points may be established at rail facilities, pipeline takeoff points, air terminals, ports, beach sites, or inland waterway terminals. Transfer operations are conducted by cargo transfer companies. Operations and required facilities for motor transport service at a transfer point are similar to those of a truck terminal.

f. **Drive-away Operations**. Drive-away operations involve over-the-road movement of vehicles, other than assigned task vehicles of the motor transport unit. These operations include such over-the-road movements as--

- Driving pipeline and maintenance float stock vehicles coming into theater from points of entry to either general or direct support activities or directly to receiving units.
- Driving such vehicles to points of exit from theater for redeployment.

Drive-away operations vary in size. They may involve a one-time movement requiring driver support of truck company strength or less. They can also be extended operations requiring driver support by one or more motor transport battalions. The method of carrying out a drive-away movement depends on the distance involved and the duration and scope of the operation. This type of movement normally involves the standard convoy organization and operation.

Driver requirements in a drive-away operation can be reduced by double-stacking semitrailers and loading smaller vehicles onto larger vehicles. The use of tow bars or tandem semitrailers is prohibited unless authorized by the headquarters directing the move. For a discussion on methods of stacking semitrailers, see Chapter 10 of this manual.

Unit maintenance personnel must conduct a safety check on retrograde vehicles, particularly those showing heavy use, to ensure unit drivers are not operating unsafe vehicles. Unsafe vehicles must be convoyed to the destination using other means.

g. **Container Transport Operations**. Containers are specially designed cargo carriers that permit the packaging of small and/or loose cargo items into a single unit for security and ease of handling. Containers are a safe, secure means for loading (stuffing) cargo into a container at a supply source (such as a CONUS depot, COMMZ storage point, or corps supply point). The container is sealed at the source, and there is no need to open it or rehandle the cargo until it is delivered at destination. Cargo security is enhanced and cargo can be expected to be received intact and in serviceable condition.

Containers are hauled in any of the types of transport operations. Containers transported by trucks are handled as any other cargo. Pickup, movement, and delivery are made according to the type haul for which the motor transport is committed. However, the movement of containers requires consideration of CHE at the origin and destination.

The use and control of containers moving through the motor transport system is of prime importance. Personnel must adhere to all theater and local policies governing the handling and use of containers. This control and utilization policy also applies to the container chassis. Pickup, delivery, and return of containers must be accomplished by prescribed time standards. Movement control organizations ensure that using agencies rapidly load and unload container cargo. A reporting system must be in place to provide in-transit visibility. For commercial containers, contractual service agreements govern time limitations imposed on loading and unloading activities before demurrage costs start. The using agencies must make every effort to abide by these limits to control costs and return containers to the transportation system. Motor transport units must also note whether container cargo load and unload procedures are conducted according to established procedures. Violations are to be brought to the attention of the using agency and the proper motor transport command.

Containers may be off-loaded from chassis onto the ground to permit continuous use of container chassis. Some containers may be transported on conventional military cargo semitrailers as well as on a container chassis. In either case, the following policies apply:

- Containers designated for storage purposes or for other use by the consignee will, upon receipt at destination, be removed immediately from the transporting chassis/semitrailer. The chassis will then be returned to transportation use.
- In operations where containers will be lifted from or placed onto either chassis or other transporting vehicles, planners and operators should ensure that proper and sufficient handling equipment is available to accomplish these tasks.
- Each transfer point should establish an external container inspection program. External container inspections aid in determining liability for container damage and/or loss. Inspections should be made at the time of pickup and delivery to cover the time the containers are in the hands of the motor transport service. Inspection forms should be required and may be prepared and reproduced locally. See Appendix L for a container inspection checklist.

h. **Retrograde**. Retrograde is any movement of a command to the rear or away from the enemy. This includes movements within a theater of operations and between a theater of operations and CONUS. Its main purpose is to return containers, reparables, and other cargo back to the supply or transportation system for reuse, alternate use, or repair. It is also a means for carrying human remains, EPWs, and personnel.

Retrograde is not a type of motor transport operation. Rather, it is a means to increase the efficiency of the transportation system by taking advantage of vehicles that would otherwise be returned empty. Returning loaded equipment offers enhanced use of motor transport capabilities through the increase of tonnage hauled and ton-miles accomplished. It limits deadhead miles and may reduce the total number of vehicles required.

Retrograde movements must be coordinated through movement control channels. Requirements are identified, requested, or programmed like any other movement requirement. Synchronization is also required to ensure drivers receive accurate information. Communications forward is essential to reroute or divert vehicles in the forward area. Drivers may report to a different loading site some distance from their unloading point to pick up return loads. They may also pick up return loads anywhere along the return route. Vehicles can be used specifically to pick up retrograde loads if unacceptable delays are experienced due to either the requirement for vehicles to travel to a different location or a long delay in reloading. Special consideration must be applied in the retrograde of cargo to CONUS or to another theater for the conduct of other force projection operations. Commanders must ensure that quarantine, agriculture, and customs inspections are completed and documented according to AR 40-350 and applicable TMs.

4-8. SUPPORT TO COMBAT OPERATIONS. Motor transport units may be used in direct support of tactical movement or other combat operations. Corps and divisions may use organic or attached motor transport as a pooled service where and when needed to displace heavy forces, move light forces, or provide mobility to headquarters and nonroadable equipment. Motor transport units are required to be as mobile as the supported unit at each echelon.

When supporting combat forces directly, both the movement control organization and motor transport commander should maintain a close liaison with the combat force to ensure effective support. Nonorganic motor transportation assets may be attached to combat forces for short periods. However, theater priorities usually dictate that trucks are provided on a mission basis and returned to control of the motor transport commander for common use.

4-9. HEAVY EQUIPMENT TRANSPORTER. The HET will be used primarily to displace heavy forces, either operationally or tactically. This supports versatility by increasing the maneuver commander's capability to quickly and efficiently shift forces on the battlefield and have forces available at destination in a high state of readiness.

In an operational mobility role, the HET will move the tracked vehicles of heavy forces from ports of debarkation to assembly areas in the corps area. In this role, HET companies will be under the command and control of a functional transportation battalion.

In a tactical mobility role, HETs will move heavy forces in the corps area as far forward as METT-T factors will permit. Once the HET has been committed to tactical mobility (normally four companies per corps), a functional TMT battalion headquarters will be used for command and control. This headquarters will be in addition to the TMT battalion normally aligned with a CSG (rear).

Use of HETs in either role will be by company or platoon. They will not normally be employed as individual vehicles. Most often, HETs will be used for a one-time lift (direct haul) to move up to a brigade-size force. In convoy operations, they may be integrated with roadable wheeled vehicles of the supported combat force or they may move independently. HETs can also be used to support evacuations. Because routes must be able to accommodate the weight and width of the HETs, movement control interface and planning is essential.

CHAPTER 5

CONVOY CONTROL, ORGANIZATION, AND PLANNING

Convoys are planned to organize and control motor movements. They are used for the tactical movement of combat forces; the nontactical movement of logistical units; and the movement of personnel, supplies, and equipment. This chapter contains information on all aspects of convoy operations.

5-1. PLANNING FACTORS. Regardless of the mission, the process of planning and organizing convoys is the same. Mission, enemy, troops, terrain, and time available drive the specific planning factors and influence how the convoy will be controlled. Other factors include:

- The state of training of drivers.
- Types of loads.
- Number of vehicles involved.
- Traffic conditions.
- Quality of road networks.
- Time.

When operating with allied forces, also consider such factors as foreign equipment, cultural differences, and diverse ethnic backgrounds.

5-2. CONVOY CONTROL. Control of motor movements is exercised in two ways. The first type of control is exercised by the unit making the motor movement; this is organizational control. The second is by the commander of the area through which the convoy moves; this is area control.

"Marches are war...aptitude for war is aptitude for movement." Napoleon

a. **Organizational Control**. Organizational control is exercised by the moving unit before, during, and after movement. Effective organizational control requires march discipline. March discipline is a command responsibility that comes from effective organizational control and training. It is essential to the effectiveness of the march column to prevent conflict with other movements in the area. It can only be attained by thorough training, supervision of operations by technically competent leaders, and attention to detail. March discipline demands--

- Using qualified drivers who operate their equipment safely under a variety of driving conditions.
- Adhering to unit SOPs that specify tactics and techniques for movement, immediate action drills, and communications techniques.
- Strictly following traffic regulations.
- Meeting SP, en route CP, and RP times without failure.
- Following the prescribed route at the prescribed march rate.
- Halting at rest stops for the required amount of time.

- Effectively using protective measures, including maintaining the prescribed vehicle interval, radio discipline, and blackout driving during night convoys.
- Maintaining proper care of equipment.
- Observing safety policies and regulations at all times.
- Ensuring that drivers obey the rules of the road, traffic laws or regulations, speed limits, and time and distance gaps.

b. **Area Control**. This kind of control is exercised by the commander who controls the area/terrain through which convoys move. Area control is normally exercised through movement control channels and is known as highway regulation. Highway regulation is planned by the DTO for the division rear area, the transportation battalion (MC) for the corps rear area, and the TMCA for the COMMZ. It is supervised by movement regulating teams assigned to the MC battalion and TMCA and by MPs for traffic control.

Division, corps, and theater army traffic circulation plans and highway regulation plans specify the control measures applied to MSRs. Convoy commanders are responsible for ensuring that they follow policies in areas through which they will pass.

Controlling traffic in an area of operations is difficult even under the best of conditions. There will always be competing demands for the available road network. Units cannot expect to be able to use all routes without requesting permission. Highway regulation planners establish control measures to ensure order and prevent congestion.

One method used to establish control is classifying MSRs and ASRs. These classifications are based mainly on the ability of a route to support the expected traffic volume and types of vehicles that will use the route. The classifications specify the degree of control required and whether moving units must submit a movement bid (clearance request) to use a route. The classifications will be specified in the highway regulation plan. There are five route classifications:

- *Open route*. The route is open to all types of traffic and the moving unit does not need to submit a movement bid to use the route.
- *Supervised route*. The route is open to most types of traffic. However, convoys of certain size, vehicles of certain characteristics, and certain slow-moving vehicles may require a movement credit to use the route. The highway regulation plan will specify the size of convoys or types of vehicles that require a movement credit.
- *Dispatch route*. Full control is exercised over a dispatch route. Priorities are set for use of this type route. A movement credit is required for the movement of any vehicle or group of vehicles.
- *Reserved route*. This type route is set aside for the sole use of a certain unit, specified operation, or type of traffic. If a route is reserved for a unit, then the commander of that unit decides how much and what kind of control is required.
- *Prohibited route*. No traffic is allowed over a prohibited route.

5-3. CONVOY ORGANIZATION. A convoy is a column of vehicles that moves from the same origin to destination and is organized for the purpose of control under a single commander. The minimum number of vehicles in a convoy is directed by theater policy, standardization agreement, or the HN. In the absence of policies to the contrary, convoys are considered six or more vehicles. All vehicles normally move at the same march rate.

a. **Convoy Elements**. Vehicles in a convoy are organized into groups to facilitate command and control. A convoy may be as small as a 6-vehicle march unit or as large as a 300-vehicle column. Whenever possible, convoys are set up along organizational lines, such as squad, platoon, company, battalion, and brigade. Convoy elements include march units, serials, and columns (Figure 5-1).

(1) ***March units***. A march unit is the smallest element of a convoy. As the smallest subdivision of a column, march units may have up to 25 vehicles assigned. A march unit usually represents a squad- to platoon-size element. Each march unit has a march unit commander.

(2) ***Serials***. A serial is a group of two to five march units. It represents approximately a company- to battalion-size element. Each serial has a serial commander.

(3) ***Columns***. A column is a group of two to five serials. It represents approximately a battalion- to brigade-size element. Each column has a column commander.

For example, a medium truck company commander can organize his convoy as a serial by dividing the 60 task vehicles by platoons into three march units of 20 vehicles each. The company commander would then serve as the convoy commander and the platoon leaders would serve as march unit commanders. Remaining vehicles would be added to each march unit for command and control and convoy support.

Convoy commanders should not generally subdivide march units of 20 or fewer vehicles into smaller march units because of road space considerations. This will reduce the amount of road space taken up by the gaps between small march units. If the convoy commander determines that security requirements warrant greater separation between convoy elements, he could divide the 60 task vehicles by platoons into three serials of 20 vehicles each and further subdivide each serial by squads into two march units of 10 vehicles each. In this example, the platoon leaders would serve as serial commanders and the squad leaders as march unit commanders.

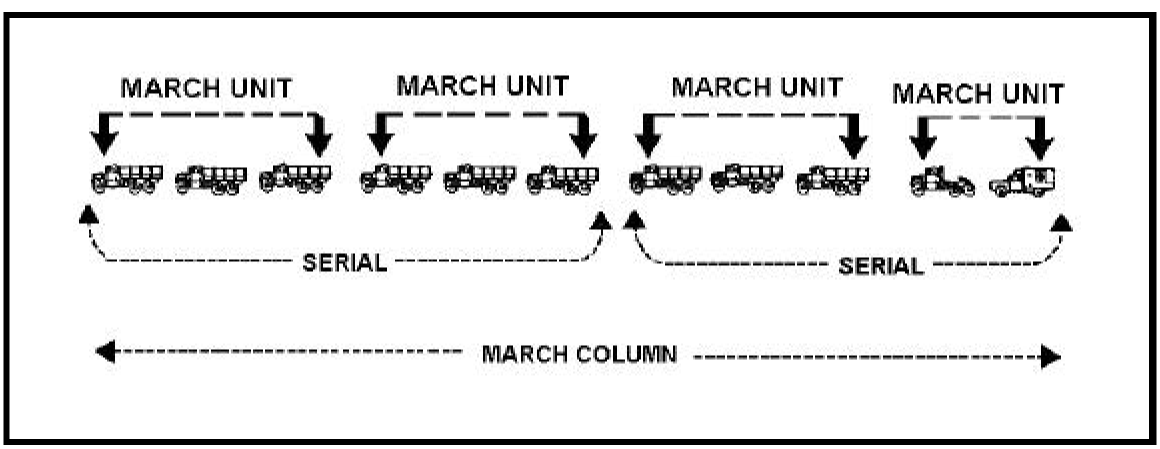


Figure 5-1. Convoy organizational elements

b. **Convoy Sections**. Leaders must know how to position vehicles within the elements. All columns, serials, and march units, regardless of size, have three parts: a head, a main body, and a trail (Figure 5-2). Each of these parts has a specific function.

(1) ***Head***. The head is the first vehicle of each column, serial, and march unit. Each head should have its own pacesetter. The pacesetter rides in this vehicle and sets the pace needed to meet the scheduled itinerary along the route. The officer or noncommissioned officer at the head ensures that the column follows the proper route. He may also be required to report arrival at certain checkpoints along the route. With the head performing these duties, the convoy commander has the flexibility to move up and down the column to enforce march discipline.

(2) ***Main body***. The main body follows immediately after the head and consists of the majority of vehicles moving as part of the convoy. This is the part of the convoy that may be subdivided into serials and march units for ease of control.

(3) ***Trail***. The trail is the last sector of each march column, serial, and march unit. The trail officer/NCO is responsible for recovery, maintenance, and medical support. The recovery vehicle, maintenance vehicles, and medical support vehicles/teams are located in the trail. The trail officer/NCO assists the convoy commander in maintaining march discipline. He may also be required to report clear time at checkpoints along the route. In convoys consisting of multiple march units and serials, the convoy commander may direct minimum support in the trail of each serial or march unit and a larger trail party at the rear of the column. As the trail party may be left behind to conduct repairs or recovery, the convoy commander should provide trail security and communications.

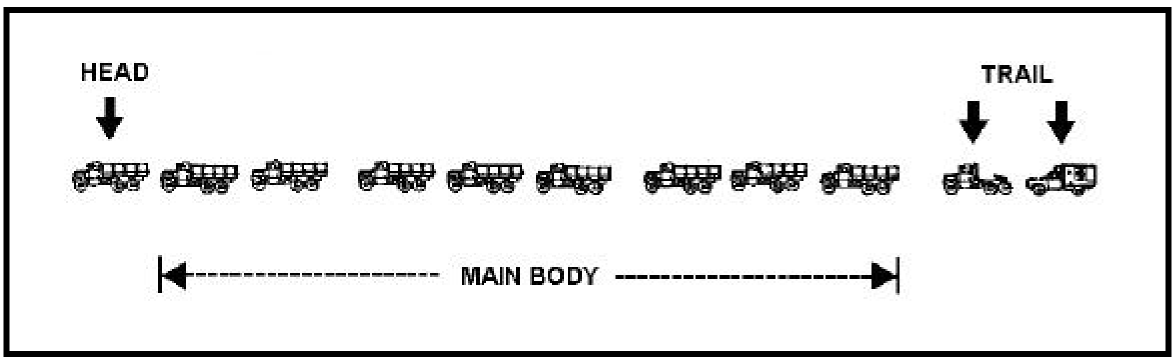


Figure 5-2. Functional elements of a convoy

c. **Vehicle Placement**. Certain factors influence the placement of vehicles in a convoy. The commander should consider the following guidance in placing vehicles within each convoy element:

- Give special attention to vehicles loaded with ammunition and bulk petroleum. Try to separate these vehicles or disperse them throughout the march elements. A larger gap between vehicles carrying ammunition or bulk petroleum can also be prescribed. Tactically segregate critical supplies to ensure that no one element or capability is lost due to enemy action.

- Position heavier or slower vehicles at the head to assist in maintaining the prescribed convoy speed.
- Place C2 vehicles where they can maintain control of the convoy. Also consider protecting C2 vehicles from enemy action. They are priority enemy targets. Commanders may use an irregular pattern of placing C2 vehicles, or they may use trucks instead of HMMWVs or CUCVs.
- Place maintenance and recovery vehicles at the end of each march unit and at the end of the convoy to recover or make quick repairs to disabled vehicles down along the side of the road.
- When it will not compromise the security of the convoy, locate trucks requiring the longest unloading time at the head of the march element to achieve the fastest turnaround time.

d. **Types of Column Formations**. The column must be organized to meet mission requirements and ensure organizational control. The convoy commander decides how the column will be organized for control, choosing from three basic methods: close column, open column, and infiltration. The difference between the three methods is one of spacing vehicles, or gap. The convoy commander must weigh factors such as the threat, type of route, and ability to communicate in deciding the proper gap for the movement. The gap is determined by the length and speed of the vehicles. The rule of thumb for vehicle gap is to allow a 4-second gap for trucks. If the convoy includes vehicles with trailers, allow an 8-second gap. Normally, the gap will be 25 to 50 meters in urban areas (close column) and 100 meters in rural areas or highways (open column). Table 5-1 (page 5-6) and Table 5-2 (page 5-7) show types of column formations and the gap between vehicles. The number of vehicles (density) per kilometer of road and the rate of march may be changed based on METT-T. For detailed instructions for figuring vehicle gap, see AR 55-29 or FM 21-305.

Drivers are responsible for maintaining the gap between vehicles along the route. Leader and driver training is essential. Helicopters or other aircraft, if available, can assist the convoy commander in maintaining the proper gap. When the pilot informs the convoy commander of how well or poorly drivers are maintaining the gap, the convoy commander can make the necessary adjustments.

5-4. CONVOY PLANNING. When a unit receives a mission or movement order, the unit officers and operations section personnel begin making plans. Most convoy planning should be based on the unit SOP. It should specify the most common planning activities. However, certain requirements must be coordinated outside the moving unit and these require support from the battalion and higher staffs. See Appendix M for information on coordinating active and reserve component convoys in CONUS. See Appendix N for distribution formulas and percentages needed to estimate the axle weight distribution for a loaded vehicle.

The convoy commander must perform specific actions to prepare the convoy. A limited amount of time is available to accomplish the following:

- Select and reconnoiter the route.
- Submit a movement bid if required.
- Effect coordination for en route security.
- Give instructions to subordinate element commanders and other supervisory personnel.
- Inspect personnel and vehicles.
- Brief convoy personnel.

Table 5-1. Types of column formations

TYPE OF FORMATION	WHEN USED	GAP BETWEEN VEHICLES	RATE	ADVANTAGES	DISADVANTAGES
Close	Night, poorly marked routes, congested areas, reduced visibility.	25 to 50 M	15 MPH/ 25 KMPH	Full traffic capacity of road can be used. Control is easier. Fewer guides, escorts, and route markers are needed.	Quick dispersion is difficult. The column is easily detected. May cause congestion at point of arrival. Requires careful scheduling and rigid control to avoid blocking at intersections. Causes driver fatigue.
Open	Daylight, well-marked routes, highways.	100 M	25 MPH/ 40 KMPH	Less chance of enemy observation or damage from attack. Cargo moves faster. Driver's fatigue is reduced. Fewer accidents; very flexible.	Command and control are difficult. Proper vehicle spacing is hard to keep.
Infiltration	Daylight, congested areas, heavy traffic crosses route.		Various	Provides maximum security and deception. High speeds are possible. Other traffic has little effect on individual trucks.	More time required to complete the move. Column control is nearly impossible. Drivers can get lost. Specific details must be given to each driver. Maintenance, refueling, and messing are hard to arrange. Vehicles may bunch up, causing close columns to form. Requires experienced drivers. Orders are not easily changed. The unit cannot be redeployed as a unit until the last vehicle arrives at destination.

Table 5-2. Night column formations

TYPE	GAP BETWEEN VEHICLES	RATE	ADVANTAGES	DISADVANTAGES
Blackout drive	15 to 20 M	5 to 10 MPH/ 8 to 16 KMPH	Limits enemy observation. Darkness provides security.	More vehicles in ambush kill zone. Driver fatigue. Increased time distance.
Lights on drive	50 to 100 M	20 to 30 MPH/ 33 to 50 KMPH	Drivers stay alert. Enemy reaction time reduced. Speed provides security. Less vulnerable to ambush and sniper fire.	Control is harder. Enemy observes the move. May be very vulnerable to enemy air strikes.

Besides convoy control and organization, convoy commanders must consider the following elements during the planning process:

- Advance/quartering party.
- Convoy control personnel.
- Start points and release points.
- Halts.
- Gaps and march rate.
- Submission of movement bids.
- Communications.
- Route reconnaissance.
- Escort and security elements.
- Convoy support.

a. **Advance/Quartering Party**. Advance and quartering parties coordinate convoy arrival at destination. For support missions, the advance party coordinates with the receiving unit for staging vehicles for on-load or off-load, MHE, and security. When a unit relocates, the quartering party prepares for the arrival of the main body of the convoy. The advance party may travel with the column during the early stages of the move; however, it must arrive at destination sufficiently ahead of the column to perform its mission.

From a convoy control perspective, the major functions of the advance party or quartering party are to ensure that the column is able to move quickly off the route and into the marshaling or assembly area. It also positions individual vehicles within the marshaling or assembly area. These actions will prevent congestion on the route and enhance security by not allowing vehicles to be lined up along a route waiting to enter the marshaling or assembly area. The advance party must have enough personnel to accomplish this task. The advance party will also have to secure and sweep the area for contamination or enemy activity if the area is not secured.

b. **Convoy Control Personnel**. Control is exercised by the column commander, serial commanders, and march unit commanders. The advance party officer, trail party officer, pacesetter, and escorts assist the convoy commander in controlling the movement.

(1) ***Column, serial, and march unit commanders***. These commanders plan and control the motor movement and enforce march discipline. They may be either officers or noncommissioned officers.

(2) ***Pacesetter***. The pacesetter should be an experienced officer or NCO who rides in the first vehicle of each element in the convoy. The pacesetter maintains or adjusts the rate of march necessary to meet the schedule. In so doing, the pacesetter will direct that the convoy speed up to compensate for lost time due to terrain, weather, traffic conditions, or other obstacles. The pacesetter's job is critical as he must ensure the convoy averages the march rate over the length of the route.

(3) ***Trail officer***. The trail officer is positioned at the rear of the column. He checks and observes vehicles, march units, or serials at the SP. He ensures that approaching traffic from the rear is warned when the column halts. He also picks up guides and markers left by preceding elements of the march column. He investigates accidents on-the-spot, directs evacuation of injured personnel, and effects disposition of disabled equipment.

(4) ***Trail maintenance officer***. A maintenance technician/NCO rides at the rear of the column with maintenance and recovery personnel and equipment and supervises en route maintenance operations. In a small column, the trail officer and the trail maintenance officer may be the same person.

(5) ***Guides***. Guides are used to ensure the convoy follows the prescribed route. Guides become very important when operating in an area where road signs are poor or nonexistent. On controlled routes, the area commander may furnish guides to direct units or vehicles moving over these routes. Highway regulation authorities will use movement regulation teams and military police to assist moving units. Although these teams do not normally escort convoys, they assist convoy commanders in locating supported units, preventing conflict with other convoys, and providing other information on the route. On routes that are not controlled, the moving unit is usually responsible for providing its own guides.

c. **Start Points and Release Points**. All motor moves are scheduled from a start point to a release point. For most moves, when all vehicles originate from the same location, selecting an SP is a simple procedure. However, columns are sometimes composed of vehicles from several different units that may not originate at one location. When this occurs, the convoy commander must select an SP that is common to all units and vehicles on the route. Similarly, not all vehicles may have the same final destination. Yet, there must be a place where elements of the column can be released from column control to continue their assignments. This place is the RP.

(1) ***Start point***. An SP is the place all elements of a column come under the active control of its commander. On passing the SP, each unit should be traveling at the rate of march and vehicle interval (gap) stated in the operation order. If the convoy is moving on a controlled route, the SP will usually be the first checkpoint on the route that the convoy passes. If the convoy is not

moving on a controlled route, the convoy commander will select an SP along the route that is easily recognized on both map and ground.

(2) ***Release point***. The RP is the place where elements of a column are released from the active control of the commander. They leave the column to go to their designated areas. The RP, like the SP, must be on the column's route. If the convoy is moving on a controlled route, the RP will usually be the last checkpoint on the route that the convoy passes. If the convoy is not moving on a controlled route, the RP should be a place along the route easily recognized on both map and ground. The RP is neither the final destination nor a place to stop a convoy. The convoy must clear the RP and get off the route with a minimum of delay to prevent congestion with other scheduled movements. Unit guides may meet their units as they arrive at the RP and lead them to their designated area. Multiple routes and cross-country movements should be used from the RP to allow units to spread rapidly.

If the destination is a customer support location, the convoy commander should use an advance party or other communications to contact the receiving unit before arrival of the main body. This will let the receiving units meet the convoy at the RP and guide the vehicles to where they are needed. It will also facilitate getting the vehicles off the route quickly, so as not to interfere with other scheduled traffic. As the vehicles are unloaded, they should be scattered out, and after-operation maintenance performed. Drivers should be informed as to where and at what time to assemble for the return trip.

d. **Halts**. Halts are made for rest, personal comfort and relief, messing, refueling, maintenance and inspection of equipment, and schedule adjustments. Halts must be incorporated into road movement planning to ensure that the time for the halt is reflected in road movement tables and the movement bid (see Appendix J). Before any convoy, a risk assessment should be accomplished considering such things as time, duration, and cargo to ensure the mission is completed safely.

(1) ***Time, duration, and purpose***. Short halts are made for personal comfort and relief, inspection of equipment, and en route equipment checks. Short halts will normally last 10 to 15 minutes. Longer halts, for messing, refueling, and bivouacking, will last as long as required to accomplish these tasks. When the situation permits, messing and refueling halts should coincide. Convoy commanders must remember that the time taken to get in and out of the rest halt is part of the time allocated for the halt.

(2) ***Halt procedures***. Use the following procedures at halts:

- Plan for halts in areas with good security and fields of fire.
- Avoid halting on curves or grades.
- Never block the road when conducting halts.
- Maintain the prescribed gap to enhance security.
- Keep civilians away from the convoy vehicles.
- Post road guards at the front and rear of the convoy to warn approaching traffic.

(3) ***Location***. Select the locations for scheduled halts in advance. In most areas of operations, the location of rest halt areas on controlled routes will be centrally selected by commanders exercising area control and published in the highway regulation plan. Some types of rest halts, especially those for refueling, maintenance, and messing, may be established by an ASG

(COMMZ), CSG (corps), or DISCOM to support all convoys passing over the route. No matter who plans rest halt locations, they should offer adequate ingress and egress to get all vehicles in and out, offer dispersion and concealment, and be large enough to accommodate all vehicles and rest halt functions.

(4) ***Duties of personnel***. During halts, all personnel have certain responsibilities. Officers and noncommissioned officers check the welfare of their soldiers, the security of loads, and en route maintenance. Control personnel inspect vehicles and loads. They give instructions to ensure that the column will get started with a minimum of confusion. Dining, medical, and maintenance personnel perform such special duties as the purpose and duration of the halt permit. Drivers inspect their vehicles and loads and perform en route maintenance.

e. **Gap and March Rate**. Distance between vehicles (gap) has been mentioned several times in the preceding paragraphs. The commander determines the gap based on the march rate, route, and threat. If the same gap is prescribed for all speeds, then the move will be executed as a fixed column. If the gap between vehicles is regulated to increase or decrease as speeds increase or decrease, the move will be executed by a governed column.

March rate will depend on the condition of the road, the traffic, and the speed of the slowest vehicle. In all cases, the march rate will be less than the legal posted speed limits. Also, various commands specify maximum convoy march rates under various operational conditions. Convoy commanders must be familiar with local command policies.

If a governed column is prescribed, a technique for drivers to determine the correct gap based on speed is the speedometer multiplier. The speedometer multiplier is a specified number (1, 2, or 3) to multiply times speed to determine the correct gap. For example, with a speedometer multiplier of 2, vehicles traveling at 40 kilometers (25 miles) per hour will have a gap of 80 meters (50 yards) between them. The gap will thus vary by speed and the speedometer multiplier. Because the gap changes with speed, drivers must open or close the gap to adjust to changing conditions. The major benefit is safety, to put more distance between vehicles at higher speeds. Even when using the speedometer multiplier, a minimum gap should be set to prevent bunching of vehicles at very low speeds. The governed column method can only be used by a well-trained, thoroughly disciplined unit.

f. **Submission of Movement Bids**. A movement bid is a request for clearance to move on a controlled route, such as an MSR. Movement bids may be required for convoys containing a certain number of vehicles, types of vehicles, or types of loads. Local policy or law determines the requirement to submit a movement bid. In CONUS, DD Form 1265 and DD Form 1266 serve as movement bids. In NATO, STANAG 2154 and STANAG 2155 govern movement bids. A movement credit is an alphanumeric code issued to the moving unit as the approval of the movement bid. In some areas of operation, the moving unit is required to chalk the movement credit on the sides of vehicles. See Appendix M for information on obtaining convoy clearance in CONUS. For information on movement bids in overseas theaters, see FM 55-10.

To complete a movement bid, the convoy commander must calculate the arrive and clear times at the SP, en route CPs, and the RP. The arrive time is the time the first vehicle of the convoy will arrive at an SP, CP, or RP. The clear time is the time the last vehicle of the convoy will clear that SP, CP, or RP. To calculate the arrive and clear times, the convoy commander must understand the various time and distance factors relating to movement. Decisions the convoy commander makes in organizing the convoy--such as the number of serials and march units, the march rate, and the gaps--will affect the amount of time it takes a convoy to travel over a route. Moving units must carefully plan their movements and submit an accurate movement bid when required. See Appendix J for the necessary formulas.

If the route selected for movement is a supervised or dispatch route, the convoy commander or battalion headquarters should contact the DTO or servicing MC detachment to determine what restrictions and requirements they place on convoys. If a movement bid is required, the convoy commander or battalion staff must complete the bid and submit it in the required time. The DTO or MC detachment commander can also inform the convoy commander of support furnished along the route, such as security, traffic control, maintenance, and fuel. Perhaps most importantly, he can inform the convoy commander about the current threat status along the route.

g. **Communications**. The ability to communicate during convoy operations is essential. Radio nets must be established to link the convoy commander with higher headquarters, air and artillery support, element commanders, any security force commander, gun trucks, medics, and the trail party commander. Within the column, each march element may have its own control net with the march element commander and the head and trail party. Other communications techniques, such as signals, must be established and rehearsed. There are several ways to communicate while on convoy. These include the following:

- *Visual signals*. These may involve arm-and-hand, flashlight, flag, headlight, and pyrotechnic signals. These signals should be specified in an SOP so that drivers are completely familiar with them. Visual signals must be trained and rehearsed.
- *Audio (sound) signals*. These may include the use of whistles, horns, and verbal messages. Aircraft and command and control vehicles may be equipped with loudspeakers to issue instructions.
- *Radio*. This is the best way to communicate during a road march. There are several things to consider about the use of radios:

  - Availability of radios is limited within the convoy. Radios are usually limited to command and control vehicles.
  - The range of radios is limited unless retransmission stations are established.
  - Radio transmissions may not always be allowed under all combat conditions. Even with newer radios, the volume of radio transmissions and the ability of the enemy to jam may render them unreliable in some circumstances.

h. **Route Reconnaissance**. The decision as to which route to use will depend on routes available under the current highway regulation plan and the ability of routes to support the type of vehicles moving. Often the route will be prescribed by the higher headquarters. In this case, a map reconnaissance will enable the convoy commander and battalion staff to select tentative checkpoints or to confirm those already established. The convoy commander can ascertain critical points and potential ambush sites by contacting the DTO or servicing MC detachment through whose area the convoy will pass. The convoy commander should also conduct either a ground or aerial reconnaissance of the route once the map reconnaissance has been completed. To help them become familiar with the route, subordinate convoy leaders should be included in any reconnaissance. If the reconnaissance shows road or bridge damage, the convoy commander should notify his higher headquarters, which will in turn notify the DTO or MC detachment. The route reconnaissance should include identification of critical points and check points and the selection of an SP, RP, halt sites, and a bypass or alternate route.

i. **Escort and Security Elements**. Military police units may provide convoy security to a specific convoy or on an area basis. Security of routes is an MP mission. However, the availability of MP support depends on the threat in the area of operations, the sensitivity of the cargo, and other missions the MPs must support. If available, escort and security elements are used to secure and protect the convoy from enemy activity. Convoy escort and security elements are usually the responsibility of the moving unit. However, the MPs may provide them on a mission basis contingent upon the threat and importance of the convoy. Convoy commanders must request MP support through command or movement control channels. If MP support is approved, convoy commanders must closely coordinate with the MP unit directed to provide support. The presence of MPs or other escorts does not relieve the convoy commander from responsibility for the security of his convoy. Convoy commanders must plan and coordinate through their chain of command all matters pertaining to convoy security. These include the following:

- Noise, litter, and light discipline.
- Front, flank, and rear security.
- Security during halts.
- Air cover.
- Fire support.
- Communications security.
- Deception.

A convoy may be provided MP or combat force escorts. In placing escorts, the commander must consider the number of vehicles available, the size of the convoy, terrain and route characteristics, and likely enemy activity. Escorts should be placed to allow maximum protection for the most critical convoy elements. Since it is easier for vehicles to move forward, some escort vehicles must be positioned in the rear of the march element to which they are attached. If only one escort vehicle is provided, it should be placed to the rear of the convoy so it can be brought forward in the event of a tactical emergency.

j. **Convoy Support**. Based on the mission and circumstances of the move, support to convoys may include any of the following: fire support, combat aviation support, messing en route, maintenance en route, refueling en route, and medical support en route.

(1) ***Fire support***. As a rule, convoy commanders do not coordinate fire support. Convoy fire support is planned and coordinated by a fire support element on an area basis (such as a base operations center, base cluster operations center, or rear area operations center). This planning may provide fire support to MSRs or other routes if intelligence indicates that the enemy will likely target convoys at particular locations. Fire support assets will usually be employed only against Level III threats. Convoy commanders should know the fire support plans along their route and know how to call for and adjust fire. For more information, refer to FMs 6-30 and 6-20-30. Convoy commanders must know call signs, frequencies, and other signal operating instructions.

(2) ***Combat aviation support***. Another element of fire support that should be considered is Army attack helicopters. Through coordination, attack helicopters can be on alert status or overhead while the convoy is en route. In either situation, their radio frequencies must be

known to convoy and security radio operators and control personnel (FM 24-18). Steps must also be taken to standardize markings of convoy vehicles to prevent fratricide.

(3) ***Messing en route***. While on convoy, drivers can be fed by their organizational field feeding capabilities or by transient messes. For organizational mess, the convoy commander uses organic capabilities to feed, such as an MKT or MREs. The ASG or CSG may establish transient field feeding sites along the MSRs.

(4) ***Maintenance en route***. En route maintenance is performed by the driver and by mechanics in the trail element when the repairs are beyond the driver's capability. Drivers always perform normal preventive maintenance at halts. Maintenance personnel in the trail element are used to carry out all unit-level repairs on vehicles of the convoy. If the vehicle can be repaired quickly, then attempt the repair. If it cannot be repaired quickly or there is doubt, the vehicle should be towed or recovered and the march continued. Vehicles undergoing repairs or those that are to be abandoned or destroyed will be moved off the road. When a vehicle is disabled during a convoy, the following procedures should be observed:

- Driver pulls disabled vehicle to the right of the road and signal the convoy to pass.
- Assistant driver and any passengers dismount and take up defensive positions.
- Driver tries to repair the vehicle.
- Trail officer notifies the convoy commander of the disabled vehicle and recovers or destroys it depending on the tactical situation.
- Limit recovery vehicle recovery operations to only those situations where a tow bar will not work. Use tow bars when possible.
- Do not obstruct roads during recovery operations.
- Do not destroy equipment unless directed through command channels or as a last resort to prevent enemy capture.

(5) ***Refueling en route***. The requirement for refueling is based on the normal operating range of convoy vehicles. The operating range is the normal distance that a vehicle can travel on a full tank of fuel. Operating range varies according to the terrain, vehicle, and load. A heavily loaded truck operating on poor roads in hilly terrain will get less fuel mileage than a lightly loaded truck operating on good roads in fairly level terrain. In determining when to refuel, use the vehicle with the least operating range. This will prevent any vehicle in the convoy from running out of fuel.

(6) ***Medical support en route***. The convoy commander must consider medical support based on the mission and likelihood of enemy contact. Medical support can be provided by unit personnel trained as combat life savers, by attachment of a medical team to the convoy by higher headquarters, or by the area commander. Normally, MEDEVAC frequencies are established for emergencies in the SOI.

5-5. UNIT SOP. A complete SOP facilitates planning. At company level, SOPs should conform with those prepared by the next higher headquarters. At a minimum, the SOP should cover the following subjects:

- Duties of the convoy commander and other convoy control personnel.
- Convoy organization.
- Weapons and ammunition to be carried.
- Hardening of vehicles.
- Protective equipment to be worn.
- Preparation of convoy vehicles; for example, information on tarpaulins, tailgates, and windshields.
- Counterambush actions.
- Operations security measures.
- Immediate action drills.
- Actions during scheduled halts.
- Maintenance and recovery of disabled vehicles.
- Refueling and rest halts.
- Communications.
- Actions at the release point.
- Reporting.

5-6. PREPARING VEHICLES FOR CONVOY. This paragraph discusses the responsibilities of key personnel, as well as the elements needed, in preparing vehicles for convoy.

a. **Command Responsibilities**. The commander of the moving unit is responsible for the mechanical condition of his vehicles. Leaders must inspect all vehicles according to appropriate TMs before departing for the mission. Convoy commanders should also ensure that--

- Additional fuel, water, and lubricants are provided for en route requirements.
- Loads are inspected.
- Tarpaulin, troop safety straps, and end curtains are provided when required.
- Vehicles are hardened when required.
- Columns are identified with appropriate markings.
- Weapons are inspected.

b. **Marshaling or Assembly Area Inspection Teams**. A technique for large unit movements is to establish marshaling area or assembly area inspection points. As convoys are ready to depart, they proceed to the inspection point for final checks and driver briefings. Unit level maintenance personnel may be available to assist unit leadership in correcting last-minute minor deficiencies. Trucks with major problems will be returned to the parent unit and replaced with serviceable vehicles.

c. **Hardening Vehicles**. Cover the cargo bed of troop-carrying vehicles with at least a double interlocking layer of sandbags. Cover the cab floor of all vehicles with a double layer of sandbags under the driver's seat. Take care not to hamper pedal movement or hamper the driver's access to them. As an additional precaution, place a heavy rubber or fiber mat over the sandbags to reduce danger from fragments such as sharpened stones, sand, and metal parts of the vehicle. This also prolongs the life of sandbags. Sandbags may also be placed on the fuel tank, fenders, and hood. See Appendix O for more information on vehicle hardening.

When contemplating hardening vehicles for escort and/or gun truck duty, use one escort/gun truck for every eight task vehicles. Prior approval from higher headquarters must be received before task vehicles are converted into escort/gun trucks.

d. **Covering Cargo**. The main advantage in covering cargo is that it denies intelligence information while providing protection from weather elements. The disadvantage in installing tarpaulins is that they have to be removed for loading and unloading operations. This increases the time it takes to accomplish a mission.

e. **Convoy Identification**. Each column should be identified by a blue flag on the lead vehicle and a green flag on the rear vehicle. Flags should be mounted on the left of the vehicles, either front or rear. They must be positioned so that they do not interfere with driver vision or functional components of the vehicle. When movement is at night, the lead vehicle shows a blue light and the rear vehicle a green light. The vehicle of the convoy commander and the march unit commanders must display a white and black diagonal flag on the left front bumper. This flag is divided diagonally from the lower left corner to the upper right corner with the upper left triangle white and the lower right triangle black. Trail party vehicles carry an international orange safety flag. State and local police or MP escort vehicles do not display convoy identification flags. See Figure 5-3 (page 5-16) for illustrations of flags and flag placement.

The convoy movement order includes a CCN which identifies the convoy during its entire movement. The CCN is placed on both sides of each vehicle in the convoy and, if possible, on the front and back of each vehicle (see Figure 5-4, page 5-16). It is also placed on the top of the hood of the lead and rear vehicles of each march unit. See Appendix M for detailed information on convoy clearance procedures, to include the assigning of CCNs to both AC and RC convoys. See Appendix P for specifications for convoy warning signs.

f. **Final Preparation.** Final convoy preparation includes organizing the convoy, briefing personnel, and inspecting individual equipment and vehicles. Convoy personnel are usually briefed after the vehicles are lined up. After the convoy commander's briefing, personnel are returned to the control of the march unit commanders who give final instructions. Leaders make final inspections of loads to ensure that they are properly secured and that vehicles are ready to move. See Appendix Q for a sample convoy briefing. Radio operators are instructed to check their equipment and enter the net.

5-7. NIGHT CONVOYS. Although night convoys are extremely vulnerable to ambush and sniper fire, CSS doctrine requires that the preponderance of resupply operations be conducted during hours of darkness. Units must be trained in techniques for night convoys, night loading and off-loading, and night refueling. Heed the following guidelines for night convoys--

- Keep night convoys small.
- Use roads that drivers know.
- Make maximum use of night vision devices.
- Rehearse movements.
- Conduct leader reconnaissance.

Plan night moves in the same manner as daylight moves. However, night moves take longer and there is greater chance for mistakes, injury, and fratricide. When planning a night move, determine if the convoy will operate in an area that requires blackout drive. This decision will be made by the area commander.

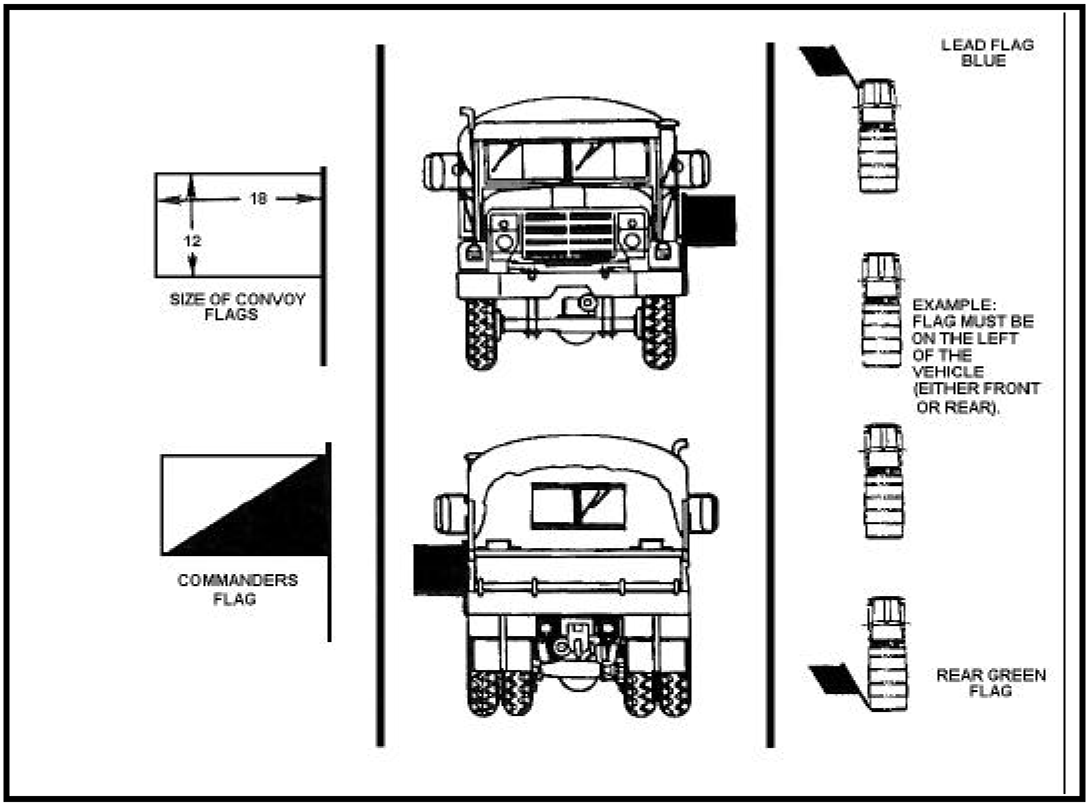


Figure 5-3. Flag placement on a vehicle

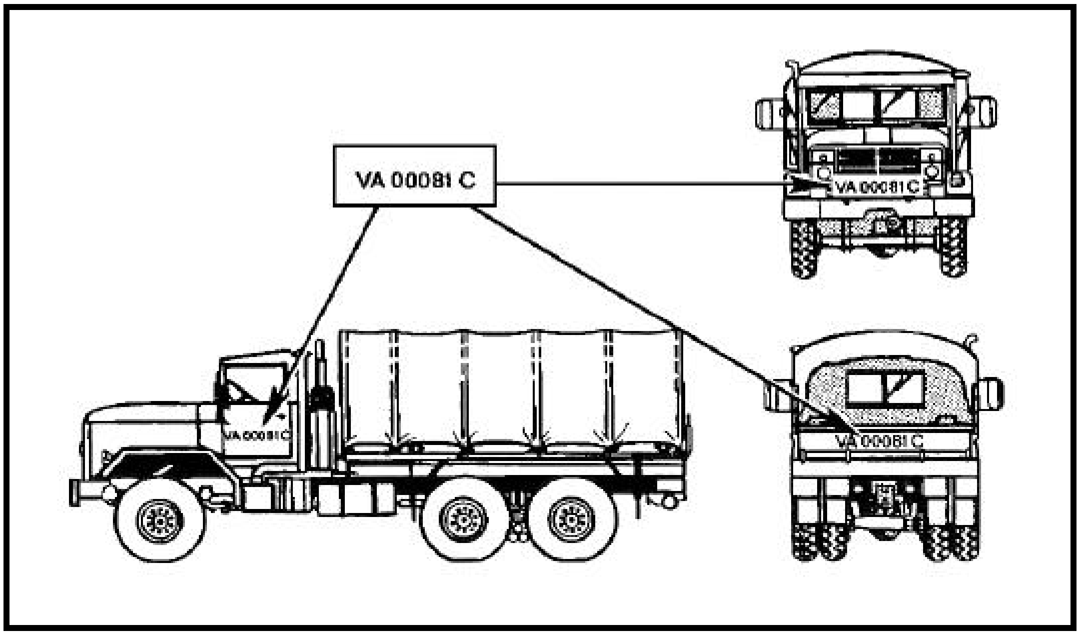


Figure 5-4. Placement of convoy clearance number

5-8. CONVOY COMMANDER'S REPORT. The convoy commander's report provides detailed information on convoy operations. It is a source of operational data that may be used in various reports as well as in planning future operations. Although this report is submitted upon completion of the convoy operation, the nature of the information recorded requires that it be maintained throughout the operation. See Appendix R for a sample report format.

5-9. HIGHWAY CONVOY OPERATIONS. Main convoy routes, such as major highways and expressways, are usually characterized by heavy, fast-moving traffic. Entering, driving, and halting on these routes are extremely critical operations that require prior planning and coordination with civilian authorities.

a. **Entering Convoy Routes**. The convoy should depart the assembly area at the time given in the movement order. Police support will reduce interference with other traffic and ensure the integrity of the convoy. Use the "close column formation" when moving from the assembly area to the main convoy route.

NOTE: Risk can be significantly reduced when civilian police assist by controlling civilian traffic. If a civilian police escort is not available, MPs or other military personnel should provide escort service. However, military escorts have no authority to instruct military drivers to disregard traffic control devices or signs.

Most expressways are equipped with entrance and exit ramps and acceleration and deceleration lanes that are designed to allow vehicles to enter and leave without interfering with other traffic. When used properly, these lanes greatly reduce the risk of traffic accidents and help in the movement of the convoy. The following instructions apply both to the initial point of entry to the expressway and the return to it from a rest halt area:

- As mentioned previously, civilian police assistance should be obtained to direct convoy vehicles onto the expressway and to control civilian traffic. When civilian police are not present, use MP or other military personnel to signal military vehicles when it is safe to enter the expressway. Military traffic should not interfere with civilian traffic.
- Before driving onto the entrance ramp, close up convoy vehicles to a maximum distance of 20 yards. This reduces the time the entrance ramp is blocked to normal traffic (see Figure 5-5, page 5-18). Upon reaching the acceleration lane, increase convoy speed to equal as closely as possible that of other traffic on the expressway. The maximum speed authorized for military vehicles on expressways is 50 MPH. Military vehicles moving on controlled access highways will maintain the posted minimum speed or 40 MPH if a minimum speed is not posted. Vehicles that cannot maintain the posted minimum speed will be routed over an alternate noncontrolled access road (refer to AR 55-162). Do not exceed the minimum speed unless directed by the convoy commander. Under no circumstances will the posted maximum speed limit be exceeded.
- When moving into the traffic lane and before merging, the driver must ensure that lanes are clear of oncoming traffic.
- After entering the traffic lane, drivers should not immediately try to move to the prescribed distance for expressway convoy operations but continue for a distance equal to the road space of the column. Drivers should then gradually attain the distance between vehicles for expressway driving or as given by the operation order and the final briefing.

NOTE: Vehicles must not slow down or close up while in a traffic lane of the expressway.

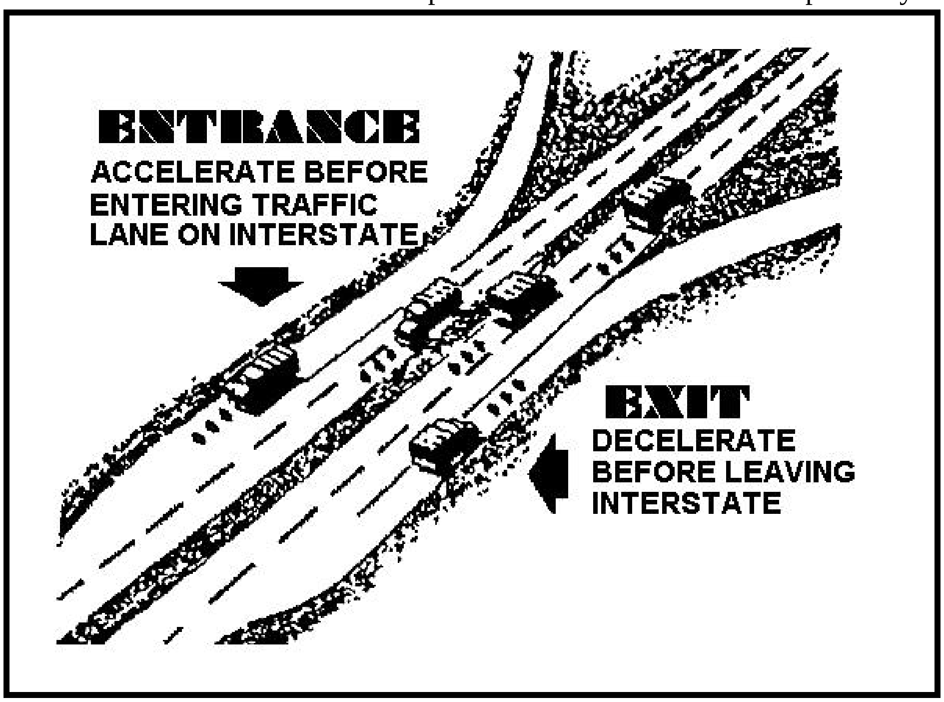


Figure 5-5. Entering and exiting an expressway

b. **Driving on Expressways**. All vehicles must remain in the right lane once the convoy has entered the expressway. Where the right lane is reserved for traffic turning off at the next exit ramp, the convoy should use the next adjacent lane. Drivers must be alert and prepared to slow down or take other evasive action to avoid vehicles entering the expressway from acceleration lanes.

If a vehicle develops mechanical trouble, the driver should turn on the appropriate turn signal to alert the vehicle behind him and move onto the shoulder of the road or into a parking area and wait for the arrival of the trail party. The remaining convoy vehicles should continue past the halted vehicle, leaving maintenance to be done by the trail party. The following actions will help drivers to avoid drowsiness or "highway hypnosis":

- Keep cab windows open.
- Shift body positions frequently.
- At rest halts, get out of the cab and move about.

CAUTION

Instruct convoy vehicle drivers NOT to give "clearance signals" to civilian vehicle operators. Responsibility for determining safe passing conditions rests with the driver desiring to pass.

c. **Exiting an Expressway**. To exit an expressway, either to enter a rest area or take another route, move vehicles to the deceleration lane at the earliest opportunity. Reduce speed to posted exit speed limit.

d. **Rest and Meal Halts on Conventional Highways**. Schedule rest halts so that the convoy will halt for 15 minutes at the end of the first hour of operation and 10 minutes every 2 hours thereafter. When a suitable area is not available at these periods, minor adjustments may be made to this schedule. On conventional highways with adequate off-shoulder parking space, rest and meal halts normally do not present a problem. However, the following precautions should be taken:

- Do not select rest areas located in urban or heavily populated areas.
- Avoid areas on curves or reverse sides of hills.
- Leave enough room to allow the vehicles to park off the paved portion of the road and return to the road safely.
- Maintain a minimum distance of 3 feet between parked vehicles.
- Place warning kit devices at the head and tail of the column unless the vehicles are completely off the highway and shoulder. Leave the flashing warning lights in operation and the headlights on. Post a guard behind the trail party with proper warning devices to alert, but not direct, approaching traffic.
- Do not permit convoy personnel, with the exception of guards posted at the head and tail of each halted march element, on the traffic side of vehicles except to perform prescribed maintenance.
- Make sure drivers and assistant drivers perform prescribed at-halt maintenance and check the security of cargo. Deficiencies that cannot be corrected by the vehicle crew should be reported to the serial commander.
- Check drivers for illness and fatigue.

- Post guards at least 50 yards behind the last vehicle to warn traffic when departing a rest area. When police support is provided, this step may not be required. Convoy vehicles should return to the highway as rapidly and safely as possible.

e. **Rest and Meal Halts on Expressways**. Information on the location of rest areas and their truck parking capacities on expressways over which the convoy will move is available at each ITO. The designated federal or state rest areas planned for convoy use should be entered in item 20 of DD Form 1265.

Only emergency stopping is authorized on expressways. Official rest areas or parking areas may be used for scheduled halts of military convoys. On most expressways, these areas are located at 25- to 30-mile intervals. Normally, separate parking areas within the rest area are designated for truck and passenger car parking. Convoys should use the portion reserved for trucks. Ensure that there is space for other vehicles. Convoy vehicles should not occupy more than 50 percent of the truck parking space at any time. If the number of trucks in a convoy will exceed 50 percent of the truck parking area, organize the column into serials. Maintain a sufficient time gap between serials to allow one to clear a rest area before the following serial arrives. Or, you may schedule convoy serials into different rest areas; however, this separates serials to such an extent that control is reduced.

Normally, acceleration lanes are provided at rest areas to facilitate merging of vehicles with other traffic. The same procedures are used when departing a rest area as when making an initial entry onto an expressway.

Meal halts on expressways require careful planning because of their longer duration. If the selected rest area cannot accommodate all of the convoy vehicles, one of the following options can be taken:

- Phase the convoy into a rest area in serials with enough time gap to allow the preceding serial to eat and clear before the arrival of the next serial.
- Have all serials halt at about the same time but at different rest areas. However, this will require excessive gaps between elements, thus reducing the commander's control.
- Use the leapfrog method by requiring the first serial to halt at a rest area while the second serial continues on to the next area, usually 25 to 30 miles ahead. By the time the first serial has completed its halt and arrived at the area where the second serial stopped, the second serial should be ready to join the column.
- Leave the expressway and use a previously selected area. This option allows all personnel to take a meal halt at the same time.

f. **Refueling Halts**. The majority of military vehicles can travel 300 miles without refueling. Since this exceeds the distance a convoy normally travels in one day, arrangements for mass refueling before reaching the overnight halt are unnecessary. Vehicles with limited range should be refueled during the noon meal halt as well as during regular refueling halts.

g. **Toll Roads, Bridges, and Tunnels**. A convoy representative should be assigned to clear the convoy at the initial entrance to toll facilities and any intermediate points where tolls are collected. When possible, obtain toll tickets before the convoy departs from its point of origin.

When this is not feasible, the convoy representative should arrive at the toll facility entrance well ahead in advance to purchase tickets and arrange for the uninterrupted movement of the convoy through the toll facility.

h. **Halts Due to Mechanical Failure**. A vehicle disabled because of mechanical failure should immediately be moved from the traffic lane to a location where it will not be a hazard to other traffic. If a breakdown occurs while driving on an expressway or highway, the driver should take immediate action appropriate to the time of day and degree of visibility in the area.

(1) ***Sunset to sunrise***. During the time that lights are required (sunset to sunrise) and when forward visibility is reduced to 500 feet or less, a reflector should be placed either in the obstructed lane or on the shoulder of the road if the vehicle is on or over the shoulder. Place the reflector to face the traffic using that lane. Do this before any attempt is made to repair the vehicle. Reflectors should be placed in the following order:

- One reflector in the center of the lane of traffic occupied by the vehicle and not less than 40 paces (approximately 100 feet) from it in the direction of traffic approaching in that lane (see Figure 5-6). If the vehicle is on or over the shoulder and does not occupy a traffic lane, the warning device should be placed on the edge of the roadway so that the traffic lane is not blocked.
- One reflector on the traffic side of the vehicle, four paces (approximately 10 feet) to its rear facing the traffic in that lane.
- One reflector 40 paces from the vehicle in the opposite direction.
- If the vehicle is stopped within 300 feet of a curve, crest of a hill, or other obstruction to view, the warning device in that direction should be placed so as to give ample warning to other users of the highway. However, the device should be placed not less than 80 paces or more than 120 paces from the vehicle (see Figure 5-7, page 5-22).

(2) ***Sunrise to sunset***. During the time lights are not required (normally sunrise to sunset), place red flags or reflectors with mounted flags at the distances prescribed for night. Since most warning kits contain only two flags, the reflector placed 10 feet behind the vehicle will not have a flag mounted on it. DO NOT use military personnel to warn drivers by manual flagging except where emergency warning devices do not give adequate warning to civilian traffic.

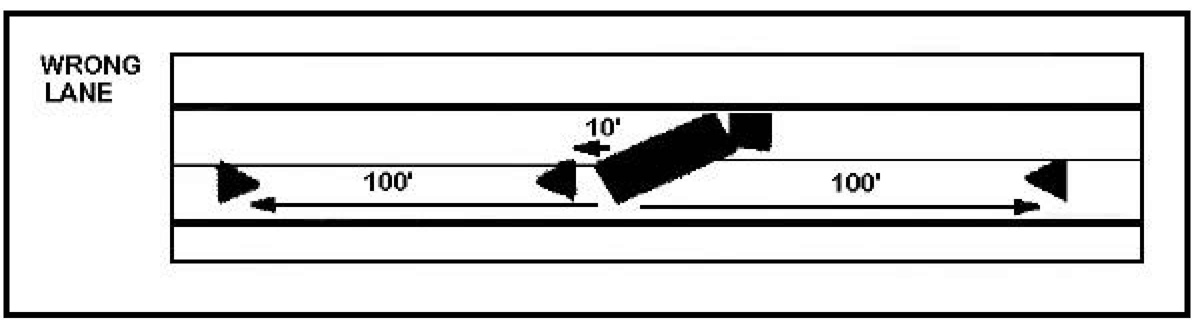


Figure 5-6. Vehicle stopped, blocking two lanes

i. **Accident Procedures**. If an accident occurs, every effort must be made to reduce its effects and to keep the convoy moving. If an accident happens in the convoy, the following steps should be taken:

- *Keep moving*. Only the vehicle immediately behind the vehicle should stop and render assistance.
- *Give first aid*. Give immediate attention to injuries according to FM 21-11.
- *Wait for assistance*. Do not move the damaged vehicle until an accident investigation has been completed by civilian police. Report any accident to civilian police IAW AR 385-40.
- *Clear the traffic lane*. The crew of the affected vehicle should make every effort to clear the traffic lane as soon as possible. In case of injuries, the crew of the assisting vehicle may be required to move the damaged vehicle.
- *Prepare the accident report*. Whenever a military vehicle is involved in ANY accident, the driver will prepare a SF 91.

On-the-spot information will be recorded on the form by the operator involved. If the operator is unable to prepare the report at the scene of the accident, it will be prepared by anyone so directed. The report must be completed and delivered to the operator's immediate supervisor as soon as possible for use in preparing DA Form 285.

Whenever state or local regulations require submission of accident reports to their agency, the report will be submitted first to the appropriate claims officer for review to ensure that the rights of the United States government are not prejudiced by admission of liability.

It is essential that personnel be trained to obtain all vital information at the scene of the accident and to complete all entries on the form. Information will often be unavailable after witnesses have left or vehicles have been removed from the scene of an accident. Each item of the report should be checked to make sure it gives a complete picture of facts leading to the accident and what occurred in the accident. If there is any question as to the validity of information obtained for the report, a notation should be made to this effect.

NOTE: When another driver is involved in the accident, his name should be obtained from his driver's permit.

The first officer or noncommissioned officer to arrive at the scene of the accident will take charge by supervising emergency aid, directing military traffic, warning civilian traffic, and directing placement of warning devices until the trail officer arrives. The trail officer, aided by available medical and maintenance personnel, will supervise and direct care of the injured and disposition of the damaged vehicles. Further assistance needed should be requested from the agencies listed in the convoy operation order.

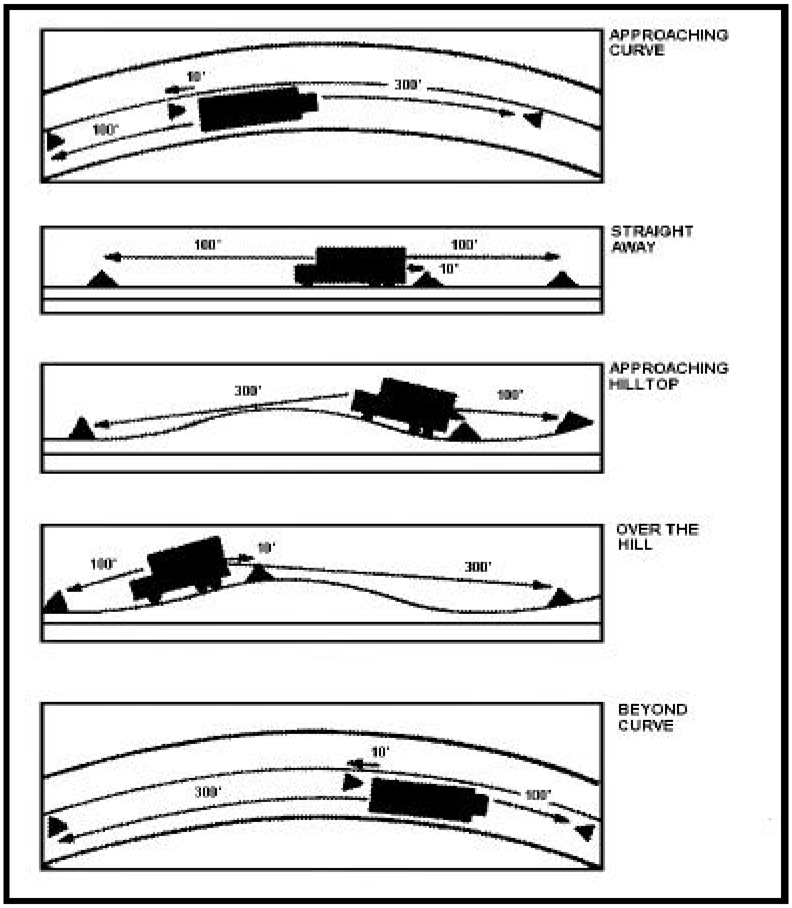


Figure 5-7. Halts under varying conditions due to mechanical failure

j. **Vehicle Accidents Causing a Fire or Creating an Electrical or Fire Hazard**. Motor convoys travel mostly over highways in rural areas. Fire departments in these areas are widely scattered, and firefighters may have to travel a long distance to respond to an emergency. This means that convoy control personnel will probably be the first to arrive at the scene of the accident and must be prepared to rescue endangered personnel, attempt to control the fire, or take steps to prevent a fire. If the accident results in a vehicle fire, convoy supervisory personnel should take the following actions:

- Halt the control vehicle a safe distance from the fire. Direct the driver or other convoy personnel to notify the nearest fire department and police department, using the most expeditious means; for example, roadside emergency, service station, or private residence telephone. If radio communication is available, notify the convoy commander.

- Remove injured personnel from burning vehicles as quickly as possible, even when it means subjecting a person to further injury. Follow established first aid procedures in caring for the injured before attempting to control fire in unoccupied vehicles.
- Keep spectators at a safe distance.
- Attempt to extinguish the fire with the control vehicle extinguisher, extinguishers from other vehicles, or with sand or mud.

In the event of an accident involving a truck carrying either explosives or hazardous cargo, supervisory personnel must take the following actions:

- Approach cautiously. Resist the urge to rush in; people involved in the accident cannot be helped or rescued until the hazards are known.
- Move and keep people away from the scene.
- Use the Emergency Response Guidebook as a guide.
- Immediately notify all assisting agencies and personnel of the hazards involved.

If the accident results in a fire hazard, supervisory personnel should do the following:

- Halt the control vehicle a safe distance from the accident. Direct the driver or other convoy personnel to notify police and fire departments by the fastest means. When radio communication is available, notify the convoy commander.
- Turn off the ignition and lights of the vehicles involved. Because of the possibility of sparks, do not remove battery cables unless absolutely necessary.
- Remove injured personnel as soon as possible.
- Keep spectators away from the area where flammable liquids are spilled or toxic fumes have accumulated.
- Guard against smoking by spectators or cigarettes thrown from passing vehicles. If personnel are available, post guards to warn passing vehicle drivers of a fire hazard.
- Notify nearby residents when spillage may place them in danger.

If the accident involves high-tension power lines, an extremely dangerous situation exists. The danger is even greater when the downed lines are touching a vehicle. Convoy supervisory personnel will take the following steps:

- Contact police immediately and explain the situation. The police will be able to contact power company personnel for emergency assistance more quickly than convoy personnel.
- Keep spectators at least 100 feet from downed wires.
- If wires are touching any of the vehicles involved, direct the occupants to remain in place until power company workers can cut off the electricity and remove the wires.
- In case of serious injury where death may be imminent unless rescue is effected, attempt to remove the wires, assist the injured from the vehicle, render first aid, and obtain medical assistance.

The following procedures are **NOT** routine. Perform the following when the possibility of death may result.

- Remove the wire from the vehicle by looping a completely dry fiber or cotton rope around it and pulling it free.
- Lift the wire from the vehicle using a completely dry-seasoned wooden pole.
- Reduce the risk of electrical shock by standing on a rubber vehicle floor mat, dry wooden planking, or other nonconductive material. Rescue personnel must be aware that the ground in the immediate vicinity of where a hot wire is touching may be charged and should be avoided.

k. **Convoy Commander's En Route Report to Clearance Authority**. During peacetime, administrative convoys will not normally be required to report their movement progress at origin, en route, and destination. If required, the convoy commander will provide an en route report to the next higher headquarters. During mobilization and selected exercises, special instructions included with the approved convoy clearance will direct the convoy commander to report to the appropriate headquarters upon departure, at selected halt locations, and upon arrival. The en route report will outline the position of the convoy. If the convoy requires more than one day, the report should include, as a minimum, the following information--

- Time of arrival at overnight stop.
- Estimated time of arrival at state lines on the following day.
- Complete details and circumstances of any accident or incident.
- Highway clearance number and convoy commander's name.

CHAPTER 6

CONVOY DEFENSE TECHNIQUES

The motor transport commander must ensure that his troops are trained in convoy defense techniques. The payoff is reduced vulnerability to hostile action and successful mission accomplishment. The damage a convoy incurs when attacked depends on the adequacy of convoy defense training. It also depends on the adequacy of the briefing that convoy personnel receive before the operation (Appendix Q).
Some elements of convoy defense training are routine. The key is to train to react rapidly to any situation. Successful accomplishment of your mission and your life depend on it.

This chapter covers a broad range of convoy defense techniques to be employed against a variety of threats. Keep in mind that Chapter 3 discussed the threat

6-1. AIR ATTACK. The air threat varies from UAV, cruise missiles, and armed helicopters to high-performance aircraft. Convoys face the greatest danger of an air attack while moving along open roads or during halts where there is little or no overhead cover.

An air attack is a type of ambush. Accordingly, many of the procedures used during a ground ambush also apply to the air attack. For example, the convoy commander must--

- Prescribe alarm signals (unit SOP) (see FM 44-3 for more information on alarms).
- Give instructions for actions to take when under attack.
- Prescribe actions to take in the absence of orders.
- Ensure that defense procedures are rehearsed.
- Review the procedures with convoy personnel before the convoy moves out.

The convoy commander should remember that enemy pilots will seek out and try to surprise the convoy. They will fly at a low, terrain masking altitude. If they attack from higher than 350 meters, small arms fire will have no effect against them, but air defense weapons can be used against them effectively. Enemy pilots will also fly at high speed to make air defense weapons and small arms fire less effective.

a. **Active Defense**. The amount of fire a logistical convoy can bring to bear on attacking aircraft is extremely limited. It is limited to the number of vehicles with mounted machine guns and the individual weapons of operators and passengers. Although the convoy is not totally defenseless, it is no match for a skilled pilot in a modern ground attack jet aircraft. The convoy's capability to defend itself is slightly better against the slower and sometimes more vulnerable ground attack helicopter. At best, the convoy without air defense protection is extremely limited in its ability to defend against air attack.

The key to effective small arms fire against aircraft is volume. Put up a large volume of fire with small caliber weapons. Volume small arms fire comes from knowing the effectiveness of small arms fire on low-flying aircraft. Training ensures accuracy and builds confidence.

(1) ***Firing positions***. Except for the prone position, the riflemen's basic firing stances stay the same (Figure 6-1). Firing at aircraft from the prone position means the firer is lying on his back, aiming his rifle into the air. Maximum use of cover and concealment is essential. A crew served weapons gunner should fire from a protected position if possible. He needs to get the weapon up in the air. He can hold it up or use a support for his arms and the weapon. In a real emergency, another soldier can act as a hasty firing support.

(2) ***Tips for small arms defense***. The following are tips for small arms defense:

- Shoot any attacking aircraft or unauthorized UAV.
- Fire at the nose of an aircraft; fire at the fuselage of a hovering helicopter or slightly above the nose of a moving helicopter.
- Fire in volume--everybody shoots.
- Lead aircraft crossing your position (M16 and M60 lead jets the length of one football field).
- Take cover if time allows.
- Support your weapon if possible.
- Lie on your back if caught in the open.
- Aim mounted machine guns slightly above the aircraft nose for head-on targets.
- Control small arms fire so attacking aircraft flies throughout it.

b. **Passive Defense**. For a logistical convoy, normally without significant air defense firepower, passive measures are most effective. The key is to prevent attacks by hostile aircraft.

(1) ***Dispersion***. The formation used by the convoy is a type of passive defense. The convoy commander must decide whether to use an open or closed column. The distance between vehicles must not be fixed. It should vary from time to time during a march. Factors influencing selection of the best vehicle distance include:

- Mission.
- Cover and concealment along the route.
- Length of the road march.
- Type of road surface.
- Types of vehicles.
- Nature of cargo.
- Enemy threat (ground and air).
- Available defense support.
- Small arms potential.

(2) ***Open column***. Open column convoys generally maintain an 80- to 100-meter distance between vehicles. This formation offers an advantage of fewer vehicles damaged by air-to-ground rockets, cannons, or cluster bomb units. However, open columns make control more difficult for the convoy commander when it is necessary to give orders to stop, continue, disperse and seek concealment, or engage aircraft. The column may be more susceptible to attack. It is exposed for a

longer period and, if attacked, its defense is less effective since its small arms fire is less concentrated.

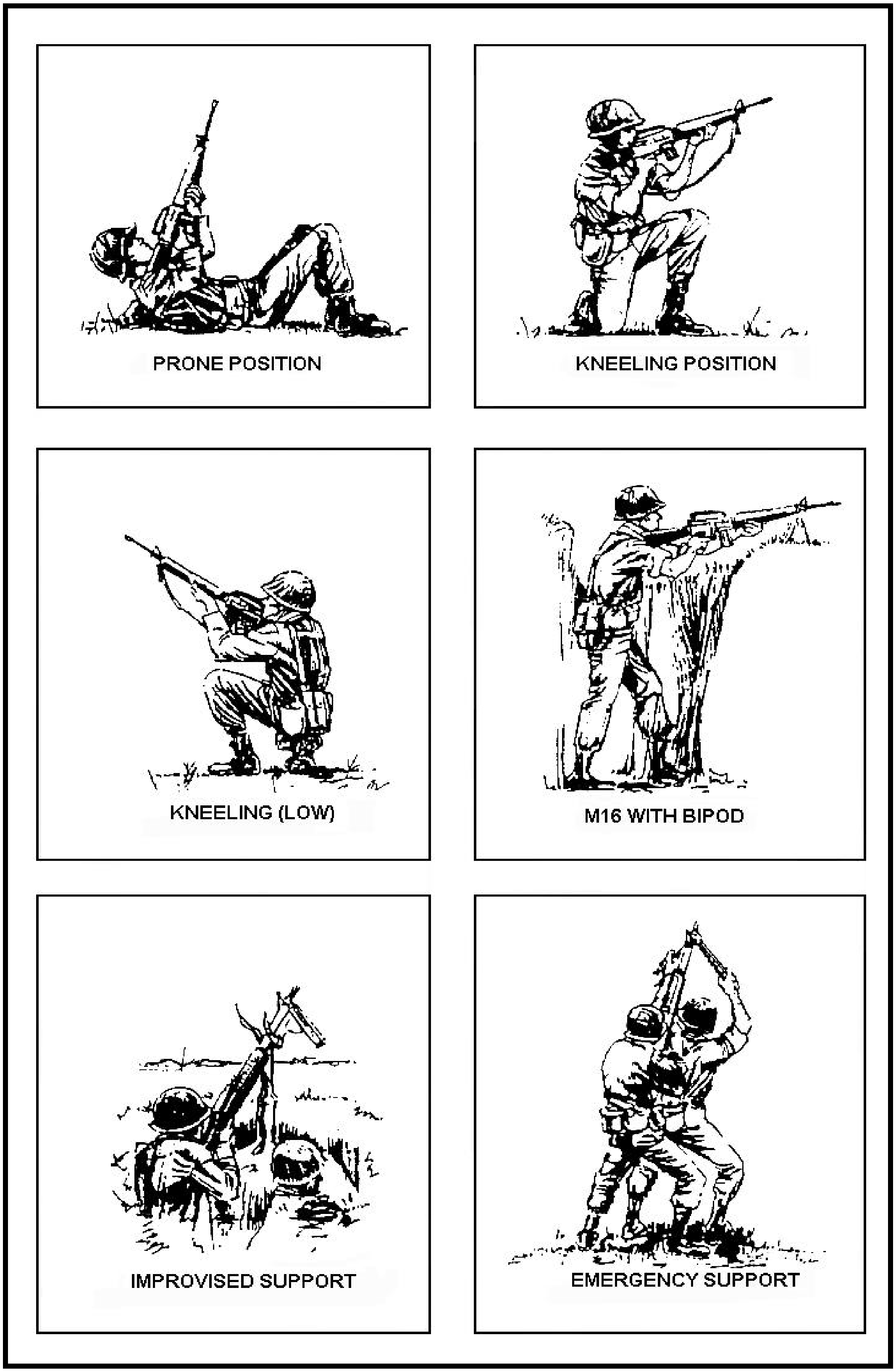


Figure 6-1. Firing positions

(3) ***Close column***. Close columns maintain a distance of less than 80 meters between vehicles. This formation has none of the disadvantages noted for the open column formation. However, presenting a bunched up target could be an overriding disadvantage. Where an air attack is likely, it may be wise for the convoy commander to move close column convoys only at night.

(4) ***Camouflage and concealment***. Camouflage and concealment techniques can make it more difficult for the enemy to spot the convoy. Not much can be done to change the shape of a vehicle moving down the road, but the type of cargo can be disguised or concealed by covering it with a tarpaulin. Bulk fuel transporters (tankers) are usually priority targets. Rigging tarps and bows over the cargo compartment conceals the nature of the cargo from the enemy pilot.
The following are other effective passive measures:

- The operator should look for a bush, tree, or some other means of concealment to break the shape as seen from the air (Figure 6-2).
- Smooth surfaces and objects, such as windshields, headlights, and mirrors, will reflect light and attract the pilot's attention. Camouflage or cover all shiny items before the convoy moves out.
- If vehicles are not already painted in a pattern to blend with the terrain and to break the outline, mud can be used to achieve this effect.

(5) ***Air guard duties***. Assign air guard duties to specific individuals throughout the convoy, and give each specific search areas. If the road march lasts more than an hour, soldiers should take shifts at air guard duty. Scanning for a long period dulls the ability to spot aircraft. Seeing the enemy first tips the odds in favor of the convoy, giving it time to react. See FM 44-3 for search and scan procedures.

(6) ***Communications security***. Today's communications equipment can be very useful for controlling convoys, but it can also help enemy pilots find you. Use the radio only when necessary and be brief. See Appendix S for added COMSEC precautions.

c. **Passive Reactions**. When aircraft are spotted or early warning is received, the convoy commander has three options: stop in place, continue to march, or disperse quickly to concealed positions (Figure 6-3, page 6-6).

If the convoy commander chooses to halt the convoy, the vehicles simply pull to the shoulder of the road in a herringbone pattern. This technique has several advantages:

- It is harder for the enemy pilot to see the convoy when it is halted than when it continues to move.
- It is easy to continue the march after the attack.
- The volume and density of organic weapons will be higher than if the convoy disperses.

A disadvantage to this option is that a convoy stopped on the open road makes a good target and an enemy attack has a better chance of causing greater damage to the unit.

The mission and/or terrain may dictate that the march continue. If this is the case, convoy speed should be increased. Continuing the march offers the advantage of presenting a moving target, making it more difficult for the enemy to hit. However, detection is easier and volume and density of small arms fire are reduced.

A simple technique to disperse vehicles is to establish a method in the SOP that, in the event of an attack, odd-numbered vehicles go to the left and even-numbered vehicles go to the right. The key to dispersion is not to make two straight lines out of what was one long line; the vehicles must be staggered (Figure 6-4, page 6-6). This should not be much of a problem if the drivers have been trained to go to trees, bushes, folds in the ground, and so forth, that will give concealment. Once the convoy is dispersed, all personnel, except for vehicular-mounted weapon gunners, dismount and take up firing positions.

Advantages of this option are that it is more difficult for the enemy pilot to detect the vehicles and get multiple hits. However, this method has several disadvantages:

- It is easier for the enemy pilot to spot the convoy as it begins to disperse.
- The volume and density of small arms fire are reduced.
- It takes longer to reorganize the convoy after the attack.

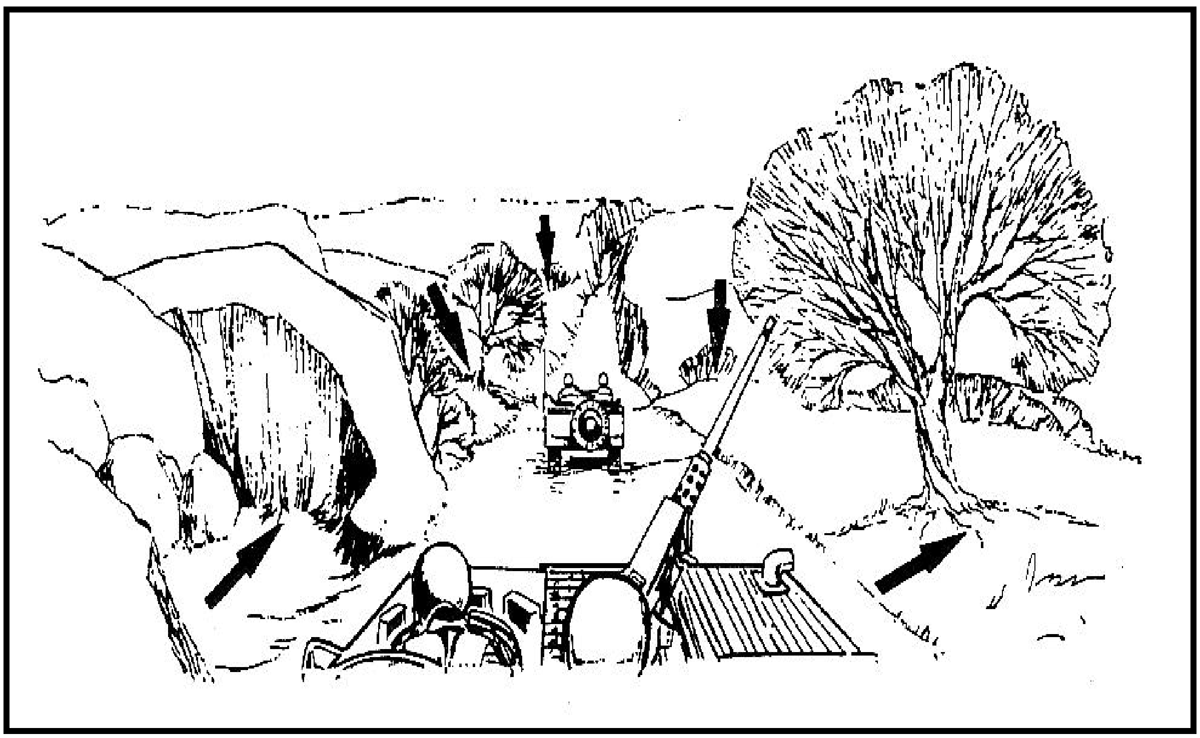


Figure 6-2. Dispersing vehicles seek cover for protection against air observation

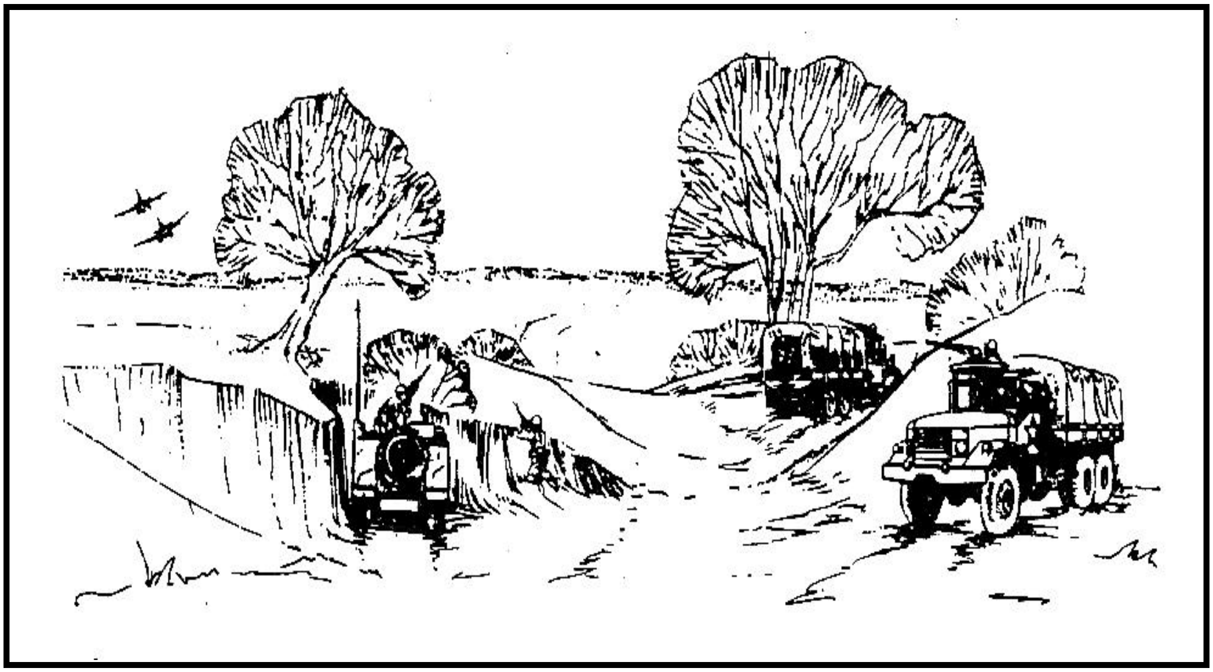


Figure 6-3. Dispersed vehicles in concealed positions

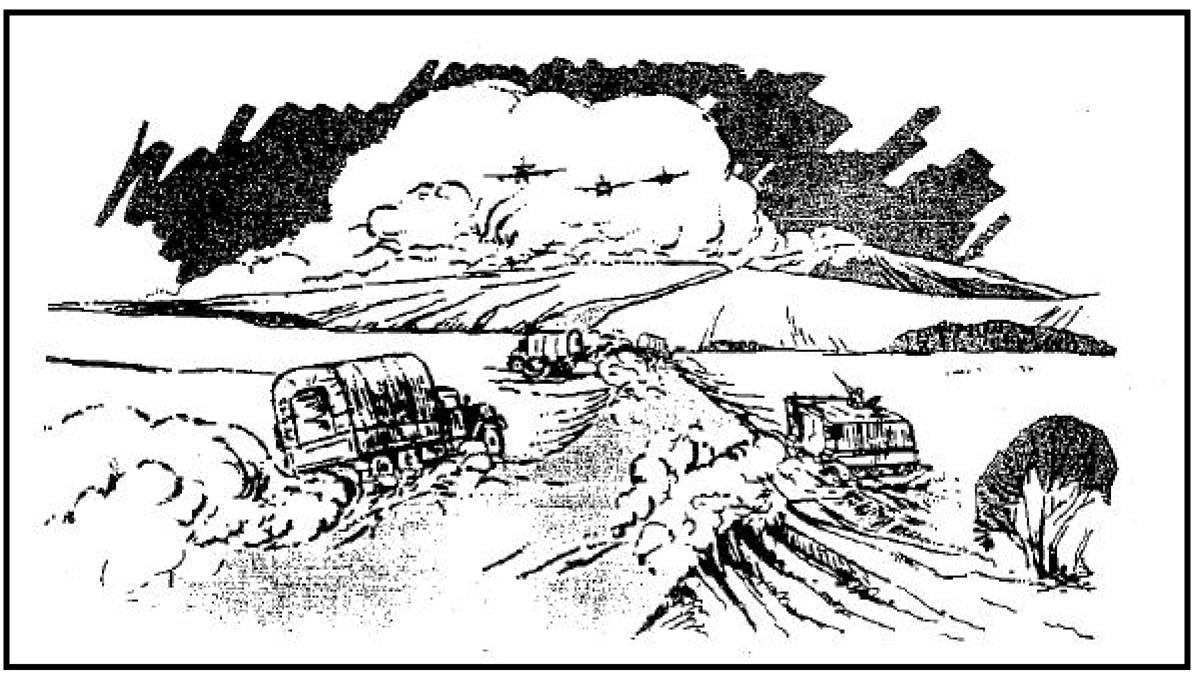


Figure 6-4. Vehicles moving to dispersed positions on road shoulders

6-2. ARTILLERY OR INDIRECT FIRE. Enemy artillery units or indirect fire weapons may be used to destroy logistical convoys or to harass and interdict the forward movement of supplies and personnel. Artillery fires are either preplanned fires or fires called in and adjusted on a target of opportunity by a forward observer. Of the two, the adjusted fires present the most complex problem as the artillery barrages can be adjusted to follow the actions of the convoy.

a. **Active Defense**. Active defensive measures against artillery are extremely limited but must not be overlooked. Active measures include--

- Directing counterbattery fire if the direction and approximate distance to the enemy artillery can be estimated.
- Directing small arms fire or artillery fires against the enemy FO if he can be located.
- Coordinating air strikes against the enemy artillery.

b. **Passive Defense**. The formation in which the convoy moves can be a type of passive defense. See the discussion of open and closed convoys under Passive Defense for Air Attacks. The convoy commander has three options when confronted with incoming artillery rounds: halt in place, continue to march, or disperse quickly to concealed positions. Regardless of the option selected, the actions to be taken and the signal directing the action should be covered in the unit SOP. The primary consideration is the immediate departure from the impact area.

The convoy should only be halted when the artillery concentration is ahead of the convoy. The convoy commander should look for an alternate route around the impact area and the convoy should remain prepared to move out rapidly.

The mission or terrain may require the convoy to continue. If this is the case, increase speed and spread out to the maximum extent the terrain will allow. Casualties can be reduced by avoiding the impact area, increasing speed, wearing protective equipment, using the vehicle for protection, and increasing dispersion.

6-3. SNIPER FIRE. Take extreme caution when sniper fire is received to ensure that any return fire does not harm friendly troops or civilians in the area. The best actions are passive. Ensure all personnel wear Kevlar helmets and available body armor at all times. All vehicles should move through the area without stopping. Escort personnel should notify the march element commander by giving a prearranged signal, like a smoke grenade thrown in the direction of fire, and attempt to locate and destroy the sniper by long-range fire if in a free-fire zone.

NOTE: Prevent convoy personnel from random firing by designating personnel to return fire. Do not return fire in a no-fire zone.

The convoy commander may order additional fire or supporting forces into the area to destroy, capture, or drive off the sniper. Convoy personnel should be aware that a heavy volume of fire is frequently used by the enemy to slow down a convoy before an ambush.

NOTE: Remember all details so the incident can be reported to higher headquarters.

6-4. AMBUSH. This paragraph provides guidance in developing and employing counterambush tactics and techniques. The very nature of an ambush--a surprise attack from a concealed position--places an ambushed unit at a disadvantage. Combat situations may prevent a convoy from taking all the measures necessary to avoid being ambushed. Therefore, a convoy must take all possible measures to reduce its vulnerability. These are passive measures supplemented by active measures taken to destroy or escape from an ambush. For information on the types of ambushes, see FM 21-75.

No single defensive measure, or combination of measures, will prevent or effectively counter all ambushes in a situation. The effectiveness of counterambush measures is directly related to the state of training of troops and the leadership ability of the leaders.

The best defense is to avoid being ambushed. Take the following actions to avoid an ambush:

- Select the best route for your convoy.
- Make a map reconnaissance.
- Make a ground reconnaissance.
- Make an aerial reconnaissance.
- Obtain current intelligence information.
- Use OPSEC to deny the enemy foreknowledge of the convoy.
- Do not present a profitable target.
- Never schedule routine times or routes.

Take the following actions to reduce the effectiveness of ambushes:

- Harden vehicles.
- Cover loads.
- Space prime targets throughout the convoy.
- Wear protective clothing.
- Use assistant drivers.
- Carry troops and supplies.
- Use prearranged signals to warn the convoy of an ambush.
- Use escort vehicles (military police, tanks, armored vehicles) or gun trucks.
- Thoroughly brief all convoy personnel on immediate action drills.
- Practice immediate action drills.
- Maintain the interval between vehicles.
- Move through the kill zone, if possible.
- Stop short of the ambush.
- Do not block the road.
- Rapidly respond to orders.
- Aggressively return fire.
- Counterattack with escort vehicles.
- Call for artillery support.
- Call in TACAIR support.
- Call for the reserve force.

- In the event of ambush during night convoy operations under blackout drive, turn on service drive lights and increase speed to clear the ambush area. Be aware that drivers wearing night vision goggles will be temporarily blinded when service drive is turned on.

a. **Road Not Blocked**. Guerrillas are seldom able to contain an entire convoy in a single kill zone. This is due to the extensive road space occupied by even a platoon-size convoy and because security or lack of available forces may limit the size of the ambushing force. More often, a part of a convoy is ambushed--either the head, tail, or a section of the main body. That part of the convoy that is in the kill zone and receiving fire must exit the kill zone as quickly as possible if the road to the front is open. Vehicles disabled by enemy fire are left behind or, if blocking the road, pushed out of the way by following vehicles. Armored escort vehicles must not block convoy vehicles by halting in the traveled portion of the road to return fire.

Vehicles that have not entered the kill zone must not attempt to do so. They should stop and personnel should dismount, take up a good defensive position, and await instructions. Since escort vehicles may have left the road to attempt to overrun a hostile position, elements of the convoy should not fire on suspected enemy positions without coordinating with the escort forces.

Other actions that convoy personnel can take to neutralize the ambush force include:

- Call for artillery fire on enemy positions.
- Call for gunship or tactical air or army aviation fire on enemy positions.
- Direct gun trucks and other vehicles mounted with weapons to lay down a heavy volume of fire on the ambush force.
- Call for reaction forces.
- Direct all nondriving personnel to place a heavy volume of fire on enemy forces as rapidly as possible as vehicles move out of the kill zone.

NOTE: Vehicles must keep their distance to reduce the number of vehicles in the kill zone.

A motor transport convoy with a limited escort is seldom able to defeat a hostile force and should not attempt to do so. When part of the convoy is isolated in the kill zone, vehicles that have not entered the ambush area must not attempt to do so. They should stop; personnel should dismount, take up a good defensive position, and await instructions until supporting forces have cleared the ambush. Normally, a transport unit will not deploy to attack a hostile force unless it is necessary to prevent destruction of the convoy element. It relies on supporting air, artillery, escorts, and reaction forces.

b. **Road Blocked**. When an element of a convoy is halted in the kill zone and is unable to proceed because of disabled vehicles, a damaged bridge, or other obstacle, personnel will dismount, take cover, and return a maximum volume of fire on enemy positions. When dismounting, exit the vehicle away from the direction of enemy fire. Security/escort troops from vehicles that have passed through the ambush area dismount and lay down a base of fire on the ambush position. Reaction forces should be called in as soon as the ambush attack is launched. When a security escort is provided and a combat emergency arises, the escort commander has operational control of the security element to attack and neutralize the hostile force. Normally, the security force will take action to neutralize the ambush while the convoy escapes from the kill zone. In an ambush situation, immediate reaction and aggressive leadership are essential to limit casualties and damage to vehicles, cargo, and personnel. If immediate air or artillery support is available, personnel will be restricted to a specified distance from the road to avoid casualties from friendly fire. In this situation, personnel in the kill zone establish a base of fire, while others take up defensive positions away from their vehicles and wait while supporting fire is called in on the enemy positions. Fire in the kill zone may be from only one side of the road with a small holding force on the opposite side. To contain the convoy element in the kill zone, mines and booby traps are frequently placed on the holding force side. The security escort must take care in assaulting the main ambush force as mines and booby traps are commonly used to protect its flanks.

When the enemy is dislodged, the road must be cleared and convoy movement resumed as soon as possible. Wounded personnel are evacuated using the fastest possible mode. When disabled vehicles cannot be towed, their cargo should be distributed among other vehicles if time permits. When it is not feasible to evacuate vehicles and/or cargo, they will be destroyed upon order from the convoy commander. If at all possible, radios and other critical items will be recovered before the vehicles are destroyed. Under no circumstances will they be allowed to fall into enemy hands.

c. **Mines and Booby Traps**. Mines and booby traps are frequently part of an ambush. Command-detonated mines are often used to start an ambush. Mines will also be planted along the shoulder of the road for harassment and interdiction. A booby trap system may be used against personnel in vehicles and could consist of hand grenades. Claymore mines or artillery shells may be suspended from trees and command-detonated when a vehicle passes.

The following guidelines have proven effective in decreasing damage by mines in convoy operations:

- Track the vehicle in front.
- Avoid driving on the shoulder of the road.
- Whenever possible, do not run over foreign objects, brush, or grass in the road.
- Avoid fresh earth in the road.
- Watch local national traffic and the reactions of people on foot. (They will frequently give away the location of any mines or booby traps.)
- When possible, arrange for the engineers to sweep the road immediately before the convoy is scheduled to move over it.
- Use heavy vehicles such as tanks to explode small mines when deployed in front of the convoy.
- Harden vehicles.
- Wear protective equipment.

6-5. NUCLEAR, BIOLOGICAL, OR CHEMICAL ATTACKS. Chemical agents can be disseminated by artillery fire, mortar fire, rockets, missiles, aircraft spray bombs, grenades, and land mines. Always be alert because agents may already be present on the ground or in the air. Chemical agents are substances in either gaseous, liquid, or solid form. To protect against an NBC attack, you need to know how those agents may affect your body if they are used against you. Take defensive actions according to local directives and SOPs. For detailed information on defense against NBC warfare, see FMs 3-4, 3-5, and 3-100.

CHAPTER 7

UNIT MOTOR PARK

Organization of the motor park is one of the most important factors in motor transport operations. This chapter discusses basic characteristics and considerations for tactical type motor parks. Always plan for the most efficient and economical use of available facilities. Look for ways to improve as operating conditions change

7-1. RESPONSIBILITY. The company commander has overall responsibility for the unit motor park. As his operations assistant, the truckmaster supervises the motor park and is responsible for the efficient conduct of related activities. Unit commanders establish procedures for the controlled dispatch of vehicles after duty hours.

7-2. EMERGENCY EVACUATION. Motor parks may be prime targets for enemy aircraft or missiles. Upon receipt of an attack warning, vehicles and personnel should be evacuated to the dispersal area over previously selected routes. Rapid evacuation of the motor park may not be possible using regular exits. By designating emergency exits, commanders can facilitate evacuation and reduce traffic congestion. These exits may be gates that are secured during routine operations or areas where the fence may be temporarily removed. Since emergency evacuation may involve different units, the installation commander should coordinate the evacuation plan. Evacuation priorities should be based on unit missions. The truckmaster must be thoroughly familiar with the evacuation plan. He must brief unit personnel on the order of evacuation, assigned exits, and routes to an alternate motor park or dispersal area.

7-3. COMMUNICATIONS. Reliable communications with the company CP make motor park operations easier. Communications speed the transfer of information on routine matters as well as alert notices and other emergencies.

Field phones can be used to connect the motor park and the CP. Do not rely on commercial telephone circuits. They are an alternate means of communication for daily operations. Field phones are more dependable during emergency situations.

7-4. LOCATION. The unit commander selects the best possible site for the motor park in his area of operation. The truckmaster reconnoiters the area and recommends the location of the motor park to the unit commander. The truckmaster bases this recommendation on the following factors:

- *Location of other facilities*. The motor park should be located as close as possible to depots, railheads, terminals, or other facilities that require truck support. The unit's mission is the key consideration in selecting the tactical motor park site.
- *Terrain*. The location should have good drainage and stable soil or hardstand with little danger of fire. Abandoned schoolyards, factory storage areas, or recreational areas are ideal if the tactical situation permits their use. Make use of natural obstacles. Use artificial camouflage materials to augment natural foliage.
- *Size*. The site should be large enough to accommodate unit vehicles, tentage, maintenance facilities, and POL storage. However, it should be small enough to be defensible with the available troops.

- *Enemy capability*. Considerations include dispersion, concealment, and overhead cover of vehicles, along with the ability to secure the motor park against enemy attack, sabotage, and cargo pilferage.
- *Roadnet*. Easy access routes, all-weather roads, and separate entrances and exits to the area are all highly desirable.
- *Troop billets*. The motor park should be located near permanent buildings when possible, especially when the position will be occupied for more than seven days. Before use, abandoned buildings should be checked for structural soundness, booby traps, and sanitary conditions.

When possible, locate the dispatch office at the motor park exit. The operations office and driver's briefing room should be in the same building. This allows the dispatcher to see departing vehicles and to give final instructions to drivers when necessary. Locate the truckmaster and dispatcher together for easier control over vehicles. Individual units rarely choose their buildings or location, so the most effective use of the available facilities is essential.

7-5. TRAFFIC PLAN. Design the motor park traffic plan to maximize effective use of existing facilities. Local conditions will determine the exact details of the traffic plan. The plan should--

- Prevent vehicles from crossing the maintenance shop aprons when maneuvering, entering, or leaving the motor park.
- Use one-way traffic to simplify vehicle movement.
- Establish entrance lanes with easy access to POL, water, and air facilities.

7-6. FIRE PREVENTION. Fires in motor parks are usually caused by careless smoking or by using welding equipment near flammables. Take the following measures to prevent or reduce the effect of motor park fires:

- Have adequate firefighting equipment on hand.
- Train personnel to use firefighting equipment.
- Designate NO SMOKING areas around fuel pumps, paint and POL storage areas, and the battery shop.
- Designate safe smoking/break areas.
- Designate separate containers for disposal of waste POL.
- Place oily rags and trash in covered metal containers.
- Make sure containers are appropriately marked.
- Educate personnel in fire prevention.
- Have the fire marshal survey the motor park.

7-7. SECURITY. Normally, the guard provides perimeter security for the motor park. This includes guards at the entrance and exit gates. The unit commander who occupies the motor park must ensure that auxiliary gates in his area of responsibility are locked and the fence is secure. The unit commander must also--

- Provide security for classified cargo.
- Provide security for government property within areas of responsibility.
- Provide security for loaded vehicles.
- Designate an area for parking dangerous loads.

- Control keys and provide key control according to security directives.

7-8. ENVIRONMENTAL PROTECTION. It is essential that environmental protection procedures are established and followed in unit motor parks. Requirements include:

- Maintaining spill response SOPs and materials.
- Storing POL and hazardous materials properly.
- Planning for waste storage and disposal.
- Conducting periodic inspections for compliance with environmental practices.

CHAPTER 8

ORGANIZATION AND OCCUPATION OF THE TRUCK COMPANY AREA OF OPERATIONS

A truck company does not normally occupy a field site for extended periods of time. Units move to maintain support, in response to a change of mission, and to enhance survivability. When a unit relocates, procedures are divided into three phases: reconnaissance and selection of positions; moving the company; and occupying, organizing, and improving the position. This chapter explains the basic steps for moving a truck company to a new location. These actions may be modified to fit a specific tactical situation.

8-1. METHODS OF SELECTION AND PREPARATION. It is critical that units keep movement time to a minimum. Tactical movement SOPs are essential to unit tactical preparations and procedures and should be written for both day and night occupation. Either the two-party or RSOP method may be used to select and prepare unit operations areas.

a. **Two-party Method**. The two-party method involves two distinct parties, the reconnaissance party and the advance party. This method is normally used when the commander has advance warning of movement.

b. **Reconnaissance, Selection, Occupation Party Method**. This method combines the functions of the reconnaissance and advance parties. It is generally used when the commander has little advance warning or when the company is moving as part of a larger unit. The RSOP may also be used when the commander has limited personnel, equipment, or time available.

8-2. BASIC AREA REQUIREMENTS. All motor transport units need large field sites. Guidance to all levels of command are given by the planner, who develops requirements for establishing a base to the motor transport unit commander who selects a suitable field site for his unit. In actual operations, factors to consider also include:

- Terrain.
- Weather.
- Operational requirements.
- Existing facilities.
- Local directives.

Site selection is governed by:

- *Mission*. Mission is paramount. A particular site may be excellent for several reasons, but it is acceptable only if it permits mission accomplishment.
- *Enemy threat*. Site size is of limited usefulness if it does not allow for enough dispersal for survivability and effective operations based on the threat.

Where applicable, mission and enemy threat take precedence over the figures and considerations in this chapter.

8-3. TYPES OF OPERATING BASE AREAS. From an operational viewpoint, and considering the requirements for dispersion of vehicles and facilities as dictated by the tactical situation, the operating base area requirements for motor transport units are classified as follows:

- *Minimum*. The formal type of field setup under administrative conditions (possibility of hostile action remote). Vehicles are parked in the unit motor park. Tentage, troops, and administrative, are in designated areas. Only a minimum distance is maintained between vehicles and unit facilities.
- *Average*. A field setup under tactical conditions where friendly forces have air superiority (possibility of hostile air attack remote). An approximate 50-foot (15-meter) dispersion between unit vehicles and facilities is maintained to protect against losses from hostile ground action including mortar or artillery fire.
- *Maximum*. A field setup that considers a dispersion of about 150 feet (46 meters) between unit vehicles and unit facilities as protection against hostile air attack or indirect fire.

Figure 8-1 shows the layout of a typical operations area.

8-4. RECONNAISSANCE AND SELECTION OF POSITIONS. When a transportation unit receives an MWO, the unit commander initiates actions to prepare his unit for movement. The process described here remains essentially the same for both selection and preparation. The sequence is as follows:

- Commander/CP receives the MWO.
- Limited map reconnaissance conducted to determine limited time-distance factors.
- Pertinent tactical information gathered.
- Warning order issued to the reconnaissance party OIC or RSOP OIC and key leaders.
- RSOP OIC performs detailed map reconnaissance.
- Strip maps of primary and alternate routes drawn and distributed (if not given in the MWO); includes the harbor/hide area. Copies provided to the CP/company commander and each driver in the reconnaissance/RSOP party.
- Operations order issued. (NOTE: Use of sand tables and rock drills is recommended during the OPORD. The general rule of one-third/two-thirds should be used in the development of the OPORD.)
- Route and site reconnaissance conducted.
- FRAGO issued (if necessary, based on reconnaissance/RSOP findings).
- Position selected.
- Occupation planned and position prepared for occupation.
- Position occupied, organized, and improved.

8-5. TWO-PARTY METHOD. The two-party method employs a reconnaissance party to aid in site selection and an advance party to occupy and prepare the AO. The function of the reconnaissance party ends once the commander has selected an acceptable location. The job of the advance party begins with its arrival at the site and ends with the arrival of the last vehicle.

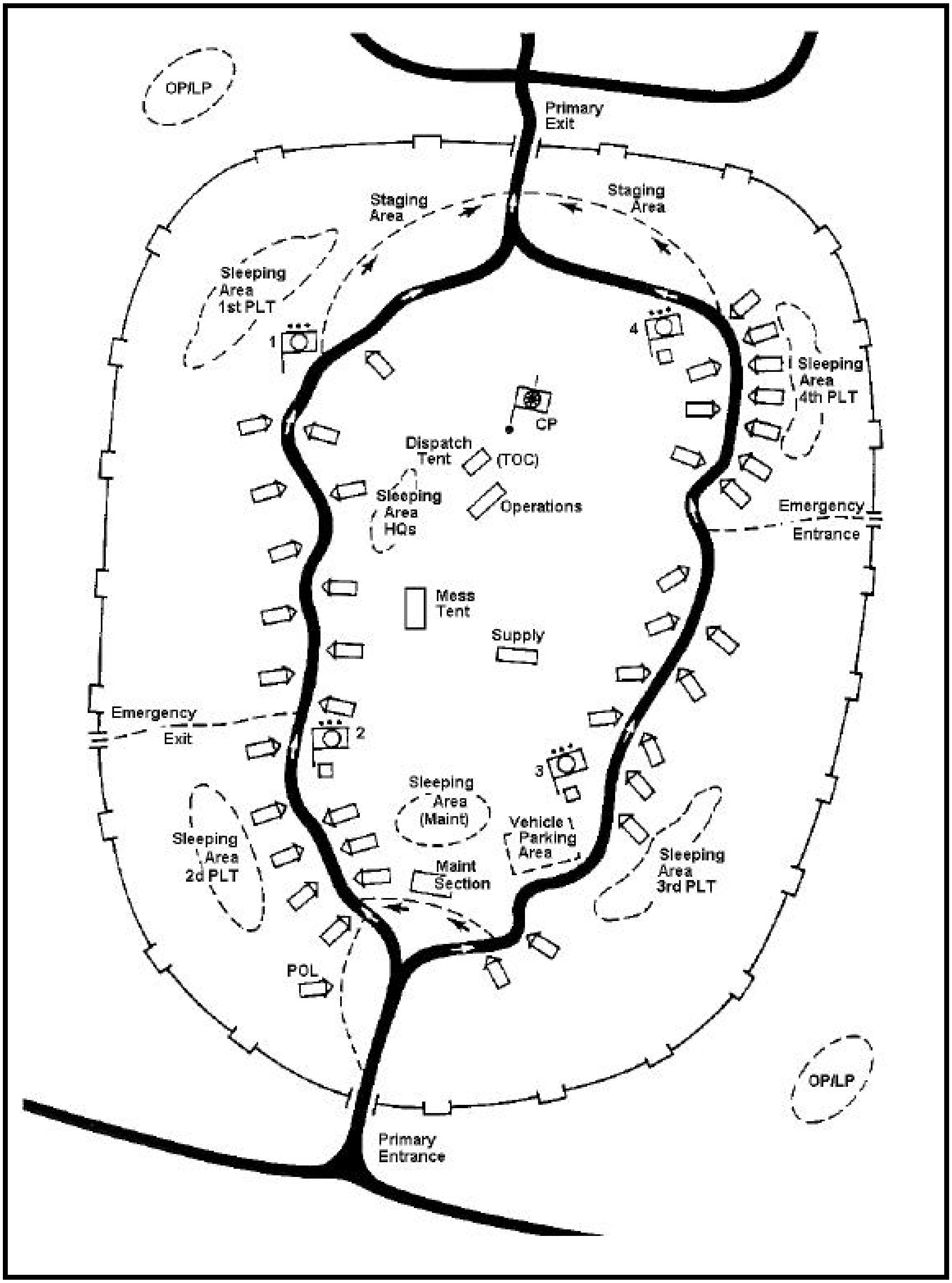


Figure 8-1. A typical operations area

a. **Reconnaissance Party**. At a minimum, the unit commander will make a map reconnaissance before occupying an unfamiliar area. After this, he sends out a leader's reconnaissance party to select the best location. The primary purpose of reconnaissance and selection of routes and sites is to facilitate orderly, rapid, and safe movement to, and emplacement at, the designated position.

b. **Composition and Size of the Reconnaissance Party**. The composition of the reconnaissance party is governed by METT-T. The company commander will decide the size or deviate if the size is per unit SOP. The reconnaissance party usually consists of a lieutenant (if available), assistant truckmaster, and a security team. The reconnaissance party determines the acceptability of proposed sites and makes recommendations to the commander. Site acceptability is based on--

- *Defendability*. Is the site defendable?
- *Size*. Is the site large enough to accommodate unit vehicles and equipment?
- *Roads*. Is there a suitable internal road network?

To be entirely suitable the site should also have the following:

- A firm, well-drained surface for maintaining and dispersing vehicles.
- A minimum of one entrance and exit.
- Natural cover and concealment.

NOTE: The RSOP OIC must ensure that the composition and drainage of the ground surface will support unit equipment. He must consider the effect of weather on the surface firmness for the site and its access routes.

Based upon reconnaissance party findings, the unit commander selects the most favorable site. The next step is to prepare the area for occupation.

c. **Composition and Size of the Advance Party**. The company commander organizes an advance party to occupy and prepare the site. The advance party typically consists of the first sergeant, assistant truckmaster, platoon representatives, NBC NCO, mess personnel, a senior wheeled vehicle repairman, a wireman, and added troops for labor and security. Troops assigned to the advance party are split up and assigned specific tasks. The makeup and size of the advance party is governed by the--

- Tactical situation.
- Amount of work required to prepare the site for occupation.

d. **Advance Party Activities**. The first task of the advance party is to clear and secure the site. Troops divide into fire teams. They search the area for mines, booby traps, intelligence information, and other signs of enemy activity. Once the teams have cleared the area, a light security screen is set up around the site. Observation posts and strong points along likely avenues of approach are established to ensure early warning and limited protection.

Tentative locations of the company and platoon command posts are identified and provision made for wire communications. Platoon and maintenance section areas are selected and marked. Roads and trails that allow for two-way traffic are selected. Alternate exits are selected and marked to allow emergency departure if the main exit becomes blocked. Individual parking areas are selected, keeping in mind the heaviest, most awkward vehicles such as tractors and trailers. Platoon representatives thoroughly reconnoiter their assigned area.

As the main body of the company arrives, vehicles rapidly clear the approach route and are guided into the site and parked. Drivers quickly tone down their vehicles by covering reflective surfaces. They then take up a hasty position on the perimeter and wait to be assigned a fighting position.

8-6. RECONNAISSANCE, SELECTION, OCCUPATION PARTY METHOD. The RSOP performs all functions required to successfully occupy a site. It is directed by an OIC and/or NCOIC, and its mission is accomplished by teams that carry out specialized activities.

a. **Reconnaissance and Selection of Routes and Sites**. The primary purpose of reconnaissance and selection of routes and sites is to facilitate orderly, rapid, and safe movement to, and emplacement at, the designated position. The RSOP performs its function by reconnoitering and selecting primary and alternate access routes (if not already dictated) and sites for unit equipment and facilities within the position.

b. **Organization and Equipment**. The unit SOP generally establishes RSOP organization and equipment. Changes are made by the company commander as needed and IAW the tactical situation.

c. **Officer in Charge**. The OIC has overall responsibility for the RSOP. He ensures that the party is properly briefed. He verifies the acceptability of the new position and is responsible for its detailed layout. The OIC is normally a commissioned officer but may be a senior NCO.

d. **Noncommissioned Officer in Charge**. The NCOIC assists the OIC. He ensures that the new position is properly cleared of mines and secured prior to entry by the main RSOP element. The NCOIC ensures that RSOP members have local security, that they conduct a chemical and radiological survey, and that the parent unit is notified as to the acceptability of the new site.

e. **Teams**. The size of the RSOP is METT-T dependent. The tactical situation determines the number and types of teams necessary to clear and secure an area. Individuals may be on more than one team, and some teams may have concurrent activity. Teams should be proficient in operating the equipment necessary to perform their function. At a minimum, the following teams should be established:

- *Security team*. Until the area has been cleared and a light security screen established, everyone is a member of this team. The light security screen may be in the form of strong points placed in the four cardinal directions or along likely avenues of approach, with one acting as the dismount point. If needed, roving patrols may augment the light security screen and act as a quick reactionary force.
- *NBC team*. If the tactical situation warrants, this team emplaces the M8 chemical alarms and conducts M256 kit readings. If the situation does not warrant, these personnel assist other teams in preparing the site.
- *Minesweeping team*. If the tactical situation warrants, this team operates the mine detector as part of the initial clearing of the area or when areas within the tentative perimeter are

suspected of being mined. If the situation does not warrant, these personnel assist other teams in preparing the site.

- *Ground guides*. This team assists in a smooth initial occupation. One ground guide per subelement is designated to meet that element at the dismount point upon arrival. Prior to the arrival of the main body, these personnel assist the OIC and other teams with the layout of the site.

f. **Equipment**. The RSOP must have equipment sufficient to successfully accomplish the reconnaissance, layout, and security of the new position. The RSOP normally requires the following:

- Truck, cargo, 2 1/2- or 5-ton, 6 x 6.
- Truck, utility with radio set, AN/VRC-46.
- Detecting set, mine, portable, metallic and nonmetallic.
- Alarm, chemical agent, automatic, portable, M8.
- Radiacmeter, IN-174/PD.
- Telephone set, TA-312/PT or cable, telephone, WD-1.
- Marking stakes.
- Maps of area of operations.
- Binoculars and night vision goggles, PVS-7.
- Camouflage screen system.
- Machine gun, 7.62-millimeter with tripod.
- Sufficient water, rations, and POL for 24 hours.

g. **Reconnaissance**. The RSOP OIC conducts at least three types of reconnaissance per mission: map, route, and site.

(1) ***Map reconnaissance***. The OIC conducts a map reconnaissance upon receipt of the MWO. At a minimum, the OIC looks for the following:

- Primary route (if not dictated from higher).
- Alternate route.
- New location.
- Overhead clearances.
- Bridge classification.
- Route trafficability.
- Roadway width.
- Harbor/hide areas along the primary and secondary routes.
- Proximity to built-up areas.

(2) ***Route reconnaissance***. The route reconnaissance is conducted en route to the new position. Based on the above considerations, the OIC determines if the route is acceptable. The RSOP also ensures that the designated harbor/hide area is adequate. A harbor/hide area is off the MSR, large enough for the entire main body, has adequate cover and concealment, and is defendable for short periods. It is about halfway between the old and new sites, terrain permitting.

All RSOP personnel dismount upon reaching the access road that leads to the new position. All vehicles then disperse, herringbone style. The OIC notifies the unit of arrival. At least two soldiers stay to secure the vehicles and monitor the radio. The OIC or NCOIC gives them a five-point contingency plan that includes the following information:

- Who is going with the OIC/NCOIC.
- How long the OIC/NCOIC element will be gone.
- What to do if the OIC/NCOIC element does not return.
- What to do if another element becomes engaged.
- What to do if they become engaged.

If the tactical situation warrants, two security team members use the mine detector to clear the access road, and two personnel conduct a radiological and chemical survey. The entire team then moves tactically to the new site looking for signs of enemy activity. Upon reaching the new site, the RSOP OIC/NCOIC places a two-man team at what they believe to be the 6 o'clock position; this becomes the dismount point. The technique used by the RSOP to clear the area must be tactically sound. Upon reaching what the OIC/NCOIC believes to be the farthest position, another two-man team is left to act as a LP/OP or strong point. This team should also have a five-point contingency plan. Personnel permitting, the OIC/NCOIC may elect to leave more two-man teams along likely avenues of approach. They may also augment the LP/OP or strong points with roving patrols while laying out the site and waiting for the main body. RSOP vehicles do not enter the area until it has been secured. The position is secured as covertly as possible.

If the RSOP encounters enemy forces en route to or at the new location, it does not become decisively engaged but immediately breaks contact. When contact is broken, the OIC advises the commander of the situation. The commander then issues a FRAGO directing movement to the alternate position (if one is given) or to the harbor/hide area. If chemical or radiological contamination is present, the RSOP must move to the harbor/hide area, notify the commander, and request decontamination, if necessary.

(3) ***Site reconnaissance***. The third type of reconnaissance is the site reconnaissance. It is conducted IAW arrival at and clearance of the site. Site reconnaissance determines if the site will be selected. The OIC considers many requirements and factors in determining the acceptability of the tentative position. Once the OIC determines that the position is suitable, he informs the parent unit over FM radio. If the site is unacceptable, the OIC reconnoiters alternate locations. He may have authority to reconnoiter positions within a given distance to find a suitable location. The OIC uses the following criteria to determine site acceptability:

- Is it defendable?
- Is it large enough to accommodate unit vehicles and equipment?
- Is the internal road network sufficient?
- Does it have a firm, well-drained surface for maintenance and dispersion of vehicles?
- Does it have a minimum of one entrance and exit?
- Does it have natural cover and concealment?

NOTE: The RSOP OIC must ensure that the composition and drainage of the ground surface will support unit equipment. He must consider the effect of weather on the surface firmness for the site and its access routes.

h. **Laying Out the Position**. The RSOP OIC lays out the position. Selected positions are the best available for fields of fire, communications, accessibility, and survivability. Specific considerations for position layout include: command post, maintenance area, fuel tanker/tank and pump unit, troop area, mess facilities, latrines, and ammunition storage.

(1) ***Command post***. The CP is centrally located within the perimeter where it can exercise control over the company, remain well defended, and have lines of communication with subelements.

(2) ***Maintenance area***. The selection of the maintenance location depends on its accessibility to entry and exit routes. The area is located within the perimeter near the entrance. The maintenance area should have an entrance and exit within the perimeter.

(3) ***Fuel tanker/tank and pump unit***. The fuel tanker/TPU is located as near as possible to the primary entrance, inside the perimeter, so returning vehicles can be topped off.

(4) ***Troop area***. Personnel are permitted to sleep only in designated areas. Vehicles are not permitted to move without ground guides in areas where troops are sleeping.

(5) ***Mess facilities***. Special attention is given to the selection of the mess area. It should be centrally located within the perimeter, away from interior roads to avoid contamination of the food by dust. The mess area should be at least 100 yards (90 meters) from the latrines. The serving line, or lines, are marked with engineer tape and located to take advantage of available cover and concealment. Serving lines are planned so that a 5-yard (4.5-meter) interval is maintained between personnel under tactical conditions.

(6) ***Latrines***. Latrines are located on the downwind side of the operations area at least 100 yards (90 meters) from the water supply. Latrines should be able to accommodate at least 8 percent of the unit at a time. Hand-washing facilities should be located near the exits.

(7) ***Ammunition storage***. The basic load of ammunition is removed from transporting vehicles as soon as possible. It must be protected by sandbags or earth revetments and located near the supply tent.

i. **Plan the Occupation and Prepare Positions for Occupation**. After the RSOP OIC determines the layout of the new site, he ensures that all ground guides know exactly where they are to go and where equipment is to be placed. Preparations also include marking the location of major subelements of the unit. Everyone in the RSOP is updated on the challenge and password, changes to the original order or deviations to the SOP, and approximate arrival time of the main body and order of march.

j. **Occupy, Organize, and Improve Positions**. The unit is extremely vulnerable during the initial occupation. When the main body arrives at the new field location, a ground guide meets each major subelement and leads it to its location. All vehicles are moved off the MSR and access road into the position area as quickly as possible; maintaining intervals if possible.

Once the main body arrives, the unit focuses all its efforts on rapidly establishing a defensive perimeter, maintaining communications to higher headquarters while establishing internal communications, and reestablishing operations. Work priorities are established and unit personnel are given specific tasks.

8-7. MOVING THE COMPANY. A unit begins preparations to clear an area as soon as it receives the MWO. The sequence used to clear may vary based on the situation. However, the initial focus is on nonmission-essential equipment. Perimeter security must not be compromised in the preparation for movement.

a. **Vehicles on Dispatch**. The unit develops a plan and procedures to contact the driver on dispatch to regain positive control of the drivers as quickly as possible. Unless the unit is released from its mission during movement, the unit is prepared to continue support.

b. **Loading**. All nonmission-essential equipment, to include individual clothing and equipment, is loaded first. Vehicles are loaded so as to prepare for unloading at the new site. In other words, equipment needed first at the new site is either loaded last or is readily accessible. All loads are secured to prevent damage en route.

c. **Maintenance Section**. All nonoperational vehicles are planned for in the unit movement plan. Evacuation of nonoperational vehicles is accomplished as soon as the situation permits; if possible, prior to moving the main body.

d. **March Order**. When the unit's reconnaissance party or RSOP radios that the tentative site is acceptable, units with various types of vehicles determine the order of march. This prevents congestion on arrival at the new site.

e. **Final Inspection**. Once the main body is ready to depart, a police call of the entire area is conducted. This inspection ensures that no equipment has been overlooked. FM 21-10 contains detailed instructions on how to make and close garbage sumps and latrines.

8-8. OPERATING IN AN URBAN ENVIRONMENT. Truck companies may be required to operate from urban areas. The basic principles of occupying an area remain, but with significant differences. These differences include: camouflaging vehicles and equipment, establishing a defensive perimeter, and controlling civilians.

a. **Unit Operations Areas**. Unit operations areas in urban terrain function much as they do in rural terrain. In both cases, the operations area must contain a minimum of two entrance/exit routes, sufficient parking areas for tactical dispersion, camouflage of vehicles and equipment, and a maintenance area. Normal unit security measures must be modified for the urban operations environment. Factors include the nature of the terrain and the possible presence of civilians.

b. **Terrain Types**. Urban terrain types are categorized roughly by size of area, type and arrangement of buildings, and population. The five major urban terrain types--large cities, small cities and towns, villages, residential areas, and strip areas--are defined as follows:

(1) ***Large cities***. Large cities usually have multistory buildings with wide streets laid out in a fairly regular pattern. The populations are large, numbering into the hundreds of thousands, and vegetation is limited. Whenever possible, avoid using cities as operations areas. Indirect fire or air strikes can easily block streets with rubble. This prevents transportation units from moving through or out of the area. Units required to operate large cities should locate near the edge, close to the industrial section. Industrial sections have large factories, warehouse buildings, and parking lots that are well-suited to transportation units. Road networks in these areas are usually in good condition.

(2) ***Small cities and towns***. Small cities and towns are by far the most numerous of urban terrains available to support transportation units. They generally have good road networks. Most have an adequate number of paved vehicle parking areas and large buildings for concealment. However, some of the roads may be narrow and laid out in an irregular pattern, restricting movement.

(3) ***Villages***. More plentiful than towns or small cities, villages consist of a combination of closely positioned residential houses and small family farms. Few have areas or buildings large enough to be used by transport units.

(4) ***Residental areas***. As a rule, residential areas do not afford good positions for concealing large task vehicles and equipment. Residential buildings are usually arranged in a regular pattern with straight streets. Scattered trees and low vegetation also make it difficult to camouflage equipment.

(5) ***Strip areas***. Strip areas consist of commercial or residential buildings. They are often found along highway routes connecting two cities or between towns and cities. Strip areas lack depth. Most of the buildings are one or two stories high and too small to conceal vehicles inside. Such areas generally allow for early detection of enemy forces; assisting in designing and maintaining perimeter security. The road network and design allows for the easy movement of vehicles.

c. **Operational Considerations**. With a few modifications, the procedures for setting up an operations area in urban terrain are similar to those used in rural terrain. Transportation units are usually not alone in an urban environment. At a minimum, civilians will also remain in the area. The fact that civilians are in the area must be considered when planning and executing mission support. Close coordination with collocated units in the base or base cluster is essential to prevent breeches of security.

d. **Billeting**. The physical layout of urban terrain allows for billeting soldiers and concealing vehicles without using tents or camouflage screening systems. The decision to pool or disperse is METT-T dependent. Billets must give adequate protection. All billets should be either in the basement or higher than the second floor to protect troops from aerial or artillery attacks. Cover windows with chicken wire to prevent entry by grenades or other items. Tape the windows to protect against shattering glass.

e. **Vehicles**. The best method of camouflaging vehicles and pieces of equipment is to hide them inside buildings. If building contents must be moved outside to make way for unit vehicles and equipment, ensure that the contents fit the surroundings and do not draw undue attention. Whenever possible, do not move equipment found inside to the outside. Do not permit soldiers to run vehicle engines inside buildings without adequate ventilation.

f. **Observation Posts**. Buildings that offer good views of the likely avenues of approach are ideal OPs. A secondary responsibility is the monitoring of overhead airspace for hostile aircraft.

g. **Security**. Operating in urban terrain and in close proximity of local civilians increases the possibility of security compromise. The degree of security depends on the available security resources, type of urban terrain, and extent of terrain occupied. Security precautions must be taken against the use of sewers or interconnected cellars by infiltrators or saboteurs. Commanders should use MPs or HN police when possible to augment unit internal security.

h. **Command Post**. The company CP should be centrally located inside the perimeter. The building should be well-constructed and large enough to accommodate the quick reaction force/reserve force during periods of increased security. Take all measures to conceal the CP position. Vehicles should be kept away from the CP. Radio antennas should be removed and concealed.

i. **Defense**. The defense of the urban operations area perimeter should be organized for both ground and air threat. Locate and construct fighting positions IAW FM 90-10-1. The best defense of an urban operations area is concealment. Truck units should only fight defensively and not become decisively engaged with air or ground forces.

j. **Urban Power Source**. Use the electrical power from the area if operational. However, generators should be prepared and wire already run as a backup source.

k. **Mess Operations**. The dining facility should be positioned centrally, but not next to the CP. Consider using existing civilian mess facilities if available. Also consider putting the MKT inside a building and operating from that location.

CHAPTER 9

PREVENTIVE MAINTENANCE

The primary mission of motor transport companies is to support combat units engaged in winning the battle. Deadlined equipment is not conducive to the accomplishment of this mission. While limited repairs and higher echelon maintenance are expected, problems can be greatly reduced by properly operating and caring for the equipment. Other measures include conducting timely preventive maintenance, supervising preventive maintenance, and promoting competition to realize maintenance standards and reward achievement.

This chapter discusses preventive maintenance responsibilities. It should be used as a guide for commanders, platoon leaders, vehicle and equipment operators, and other responsible personnel. Because preventive maintenance requires the use of POL and hazardous materials, SOPs must cover proper storage and disposal, spill response, and compliance with applicable environmental regulations

9-1. RESPONSIBILITIES. The object of preventive maintenance is to avert equipment failure by finding and fixing minor problems before major defects occur. The company commander is responsible for preventive maintenance on all organic equipment. Platoon leaders, aided by platoon sergeants and squad leaders, are responsible to the company commander for supervising preventive maintenance, providing technical advice and assistance to operators performing preventive maintenance, and reporting required repairs that are beyond the scope of preventive maintenance. The equipment operator is responsible for doing the required preventive maintenance on his equipment.

Where possible, all operators should be permanently assigned to their equipment. No one else should operate the equipment except in an emergency.

a. **Platoon Leader**. The platoon leader is the cornerstone of the total maintenance system. He is responsible to the company commander for user maintenance on all equipment in his platoon. This includes the platoon's weapons, tentage, protective masks, and communications equipment, as well as vehicles. His leadership ability and job performance greatly affect unit mission effectiveness.

It may be difficult for the platoon leader to establish a rigid maintenance schedule covering all his equipment. Maintenance depends largely on the needs of each piece of equipment.

The following guidelines can help the platoon leader with his maintenance responsibilities. These tips apply to all equipment:

- Clearly define what is expected from each platoon member.
- Explain what maintenance each member is responsible for.
- Delegate supervisory responsibility for preventive maintenance to the platoon sergeant and squad leaders.
- Establish high standards of maintenance and spot-check the equipment.
- Recognize special effort with incentive awards.

- Have the operator present during technical inspections.
- Have the platoon sergeant and squad leaders present during supervised maintenance periods.
- Ensure all operator maintenance is done before equipment goes in for unit-level maintenance.
- Have the operators assist mechanics during unit-level maintenance.
- Check areas of responsibility to ensure members of the platoon are doing their jobs.

b. **Operator**. Preventive maintenance performed by the operator is accomplished according to the -10 TM. It includes cleaning, inspecting, servicing, preserving, lubricating, adjusting, and spot-painting. It also includes making minor replacements that can be done with hand tools in the BILI for the equipment. These services are generally done IAW the following schedule:

- Before-operations service includes checks and services done at the start of each day's operation, IAW the -10 TM for the vehicle. This ensures that the equipment is operational and safe and has not been damaged since the last service.
- During-operations service includes checks and services done during vehicle operations. The operator observes the gauges and listens for unusual noises. He looks for malfunctions and, if possible, corrects them. He reports on return faults he cannot correct. If continued operation would damage the equipment or cause personal injury, the vehicle should be shut off and recovered.
- After-operations service is usually done at the close of each day's operation. The operator should clean, refuel, and service the vehicle as needed and report any faults he cannot correct to the squad leader.
- Scheduled service includes most of the before- and after-operation services. Operator services, during-operations services, and certain other services are done less frequently. Weekly and monthly services are types of scheduled services.

9-2. MAINTENANCE CHECKLISTS AND REFERENCES. See Appendix T for a checklist to use as a general guide in inspecting semitrailers. More information may be found in the following references:

- *Operator's manual*. The operator’s manual (-10 TM) for the specific piece of equipment is the primary guide to use in preventive maintenance. This manual gives information needed to find and fix problems discovered during preventive maintenance checks or equipment operation. It lists possible problems, explains what may cause them, and suggests how to correct them. Problems not covered in the -10 TM should be reported to unit maintenance.
- *DA Pamphlet 738-750*. This publication contains detailed information on the forms and records used to document maintenance services.

CHAPTER 10

LOADS AND LOADING OPERATIONS

To successfully support military operations, motor transport unit operating personnel must be trained in and be aware of the principles of vehicle loads and cargo loading. This chapter addresses these principles, with emphasis on shipper and receiver responsibilities, hazardous material, oversize and overweight loads, and methods of loading and unloading.

10-1. RESPONSIBILITIES OF UNIT PERSONNEL. All motor transport company personnel have some responsibility for vehicle loads and cargo loading. A discussion of individual responsibilities follows. For specific information on loading, see FM 55-15 or the applicable vehicle technical manual.

a. **Company Commander**. The company commander develops training plans for the unit. He ensures that company personnel are qualified to safely operate all equipment and are thoroughly trained in the principles of loading, securing, and transporting cargo. He also ensures that company training plans support individual driver skills, the required METL, and MOS training.

b. **Platoon Leader**. The platoon leader and platoon sergeant develop the platoon’s training plans based on their assessment of training needs. Plans include both individual and collective tasks. The platoon leader and platoon sergeant also implement company training plans and policies and ensure that squad leaders are qualified. They review driver testing and qualification records and observe driver training. They keep the commander informed of the platoon's level of training.

c. **Truckmaster**. The truckmaster maintains driver qualification records and ensures that personnel are properly trained before being licensed. He must be satisfied that training is conducted according to standard. For this reason, the truckmaster regularly observes driver training. Based on the type of equipment in the unit, he may incorporate load and loading criteria in testing. The truckmaster also screens commitments that involve unusual or hazardous loads and highlights them for the tasked platoon.

d. **Squad Leader**. The squad leader trains drivers to properly load and secure cargo on their vehicles. He ensures that operators know what they are carrying and that both drivers and vehicles are prepared to move the types of loads specified in taskings. The squad leader also supervises maintenance and ensures that vehicles meet operational standards.

e. **Driver**. The driver supervises the loading of his vehicle and ensures that his cargo is properly loaded and secured against movement. He further ensures that the load is balanced and does not exceed the vehicle capacity as noted on the data plate. He uses the vehicle tarpaulin to protect the load from the weather and pilferage. Once the driver accepts the load from the shipper, he alone is responsible for its safe delivery. The driver should not accept an unsafe load and must resolve any dispute before moving.

10-2. SHIPPER'S RESPONSIBILITIES. Unless the vehicle has an onboard loading system such as a crane or PLS, the shipper normally loads the vehicle. The shipper provides all tie-down devices, dunnage, blocking and bracing materials, and special tools required to secure the load. An exception is loading containers on semitrailers equipped with locking devices. The shipper also prepares shipping documents such as the TCMD.

10-3. CARGO CHARACTERISTICS. The shipper's request for transportation identifies the characteristics of the cargo--its description, dimensions, and weight. This data is used by unit operations personnel to plan the number and types of vehicles needed to support the movement and tells drivers what they need to prepare for the movement (such as the requirement for a tarpaulin, placards, protective clothing, and fire extinguishers). If transporting hazardous material, this information alerts drivers to prepare vehicles for certain inspections and to seek guidance on loading techniques from squad leaders, platoon sergeants, or truckmasters.

a. **Cargo Area**. The vehicle cargo area is measured in cubic feet. (To calculate cubic feet, take the length times width times height.) Cargo dimensions should not exceed the dimensions of the vehicle. An exception is made for certain outsize loads where there is an overhang from the sides or tail end. To make efficient use of assets, transportation units should try to maximize the weight and cube of vehicles and send only the number of vehicles that can safely carry the load. Theoretically, a perfect cargo load is one that exactly matches the cubic measurement of the vehicle's cargo area and its allowable weight. For example, if the maximum payload capacity of an M923 5-ton cargo truck traveling on a highway was fully used, the load (piled no higher than the side racks) would occupy about 550 cubic feet (15.40 cubic meters) and weigh 20,000 pounds. These conditions are seldom met. The weight, bulk, shape, and compatibility of the cargo, along with road conditions, affect how the vehicle will be loaded.

b. **Weight**. When loading dense cargo such as ammunition or machinery, the vehicle weight limit may be reached before the cargo space is filled. In other words, it may weigh out before it cubes out. In such cases, the load must be blocked and braced to prevent shifting. With most military cargo loads, however, the vehicle will cube out before it weighs out.

The weight of most military cargo is usually stenciled on the package and noted on the transportation request. The total shipment weight equals the sum of the individual package weights. If the weight is not stenciled on the cargo, the driver should ask the shipper to weigh it before loading. If this is not feasible, the driver should try to have the vehicle weighed after loading. This will ensure that the vehicle is not overloaded.

When these options are not possible, the driver should require the shipper to provide an estimated weight and annotate the estimated weight on the shipping document. If the driver has doubts about the vehicle's ability to transport the load safely, he should not accept the load.

c. **Cargo Compatibility**. Shippers are required to identify commodities that should not be shipped together on the same vehicle. If there is any doubt and before the driver transports the cargo, shippers should consult appropriate references for guidance. For shipments within CONUS, use 49 CFR, Part 177. When operating overseas, rules of the host country apply. The rules of each country transited, as well as international agreements, govern international shipments of hazardous cargo by highway. If the driver has any doubt about the safety of the load, he should contact the nearest transportation officer, movement control team, or his unit.

10-4. ROAD CONDITIONS. Every road can be classified based on its construction. Engineers normally classify roads. Classification includes bridges, tunnels, and other features that limit width, height, or weight. The payload capacity of a vehicle may be too high for existing roads or bridges. Light surface, loose surface, or fair weather roads may not bear the weight of a fully loaded vehicle. Accordingly, a driver must be familiar with the road he will travel and how its condition affects the allowable payload. For example, an unimproved mountainous road dictates a reduced load compared to a flat hard-surfaced highway. The nature of the road surface may also affect the amount of blocking and bracing needed to secure the load.

10-5. LOADING PROCEDURES. Proper loading procedures are essential to safe operations. They also support successful mission accomplishment by ensuring operational economy and efficiency. Truck unit capability is specified by TOE. See FM 55-15 for vehicle and equipment planning factors and AR 385-55 for more information on requirements for transporting passengers in tactical vehicles.

a. **Improper Loading Practices**. Underloading and overloading are improper loading practices. Though underloading does not affect vehicle operation or safety, it does affect operational efficiency. Underloading requires more vehicles than necessary to do the job. It wastes vehicles and personnel and causes unnecessary expenditures of fuel and lubricants. It also creates added highway regulation and traffic control problems that can affect all highway movements in the area. Vehicle overloading is a serious concern because it can damage the vehicle and is unsafe. Drivers should not accept loads that are greater than the authorized payload.

b. **Loading Cargo**. The amount of cargo that can be loaded lengthwise into a truck varies by truck size and model. The length and width of cargo trucks and semitrailer bodies is listed in TB 55-46-1. If it is necessary for pipes, lumber, or other cargo to hang over the front and rear of the vehicle, the cargo must be blocked to keep the weight off the tailgate. A red flag must also be placed at each end of the load in the daytime (a red light at night) to warn other motorists that the vehicle needs added road space. The amount of overhang allowed varies from state to state and country to country. Units must know local traffic rules. The following are general rules for loading cargo:

- Place heavy items on the bottom and lighter cargo on top.
- Distribute heavy cargo as evenly as possible over the bed to maintain a safe weight distribution.
- Block and brace cargo with lumber or other materials to keep the load from shifting or falling off the vehicle while en route.
- Keep the load as low as possible. A high load may make the vehicle difficult to control and may cause it to overturn.
- Fill the cargo space of the vehicle to the maximum weight allowable.
- For multistop loads, separate cargo by destination for easy offloading.
- If possible, load items of uniform size and weight together (this simplifies lashing, blocking, and distributing cargo).
- Load drums and barrels either upright or on their sides. If loaded on their sides, their length should be parallel to the sides of the truck (Figure 10-1, page 10-4).

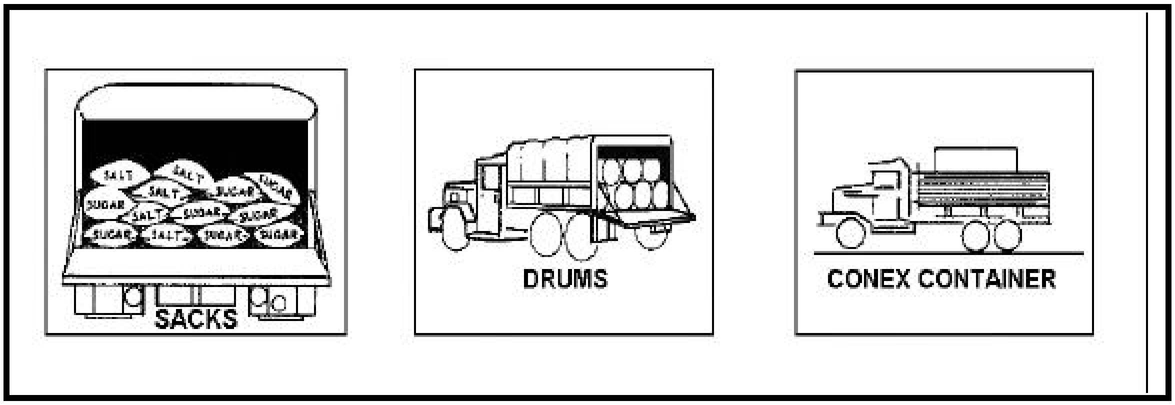


Figure 10-1. Cargo loading methods

c. **Troops and Their Equipment**. Certain vehicles designed for cargo may also carry troops and EPWs. The number of troops varies with the size of the truck and duration of the trip. Only authorized individuals may ride in military vehicles. Passengers must stay seated with all parts of their bodies inside the truck. Ventilation must protect them from exhaust gases. They should mount or dismount only after the driver or assistant driver has lowered the tailgate and disconnected the safety strap. If the tactical situation permits, a tarpaulin should be used to protect troops from the weather.

To prevent injury during loading or unloading, a soldier should not mount or dismount the vehicle with his weapon. He should pass it to someone already on board or to the person behind waiting to mount. Each soldier takes back his weapon once on board. Likewise, a soldier should not mount or dismount the vehicle with his truck sack or duffel bag on his back. Once on board, he should stack it on the bed of the truck or under the seats. The number of truck sacks or duffel bags that accompany soldiers will reduce the number of troops that can be loaded on each vehicle. However, loading them with the soldiers also reduces the chance of lost equipment.

Individual equipment not needed on the march may be loaded in separate trucks or trailers. This practice relieves soldiers of added responsibility and is less fatiguing. It also ensures that, if the enemy attacks, soldiers will not be burdened with nonessential equipment. Passengers and cargo are never hauled on the same vehicle.

10-6. TRANSPORTING HAZARDOUS MATERIAL. Hazardous material is a material or substance capable of posing an unreasonable risk to health, safety, and property when transported, as determined by the Secretary of Transportation. Hazardous materials are designated in 49 CFR and include the following:

- Explosives.
- Flammable liquids.
- Flammable solids.
- Oxidizing materials.
- Corrosive liquids.
- Compressed gases.

- Poisons.
- Radioactive material.
- Chemical agents.
- Ammunition.

Trucks hauling passengers will be separated from any vehicle hauling hazardous cargo by at least one buffer vehicle hauling general cargo.

a. **References**. In CONUS, Army vehicles carrying special loads must comply with 49 CFR and AR 190-11. When operating overseas, local regulations and policies apply. For detailed instructions on hauling AA&E, refer to AR 190-11 and AR 55-355. For information on transporting radioactive materials, see AR 385-11 and TM 55-315. For information on transporting chemical agents, see AR 50-6 and TM 3-250. For information on transporting nuclear weapons and materials, see AR 700-65. For instructions on the handling and storage of hazardous material, see TM 38-410. The proper marking and placement of placards on vehicles carrying hazardous cargo is covered by 49 CFR within CONUS (see 49 CFR, Parts 100-199, or FM 55-15, Appendix E) or by overseas regulations.

b. **Shipper Responsibilities**. Any shipper who offers a hazardous material for transportation must describe the hazardous material on the shipping documents. The driver of a motor vehicle containing hazardous material must ensure that the shipping document is readily available in the event of an accident or inspection.

At origin, the shipper must inspect vehicles before they are loaded with hazard Classes 1.1 through 1.3 ammunition, explosives, poisons, radioactive "Yellow III" material, and chemical agents. The shipper uses DD Form 626 (Figure 10-2, pages 10-6 through 10-8). Each item on the form must be completed. The driver must correct all deficiencies before the vehicle is loaded.

c. **Receiver Responsibilities**. If the destination is a restricted area, the vehicle is inspected before unloading using the DD Form 626. A restricted area is any area to which entry is subject to special restrictions or control for security reasons or to safeguard property or material. An example is an ammunition supply point. Deficiencies must be corrected at the time of inspection if practicable and if necessary for safe delivery to the unloading point. If a correction is necessary but impracticable, proper action must be taken to ensure safe delivery of the shipment. This could include use of ground guides, reduced speed, or escort vehicles. Military shippers use DD Form 836 (Figure 10-3, pages 10-9 through 10-13) to instruct drivers transporting hazardous material. The form outlines precautions to take in event of fire, accident, or breakdown. The shipper or transportation officer can add information related to the specific movement. Drivers should get a copy of DD Form 836 from the shipper or ammunition supply point before departure. The driver should read the DD Form 836 before departure and ask questions if he does not understand it.

MOTOR VEHICLE INSPECTION (TRANSPORTING HAZARDOUS MATERIALS)

(Read instructions before completing this form.)

This form applies to Class 1.1, 1.2, 1.3; Inhalation Hazard Poisons and Radioactive Label III Hazardous Material.	1. GOVERNMENT BILL OF LADING/ TCR NUMBER

SECTION 1 - DOCUMENTATION	ORIGIN a.	DESTINATION b.
2. CARRIER/GOVERNMENT ORGANIZATION		
3. DATE OF INSPECTION		
4. TIME OF INSPECTION		
5. LOCATION OF INSPECTION		
6. OPERATOR(S) NAME(S)		
7. OPERATOR(S) LICENSE NUMBER(S)		
8. MEDICAL EXAMINER'S CERTIFICATE*		

9. *(X if satisfactory at origin)*				10. CVSA DECAL DISPLAYED ON COMMERCIAL EQUIPMENT*	YES	NO
a. MILITARY HAZ/MAT CERTIFICATION		d. ERG OR EQUIVALENT				
b. VALID LEASE*		e. DRIVER'S VEHICLE INSPECTION REPORT*		a. TRUCK/TRACTOR		
c. ROUTE PLAN		f. COPY OF 49 CFR PART 397		b. TRAILER		

SECTION II - MECHANICAL INSPECTION

All items shall be checked on empty equipment prior to loading. Items with an asterisk shall be checked on all incoming loaded equipment.

11. TYPE OF VEHICLE(S)	12. VEHICLE NUMBER(S)

13. PART INSPECTED *(X as applicable)*	ORIGIN (1)		DESTINATION (2)			ORIGIN (1)		DESTINATION (2)		COMMENTS (3)
	SAT	UNSAT	SAT	UNSAT		SAT	UNSAT	SAT	UNSAT	
a. SPARE ELECTRICAL FUSES					k. EXHAUST SYSTEM					
b. HORN OPERATIVE					l. BRAKE SYSTEM*					
c. STEERING SYSTEM					m. SUSPENSION					
d. WINDSHIELD/WIPERS					n. COUPLING DEVICES					
e. MIRRORS					o. CARGO SPACE					
f. WARNING EQUIPMENT					p. LANDING GEAR*					
g. FIRE EXTINGUISHER*					q. TIRES, WHEELS, RIMS					
h. ELECTRICAL WIRING*					r. TAILGATE/DOORS*					
i. LIGHTS AND REFLECTORS					s. TARPAULIN*					
j. FUEL SYSTEM*					t. OTHER *(Specify)*					

14. INSPECTION RESULTS *(X one)* ACCEPTED ☐ REJECTED ☐

(If rejected give reason under "Remarks". Equipment will be approved if deficiencies are corrected prior to loading.)

15. REMARKS

16. INSPECTOR SIGNATURE *(Origin)*	17. INSPECTOR SIGNATURE *(Destination)*

SECTION III - POST LOADING INSPECTION

This section applies to Commercial and Government/Military vehicles. All items will be checked prior to release of loaded equipment and shall be checked on all incoming loaded equipment.	ORIGIN (1)		DESTINATION (2)		COMMENTS (3)
	SAT	UNSAT	SAT	UNSAT	
18. LOADED IAW APPLICABLE SEGREGATION/COMPATIBILITY TABLE OF 49 CFR					
19. LOAD PROPERLY SECURED TO PREVENT MOVEMENT					
20. SEALS APPLIED TO CLOSED VEHICLE; TARPAULIN APPLIED ON OPEN EQUIPMENT					
21. PROPER PLACARDS APPLIED					
22. SHIPPING PAPERS/DD FORM 836 FOR GOVERNMENT VEHICLE SHIPMENTS					
23. COPY OF DD FORM 626 FOR DRIVER					
24. SHIPPED UNDER DOT EXEMPTION 868					

25. INSPECTOR SIGNATURE *(Origin)*	26. DRIVER(S) SIGNATURE *(Origin)*
27. INSPECTOR SIGNATURE *(Destination)*	28. DRIVER(S) SIGNATURE *(Destination)*

DD FORM 626, OCT 95 PREVIOUS EDITION IS OBSOLETE. Page 1 of 3 Pages

Figure 10-2. DD Form 626

INSTRUCTIONS

SECTION I - DOCUMENTATION

General Instructions.

All items (2 through 10) will be checked at origin prior to loading. Items with an asterisk (*) apply to commercial operators or equipment only. Only Items 2 through 8 are required to be checked at destination.

Items 1 through 6. Self explanatory.

Item 7. Enter operator's Commercial Driver's License (CDL) number or Military License Number. CDL must have Hazardous Materials Endorsement.

Item 8. *Enter the expiration date listed on the Medical Examiner's Certificate.

Item 9.a. APPLIES TO MILITARY OPERATORS ONLY. Military Hazardous Materials Certification. In accordance with applicable service regulations, ensure operator has been certified to transport hazardous materials.

b. *Valid Lease. Shipper will ensure a copy of the appropriate contract of lease is carried in all leased vehicles and is available for inspection. (Defense Traffic Management Regulation requirement.)

c. Route Plan. Prior to loading any Hazard Class/Division 1.1, 1.2, or 1.3 (Explosives) for shipment, ensure that the operator possesses a written route plan in accordance with 49 CFR Part 397. Route Plan requirements for Hazard Class 7 (Radioactive) materials are found in 49 CFR 177.825.

d. Emergency Response Guidebook (ERG) or Equivalent. Commercial operators must be in possession of an ERG or equivalent document. Shipper will provide applicable ERG page(s) to military operators.

e. *Driver's Vehicle Inspection Report. Review the operator's Vehicle Inspection Report. Ensure that there are no defects listed on the report that would affect the safe operation of the vehicle.

f. Copy of 49 CFR Part 397. Operators are required by regulation to have in their possession a copy of 49 CFR Part 397 (Hazardous Materials Driving and Parking Rules). If military operators do not possess this document, shipper may provide a copy to operator.

Item 10. *Commercial Vehicle Safety Alliance (CVSA) Decal. Check to see if equipment has a current CVSA decal and mark applicable box.

SECTION II - MECHANICAL INSPECTION

General Instructions.

All items (13.a. through 13.t.) will be checked on all incoming empty equipment prior to loading. All UNSATISFACTORY conditions must be corrected prior to loading. Items with an asterisk (*) shall be checked on all incoming loaded equipment. Unsatisfactory conditions that would affect the safe off-loading of the equipment must be corrected prior to unloading.

SECTION II *(Continued)*

Item 13.a. Spare Electrical Fuses. Check to ensure that at least one spare fuse for each type of installed fuse is carried on the vehicle as a spare or vehicle is equipped with an overload protection device (circuit breaker). (49 CFR 393.95)

b. Horn Operative. Ensure that horn is securely mounted and of sufficient volume to serve purpose. (49 CFR 393.81)

c. Steering System. The steering wheel shall be secure and must not have any spokes cracked through or missing. The steering column must be securely fastened. Universal joints shall not be worn, faulty or repaired by welding. The steering gear box shall not have loose or missing mounting bolts or cracks in the gear box mounting brackets. The pitman arm on the steering gear output shaft shall not be loose. Steering wheel shall turn freely through the limit of travel in both directions. All components of a power steering system must be in operating condition. No parts shall be loose or broken. Belts shall not be frayed, cracked or slipping. The power steering system shall not be leaking. (49 CFR 396 Appendix G)

d. Windshield/Wipers. Inspect to ensure that windshield is free from breaks, cracks or defects that would make operation of the vehicle unsafe; that the view of the driver is not obscured and that the windshield wipers are operational and wiper blades are in serviceable condition. Defroster must be operative when conditions require. (49 CFR 393.60, 393.78 and 393.79)

e. Mirrors. Every vehicle must be equipped with two rear vision mirrors located so as to reflect to the driver a view of the highway to the rear along both sides of the vehicle. Mirrors shall not be cracked or dirty. (49 CFR 393.80)

f. Warning Equipment. Equipment must include three bidirectional emergency reflective triangles that conform to the requirements of FMVSS No. 125. FLAME PRODUCING DEVICES ARE PROHIBITED. (49 CFR 393.95)

g. Fire Extinguisher. Military vehicles must be equipped with two serviceable fire extinguishers with an Underwriters Laboratories rating of 10 BC or more. (Commercial motor vehicles must be equipped with one serviceable 10 BC Fire Extinguisher). Fire extinguisher(s) must be located so that it is readily accessible for use and securely mounted on the vehicle. The fire extinguisher must be designed, constructed and maintained to permit visual determination of whether it is fully charged. (49 CFR 393.95)

h. Electrical Wiring: Electrical wiring must be clean and properly secured. Insulation must not be frayed, cracked or otherwise in poor condition. There shall be no uninsulated wires, improper splices or connections. Wires and electrical fixtures inside the cargo area must be protected from the lading. (49 CFR 393.28, 393.32, 393.33)

DD FORM 626, OCT 95 Page 2 of 3 Pages

Figure 10-2. DD Form 626 (continued)

INSTRUCTIONS

SECTION II *(Continued)*

i. Lights/Reflectors. (Head, tail, turn signal, brake, clearance, marker and identification lights, Emergency Flashers). Inspect to see that all lighting devices and reflectors required are operable, of proper color and properly mounted. Ensure that lights and reflectors are not obscured by dirt or grease or have broken lenses. High/Low beam switch must be operative. Emergency Flashers must be operative on both the front and rear of vehicle. (49 CFR 393)

j. Fuel System. Inspect fuel tank and lines to ensure that they are in serviceable condition, free from leaks, or evidence of leakage and securely mounted. Ensure that fuel tank filler cap is not missing. Examine cap for defective gasket or plugged vent. Inspect filler necks to see that they are in completely serviceable condition and not leaking at joints. (49 CFR 393.83 and 396 Appendix G)

k. Exhaust System. Exhaust system shall discharge to the atmosphere at a location to the rear of the cab or if the exhaust projects above the cab, at a location near the rear of the cab. Exhaust system shall not be leaking at a point forward of or directly below the driver compartment. No part of the exhaust system shall be located where it will burn, char or damage electrical wiring, fuel system or any other part of the vehicle. No part of the exhaust system shall be temporarily repaired with wrap or patches. (49 CFR 393.83 and 396 Appendix G)

l. Brake System (to include hand brakes, parking brakes and Low Air Warning devices). Check to ensure that brakes are operational and properly adjusted. Check for audible air leaks around air brake components and air lines. Check for fluid leaks, cracked or damaged lines in hydraulic brake systems. Ensure that parking brake is operational and properly adjusted. Low Air Warning devices must be operative. (49 CFR 396 Appendix G)

m. Suspension. Inspect for indications of misaligned, shifted or cracked springs, loosened shackles, missing bolts, spring hangers unsecured at frame and cracked or loose U-bolts. Inspect for any unsecured axle positioning parts, and sign or axle misalignment, broken torsion bar springs (if so equipped). (49 CFR 396 Appendix G)

n. Coupling Devices (Inspect without uncoupling). Fifth Wheel: Inspect for unsecured mounting to frame or any missing or damaged parts. Inspect for any visible space between upper and lower fifth wheel plates. Ensure that the locking jaws are around the shank and not the head of the kingpin. Ensure that the release lever is seated properly and safety latch is engaged. Pintle Hook, Drawbar, Towbar Eye and Tongue and Safety Devices: Inspect for unsecured mounting, cracks, missing or ineffective fasteners (welded repairs to pintle hook is prohibited). Ensure safety devices (chains, hooks, cables) are in serviceable condition and properly attached. (49 CFT 396 Appendix G)

o. Cargo Space. Inspect to ensure that cargo space is clean and free from exposed bolts, nuts, screws, nails or inwardly projecting parts that could damage the lading. Check floor to ensure it is tight and free from holes. Floor shall not be permeated with oil or other substances. (49 CFR 177.815(a)(1) and 398.94)

SECTION II *(Continued)*

p. Landing Gear. Inspect to ensure that landing gear and assembly are in serviceable condition, correctly assembled, adequately lubricated and properly mounted.

q. Tires, Wheels and Rims: Inspect to ensure that tires are properly inflated. Flat or leaking tires are unacceptable. Inspect tires for cuts, bruises, breaks and blisters. Tires with cuts that extend into the cord body are unacceptable. Thread depth shall not be less than: 4/32 inches for tires on a steering axle of a power unit, and 2/32 inches for all other tires. Mixing bias and radial on the steering axle is prohibited. Inspect wheels and rims for cracks, unseated locking rings, broken, loose, damaged or missing lug nuts or elongated stud holes. (49 CFR 396 Appendix G)

r. Tailgate/Doors. Inspect to see that all hinges are tight in body. Check for broken latches and safety chains. Doors must close securely. (49 CFR 177.835(h))

s. Tarpaulin. If shipment is made on open equipment, ensure that lading is properly covered with fire and water resistant tarpaulin. (49 CFR 177.835(h))

t. Other Unsatisfactory Condition. Note any other condition which would prohibit the vehicle from being loaded with hazardous materials.

SECTION III - POST LOADING INSPECTION

General Instructions.

All items will be checked prior to the release of loaded equipment. Shipment will not be released until deficiencies are corrected. All items will be checked on incoming loaded equipment. Deficiencies will be reported in accordance with applicable service regulations.

Item 18. Check to ensure shipment is loaded in accordance with 49 CFR Part 177.848 and the applicable Segregation or Compatibility Table of 49 CFR 177.848.

Item 19. Check to ensure the load is secured from movement in accordance with applicable service outload drawings.

Item 20. Check to ensure seal(s) have been applied to closed equipment; fire and water resistant tarpaulin applied on open equipment.

Item 21. Check to ensure each transport vehicle has been properly placarded in accordance with 49 CFR Part 172 Subpart F.

Item 22. Check to ensure operator has been provided shipping papers that comply with 49 CFR Part 172 Subpart C. For shipments transported by Government vehicle, shipping paper will be DD Form 836.

Item 23. Ensure operator(s) sign DD Form 626, are given a copy and understand the hazards associated with the shipment.

Item 24. Applies to Commercial Shipments Only. If shipment is made under DOT Exemption 868, ensure that shipping papers are properly annotated and copy of Exemption 868 is with shipping papers.

DD FORM 626, OCT 95 Page 3 of 3 Pages

Figure 10-2. DD Form 626 (continued)

SHIPPING PAPER AND EMERGENCY RESPONSE INFORMATION FOR HAZARDOUS MATERIALS TRANSPORTED BY GOVERNMENT VEHICLES

THIS VEHICLE IS TRANSPORTING HAZARDOUS MATERIALS

1. DATE PREPARED	2. DATE OF TRAVEL	PAGE OF PAGES

TO BE COMPLETED BY THE UNIT OR SHIPPER T.O. OFFICE. IF A CONTINUATION SHEET IS ATTACHED, X THIS BOX →

3. CARGO

PACKAGES		PROPER SHIPPING DESCRIPTION	TOTAL WEIGHT	NET EXPLOSIVE QUANTITY
NUMBER a.	KIND b.	c.	d.	e.

4. EMERGENCY NOTIFICATION. IN ALL CASES OF ACCIDENT, INCIDENT, BREAKDOWN OR FIRE, PROMPT NOTIFICATION MUST BE GIVEN TO *(List 24-hour telephone numbers)*:

a. SHIPPER	b. CONSIGNEE	c. ADDITIONAL NOTIFICATION

FOR SAFE HAVEN/REFUGE, IMMEDIATELY CALL APPROPRIATE MTMC AREA HOTLINE LISTED BELOW:

EASTERN UNITED STATES: 1-800-524-0331 WESTERN UNITED STATES: 1-800-435-4566

NEW JERSEY ONLY: 1-800-642-1381

24-HOUR EMERGENCY ASSISTANCE TELEPHONE NUMBERS:

DOD NON-EXPLOSIVE HAZARDOUS MATERIALS ONLY: 1-800-851-8061 TO CALL FROM A SHIP AT SEA USE: 804-279-3166	DOD HAZARD CLASS 1 (EXPLOSIVES) ONLY CALL ARMY OPERATIONS CENTER - COLLECT 703-697-0218/0219 ASK FOR THE WATCH OFFICER	NATIONAL RESPONSE CENTER (NRC) 1-800-424-8802 TO CALL FROM A SHIP AT SEA USE: 202-267-2675 DOD RADIOACTIVE MATERIAL ONLY - COLLECT: 309-782-3510 ASK FOR STAFF DUTY OFFICER

FOR EMERGENCY RESPONSE INFORMATION, SEE BACK OF THIS FORM.

5. REMARKS

6. CERTIFICATION

THIS IS TO CERTIFY THAT THE ABOVE NAMED MATERIALS ARE PROPERLY CLASSIFIED, DESCRIBED, PACKAGED, MARKED, AND LABELED, AND ARE IN PROPER CONDITION FOR TRANSPORTATION ACCORDING TO THE APPLICABLE REGULATIONS OF THE DEPARTMENT OF TRANSPORTATION.

a. SIGNATURE OF SHIPPER REPRESENTATIVE	b. SIGNATURE(S) OF VEHICLE OPERATOR(S)

DD FORM 836, JUL 96 PREVIOUS EDITION IS OBSOLETE.

Figure 10-3. DD Form 836

EMERGENCY RESPONSE INFORMATION

Guide Numbers 46 and 50 from the U.S. Department of Transportation Emergency Response Guide Book P 5800.6 are reproduced hereon. These guides are applicable to Hazard Class 1 Materials (Explosives).
Mark an X in the appropriate box:

☐ USE GUIDE 46 FOR EXPLOSIVES: (1.1), (1.2), (1.3), (1.5) AND (1.6)

☐ USE GUIDE 50 FOR EXPLOSIVES: (1.4)

For all other hazardous materials or substances, annotate appropriate Emergency Response Guide Book Guide Number in the block below, and attach a copy of the guide number page or pages.

GUIDE NUMBER(S):

GUIDE 46 (ERG 93)

POTENTIAL HAZARDS

FIRE OR EXPLOSION:
MAY EXPLODE AND THROW FRAGMENTS 1 MILE OR MORE IF FIRE REACHES CARGO.

HEALTH HAZARDS:
Fire may produce irritating or poisonous gases.

EMERGENCY ACTION

IF FIRE REACHES CARGO, DO NOT FIGHT FIRE.

IF YOU KNOW OR SUSPECT THAT HEAVILY-ENCASED EXPLOSIVES, SUCH AS BOMBS OR ARTILLERY PROJECTILES ARE INVOLVED, STOP ALL TRAFFIC AND BEGIN TO EVACUATE ALL PERSONS, INCLUDING EMERGENCY RESPONDERS, FROM THE AREA IN ALL DIRECTIONS FOR 5000 FEET (1 MILE) FOR RAIL CAR OR 4000 FEET (3/4 MILE) FOR TRACTOR/TRAILER.

WHEN HEAVILY-ENCASED EXPLOSIVES ARE NOT INVOLVED, EVACUATE THE AREA FOR 2500 FEET (1/2 MILE) IN ALL DIRECTIONS.

Positive pressure self-contained breathing apparatus (SCBA) and structural firefighters' protective clothing will provide limited protection.

CALL Emergency Response Telephone Number on Shipping paper FIRST. If Shipping Paper NOT AVAILABLE or NO ANSWER, CALL CHEMTREC AT 1-800-424-9300.

FIRE
Cargo Fires: DO NOT FIGHT FIRE WHEN IT REACHES CARGO. Withdraw from area and let fire burn.

Truck and Equipment Fires: Try to prevent fire from reaching the explosive cargo compartment. Flood with water; if no water is available use Halon, dry chemical or earth.

Promptly isolate the scene by removing **ALL PERSONS** from the vicinity of the incident if there is a fire. First, move people out of line-of-sight of the scene and away from windows. Then, obtain more information and specific guidance from competent authorities listed on the shipping papers.

SPILL OR LEAK
Shut off ignition sources; no flares, smoking or flames in hazard area.
Do not touch or walk through spilled material.

FIRST AID
Call emergency medical care.
Use first aid treatment according to the nature of the injury.

GUIDE 50 (ERG 93)

POTENTIAL HAZARDS

FIRE OR EXPLOSION:
MAY EXPLODE AND THROW FRAGMENTS 1/3 MILE OR MORE IF FIRE REACHES CARGO.

HEALTH HAZARDS:
Fire may produce irritating or poisonous gases.

EMERGENCY ACTION

IF FIRE REACHES CARGO, DO NOT FIGHT FIRE.

STOP ALL TRAFFIC AND BEGIN TO EVACUATE ALL PERSONS, INCLUDING EMERGENCY RESPONDERS, FROM THE AREA FOR 1500 FEET (1/3 MILE) IN ALL DIRECTIONS.

Positive pressure self-contained breathing apparatus (SCBA) and structural firefighters' protective clothing will provide limited protection.

CALL Emergency Response Telephone Number on Shipping paper FIRST. If Shipping Paper NOT AVAILABLE or NO ANSWER, CALL CHEMTREC AT 1-800-424-9300.

FIRE
Cargo Fires: DO NOT FIGHT FIRE WHEN IT REACHES CARGO. Withdraw from area and let fire burn.

Truck and Equipment Fires: Try to prevent fire from reaching the explosive cargo compartment. Flood with water; if no water is available use Halon, dry chemical or earth.

Promptly isolate the scene by removing **ALL PERSONS** from the vicinity of the incident if there is a fire. First, move people out of line-of-sight of the scene and away from windows. Then, obtain more information and specific guidance from competent authorities listed on the shipping papers.

SPILL OR LEAK
Shut off ignition sources; no flares, smoking or flames in hazard area.
Do not touch or walk through spilled material.

FIRST AID
Call emergency medical care.
Use first aid treatment according to the nature of the injury.

SUPPLEMENTAL INFORMATION

Packages bearing the 1.4S label contain explosive substances or articles that are designed or packaged in such a manner that when involved in a fire, may burn vigorously with localized detonations and projection of fragments; effects are usually confined to immediate vicinity of packages.

If fire threatens cargo area containing packages bearing the 1.4S label, consider initial isolation of at least 50 feet in all directions. Fight fire with normal precaution from a reasonable distance.

DD FORM 836 (BACK), JUL 96

Figure 10-3. DD Form 836 (continued)

INSTRUCTIONS FOR COMPLETING DD FORM 836, "SHIPPING PAPER AND EMERGENCY RESPONSE INFORMATION FOR HAZARDOUS MATERIALS TRANSPORTED BY GOVERNMENT VEHICLES"

GENERAL

DD Form 836 shall be completed by a *qualified individual from a transportation office, unit or other organization offering hazardous material for transportation in commerce or areas accessible to the general public.

*An individual is considered qualified to complete and sign (certify) DD Form 836, having satisfactorily completed the DoD Standard Transportation of Hazardous Material Course from one of the DoD-approved schools listed in the Defense Traffic Regulation. This person shall be appointed in writing by the activity or unit commander, to include scope of authority.

STEP 1

Item 1. Enter the place and date the material was certified (e.g., Fort Campbell, 1 Jan 95).

Item 2. Enter the date this material will move in commerce.

Enter the page number and total number of pages of the DD Form 836. Mark an "X" on the box if there are continuation sheets. Enter "Page 1 of 5 Pages" or leave blank if there are no extension pages.

STEP 2

Item 3.
a. Indicate the total numbers of packages.

b. Indicate the type of package (box, pallet, etc.).

c. Describe hazardous materials on DD Form 836 (Shipping Paper) in accordance with the requirements of Title 49 CFR, subpart C, Shipping Papers (49 CFR 172.200 - 172.205). NOTE: If additional space is required, use continuation sheet (DD Form 836C).
Example: Rocket Motors, 1.1C, UN 0280, PG II
Stannic Phosphide, 4.1, UN 1433, PG I

d. The total weight (e.g., gm, kg, etc.), or volume (e.g., liter, cc, etc.) of hazardous material.

e. Net Explosive Quantity (NEQ). For explosive (Hazard Class 1) shipments, enter the Net Explosive Quantity (weight) for each proper shipping description listed. Net Explosive Quantity (weight) for explosives shall be obtained from the Joint Hazard Classification System (JHCS). NOTE: For transportation, the NEQ (weight) shall consist of the Net Explosive Weight and the Net Propellant Weight combined, as listed in the JHCS.
Example: 1 round - NSN 1315-00-761-2073
DODIC C706

Net explosive weight (kgs): 1.57642
Net propellant weight (kgs): .310793
Net Explosive Quantity (kgs): 1.887213

STEP 3

Item 4.
a. Enter the shipper address and telephone number where the hazardous material originated. Telephone number shall be monitored at all times (24 hour) until shipment is received by consignee. Telephone number is for NOTIFICATION PURPOSES ONLY. Emergency assistance shall be obtained from the appropriate 24 HOUR EMERGENCY ASSISTANCE TELEPHONE NUMBER.

b. Enter the six-digit Department of Defense Activity Address Codes (DODAAC) and/or the in-the-clear geographical location of the ultimate consignee (if known) or receiver of HAZMAT shipment.

c. Additional information or notification if needed.

STEP 4

Item 5. Additional handling instructions/information.

STEP 5

Item 6. The official or person who signs Item 6.a. must be qualified to certify that the shipment complies with the requirements of this instruction. Signature of certifying official or person must be in writing (longhand).

NOTES:
1. Units returning from exercise or firing range should have a qualified person ensure that all hazardous materials are properly repackaged and secured (i.e. blocked, braced, tied down) prior to transportation.

2. Completion of a new DD Form 836 is not required. Original DD Form 836 may be used provided that:

a. Change Item 1. (Date Prepared) and Item 2. (Date of Travel) as appropriate.

b. Change Item 3. (Cargo):
(i) Hazardous materials used shall be deleted from form by crossing out or lining through.
(ii) Hazardous materials which remain, but are in different quantities shall have the correct amounts entered in the appropriate section(s).

c. Change Item 6.a.:
(i) Cross out original signature if different certifier will be used.
(iii) A qualified individual (if available) shall sign in writing (longhand). If a qualified individual is not available, then the Officer-In-Charge (OIC) or Non-Commissioned Officer-In-Charge (NCOIC) shall sign in writing (longhand) to verify that the above procedures have been performed for the return trip to base.

STEP 6

Item 6.b. Signature(s) of operator(s) of vehicle who certifies that material is properly blocked, braced, and safe for transport in commerce.

DD FORM 836 INST, JUL 96

Figure 10-3. DD Form 836 (continued)

SHIPPING PAPER AND EMERGENCY RESPONSE INFORMATION FOR HAZARDOUS MATERIALS TRANSPORTED BY GOVERNMENT VEHICLES *(Continuation Sheet)*

TO BE COMPLETED BY THE UNIT OR SHIPPER T.O. OFFICE	PAGE OF PAGES

3. CARGO *(Continued)*

PACKAGES		PROPER SHIPPING DESCRIPTION	TOTAL WEIGHT	NET EXPLOSIVE QUANTITY
NUMBER a.	KIND b.	c.	d.	e.

DD FORM 836C, JUL 96

Figure 10-3. DD Form 836 (continued)

3. CARGO *(Continued)*			PAGE OF PAGES	
PACKAGES		PROPER SHIPPING DESCRIPTION	TOTAL WEIGHT	NET EXPLOSIVE QUANTITY
NUMBER a.	KIND b.	c.	d.	e.

DD FORM 836C (BACK), JUL 96

Figure 10-3. DD Form 836 (continued)

d. **Loading and Unloading Hazardous Material**. General requirements for loading and unloading hazardous material are as follows:

- Ensure the vehicle is safe to operate and free of fire hazards.
- Check to ensure there are no exposed wires.
- Clean off excess oil or grease accumulated on the vehicle.
- Check the fuel system for leaks.
- Set hand brake during loading and unloading and chock the wheels.
- Inspect the load and the vehicle during rest or refueling stops.
- Do not leave the vehicle unattended.
- Do not let anyone loiter near the loaded vehicle.
- Ensure hazardous cargo is marked with the proper shipping name, identification number, and appropriate labels (see 49 CFR).
- Mark the front, sides, and rear of the vehicle with the appropriate placards.
- Ensure the shipper blocked and braced the load to prevent shifting.

Drivers should see their squad leader for information on the loading, blocking, and bracing requirements for hazardous cargo before going to the loading site.

e. **Specific Types of Hazardous Material**. Besides cargo that requires DD Forms 626 and 836, specific types of hazardous material have other requirements that must be met for transporting. Personnel involved must know and observe current safety regulations and policies contained in AR 55-355, AR 385-10, 49 CFR, as well as in local policies.

(1) ***Ammunition***. Figure 10-4 shows correct loading for ammunition. Rules specific to ammunition shipments are as follows:

- Ensure tops of boxes are marked THIS SIDE UP.
- Do not smoke within 25 feet--or use open flames within 25 feet--while loading, unloading, or transporting cargo.
- Turn the engine off during loading and unloading.
- Handle ammunition with care.
- Do not overload the vehicle.
- Carry two serviceable carbon dioxide or dry chemical fire extinguishers with at least a 10 BC rating and know how to use them.
- See TB 5-4200-200-10 for selections.
- Close and secure the tailboard or tailgate. Do not load on the tailgate.

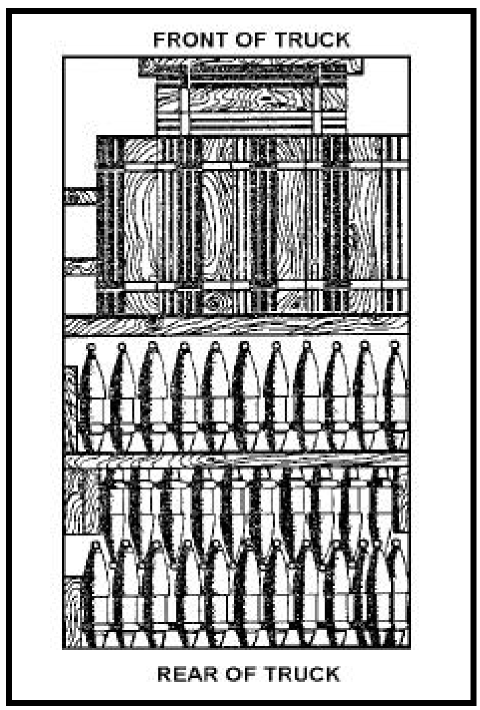


Figure 10-4. Proper loading

arrangement for ammunition

- Consult with officials on the scene before passing by a fire on the road.
- Do not push or tow a truck carrying explosives except to move it off the road.
- Do not transport detonating caps with other explosives. Complete rounds of artillery ammunition, including fuses and primer, can be carried in one vehicle.
- Ensure that artillery shells are laid on their sides. The sides of the projectiles should be parallel with the truck body.
- Follow a planned route that minimizes exposure in densely populated areas. Park in uncongested areas.
- Drive a safe distance away from other traffic.
- Protect cargo against shifting. Do not make sudden stops or turns.

(2) ***Flammable liquids***. The following are special rules for flammable liquids:

- Do not smoke within 25 feet or use open flames within 25 feet during loading, unloading, or transport of the cargo.
- Turn the engine off during loading and unloading.
- Carry two serviceable carbon dioxide or dry chemical fire extinguishers with at least a 10 BC rating and know how to use them.
- Remove tarpaulins. If this is not possible, dry and air tarpaulins that have been saturated with gasoline or fumes before storing them.
- Ensure that electrical connections on petroleum semitrailers and filling apparatus are properly grounded.
- Do not wear hobnail or metal-cleated boots.

(3) ***Flammable solids and oxidizing materials***. Special rules for flammable solids and oxidizing materials are as follows:

- Protect the load from adverse weather and keep cargo dry.
- Provide ventilation of the load.

(4) ***Corrosive liquids***. The following special rules apply to corrosive liquids:

- Inspect containers for leaks. Do not load leaking containers.
- Ensure containers are tightly closed (whether full or empty).
- Ensure storage batteries are protected from movement and from contacting each other; protect and insulate the terminals against short circuits.

(5) ***Compressed gases***. The following are special rules for compressed gases:

- Place cylinders on flat surfaces.
- Ensure cylinders are blocked and braced to prevent movement.
- Ensure engine is stopped.

(6) ***Poisons***. Do not transport poisons in the same vehicle with food or edible material.

(7) ***Radioactive materials***. The ITO has a copy of the Department of Transportation regulations that govern radioactive shipments. Also see TM 55-315 and 49 CFR. The following rules apply to radioactive shipments:

- Ensure that packages containing radioactive materials have yellow or white labels on them IAW 49 CFR.
- Use partitions in cargo compartments to separate yellow labeled packages from people and undeveloped film.
- Base the separation distances on the total transport index shown on the yellow labels. The transport index shows the degree of control the driver must use while transporting the cargo. Add up the transport indexes on all yellow labels. Do not load more than 50 transport indexes on one truck. After all transport indexes have been added, verify the separation distance with the shipper.
- Check the cargo area of the vehicle for protruding nails or bolts.
- Do not transport hazard Class 1.1, 1.2, or 1.5 explosives with radioactive materials.
- Be sure to monitor for radioactivity, if required. If monitoring is required, the shipper must provide the monitoring device and someone skilled in its use.
- Do not transport personnel in the cargo compartment of a vehicle transporting radioactive material.

(8) ***Chemical agents and chemical ammunition***. Special rules for chemical shipments are as follows:

- Check the cargo area of the vehicle for protruding nails or bolts.
- Carry individual chemical defense equipment.
- Know proper first aid procedures (see FM 21-11).
- Check the shipper's use of TM 3-250. TM 3-250 has a table that shows chemical agents that cannot be loaded together.
- Know the symptoms produced by escaping toxic chemical agents.
- Wear any protective clothing the shipper provides.
- Do not smoke within 25 feet or use open flames within 25 feet during loading, unloading, or transport of the cargo.

According to AR 50-6, shipments of certain categories of chemical surety material must be accompanied by technical escorts who are qualified by the CPRP.

10-7. OVERSIZE AND OVERWEIGHT LOADS. Civil authorities determine limitations on the weight and dimensions of vehicles using public highways. Consequently, restrictions vary considerably for shipments in the United States and in overseas areas. Unit personnel must know the applicable regulations for the area in which they are operating. During combat operations, the movement control headquarters issues instructions for determining oversize and overweight loads. These limitations are established to prevent damage to MSRs and to allow for safe movement of vehicles.

a. **Clearance Permit**. The unit or activity planning to move oversize or overweight cargo requests a DD Form 1266 (Figure 10-5, pages 10-18 and 10-19). This form furnishes the ITO with complete information on the cargo and vehicles to be used. The ITO requests a special hauling permit from the authorities. Clearance permits for the ARNG and USAR are submitted to the state DMC (see FM 55-1). The requesting unit must furnish the following information to the ITO or DMC:

- Type of equipment.
- Gross weight, axle loads, and spacing, height, width, and length.
- Origin and destination of movement.
- Date and time of movement.
- Nature of cargo (within security limitations).

See Appendix N for information regarding military vehicle axle weight distribution formulas and percentages.

b. **Clearance Warnings**. The sides and rear of oversize cargo must have adequate clearance lights or red flags to warn other traffic.

c. **Escort Vehicles**. When escort vehicles are required, they either must have warning lights or be driven with vehicle headlights on. When required, the lead vehicle carries a WIDE LOAD FOLLOWS sign on the front. The rear escort vehicle has a WIDE LOAD AHEAD sign on the back.

10-8. CARGO SECURING PROCEDURES. To secure the load for safe delivery to its destination, the shipper must follow procedures to lash and/or block and brace cargo. The shipper is responsible for blocking and bracing a load. However, since the driver must deliver the load safely to its destination, some general rules apply:

- Block crates, boxes, and barrels to keep them from shifting en route.
- Use crib blocking whenever possible. It need not be nailed to the floor or sides if placed tightly against the cargo to reduce damage to the floor and sideboards of the vehicle.
- If a gap exists between pipes or lumber and the end of the trailer, block the load with a gate constructed with 4- by 4-inch boards to prevent it from slipping.
- All lumber used for blocking must be free of knots and strong enough to provide a rigid and stable support for the load en route.
- When the load must be protected from the weather, pad the corners of boxes or crates to prevent damage to the tarpaulin.

10-9. DOUBLE-STACKING TRAILERS. Problems may arise when stacking one trailer onto another for transport, especially if loading facilities or equipment (such as ramps, loading docks, and gantry cranes) are available. Several methods can be used to solve these problems. When semitrailers are stacked and shipped as cargo or moved as a matter of convenience, be sure to coordinate with the receiving authority to ensure that the shipment can be unloaded. Experienced drivers should be used when tractors are positioning semitrailers onto or removing them from other semitrailers.

REQUEST FOR SPECIAL HAULING PERMIT	DATE 1 Jan 97

SECTION I - GENERAL

1. ORGANIZATION	2. STATION	3. DATE OF MOVEMENT a. STARTING	b. COMPLETION
100th Trans Co (Lt Mdm Trk)	Fort Eustis, Virginia 23604	0700 15 Jan 97	1830 16 Jan 97

4. POINT OF ORIGIN	5. DESTINATION
Fort Eustis, Virginia	Fort Drum, New York

6. ARRIVAL AT STATE LINES

DATE	TIME	STATE LINE
15 Jan 97	1308	Va/Md
15 Jan 97	1440	Md/Pa
16 Jan 97	1145	Pa/NY

7. ROUTING (Stipulate US Routes, State Routes, etc.)

IS 64, Va 168, Va 33, IS 64, IS 95,
IS 495E, US 1, IS 695, IS 83, IS 81,
US 11

8. ESCORT REQUIREMENTS

None

SECTION II - VEHICLE AND LOAD DATA

DESCRIPTION (a)	TYPE (2-ton etc) (b)	NO. OF VEHICLES (c)	REGISTRATION NUMBER (d)	HEIGHT (e)	WIDTH (f)	LENGTH (g)	WEIGHT (h)
9. VEHICLE							
A. TRUCK							(Empty)
B. TRUCK-TRACTOR	5-ton	8	See Item 12	103.5	98.3	158.3	(Empty) 18,560
C. TRAILER							(Empty)
D. SEMI-TRAILER	12-ton	8	See Item 12	108.3	97.3	348.5	(Empty) 14,240
E. OTHER (Specify)							(Empty)
10. LOAD Orgn Impedimenta				-	-	-	5,000
11. OVERALL (Vehicle and load)				108.3	98.3	526	(Gross) 37,800

12. DESCRIPTION OF LOAD (Brief general description: Organization impedimenta, etc.) (Within security limitations)

Organization impedimenta.

Registration Numbers

Trac	Tlr	Trac	Tlr
5E551	5T9991	5E5555	5T9995
5E5552	5T9992	5E5556	5T9996
5E5553	5T9993	5E5557	5T9997
5E5554	5T9994	5E5558	5T9998

SAMPLE

13. LOAD OVERHAND	a. FRONT	b. REAR	c. LEFT SIDE	d. RIGHT SIDE
	NA	NA	NA	NA

DD FORM 1 JAN 59 1266

Figure 10-5. DD Form 1266 (front)

14. NUMBER OF AXLES	1	2							
	A	B	C	D	E	F	G		
	AXLE 1 a	AXLE 2 b	AXLE 3 c	AXLE 4 d	AXLE 5 e	AXLE 6 f	AXLE 7 g	AXLE 8 h	TOTAL I
15. NUMBER OF TIRES	2	4	4	4	4				18
16. TIRE WIDTH (Inches)	11	11	11	11	11				
17. TIRE SIZES	1100x20	1100x20	1100x20	1100x20	1100x20				
18. AXLE LOAD (Empty)	8,244	6,958	6,958	5,320	5,320				32,800
19. AXLE LOAD (Loaded)	9,044	8,058	8,058	6,320	6,320				37,800

SAMPLE

20. AXLE SPACING (See item 14 for identification)	A SPACING	B SPACING	C SPACING	D SPACING	E SPACING	F SPACING	G SPACING
	140	54	162	52			

21. REMARKS

22. MOVEMENT BY HIGHWAY IS

☐ ESSENTIAL TO NATIONAL DEFENSE

☒ IN THE INTEREST OF NATIONAL DEFENSE

23. REQUESTING AGENCY	24. APPROVING AGENCY
100th Trans Co (Lt Mdm Trk)	
25. REQUESTED BY (Typed named, grade and title)	26. APPROVED BY (Typed named, grade and title)
Charles C. Chestnut, Cpt, TC, Commanding	

27. DATE	28. SIGNATURE	29. DATE	30. SIGNATURE
1 Jan 97	Charles C. Chestnut		

INSTRUCTIONS

GENERAL:

DD Form 1266 “Request for Special Hauling Permit” will be used to obtain special hauling permits for the movement of oversize/overweight vehicles over public highways when accompanying a convoy or when traveling separately.

This form, in duplicate and accompanied by letter of transmittal, will be forwarded through the local transportation officer so as to reach the appropriate headquarters not less than ten (10) working days prior to the starting date of the movement. Letters of transmittal will contain complete itinerary and explanation of the movement. One (1) letter of transmittal is sufficient when several DD Forms 1265 and 1266 involving one (1) movement are forwarded to the appropriate headquarters.

In cases where bona-fide emergencies exist, the information contained in this form and DD Form 1265 may be transmitted to the appropriate headquarters by telephone or electric transmission. In this event, reference will be made to item numbers in the sequence in which they appear on the forms. Items which do not apply will be so indicated.

SPECIFIC:

Item 9A, B, C, and D - Complete nomenclature of vehicles involved. More than one unit may be included, provided units are identical in equipment, load characteristics, routing and movement data. Total number of units shall be indicated prominently.

Item 9E - Note all units other than standard highway vehicles; road equipment, gunes, etc.

Item 9 (d) - Indicate the registration number for each unit or combination of units. Use additional page if required.

Item 14 - Indicate appropriate number of axles by inserting number in proper circles. Block out circules not applicable.

Item 21 - For movement through the District of Columbia, include name of manufacturer of equipment.

Figure 10-5. DD Form 1266 (back)

The methods described herein are not all-inclusive or restrictive. Based on the personnel, equipment, and facilities available--as well as on the skill and ingenuity of personnel engaged in the operation--units in the field may devise other methods or variations of the methods discussed here.

Procedures can be combined by using one loading method at origin and a different unloading method at destination. Consider the options when planning and conducting an assigned transport mission.

a. **Flip Method**. The flip method loads one semitrailer onto the other in a bed-to-bed position (Figure 10-6). This method requires no special facilities and can be done using a unit recovery vehicle or other lifting device.

The two semitrailers ride bed-to-bed. The top semitrailer is secured on the cargo bed of the transporting semitrailer using chains, wire, rope, or banding devices for tie down. The transporting tractor-semitrailer unit should rest on as level and compact a surface as possible during loading and unloading. This is essential to prevent accidents, personal injury, damage to equipment, and delays. When the transporting semitrailer is not hooked up to a tractor during loading operations, ensure that the surface on which the landing gear rests is firm. If necessary to prevent the landing gear legs from sinking into the ground, strengthen and reinforce the ground surface using fill, gravel, lumber or timbers, pierced steel planking, or other suitable materials. Block the wheels of the bottom semitrailer and set the brakes to prevent movement.

The flip method loading procedure is as follows:

- Spot two flatbed semitrailers, with side and end boards removed, side by side (parked axle-to-axle or axle-to-landing gear as desired).
- Fasten side rails together at two or more places using chain, wire rope, or other available materials, passed through the side rails.
- Use the recovery vehicle (or other lifting device) to lift the offside of the transported semitrailer and flip it over onto the cargo bed of the transporting semitrailer.
- Retract the landing gear either after the initial lift of the top semitrailer or after it is positioned on the cargo bed.
- Secure the top semitrailer to the bed of the lower semitrailer using chains and/or wire rope. Load and tie down the side and end boards.

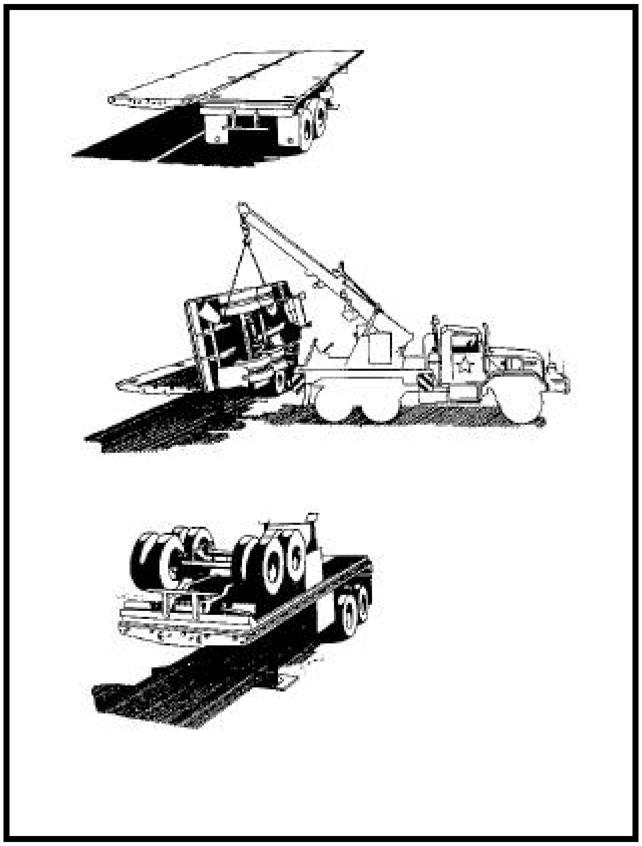


Figure 10-6. Flip method used for loading semitrailers

To unload the semitrailer at destination, reverse the loading steps:

- Remove all tie-downs and unload the side and end boards.
- Attach side rail tie-downs and use a recovery vehicle or other lifting device to lift and flip the semitrailer back onto the ground. Then remove the side rail tie-downs.
- Extend the landing gear after the rear wheels of the semitrailer rest on the ground. Use the recovery vehicle to hold the load until the gear is extended.

Field reports indicate that the following problems may occur when using this method:

- Side rails and marker lights on both semitrailers may be damaged during flipping.
- Semitrailer brake fluid may leak through the master cylinder vent.
- Landing gear may lose hydraulic fluid due to the semitrailer resting in an upside-down position.

Use care during loading and unloading to minimize damage. After delivery, both semitrailers will be inspected and serviced and/or repaired before being put back into service. A variation of the flip method is one in which the semitrailer is first flipped over to rest on its bed on the ground. Two recovery vehicles at each end (one set off to the side) then lift and hold this semitrailer while the transporting semitrailer is maneuvered under it. Then, the top semitrailer is lowered into place.

In the lifting, portable ramp, and terrain features methods, the top semitrailer rests in an upright position (on its wheels and landing gear) on the bed of the other semitrailer. It must not only be tied down but must also be securely blocked and braced.

b. **Lifting Method**. The lifting method loads the top semitrailer in an upright position (Figure 10-7, page 10-22). It requires no facilities and can be performed using one tractor and the unit recovery vehicle (or other suitable lifting device). The loading procedure is as follows:

- Back the transporting semitrailer up to the rear of the transported semitrailer.
- Use the recovery vehicle to lift the transported semitrailer by the rear lifting shackles.
- Back the transporting semitrailer approximately halfway under the lifted semitrailer. Lower the semitrailer onto the cargo bed of the other semitrailer.
- Shift the recovery vehicle to the front end of the top semitrailer and, using the front lifting shackles, lift the front end.
- Hold and maneuver the transported semitrailer with the recovery vehicle boom while the transporting semitrailer is backed into proper position under the load. Lower the semitrailer onto the cargo bed of the transporting semitrailer.
- Block, brace, and tie down the semitrailer; load and secure side and end boards.

If two recovery vehicles or lifting devices are available, they may be positioned at each end of the transported semitrailer (one set off to the side) to lift and hold that semitrailer while the transporting semitrailer is maneuvered and backed under it. The transported semitrailer is then lowered into position.

To unload the semitrailer at destination using the same method, reverse the loading steps as follows:

- Remove the semitrailer tie-downs and blocking and bracing. Unload side and end boards.
- Using a recovery vehicle, lift the transported semitrailer by the front lifting shackles. Hold it while the transporting semitrailer is moved forward approximately three-quarters of its length.
- Lower the front end of the transported semitrailer onto the ground.
- Shift the recovery vehicle to the rear of the transported semitrailer and, using the rear lifting shackles, lift it free of the transporting semitrailer. Pull the transporting semitrailer out.
- Lower the rear of the transported semitrailer to the ground. Release it from the recovery vehicle's lift.
- Install (or load) the side and end boards. Move the semitrailer out.

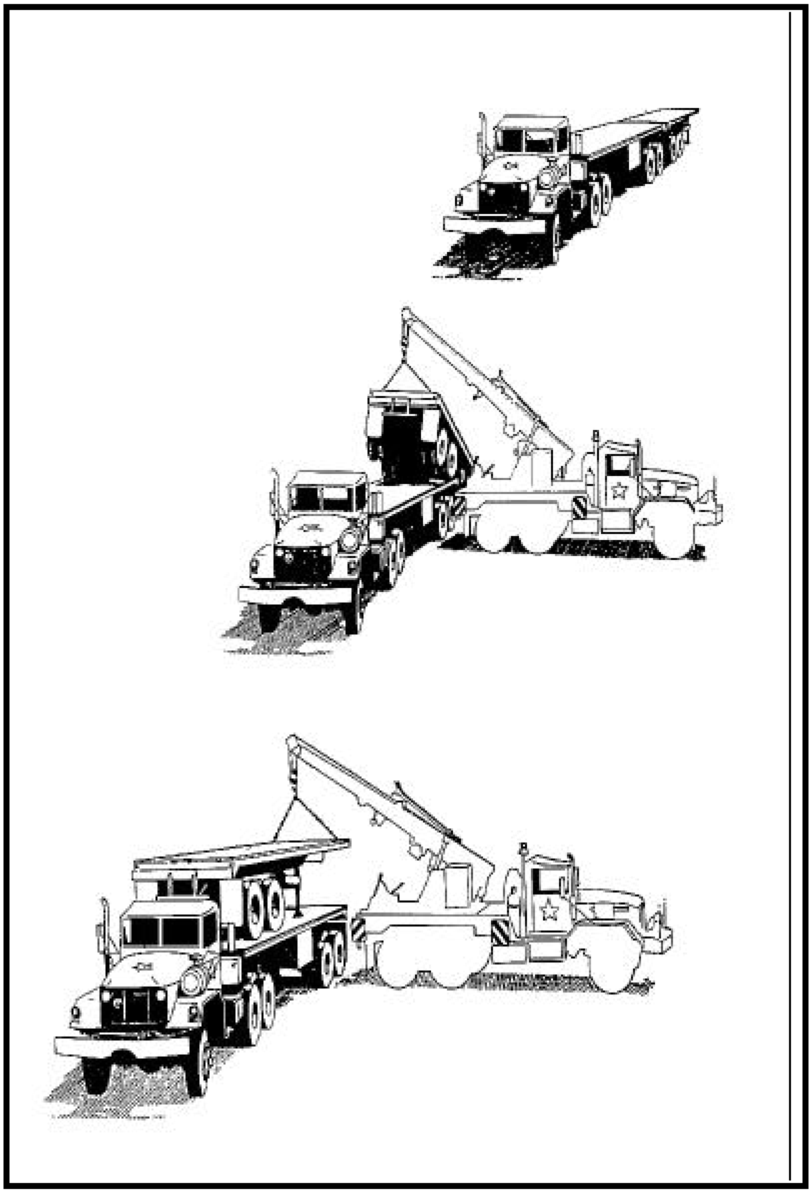


Figure 10-7. Lifting method used for loading

c. **Portable Ramp Method**. This method requires making a portable ramp (mounted on skids, rollers, or wheels) for use in the loading process (Figure 10-8). The loading procedure is as follows:

CAUTION

If the ramp is on wheels or rollers, it must be blocked. If the trans-porting semitrailer is not hooked to a tractor during loading, the wheels must be blocked and the brakes set.

- Position the ramp at the rear of the transporting semitrailer.
- Use a tractor to back the transported semitrailer up the ramp and onto the transporting semitrailer. Extend the landing gear, uncouple, and remove the tractor.
- Block, brace, and tie down the semitrailer. Load and secure the side and end boards.

To unload the semitrailer at the destination using this same method, reverse the loading steps as follows:

CAUTION

Instructions contained in the loading caution apply as well to the unloading.

- Place the portable ramp in position at the rear of the transporting semitrailer.
- Remove the tie-downs and blocking and bracing. Unload the side and end boards.
- Back the towing tractor into position and up the ramp. Hook up and tow the semitrailer from the transporting semitrailer.
- Install (or load) the side and end boards. Move the semitrailer out.

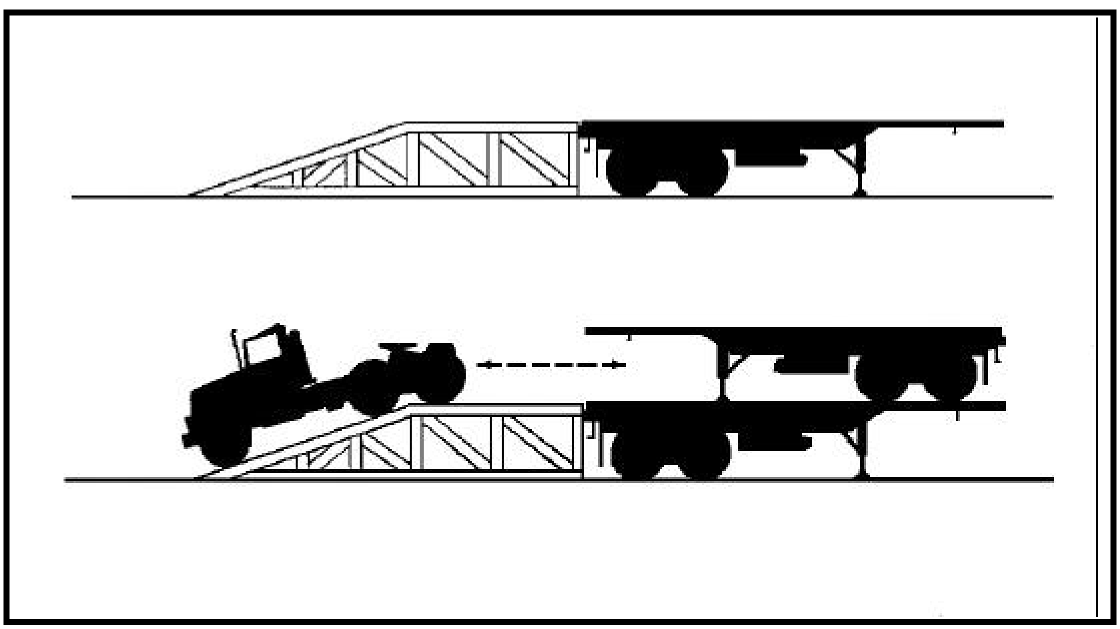


Figure 10-8. Portable ramp used for loading semitrailers

d. **Fixed Ramp Method**. The fixed ramp method is similar to the portable ramp method (Figure 10-9, page 10-24). In this instance, the ramp used is an immovable field expedient type, and the transporting semitrailer must be backed into position at the ramp for loading.

The fixed ramp is prepared using heavy timbers, railroad ties, or impacted earth. The timbers or ties should be spiked, bolted, or otherwise secured together. Tamp the earthen ramp firmly and then surface it with planks, pierced steel planking, or other available materials to make a firm, solid surface. Shore the earthen ramp at the loading end to prevent breakdown during its use. The loading procedure is as follows:

CAUTION

If the transporting semitrailer is not hooked to a tractor during loading, the wheels must be blocked and the brakes set.

- Back the transporting semitrailer into position at the ramp.
- Back the semitrailer to be transported up the ramp and into position on the bed of the transporting semitrailer. Extend the landing gear, uncouple, and remove the tractor.
- Block, brace, and tie down the transported semitrailer. Load and secure the side and end boards.

To unload the semitrailer at the destination using a tow-off method, either a portable or fixed ramp or other similar facility may be used. If a portable ramp is used, the procedures for the portable ramp method apply. If a fixed ramp or facility is used, procedures for the fixed ramp method apply.

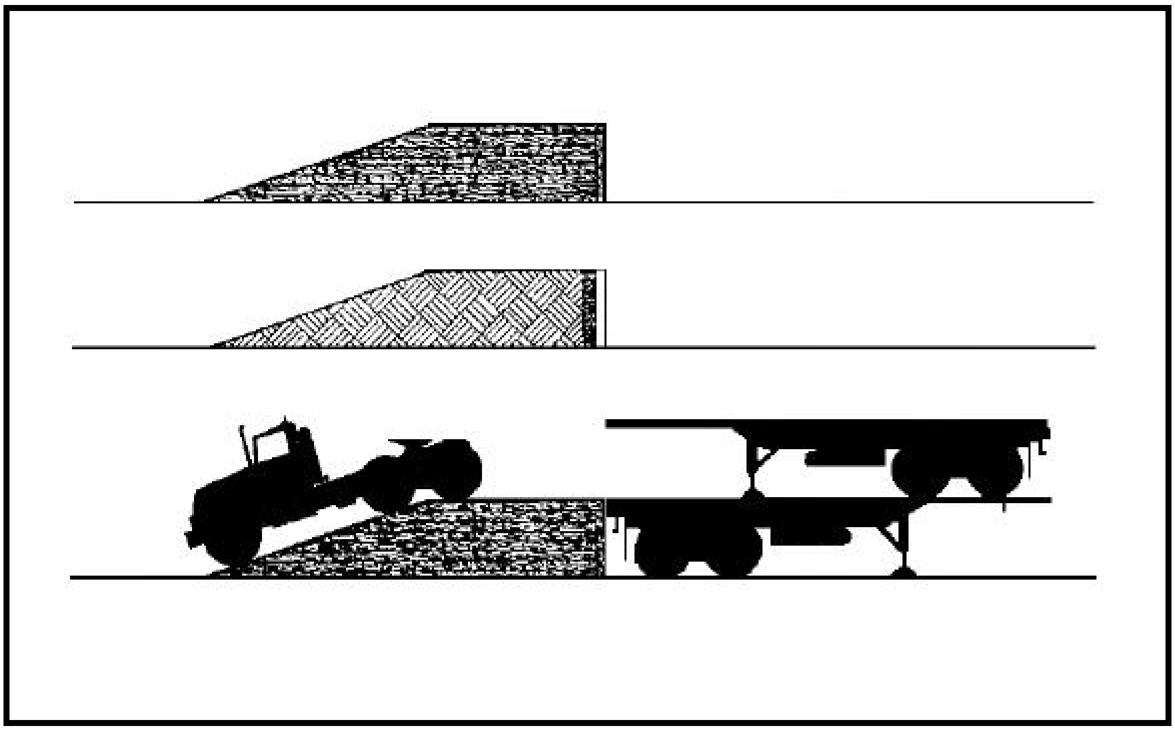


Figure 10-9. Fixed ramp used for loading semitrailers

e. **Use of Terrain Features**. Natural or manmade terrain features (arroyos, dry river beds, natural land depressions, cuts and fills, ditches, trenches, and so forth) may be used or adapted for

use as loading ramps (Figure 10-10). Based on the contours of the feature used, either little or no pioneer work or extensive work may be required to prepare it for operations.
Figure 10-10 (a) shows a cross section of a terrain feature. The heavily shaded area (b) illustrates where earth removal is required to make it a suitable ramp; (c) illustrates the feature after it is prepared. Note that the face of the cut has been shored to prevent breakdown during use. The loading procedure (d) generally follows the procedures for ramp loading stated earlier.

Unloading the transported semitrailer at destination depends on the facilities available at that point. The semitrailer can be unloaded by any of the methods outlined above, or it may be unloaded using a terrain feature.

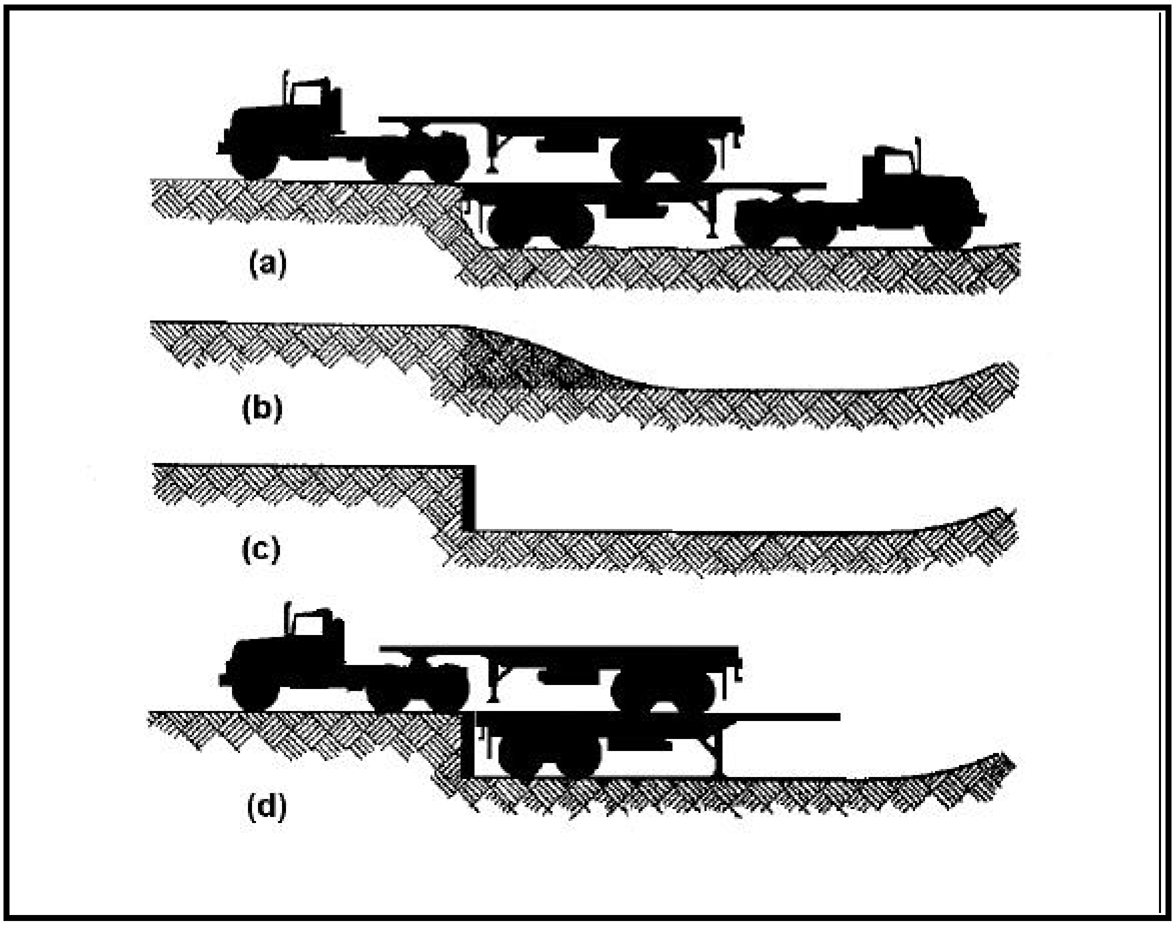


Figure 10-10. Use of terrain features for loading semitrailers

APPENDIX A

EXTRACT OF STANAG 2041 (EDITION 4), OPERATION ORDERS, TABLES AND GRAPHS FOR ROAD MOVEMENT

Annexes:
A. Example of an Operation Order for Road Movement
B. Specimen Road Movement Table
C. Example of a Road Movement Graph

<u>AIM</u>

1. The aim of this agreement is to standardize operation orders, tables and graphs for road movement.

<u>AGREEMENT</u>

2. Participating nations agree to use the standard layouts for operation orders for road movement, road movement tables and graphs, as given in Annexes A to C. The instructions given in subsequent paragraphs are in amplification of these layouts.

<u>DEFINITIONS</u>

3. These definitions are taken from the NATO Glossary of Military Terms in English and French (AAP-6) and are repeated for convenience:

a. **<u>Warning Order</u>**. A preliminary notice of an order or action which is to follow. It is designed to give subordinates time to make necessary plans and preparations.

b. **<u>Operation Order</u>**. A directive, usually formal, issued by a commander to subordinate commanders for the purpose of effecting the coordinated execution of an operation.

c. **<u>Standing Operating Procedure</u>**. Set of instructions covering those features of operations which lend themselves to a definite or standardized procedure without loss of effectiveness. The procedure is applicable unless prescribed otherwise in a particular case. Thus, the flexibility necessary in special situations is retained.

3. d. **Standing Order**. A promulgated order which remains in force until amended or cancelled.

ORDERS

4. Warning orders and operation orders are the primary means of effecting a road movement. Much detail can be eliminated from these orders by the use of standing operating procedures and standing orders for road movement.

a. **Warning Orders**. These orders are issued when required and should include sufficient data to alert troops for movement and to allow subordinate commanders to make preliminary plans. The amount of detail included will depend on the military and traffic situation, the state of training of the troops and the extent to which standing orders/standing operating procedures have been developed.

b. **Operation Orders for Road Movement**. Whenever possible, detailed orders should be issued in the form of operation orders for road movement, in conformity with STANAG 2014 and Annex A. Annexes to the orders may include road movement tables and/or road movement graphs (see Annexes B and C). Overlays may be used to reduce the amount of written detail.

c. **Standing Operating Procedures and Standing Orders**. These instructions should contain information on techniques, drills and procedures which are likely to be constant under any conditions. Properly developed, they will help to avoid unnecessary repetition of detail in orders. Some headings that may be used in preparing standing operating procedures and standing orders are:

(1) Composition and duties of advance party.

(2) Vehicle loads, including personnel.

(3) Grouping of vehicles and group commanders.

(4) Organization of columns.

(5) Sign-posting and traffic control.

(6) Responsibility for manning start point and release point.

(7) Discipline; halts; lighting.

(8) Action in the event of enemy attack.

(9) Drill for establishing headquarters on arrival.

(10) Responsibility for issue of operation orders for movements for headquarters.

(11) Safety measures.

ROAD MOVEMENT TABLES (See Annex B)

5. a. Road movement tables will consist of two parts; one giving "data" paragraphs reflecting general information common to two or more columns (or elements of column), the other listing the columns (or elements of column), together with all other necessary information arranged in tabular form.

b. These afford a convenient means of transmitting to subordinates their schedules and other essential detail pertaining to road movement. This is particularly so in cases when the inclusion of such detail in the body of the operation order would tend to complicate it or make it unduly long.

c. They will frequently require a wider distribution than a normal operation order so that copies can be issued to movement control personnel, traffic posts, etc.

d. Their security classification will be based on content and need not necessarily be the same as that of the operation order for road movement.

ROAD MOVEMENT GRAPHS (See Annex C)

6. **General**

a. Road movement graphs are used by staffs in planning, supervising and regulating complicated movements and for providing a convenient means of recording actual moves of units over a period.

b. The unit of measure to be used, i.e. kilometres or miles, will depend on the requirements of the authorities concerned. However, the resulting orders and instructions should not contain a mixture of units except where both are shown throughout, e.g. 5 miles (8 kilometres).

7. **Pass Time**. (**Road**) Pass time is calculated by the following formula:

$$\text{Pass time (in mins)} = \frac{N \times 60}{D \times S} + TG$$

Where N = Number of vehicles
D = Traffic Density (No of vehicles per km/mile)
S = Average speed
TG = Time Gap

The time gap is expressed in minutes and is the sum of the intervals between columns and elements of the columns.

8. **Time Gaps between Columns**. Between columns having different movement numbers, no standard time gaps are prescribed; these time gaps are allotted by the staff ordering the movement.

IMPLEMENTATION OF THE AGREEMENT

9. This STANAG will be considered to have been implemented when the necessary orders/instructions putting the procedures detailed in this agreement into effect have been issued to the forces concerned.

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ANNEX A TO STANAG 2041

EXAMPLE OF AN OPERATION ORDER FOR ROAD MOVEMENT
(See STANAG 2014)

(Sub-headings of paragraphs 3, 4 and 5 are intended as a guide only and may be varied according to national requirements)

(SECURITY CLASSIFICATION)

(Change from Oral Orders, if any)

Copy No _____ of _____ copies
Issuing Headquarters
Place of Issue (may be in code)
Date-Time Group of Signature
Message Reference No.

MOVEMENT ORDER No.

References: A. Maps, tables and relevant documents (see STANAG 2029)
B.

Time Zone used throughout the Order:

Task Organization

1. **SITUATION**

   a. **Enemy Forces**
   b. **Friendly Forces**
   c. **Attachments and Detachments**
   d. **Commander's Evaluation (optional)**

2. **MISSION**

3. **EXECUTION**

   a. **Concept of movement**
   b. **Task to subordinate units**
   c.
   d.
   e. **Detailed timings**

3. f. **Co-ordinating Instructions**

(1) **Order of March**
(2) **Routes**
(3) **Density**
(4) **Speed**
(5) **Method of Movement**
(6) **Defence on Move**
(7) **Start, Release or Other Critical Points**
(8) **Convoy Control**
(9) **Harbour Areas**
(10) **Instructions for Halts**
(11) **Lighting**
(12) **Air Support**

4. **SERVICE SUPPORT**

a. **Traffic Control**
b. **Recovery**
c. **Medical**
d. **Petrol, Oil and Lubricants**
e. **Water**

5. **COMMAND AND SIGNAL**

a. **Commander(s)**
b. **Communications**
c. **Position of Key Vehicles**

Acknowledgment Instructions: Last name of commander:

Authentication: Rank:

Annexes:

Distribution:

ANNEX B TO STANAG 2041

SPECIMEN ROAD MOVEMENT TABLE

(A guide only, the size of columns and the amount of data may need adjustment to suit individual cases)

(SECURITY CLASSIFICATION)

Annex B - “Movement Table” to Operation Order for Movement No.
Map:

Copy No.:
Issuing HQ:
Place of Issue:
Date-Time Group of
Signature:
Message Reference No.:

General Data:

1. Average Speed
2. Traffic Density
3. Halts

4. Routes (i.e. between Start Points and Release Points))
5. Critcal Points (See Note 4))
   (a) Start Points)
   (b) Release Points)
   (c) Other Critical Points)
6. Main Routes to Start Points (See Note 7))
7. Main Routes from Release Points (See Note 7))

Connect with paragraph 4.a. of this STANAG. These routes and points are here described by grid references, code words, etc., and, if necessary, numbered or lettered for ease of reference in the columns below.

Serial or Movement Number	Date	Unit/ Formation	Number of Vehicles	Load Class of Heaviest Vehicles	From	To	Route	Route to Start Point (See Note 7)	Critical Points			Route from Release Point (See Note 7)	Remarks
									Ref.	Due (hrs.)	Clear (hrs.)		
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)
(See Note 5)													

Acknowledge

Distribution:

Authentication:

(SECURITY CLASSIFICATION)

NOTES:

1. Only the minimum number of headings above should be used. Any information which is common to two or more movement numbers should be included under the "date" paragraphs.

2. As the table may be issued to personnel concerned with control of traffic, the security aspect must be remembered. It may not be desirable to include dates or location.

3. If the table is issued by itself, and not as an annex to a more detailed order, the table must be signed or authenticated in the normal way.

4. "Critical Point" is defined as "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 where timings are critical".

5. This will be the number which is used to identify a column (or element of column) during the whole of the movement (see STANAG 2154, paragraphs 10 and 11).

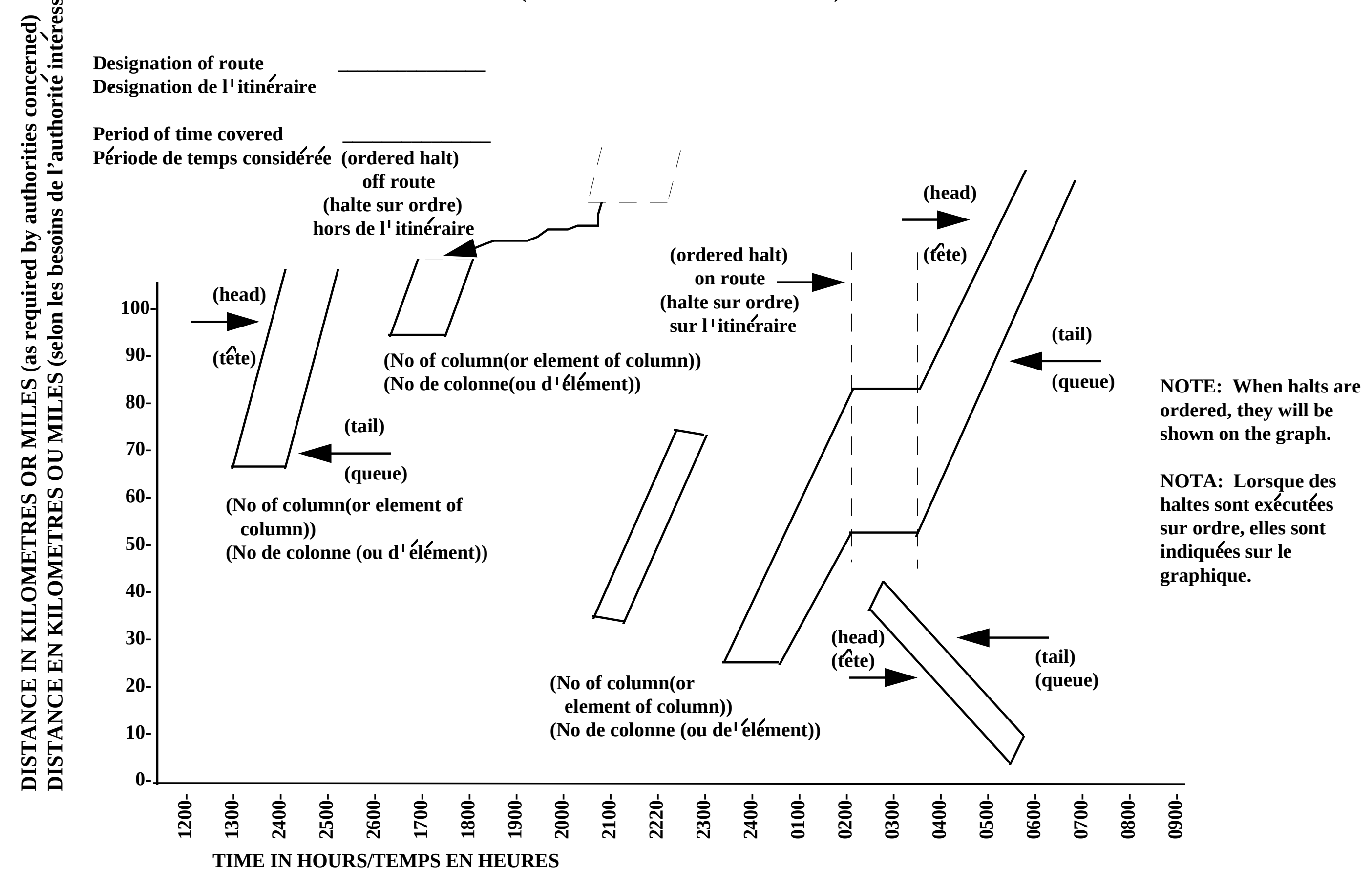
6. In the case of an annex having the same distribution as an operation order it will not be necessary to include the headings and ending as shown on this page.

7. Definitions of these terms will be found in AAP-6.

EXAMPLE OF A ROAD MOVEMENT GRAPH **ANNEX C TO STANAG 2041**

MODELE DE GRAPHIQUE DE MOUVEMENTS PAR VOIE ROUTIERE

(SECURITY CLASSIFICATION)



(CLASSIFICATION DE SECURITE)

APPENDIX B

EXTRACT OF STANAG 2154 (EDITION 7), REGULATIONS FOR MILITARY MOTOR VEHICLE MOVEMENT BY ROAD

Annexes:	A.	Terms and definitions
	B.	National marking of columns and legal Rights.
	C.	Table listing the minimum period of time for a movement bid to be submitted.
	D.	Table listing the minimum number of vehicles for which a movement credit is required.
	E.	Special movement - Vehicle dimensions and weight limits.

Related Documents:

STANAG 1059 OP	-	National Distinguishing Letters for use by NATO Forces.
STANAG 2010 ENGR	-	Military Load Classification Markings.
STANAG 2025 M&T	-	Basic Military Road Traffic Regulations.
STANAG 2041 M&T	-	Operation Orders, Tables and Graphs for Road Movement.
STANAG 2155 M&T	-	Road Movement Bid and Credi t.
STANAG 2159 M&T	-	Identification of Movement Control and Traffic Control Personnel and Agencies.
STANAG 2174 M&T	-	Military Routes and Route/Road Networks.
STANAG 2176 M&T	-	Procedures for Military Road Movement across National Frontiers.
AAP-6	-	NATO Glossary of Terms and Definitions (English and French).

AIM

1. The aim of this agreement is to set out the basic regulations applying to military road movement by wheeled and tracked vehicles of the NATO forces.

AGREEMENT

2. Participating nation s agree to use the regulations applying to military road movement, defined in the following paragraphs.

DEFINITIONS

3. For terms and definitions related to this STANAG, see Annex A.

GENERAL

4. Movement and transport staffs who are responsible for road movement and transport are required to act in accordance with this STANAG, in order to optimise the use of available road network.

COMPOSITIONS OF COLUMNS

5. A column may be composed of a number of organized elements.

6. Each organized element includes:

   a. A commander whose location may vary;

   b. In the first vehicle: a subordinate commander known as the pacesetter;

   c. At the end: a subordinate commander known as the trail officer.

7. A reporting officer (*) is to precede each column when approaching a traffic control post or border crossing point and is to contact the post commander in order to:

   a. report the movement credit number and deviations from the movement credit in case of road movements with movement credit,

   b. report in case of road movement without movement credit the required data on formation/unit, route and destination.

The reporting officer will also receive notifications and instructions, if required.

8. An officer (*) (who may be the trail officer) is to be appointed to report to each traffic control post once the column has passed, giving details of any occurrences including vehicle casualties.

9. Each vehicle must have a vehicle commander, who may be the driver. He is responsible for both crew discipline and execution of the mission.

(*) May be of any rank as considered appropriate by the column commander.

IDENTIFICATION OF COLUMNS

10. Movement credit number (example at Annex A)

   a. Each column which has been allocated a movement credit must be identified by a number known as the "movement credit number". This number identifies the column during the whole of the movement, including the crossing of national boundaries.

   b. The movement credit number must be a contrasting colour to that on which it is marked and must be placed on both sides of each vehicle. It must be legible from ground level at a minimum distance of 6 meters in normal daylight and remain legible in all weather during the whole movement. It must be removed as soon as the movement is completed.

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11. Minimum lighting and flagging.

a. In peacetime headlights of all vehicles moving in column must be on at all times (low beam).

b. The first vehicle of each element must display a blue flag mounted on the left-hand front side of the vehicle.

c. The last vehicle of each element must display a green flag mounted on the left-hand front side of the vehicle.

d. The driver of a broken down vehicle must remove the flag and filter (light) if any, and, if technical assistance is required, a yellow flag is to be attached to the vehicle so that it is visible to approaching traffic.

e. The column commander must display a black and white flag at the left-hand front side as indicated in figure 1.

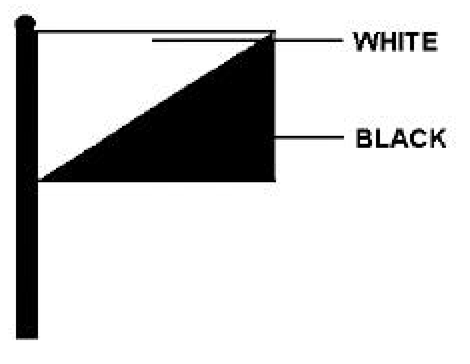

FIGURE 1

f. Flags must be approximately 30 cm (12 inch) (height) x 45 cm (18 inch) (length) in size.

g. Special regulations concerning lighting and flagging in different countries: see Annex B.

12. Legal rights. To obtain legal rights for column movements for different countries: see Annex B.

MOVEMENT BID

13. A movement bid (see STANAG 2155) is a request for a movement credit. It is submitted by a unit or a staff to the National Movement Staff or appointed authority on whose territory the movement starts (for

the minimum period of time for a movement bid to be submitted: see Annex C). A movement bid is to be submitted for:

a. Any column of vehicles whose quantity meets or exceeds the nationally specified number at Annex D.

b. Any vehicle which exceeds the nationally specified dimension and weight limits at Annex E.

c. In case of a border crossing movement (see STANAG 2176).

d. Dangerous cargo (in accordance with national/military regulations).

MOVEMENT CREDIT

14. A movement credit (see STANAG 2155) is the permission to execute the movement on an assigned route during a limited period of time. It is issued by the National Movement Staff or appointed authority, on whose territory the movement starts. The credit is co-ordinated by that staff or authority with the movement staff or authority of another nation where the crossing of international boundaries is concerned. A movement credit is required for movements as mentioned in 13.a, b, c and d.

SPECIAL REGULATIONS FOR THE EXECUTION OF MOVEMENTS

15. Halts.

a. Short halts made by columns normally are to last at least 10 minutes and should be taken when possible after every 2 hours of operation.

b. Long halts made by columns for at least 30 minutes must always be specifically plotted on road movement graphs.

c. The movement control staff can give additional i nstructions concerning time, duration and/or place of halts.

d. Particular attention is to be paid to the following aspects of traffic discipline during halts:

(1) When making a halt, single vehicles or vehicles forming part of a column should move off the road as much as possible.

(2) If this practice cannot be observed, the commander of a column which is halted must take all necessary measures to facilitate movement of other road users and avoid accidents or traffic jams. The mea sures to be taken will vary according to the conditions and width of the road and should include:

(a) Warning at a sufficient distance from the front and rear of the column (guards, warning flags, lights, or flares).

(b) Organizing and directing a system of one-way traffic along the column.

16. Overtaking of columns.

a. Single vehicles are authorized to overtake columns during their halts or if there is a large speed differential. Vehicles may only overtake if it is safe to do so.

b. Columns may only be authorized to overtake other columns by the movements control authorities and if so, the overtaking maneuver has to be supported by traffic regulation personnel.

c. A column without movement credit may overtake another column in the following circumstances:

(1) When the other column is halted and it is safe to do so.

(2) When the column commander of the leading column gives clear indication that the following column may overtake and it is safe to do so.

17. Road movement of outsize/heavy vehicles, dangerous goods/cargo material and/or ammunition carrying vehicles (except tactical movements in the combat zone).

a. This kind of road movements will be known as special movements (see Annex A, 2.c.).

b. Special application for the movement of above mentioned vehicles and/or cargo must be made before movement credits are granted. National restrictions, above which special application to move must be made, are contained at Annex E.

18. Tactical situation.

a. On principle, the directions from the local police and from the military police must be obeyed. In times of crisis or in wartime, the tactical situation may require a deviation from one or more regulations laid down in this agreement. Such situations may occur for the units in case of immediate danger of enemy threat.

b. In times of crisis or in wartime, night movements will also have to be accomplished without or with restricted lighting (blackout lighting) depending on the situation, with due regard to regulations in force in the host nation. It is desirable that a device be incorporated in the vehicle lighting switch, in order to prevent the driver inadvertently switching on the driving lights, passing lights, or direction indicators when the vehicle is operating under blackout conditions.

IMPLEMENTATION OF THE AGREEMENT

This STANAG is implemented when the necessary orders/instructions to use the regulations and definitions contained in this agreement have been issued to the forces concerned.

ANNEX A
TO STANAG 2154
(Edition 7)

TERMS AND DEFINITIONS

1. Terms and definitions included in AAP-6.
   a. Column formation (see Figure 2)
   b. Column gap (see Figure 2)
   c. Column length (see Figure 2)
   d. Movement credit
   e. Movement control
   f. Pace setter (see Figure 2)

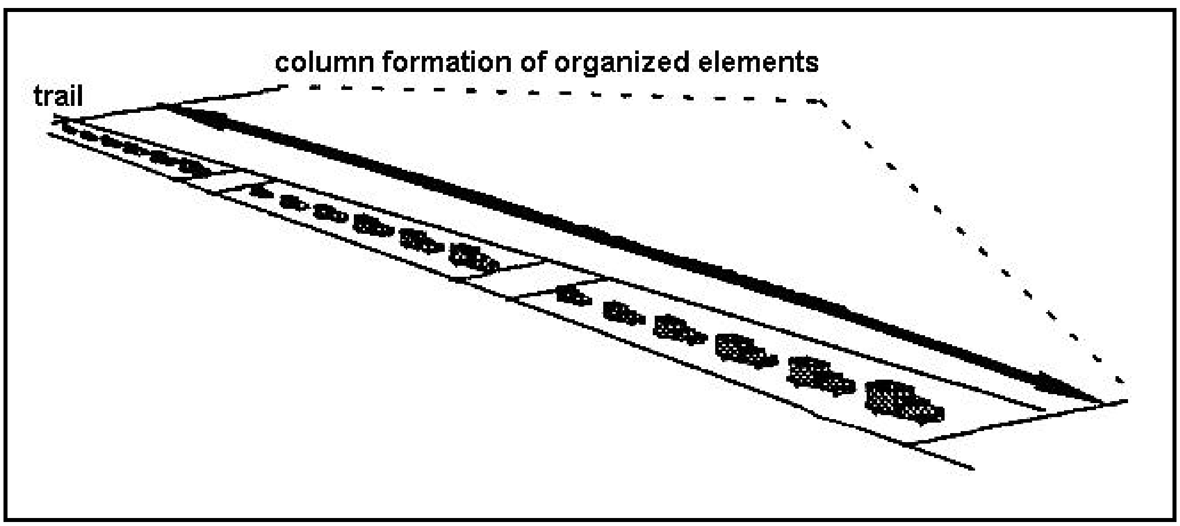

Figure 2

2. Terms and definitions used for the purpose of this agreement.
   a. Column (see Figure 2). A group of vehicles moving under a single column commander over the same route at the same time in the same direction. A column may be composed of a number of organized elements which could be named 'Marching Groups, Convoys or Packets' (See STANAG 2155).

b. Movement credit number. A number, allocated to a movement by the movement control staff responsible for the issue of a movement credit. The movement number should comprise (see Figure 3):

(1) Two figures indicating the day of the month on which the movement is due to commence.

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(2) Three or more letters indicating the movement agency issuing the movement credit, the first two letters being the national symbols of the movement agency (see STANAG 1059).

(3) Two or three figures indicating the serial number of the movement.

(4) One letter to identify the packets of the column (this is optional).

15 NLA 41 D

FIGURE 3

c. Special movement. Road movement of vehicles/equipment with or without load which requires movement credit because of MLC, dimension or movement restrictions based on national requirements.

d. Trail officer. A subordinate commander in each column who travels at the rear of the column. His duties are to be determined by the column commander. His duties may include:

(1) Reporting type and location of dropped-out vehicles;

(2) Organising the safety measures at the rear of the column required at halts;

(3) Observing and reporting column discipline.

ANNEX B
TO STANAG 2154
(Edition 7)

DIFFERENCES IN NATIONAL MARKING OF COLUMNS AND LEGAL RIGHTS

Country: BE and DA

1. Legal rights. None.

Country: GE

2. Flagging.
   a. Columns consisting of three or more vehicles are to be marked by flags. All vehicles, except for the last vehicle, display a blue flag. The last vehicle displays a green flag.
   b. If a column is separated in several independent elements and if the distance between the last vehicle of the previous element of the column and the first vehicle of the following element exceeds the distance ordered between the individual vehicles, each element of the column is to be marked by flags according to the provisions for a column.

3. Lighting. During the day the headlights of all vehicles moving in column must be on.

4. Other provisions. In order to warn the following rapid traffic on highways and freeways, the last vehicle may display an omnidirectional amber light, or if this light is not available the last vehicle may display operating hazard warning lights instead.

5. Legal rights. Closed formations moving in column must leave gaps for the remaining traffic at appropriate intervals. Such traffic must not interrupt the column at any other point. Hence follows that a closed formation or an element thereof is to be considered one road user. That also applies at crossings and junctions. If a part of the formation has already moved into a crossing, the next

vehicle must not wait when a vehicle approaches on the road with right-of-way or from the right.

It

is, however, not justifiable that that right-of-way is called upon without warning the remaining road users.

The warning tasks (no traffic regulation) may be accomplished by military police forces or other military personnel unless police forces regulate the traffic. Military police forces or military personnel detailed for warning must be clearly recognisable as military traffic posts (warning posts), e.g. by brassards or respective clothing.

When accomplishing their tasks, military traffic posts are to use the same signals as prescribed for traffic regulation by police forces (STANAG 2025). Other signals to warn road users - where necessary and appropriate must, however, not be excluded. Warning of the other road users must not be accomplished as a traffic regulation function. Only the German Police has traffic regulation authority over civilian road users.

The priority rights of closed formations must not be called upon if:

- the traffic is regulated in another way by police forces;
- other road users call upon priority by displaying a blue flashing light together with a signal horn. Such vehicles must always be given free way;
- a threat to other road users cannot effectively be prevented by traffic regulation by police forces, warning by military police forces, or other military personnel detailed for that task. ~~That applies especially if the traffic is regulated by alternating lights, permanent lights (traffic~~ signals) or by the traffic signs "Stop! Give way" or "Give way!".

Country: GR

6. Lighting.
   a. The first vehicle of each element must display a blue filter on the fro nt left-hand side headlight or a blue light;
   b. The last vehicle of each element must display a green filter on the front left-hand side headlight or a green light.

7. Legal rights. If a part of the column/element, complying to the above stated national requirements, has already moved into a crossing, the next vehicles have right-of-way. This right should be exercised with necessary caution. Civilian drivers are not to disturb or obstruct a column.

Country: TU

8. Flagging.

A red flag must be displayed on vehicles, within a column, carrying dangerous cargo.

9. Legal rights. There are no special privileges for military columns.

Country: UK

10. Flagging and lighting. In UK the national regulations do not recognise column flagging and lighting of any sort. Only recognised with the services.

11. Legal rights. The UK has no special legal rights when operating with minimum flagging and lighting.

Country: IT

12. Flagging and lighting. See 11. "Minimum lighting and flagging”.

13. Other provisions. In each column of more than ten vehicles; the first and the last vehicle must be marked with two white ‘plates’ each (see Figure 4), to be displayed respectively

a. for the first vehicle (head):
   (1) at the front of the vehicle the plate with the inscription: INIZIO COLONNA (column head);
   (2) at the rear of the vehicle the plate with the inscription: FINE COLONNA (column tail);
b. for the last vehicle (tai l):
   (1) at the front of the vehicle the plate with the inscription: FINE COLONNA (column tail);
   (2) at the rear of the vehicle the plate with the inscription: INIZIO COLONNA (column head);

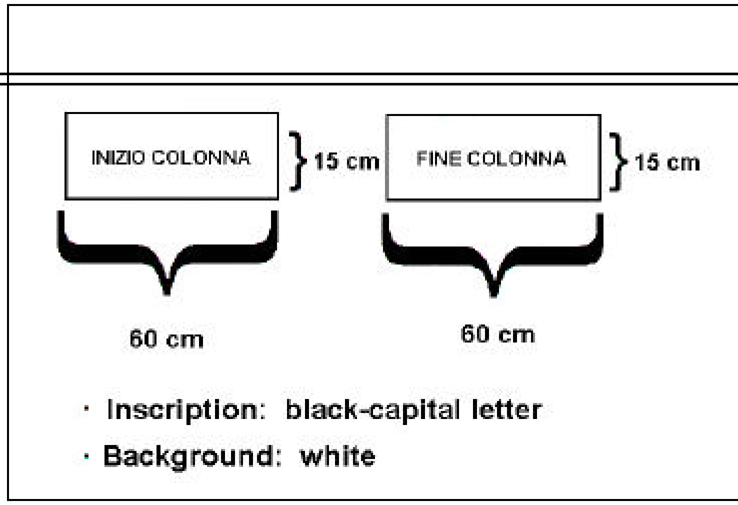

Figure 4

14. Legal rights. Closed formations moving in column must not be interrupted. So, civilian drivers are not to disturb or obstruct a column.

Country: NL

NL requirements for marking of columns in peacetime only:

15. Flagging.
   a. Two blue flags displayed on the first vehicle of an element mounted on the left- and right-hand front side of the vehicle;
   b. One blue flag displayed on each following vehicle of an element, except for the last vehicle, mounted on the right-hand front side of the vehicles;
   c. One green flag displayed on the last vehicle of an element mounted on the right-hand front side of the vehicle.

16. Lighting.
   a. Headlights (low beam) of all vehicles moving in column must be switched on at all times;
   b. Each vehicle except the last of each element must display a blue filter on the front right-hand side headlight;
   c. The last vehicle of each element must display a green filter on the front right-hand side headlight.

17. Legal rights. If a part of the column/element, complying to the above stated national requirements, has already moved into a crossing, the next vehicles have right of way. This right should be exercised with necessary caution. Civilian drivers are not to disturb or di srupt a

column.

Country: NO

18. Flagging.

a. Columns or elements of columns consisting of four or more vehicles are to be marked by flags and signs on the first and last vehicle.

b. One sign displayed at the front of the first vehicle and one sign displayed at the rear of the last vehicle of a column or element of columns stating "MILITAER KOLONNE" (Black capital characters on a white board, see Figure 5).

FIGURE 5

c. The yellow flag, for broken down vehicles, is not used in NO.

19. Legal rights. Columns complying to the above stated national requirements have right of way. This right should be exercised with necessary caution. Civilian drivers are not to disturb or obstruct a column.

Country: SP

20. Flagging.
A red flag must be displayed on vehicles carrying explosives or ammunition, dimensions are not regulated.

21. Lighting. See 11. "Minimum lighting and flagging". In order to warn the following rapid traffic on highways and freeways the last vehicle may display an omnidirectional amber light.

22. Other provisions. A hazard triangle must be displayed at the front of the first vehicle and at the rear of the last vehicle (see Figure 6).

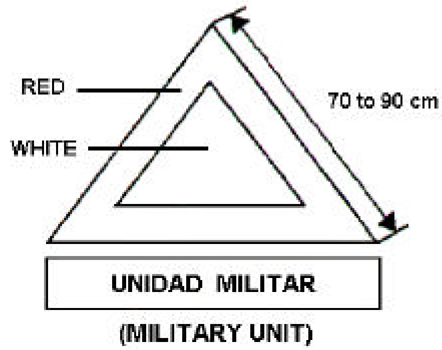

FIGURE 6

23. Legal rights. None.

ANNEX C
TO STANAG 2154
(Edition 7)

TABLE LISTING THE MINIMUM PERIOD OF TIME
~~FOR A MOVEMENT BID TO BE SUBMITTED~~
(In working days)

MOVEMENT \ NATION		BE	CA	DA	FR	GE	GR	IT	LU	NL	NO	PO	SP	TU	UK	US
NATIONAL MOVEMENT	COLUMN	10		15	5	5	5			5	10			14	5	
	EXCEEDING WEIGHT AND DIMENSIONS	15		15	10	10	10			5	10			14	5	
	DANGEROUS CARGO	10		15	5	5	10			5	10			14	5	
BORDERCROSSING MOVEMENT	COLUMN	15		15	10	15	10			10	10			14	10	
	EXCEEDING WEIGHT AND DIMENSIONS	15		20	10	15	10			10	10			14	10	
	DANGEROUS CARGO	15		20	10	15	10			10	10			14	10	

Figure 7

TABLE LISTING THE MINIMUM NUMBER OF VEHICLES FOR WHICH A MOVEMENT CREDIT IS REQUIRED

NATION		BE	CA	DA	FR	GE	GR	IT	LU	NL	NO	PO	SP	TU	UK	US
NUMBER OF VEHICLES	PEACETIME	20	31	31	10	31	1	7	20	10	20	10	*1	10	10	6
	WARTIME	20	31	31	20	31	1	*2	20	20	20	10	*1	10	10	6

Figure 8

*1: In SP a study is being conducted about this subject.
*2: In IT in time of crisis or war:
a. over controlled routes: a movement credit is allocated for convoy/columns of more than 19 vehicles
b. over supervised routes: the minimum number of vehic les by which a movement credit is determined by the Military Authority supervising the routes
c. over reserved routes: an authorization/movement credit is required for every movement, even in case of a single vehicle

SPECIAL MOVEMENT
VEHICLE DIMENSIONS AND WEIGHT LIMITS

All vehicles/equipment exceeding dimensions and weights listed below (Figure 9) must be considered as special movement and require a road movement credit.

COUNTRY	All measurements in meters								
	Width (including all projections)	Length of vehicles					total height (including load)	class MLC
		Single vehicles (prime mover)	Prime Mover and Trailer	total length: Tractor and semitrailer	total length: Semi-trailer	motor coach		
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)
BE	2,5	12	15,5	18	11	12	4	=<50
CA	2,6	12,2	20	23	-	12,2	4,15	*1
DA	2,55	12	16,5	18,5	12	12	4	*2
FR	2,5	12	16,5	18,35	12	12	-	=<50,*3
GE	2,55	12	15,5	18	12	12	4	*4
GR	2,5	*5	14	18	-	12	3,8	?
IT	2,5	*5	15,5	*6	12	12	4	*7,*8
LU	2,6	12	15,5	18	12	12	4	=<44
NL	2,6	12	15,5	18	-	12	4	*9
NO	2,5	12,4	17	18,5	-	12,4	3,8	=<50
PO	2,5	*10	18	12	12	12	4	=<50
SP	2,5	12	16,5	18	-	12	4	*11
TU	2,5	10	18	16	-	12	4	42
UK	2,5	12	18,35	18,35	14,04	12	4,2	=<50,*12
US	2,438	10,668	15,24	18,228	10,668	12,192	3,81	=<50

Figure 9

Explanatory notes to Annex E to STANAG 2154

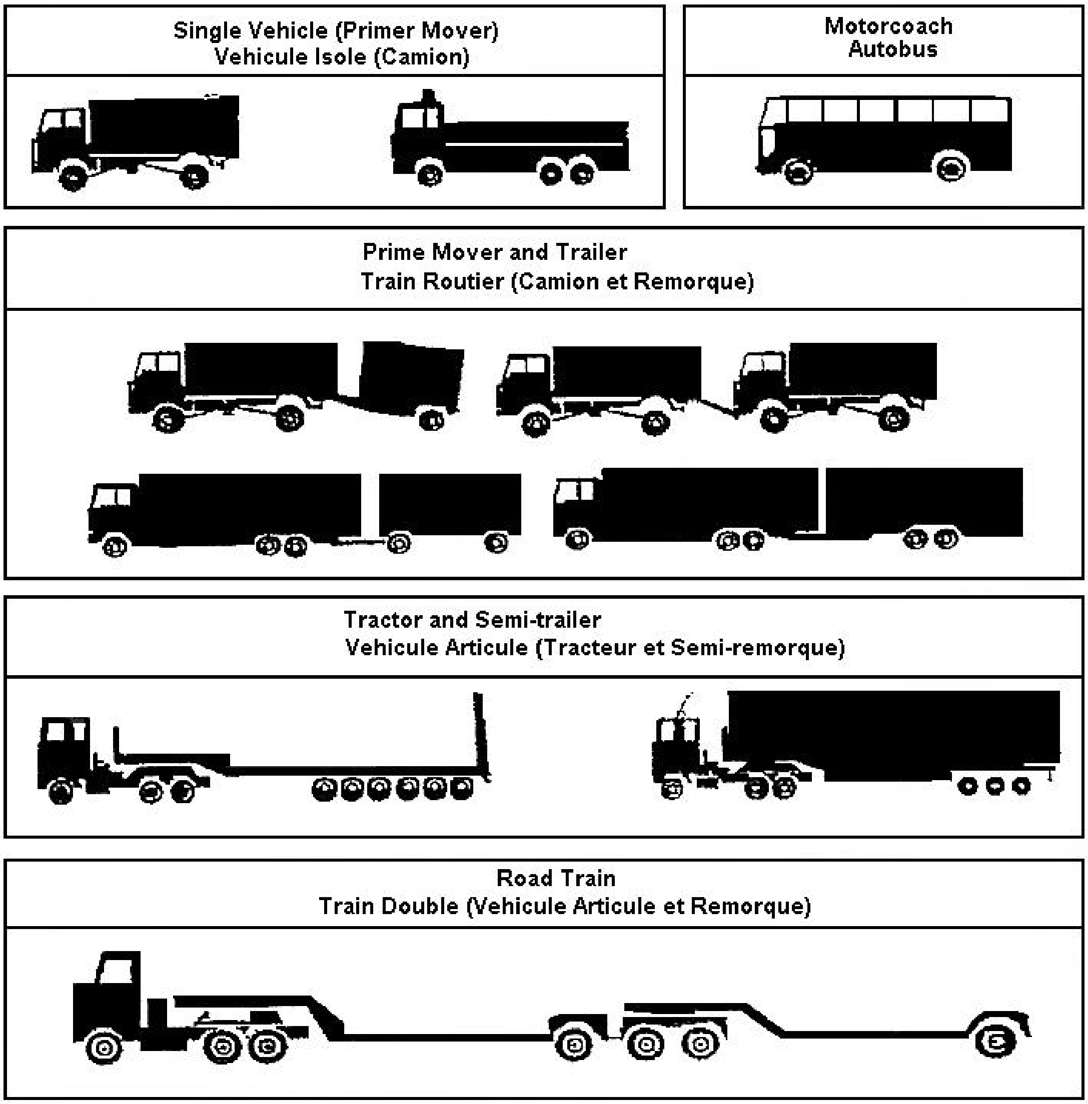

Figure 10: Possible vehicle combinations

Country: CA

*1 Generally in most provinces and designated highways, size limits exceed the limitations quoted. In some provinces, certain types of articulated trains are not permitted. Weight limitations are based on axle loads, axle spacing, and tir e size. They vary by provinces and designated highways. Restrictions on weight may be imposed during spring thaws.

Country: DA

Type of Vehicles	Permissible total weight			Permissible axle load		
	2 axles	3 axles	>=4 axles	per axle	bogie w/2 axles	bogie w/3 axles
Single Vehicle	18.0 t	24.0 t	29.5 t	10.0 t	16.0 t	24.0 t
Trailer	-	24.0 t	24.0 t	10.0 t	18.0 t	24.0 t
Semi-trailer	-	-	-	10.0 t	20.0 t	24.0 t
-tractor and semi trailer	-	-	48.0 t	-	-	-
-other types	-	-	44.0 t	-	-	-

Figure 11: Special Movement Regulations in DA

a. If the two front axles are steering, and the axle distance is less than 1.8 m, and, at the same time the distance between the front axle and the rear axle is more than 5.0 m, the permissible total weight can be extended up to 32 tonne.

b. This is, if the axle distance is 1.0 m to less than 2.0 m. For each single axle the permissible axle load may not exceed 8.0 tonne, if the axle distance is less than 1.3 m.

c. The permissible axle load for each single axle may not exceed 8.0 tonne. The total amount of permissible axle load may not exceed 22.0 tonne, if only one of the axle distances is less than 1.3 tonne.

d. If the axle distance is 1.0 m to less than 1.3 m, then 16.0 tonne. Less than 1.0 m max 11.0 tonne. If the total permissible axle load is exceeding 16.0 tonne, the permissible axle load on each single axle may not exceed more than 9.0 tonne. If the total permissible axle load is less than 16.0 tonne, then the permissible axle load may not exceed 8.0 tonne per axle.

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e. If the axle distance is 1.0 m to less than 1.3 m, then max. 22.0 tonne. Less than 1.0 m: max 21.0 tonne. This is, if only one of the axle distances is below the mentioned limits.

The above mentioned regulations regarding permissible axle load and total weight do not apply to block cars or engine driven vehicles which are only used as a drawing power.

Country: FR

Type of Vehicles	Permissible total weight			Permissible axle load	
	2 axles	3 axles	>=4 axles	per axle	bogie w/2 axles
Single Vehicle	19	26.0 t	32.0 t	13.0 t	21.0 t
Prime mover & Trailer	-	40.0 t	1)	13.0 t	21.0 t
Tractor & Semi-trailer	-	38.0 t	1) 2)	13.0 t	21.0 t

1) : Combined “Rail-Route” transport; 44,0 t
2) : 4 axles 33,0 t; 5 axles : 40,0 t

Figure 12: Special Movement Regulations in FR

Country: GE

*4 For vehicles and trailers with pneumatic tires, the permissible axle load must not exceed the following values:

a. Single axle load
(1) single axles 10.0 t
(2) single axles (live) 11.5 t

b. Double axle load, for motor vehicles taking into consideration the regulations for the single axle load
(1) axle distance less than 1.00 m 11.5 t
(2) axle distance 1.00 m to less than 1.30 m 16.0 t
(3) axle distance 1.30 m to less than 1.80 m 18.0 t
(4) axle distance 1.30 m to less than 1.80 m, if live axle has double tires and pneumatic suspension, or if each live axle has double tires and the permissible load of 9.50 t per axle is not exceeded 19.0t

c. Double axle load <u>for trailers</u> taking into consideration the regulation for the single axle load

(1)	axle distance less than 1.0 m	11.0 t
(2)	axle distance 1.0 m to less than 1.30 m	16.0 t
(3)	axle distance 1.3 m to less than 1.80 m	18.0 t
(4)	axle distance 1.8 m or more	20.0 t

d. <u>Triple axle load</u>, taking into consideration the regulations for the double axle load

(1)	axle distance 1.30 m or less	21.0 t
(2)	axle distance more than 1.30 m to 1.40 m	24.0 t

If vehicles are not equipped with pneumatic tires the maximum axle load must not exceed 4.00 t.

e. <u>Total weight</u> of individual vehicles, except for semi-trailers, taking into consideration regulations for axle loads

(1) Vehicles with not more than 2 axles:

(a)	vehicles or trailers	18.0 t

(2) Vehicles with more than 2 axles:

(a)	vehicles	25.0 t
(b)	vehicles with a double axle load according to Para b.(4)	26.0 t
(c)	trailers	24.0 t
(d)	buses which are constructed as articulated vehicles	28.0 t

(3) Vehicles with more than 3 axles

(a)	vehicles with 2 double axles, the centres of which are at least 4.00 m apart	32.0 t
(b)	vehicles with 2 steering axles and a double axle load according to Para b.(4) with the permissible load referring to the distance between the centres of foremost and rearmost axle not exceeding 5.00 t per meter, not more than	32.0 t

(4) Vehicles with more than 4 axles, taking into consideration the regulation under Para e.(3) — 32.0 t

f. <u>Total weight</u> of vehicle combinations (towing vehicles and semi-trailers) taking into consideration the regulations for axle loads and individual vehicles

(1)	vehicle combinations with less than 4 axles	28.0 t
(2)	two-axle vehicle with two-axle trailer	36.0 t
(3)	two-axle towing vehicle with two-axle semi-trailer	

(a)	with an axle distance of semi-trailer being 1.3 m or more	36.0 t
(b)	with an axle distance of semi-trailer exceeding 1.8 m, if live axle has double tires and pneumatic suspension, or is provided with equivalent suspension	38.0 t

(4) other vehicle combinations with 4 axles

(a) with towing vehicle according to Para e.2.(a) 35.0 t

(b) with towing vehicle according to Para e.2.(b) 36.0 t

(5) vehicle combinations with more than 4 axles 40.0 t

(6) three-axle vehicle with two- or three-axle semi-trailer which transports a 40 foot ISO container in combined freight traffic within the meaning of Directive 75/130/EEC, dated 17 February 1975, on the determination of common rules for specific transports in combined freight traffic rail/road between member nations (official EC Bulletin No. L48, p.31) latest amendment by Directive 86/544/EEC, dated 10 November 1986 (Official EC Bulletin No. L 320, p 33) 44.0 t

Country: GR and IT

*5 Motor vehicles with one rear-axle: 11 m (IT motor coaches excluded). Motor vehicles with two or more axles: 12 m.

Country: IT

*6 18 m; Less if turning radius (a) exceeds 12 m and/or circular crown of turning way (b) is more than 5.30 m (see Figure 13).

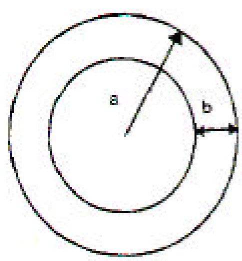

Figure 13

*7 =<50; highways can be considered up to class 120; in peacetime forbidden for tracked vehicles.

8 For vehicles and trailers with pneumatic tires the permissible axle load and the permissible total width must not exceed the following values:

a. Single axle load

(1) single axles 10.0 t

(2) single axles (live), except for two-axle buses 10.0 t

b. Double axle load, taking into consideration the regulations for the single axle load

(1) axle distance less than 1.00 m 11.0 t

(2) axle distance 1.00 m to less than 1.30 m — 16.0 t

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(3) axle distance 1.30 m to less than 1.80 m — 18.0 t
(4) axle distance more than 1.90 m — 20.0 t

c. Triple axle load, taking into consideration the regulations for the single axle load and the double a xle load
(1) axle distance 1.30 m or less — 21.0 t
(2) axle distance more than 1.30 m to 1.40 m — 24.0 t

d. Total weight of individual vehicles, except for semi-trailers, taking into consideration the regulations for axle loads
(1) vehicles with not more than 2 axles:
(a) vehicles — 16.0 t
(b) vehicles with live axle according to point a. (2) — 17.0 t
(c) trailers — 18.0 t

(2) vehicles with more than 2 axles:
(a) vehicles and trailers — 24.0 t
(b) buses which are constructed as articulated vehicles — 28.0 t
(c) vehicles with 2 double axles, the centres of which are at least 4.00 m apart — 32.0 t

e. Total weight of vehicle combinations (towing vehicles and semi-trailers) taking into consideration the regulations for axle loads and individual vehicles
(1) vehicle combinations with less than 4 axles — 27.0 t
(2) two-axle vehicle with two-axle trailer or semi-trailer — 35.0 t
(3) other vehicle combinations with 4 axles — 34.0 t
(4) vehicle combinations with more than 4 axles — 40.0 t
(5) three-axle vehicle with two- or three-axle semi-trailer which transports a 40 foot ISO container in combined freight traffic within the meaning of Directive 75/130/EEC on the determination of common rules for specific transports in combined freight traffic between member nations in the version dated 28 July 1982 (Official EC Bulletin No. L247, page 6) — 44.0 t

Country: NL

*9 Maximum:

total weight:	50,000 kg (50 tonnes);
single axle load:	10,000 kg (10 tonnes);
double axle load:	18,000 kg (18 tonnes);
double axle load:	20,000 kg (20 tonnes), if axle distance >2,00 m;
triple axle load:	24,000 kg (24 tonnes).

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Country: PO

*10 15m; for container transporters a maximum length of 15.50 m is allowed.

Country: SP

*11

Max. load per single axle	13 t
Max. load per tandem axle	21 t

(Two single axles separated 1.5 m. or less are considered a tandem axle)

From a separation of 1.35 m. down, the maximum limit of 21 t has to be reduced in 700 kg for each decrease of 0.05 m. in the distance between the twin axles.

~~Vehicles with two axles, max weight~~	~~20 t~~
Vehicles with three axles, max weight	26 t
Vehicles with more than three axles, max weight	38 t
Combined or articulated vehicles, max weight	38 t
Max load density between farthest axles:	5 t per meter
Max pression to the road:	9 kg per square/cm

Country: UK

*12 In UK the legal limit is effectively 13.6 m for the semi-trailer and the overall combination limit of prime mover and semi-trailer is limited to 16.5 m.

A trailer with at least 4 wheels (and one which is not a semi-trailer or composite trailer) being drawn by a goods vehicle with a maximum gross weight exceeding 3,500 kg may have a maximum length of 12 m. Any other trailer is limited to a maximum of 7 m.

For a large motor coach fitted with seating for more than 8 passengers and which is able to turn within a circle of 24 m diameter maximum and an inner circle of 10.6 m diameter maximum, the overall length may be no more than 12 m.

For a large motor coach (see Note 12) the maximum height is 4.57 m. For tractor and semi-trailer combinations there is a limit of 4.2 m. Certain vehicles or combinations over 3.66 m, e.g. carrying containers or heavy plant, must carry a note in the vehicle cab which states the height in feet and inches .

APPENDIX C

EXTRACT OF STANAG 2174 (EDITION 4)
MILITARY ROUTES AND ROUTE/ROAD NETWORKS

Annexes : A. Hazard Warning Signs
B. Blackout Signs, Warning, Enforcement and Relaxation Signs
C. Guide Signs

Related documents :

STANAG 2002 NBC	-	Warning Signs for the Marking of Contaminated or Dangerous Land Areas, Complete Equipments, Supplies and Stores
STANAG 2010 ENGR	-	Military Load Classification Markings
STANAG 2021 ENGR	-	Military Computation of Bridge, Ferry, Raft and Vehicle Classifications
STANAG 2025 M&T	-	Basic Military Road Traffic Regulations
STANAG 2035 OP	-	Signing of Headquarters and Installations
STANAG 2036 ENGR	-	Land Mine Laying, Marking, Recording and Reporting Procedures
STANAG 2154 M&T	-	Regulations for Military Motor Vehicle Movement by Road
STANAG 2159 M&T	-	Identification of Movement Control and Traffic Control Personnel and Agencies
APP-6	-	Military Symbols for Land Based Systems

European Rules Concerning Road Traffic Signs and Signals (1974) (1)

AIM

1. The aim of this agreement is to standardize the method and procedures used on military routes and route/road networks by the NATO Forces.

AGREEMENT

2. Participating nations agree to adopt the methods and procedures outlined in this Agreement as a basis for the classification, the signing and the lighting of military routes and route/road networks, and for ensuring the visibility of traffic control personnel at night.

---

(1) This document arises from the Geneva Convention and incorporates subsequent protocols and agreements.

GENERAL

3. The Agreement is divided into five parts:

Part 1	-	Route Classification
Part 2	-	Route Signing
Part 3	-	Lighting
Part 4	-	Visibility of Military Traffic Control Personnel at Night
Part 5	-	List of Relevant Definitions

PART 1 - ROUTE CLASSIFICATION

GENERAL

4. Route classification enables the authorities responsible for the organization of movement and transport to assess more easily the characteristic of a route network or routes. The following factors are involved, which are subsequently explained in detail:

a. Width of route in metres or feet (see paragraph 5).

b. Type of route (see paragraph 6).

c. Military load classification (see paragraphs 7, 8, and 9).

d. Overhead clearance in metres or feet (see paragraph 10).

e. Obstructions to traffic, if any (see paragraph 13).

WIDTH

5. a. The width of a route, for any given section, is that of the narrowest part of its travelled way and is expressed in metres or feet.

b. The number of lanes is determined by the width of the travelled way. The width of lane normally required for wheeled vehicles is estimated at 3.50 m (11.5 ft.) and for tracked combat vehicles 4 m (13 ft.).

c. According to the number of lanes, a road or route can be classified as follows:

(1) Limited Access - permits passage of isolated vehicles of appropriate width and in one direction only.

(2) Single Lane - permits use only in one direction at any one time. Passing or movement in the opposite direction is impossible.

(3) Single Flow - permits passage of a column of vehicles and allows isolated vehicles to pass or travel in the opposite direction at predetermined points. It is desirable that such a route/road be at least 1+1/2 lanes wide.

(4) Double Flow - permits two columns of vehicles to proceed simultaneously. Such a route/road must be at least 2 lanes wide.

d. The table and diagram below illustrates the various measurements applicable to road width and traffic flow possibilities:

Flow Possibilities	Road/Route Widths
Limited Access	Up to 3.5 m (11'6") incl.
Single Lane	Between 3.5 m (11'6") and 5.50 m (18 ft.) incl.
Single Flow	Between 5.50 m (18 ft.) and 7.30 m (24 ft.) incl.
Double Flow	Over 7.30 m (24 ft.)

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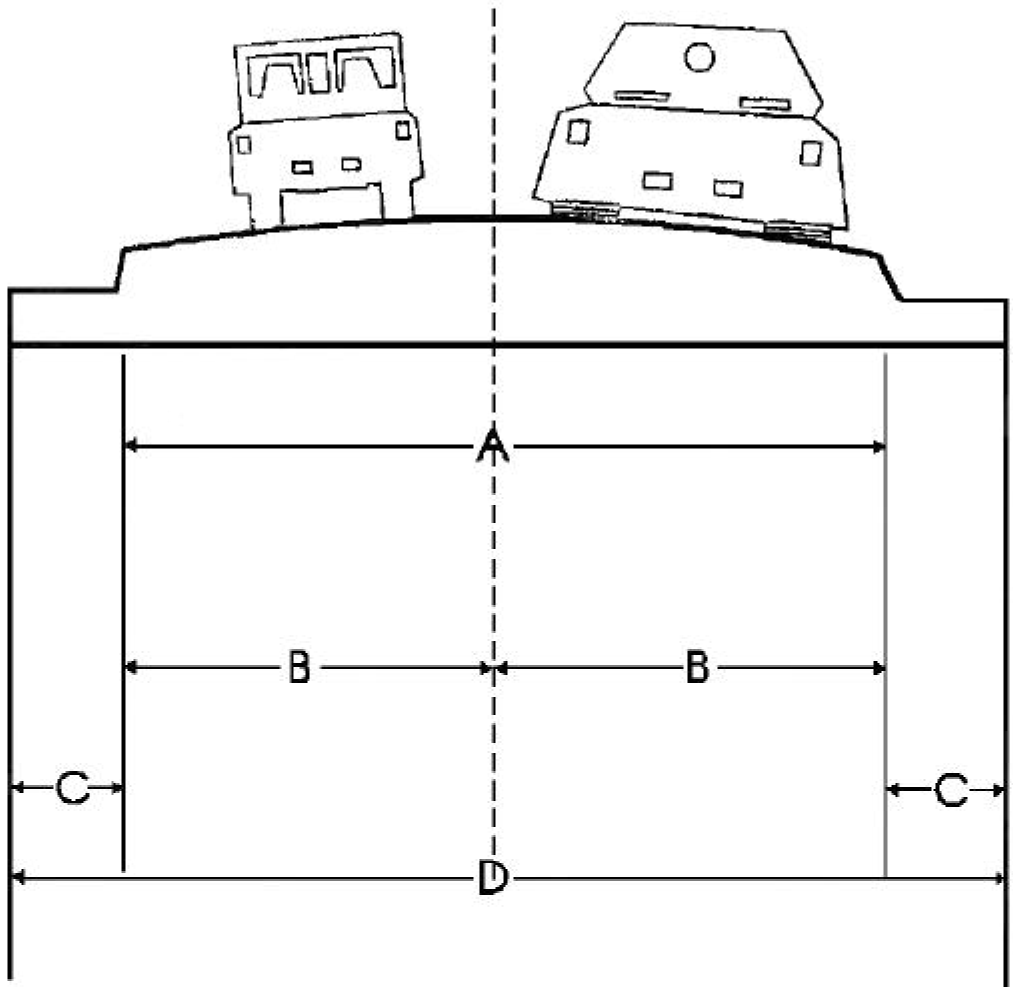
ROAD CHARACTERISTICS



A. Width of travelled way.
B. Width of lane.
C. Width of hard shoulder.
D. Width of grading.

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TYPE OF ROUTE

6. On the basis of their ability to withstand the effects of the weather, routes are divided into three types:

a. Type X--All-Weather Route. Such a route has the following characteristics:

(1) With reasonable maintenance, passable throughout the year to a volume of traffic never appreciably less than its maximum capacity.

(2) Normally formed of roads which have waterproof surfaces and are only slightly affected by rain, frost, thaw, or heat.

(3) Never closed because of weather effects other than snow or flood blockage.

b. Type Y--Limited All-Weather Route. Such a route has the following characteristics:

(1) With reasonable maintenance, passable throughout the year but at times the volume of traffic is considerably less than maximum capacity.

(2) Normally formed of roads which do not have waterproof surface and are considerably affected by rain, frost, thaw, or heat.

(3) Closed for short periods of up to one day at a time by adverse weather condition during which heavy use of the road would probably lead to complete collapse.

c. Type Z--Fair-Weather Route. Such a route has the following characteristics:

(1) Passable only in fair weather.

(2) So seriously affected by adverse conditions that the route may remain closed for long periods.

(3) Improvement of such a route can only be achieved by construction or realignment.

MILITARY LOAD CLASSIFICATION

7. The military load classification of a route is a class number which represents the safe load carrying capacity of the route and indicates the maximum vehicle class that can be accepted under normal conditions. (The maximum class of vehicles which can safely use the route and will usually be that of the weakest bridge on the route--see STANAG 2021).

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8. To facilitate movement, routes included in a low class network but over which heavier equipment can be moved are regrouped in broad categories:

a.	Average traffic routes	-	Class 50.
b.	Heavy traffic routes	-	Class 80.
c.	Very heavy traffic routes	-	Class 120.

9. Whenever possible the basic military route network should include very heavy traffic routes.

OVERHEAD CLEARANCE

10. Overhead clearance is the least vertical distance between the route/road surface and any obstruction above it which denies use of the route/road to all vehicles or loads which exceed this height.

ROUTE CLASSIFICATION FORMULA

11. Route classification may be expressed by a formula incorporating the factors given in paras 5 to 10 above. For example, the formula for a 10 m (33 ft) wide "all weather" route with a class 80 load restriction, a height restriction of 4 m (13 ft) may be expressed as follows:

10m/x/80/4m or 33ft/x/80/13ft.

12. It must be noted that the lowest classification encountered on a route will determine the overall classification of that route.

13. If there is a temporary obstruction or single obstruction other than a bridge, or should there be special conditions described below, the overall classification will not be altered. However, these factors should be included in the route classification formula as they could affect movement over a route until conditions return to normal. The symbols to be included is the formula are as follows:

a. Temporary or Single Obstructions: the formula for a route will be followed by"(OB)".

b. Snow Blockage: where snow blockage on a route is regular, recurrent and serious, the formula for classifying a route will be followed by "(T)".

For example:
6 m/Y/50(T) and or 20 ft/Y/50 (T) and
6 m/Y/50(OB) (T) 20 ft/Y/50 (OB) (T).

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c. Flooding: where flooding is regular, recurrent and serious, the formula for classifying a route will be followed by “(W)”. For example:

6 m/Y/50 (W) and	or	20 ft/Y/50 (W) and
6 m/Y/N/50 (OB) (W)		20 ft/Y/50 (OB) (W).

TRAFFIC FLOW

14. The traffic flow is the total number of vehicles passing a given point in a given time. It is expressed as vehicles per hour (VPH) (AAP-6). It is dependent on the factors above. From these are derived:

a. Route/Road Capacity (Expressed in Vehicles). The maximum traffic flow (VPH) in one direction over a particular road or route. It cannot be greater than the maximum traffic flow at the most restricted point on the road or route (When the road is to be used in both directions this should be noted and the two capacities can be reduced accordingly).

b. Route/Road Capacity (Expressed in Tons). The maximum number of tons that can be moved in one direction over a particular road or route in one hour. It is the product of the Route Capacity (Vehicles) and the average payload of the vehicles using the road or route. (When the road is to be used in both directions this should be noted and the two capacities can be reduced accordingly).

c. Potential. For planning purposes it would be useful that the potential of a route should be expressed in diagrams, tables and maps (by road sections) by:

(1) Road capacity (in vehicles per hour--one-way traffic or two-way traffic).

(2) Number of lanes (normal vehicles).

(3) Load class (tracked vehicles, one-way).
(Example: 900/2/80/780 means a route with a one-way traffic capacity of 900 VPH, 2 lanes, class 80; or a two-way traffic capacity of 780 VPH).

PART 2 -ROUTE SIGNING

PURPOSE OF SIGNS

15. The purpose of a route signing system is to enable movement by day and by night without difficulty on any territory, including the blackout zone, whether controlled by the operational

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military command or a national authority. This system will be capable of being integrated with any existing civil system to meet any specifically military requirement.

AUTHORITY FOR MILITARY ROUTE SIGNING

16. The authority for military route signing is vested in the senior headquarters controlling the particular route network. This headquarters will be responsible for ensuring that military route signing is integrated with any existing civil system, and is in accord with any existing agreements with national authorities. Routes may be signed by a unit on its own initiative under the conditions prescribed by the commander or the movement instructions and in accordance with para. 15 above.

TYPES OF MILITARY SIGNS TO BE USED

17. In any area under military control, the additional signing inside such areas to be set up as required, will be in accordance with the system for military route signing as laid down in this agreement. All military route signs fall into one of three categories:

a. Hazard Signs. Signs used to indicate traffic hazards, e.g., dangerous corners, steep hills, or crossroads. In the communication and rear combat zones, military hazards signs should only be used in accordance with existing agreements with national authorities, and in very exceptional circumstances.

b. Regulatory Signs. Signs used by competent authority to regulate and control traffic (AAP-6). They may also be used to define the light line. (Examples of such signs are in Annex B).

c. Guide Signs. Signs used to indicate locations, distances, directions, routes and similar information (AAP-6) (Examples of these signs are in Annex C).

Note: Contaminated, Dangerous Land Areas and Minefields

The signs for these areas are not within the scope of STANAG 2174. (Reference should be made to STANAGs 2002 and 2036.)

SHAPE AND COLOUR OF SIGNS

GENERAL

18. All military route signs are to conform with the signs included in the Geneva Convention as far as possible in shape, size, and colouring. Details are shown in Annexes A, B, and C.

19. Hazard Warning Signs. Hazard warning signs will be triangular in shape and will conform to the Geneva Convention. Where no suitable symbol exists within the Geneva Convention, a

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rectangular placard is to be affixed below the hazard warning sign with an explanatory legend. Details are shown in Annex A.

20. Regulatory Signs. Regulatory signs will conform to the shape, size, and colours of Geneva Convention signs with the following exceptions:

a. Military Load Classification Markings. Bridges will be marked with Military Load Classification Marking in accordance with STANAG 2010.

b. Blackout Signs:

(1) Blackout Warning Sign. This sign will be based on the Geneva Convention hazard warning sign with the legend and any distance indication mounted on rectangular plaques beneath the warning signs.

(2) Blackout Enforcement Sign. This sign will have the Geneva Convention prohibitory sign with the words "VEHICLES LIGHTS FORBIDDEN" on a plaque affixed below the prohibitory sign.

(3) Blackout End Sign. Details of these signs are in Annex B.

c. Special Provisions. For civilian purposes, the military might be requested to erect signs or to ask the civil authorities to do so. If provision is made for suitable signs in the existing system, they must be used.

21. Guide Signs. Guide signs will be rectangular in shape with the long axis vertical. They will have a black background on which the legend or symbol will be superimposed in white. Exceptions to this rule are as follows:

a. Detour Signs. The detour sign will be a black arrow, barred or not, on a white square, placed with one diagonal vertical; as illustrated in Annex C. The number of the diverted main route will be shown either:

(1) Painted in black above the arrow, or

(2) Added under the square by means of the small panels already provided for the guide signs for routes.

b. Directional Discs. These will be circular in shape and will be inscribed with a black arrow, on a white background. (Examples are in Annex C).

(1) The discs will be used in addition to other guide signs to indicate the direction of a route. These may be used with the distinguishing signs of a

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major formation or a large unit to indicate the route of that formation or unit.

(2) Battalions and lower formations may not use this directional disc. They may, however, use directional arrows (see subparagraph c. below).

c. Directional Arrows. These signs are to be used by battalions and lower units. The arrows should be black on a white background and bear the identification symbol of the unit in question. They may be of a similar type to that shown in Annex C. The arrows should be installed shortly before the passage of the column and should be removed as soon as possible after the end of the column has passed.

d. Military Casualty Evacuation Route Signs:

(1) These will normally be rectangular signs with a white background on which the following information will be inscribed in red:

(a) Directional arrow.

(b) Cross or crescent.

(c) The word "Military" in the language of the force erecting the sign.

(d) Unit or subunit designation in abbreviated form or using military symbols.

(e) Additional information, such as formation or national markings.

(2) As an alternative, a normal directional disc with four segments cut out to give a cruciform shape or a directional disc with a crescent may be used as a background. The information shown will be similar to that above.

(3) Examples of these signs are in Annex C.

e. Civilian Casualty Evacuation Route Signs. These may be a Geneva Convention Informative sign, blue in colour with the silhouette of an ambulance in white with red cross or crescent on the silhouette. A supplementary placard bearing the words "Civilian Casualty Evacuation Route" in the language of the host nation, is affixed beneath the sign. (An illustration of this sign is in Annex C).

f. For HQs and Dumps the signs will also be marked with the appropriate symbols in accordance with APP-6 (See also STANAG 2035).

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g. For Traffic Posts and Regulating Headquarters. Guide signs will consist of the agreed operational conventional symbol together with the direction and distance to the Traffic Post or Regulating Headquarters indicating there on. (See APP-6).

22. Alternative Colour in Snow Conditions. In constructing purely military signs, yellow may be used instead of white if the sign is to be used during prolonged snowfall conditions, or is to be permanently erected in an area which is annually subject to prolonged snowfalls.

DIMENSIONS OF SIGNS

23. Signs must be sufficiently large to be easily read but need not be constructed to a standard size except that:

a. Signs for international use are not to be less than 40 cm x 33 cm (16 in x 13 in).

b. Military Load Classification Markings are to conform to the dimension specified in STANAG 2010.

c. Directional discs are not to be less than 30 cm (12 in) in diameter and will have eight holes drilled at equal intervals around the circumference to allow the disc to be erected with the arrow pointing in the appropriate direction.

IDENTIFICATION OF MILITARY ROUTES

24. Route Identification Numbers.

a. Each axial and lateral route will be allotted one route number, which is to be used to describe the route throughout its length.

b. Axial routes will be given odd numbers and are shown on a tracing or map by continuous lines.

c. Lateral routes will be given an even number and are shown on a tracing or map by broken lines.

d. Connecting routes will be given a number formulated on b. or c. above followed by a serial number and will be shown on a tracing or map by dotted lines.

e. The Theatre Commander is responsible for allotting blocks of numbers to the Army Group, etc. operating in his theatre, in accordance with paragraphs 24.a. to d. above.

f. Formation (Brigade or equivalent and above) axis may be signed.

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(1) In the case of routes of the manoeuvre network (axial or lateral) by supplementing the route number with a separate and removable formation sign, letter, colour, or emblem. These additional signs should be used only as a temporary measure.

(2) In all other cases with the removable formation sign (letter, colour, or emblem).

25. Military Routes Markers

a. The legend on a route marker (i.e., a guide sign used to indicate a route) will consist of the route number on an appropriate directional disc.

b. Commanders may supplement for their own purposes the route number system with a pictorial symbol and/or name (e.g. dog, hen).

c. Route markers should show the direction of the traffic. In this case of axial routes, differentiation between the stream of traffic moving to the front and the stream moving to the rear will be by the use of different types of arrows. The stream moving to the front will be indicated by a plain arrow; that to the rear by an arrow with a bar at its tail. On route signs for lateral routes, the standard letters N, E, S, W, NE, SE, NW, and SW will be used to indicate the general direction of movement of each traffic stream.

d. Examples of military route markers are given in Annex C.

SIGNS OUTSIDE BUILT-UP AREAS

26. The military signs described above should be placed so that they provide adequate warning and reaction time for military drivers but do not obscure existing civilian signs. As a general rule, the placement of signs will conform to the following guidelines:

a. Signs shall be placed on that side of the road used by the traffic, 0.60 m (2 ft) off the travelled way, and the sign panels should be from 1 to 2m (3 to 7 ft) above the level of the road.

b. Hazard signs should be placed approximately 150 m (160 yards) in advance of the hazards.

c. Regulatory signs should be placed at the exact location at which the regulation applies, but panels used as warnings should be placed at a convenient distance from the point where the regulation is applicable; this distance may be indicated on the panel (e.g., Blackout 500 m [550 yards]).

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d. Guide signs should be placed in such a manner as to eliminate possible confusion at road junctions; if necessary, both sides of the road to be followed will be signed, and in any event confirmatory guide signs will be placed 150 m (160 yards) after the junction.

e. Detour signs, when used in conjunction with other general traffic signs, should be placed beside the general sign approximately 150 m (160 yards) in advance of the detour, and on that side (left or right) of the general sign which corresponds to the new direction to be taken.

PART 3 -LIGHTING

GENERAL CONDITIONS FOR LIGHTING

27. The conditions under which military traffic will move at night will be determined by the Commander in relation to the enemy threat, and, as far as possible, with due regard to regulations in force in the host country. Such conditions may be directly imposed on operators by this threat (especially in the case of air raid warnings). These conditions may be as follows:

a. Normal Lighting Conditions. Normal lighting is prescribed or authorized by the low of a given country without restrictions for military reasons.

b. Reduced Lighting Conditions. The expression “Reduced Lighting Conditions” implies that the brightness of all exterior and interior lights must be reduced by power reduction or screening in such a way that the direction or reflected light visible to an aerial observer is limited to a minimum which will permit military vehicles, either singly or in column:

(1) To travel as fast as possible compatible with safety.

(2) To brake in time.

(3) To see the side of the road.

c. Blackout Conditions. The expression “Blackout Conditions” implies either:

(1) Total blackout, in which all lights are extinguished, or

(2) Partial blackout, in which lights are used which cannot be spotted by enemy observation, but which prevent collision by showing the position of the vehicle to either road users.

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ILLUMINATION OF SIGNS

28. The appropriate authority responsible for military route signing in an area will specify those signs which must be illuminated. Primary consideration will be given to danger or warning signs and signs indicating a change of direction. Under the various lighting conditions outlined above, signs shall be illuminated as follows:

a. Normal Lighting Conditions. Under normal lighting conditions, signs must be clearly visible during the hours of darkness and in any other condition of restricted visibility.

b. Reduced Light Conditions. Under these conditions the positioning of the signs and the methods adopted to render them visible (illumination, reflection) must enable them to be seen by drivers whose vehicles have lights fitted with screening devices.

c. Blackout Conditions. Under blackout conditions the requirement for any system of illuminating route/road signs are as follows:

(1) The route/road traffic sign will be provided with an upper mask which would prevent the light from being seen from above.

(2) The intensity of the light illuminating the route/road traffic sign will be such that it would not be possible for a pilot flying higher than 150 m (500 ft) to locate the sign or the reflection of the light on other adjacent surfaces.

(3) Where possible, the light will be oriented that to truck drivers sitting in the cabs of their vehicles, it would be visible at a minimum distance of 100 m (110 yards) and readable at a distance of 30 m (33 yards).

EQUIPMENT FOR ILLUMINATING SIGNS

29. It is not considered necessary to standardize the equipment to be used; however, the following characteristics are desirable. The equipment should:

a. Be capable of providing the illumination for a minimum period of 15 hours without refuelling or change of batteries.

b. Permit rapid and easy replacement of the power source under wartime conditions.

c. Be shock-resistant, fireproof, and damp and weatherproof.

d. Be simple to operate.

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e. When based on an independent light source, be of light weight, easy to store, and easy to transport in small vehicles.

f. Be easy and quick to place in operation.

INDICATION OF LIGHT LINE

30. The light line will be indicated by a BLACKOUT panel preceded by two warning panels corresponding to the example shown in Annex B. These warning panels will be placed to the best advantage in relation to the situation and the nature of the ground, in accordance with the instructions of the Command responsible for traffic control in the area in question.
Locations of panels will be:

a. The first, preferably at a distance varying between 1 km (1,100 yards) and 500 m (550 yards).

b. The second, preferably at a distance varying between 500 m (550 yards) and 200 m (220 yards).

At the end of the restriction a relaxation sign as illustrated in Annex B will be displayed.

31. These distances are given as an indication only; it may be useful in certain cases to spread these panels over a much greater distance. However, the distance between the first warning panel and the sign indicating the light line must under no circumstances exceed 10 km (7 miles). In the black section of the rectangular warning the distances separating this panel from the sign indicating the light line will be shown in white figures.

PART 4 - VISIBILITY OF MILITARY TRAFFIC CONTROL PERSONNEL AT NIGHT

VISIBILITY

32. It will be the responsibility of each NATO country to ensure that military traffic control personnel, when on duty, are readily visible to drivers at night, whether under Normal Lighting, Reduced Lighting, or Blackout Conditions.

EQUIPMENT

33. Traffic control personnel, in addition to wearing the distinguishing cuff, will be equipped with a luminous or illuminated appliance for directing the movement of traffic. This appliance must comply with the visibility requirements appropriate to condition of movement at night in force at the time.

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PART 5 - LIST OF RELEVANT DEFINITIONS

MILITARY LOAD CLASSIFICATION

34. The military load classification of a route is a class number which represents the safe load carrying capacity of the route and indicates the maximum vehicles class that can be accepted under normal conditions.

OVERHEAD CLEARANCE

35. Overhead clearance is the least vertical distance between the route/road surface and any obstruction above it which denies use of the route/road to all vehicles or loads, which exceed this height.

ROUTE CLASSIFICATION FORMULA

36. The road formula shows, in a combination of letters and figures, the main characteristics of a road section that are expressed as follows:

a. Limiting factors.

b. Width of travelled way.

c. Obstructions, if applicable.

IMPLEMENTATION Of THE AGREEMENT

37. This STANAG will be considered to have been implemented when the necessary orders/instructions bringing into use the documents mentioned in this Agreement, have been issued to the forces concerned.

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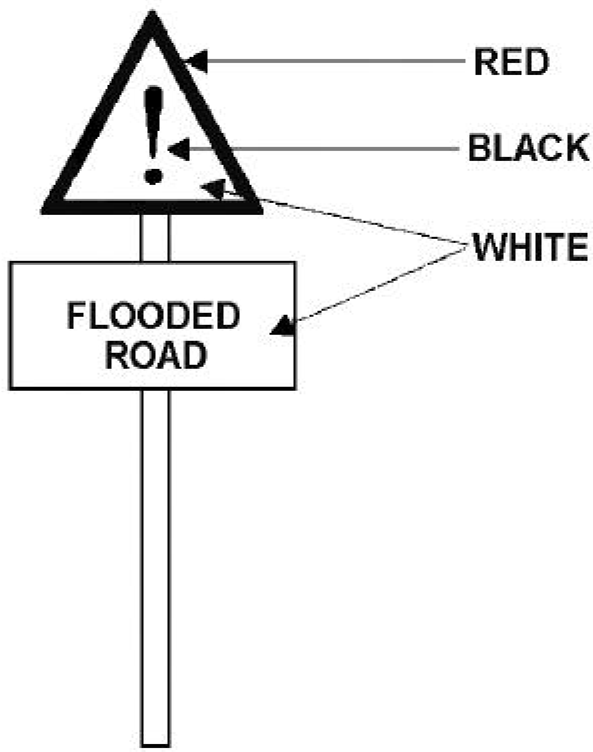
ANNEX A TO
STANAG 2174
(Edition No 4)

HAZARD WARNING SIGNS

Military Signs not included in the Geneva Convention

Black symbol or legend on a white background affixed beneath Geneva Convention general hazard warning sign.



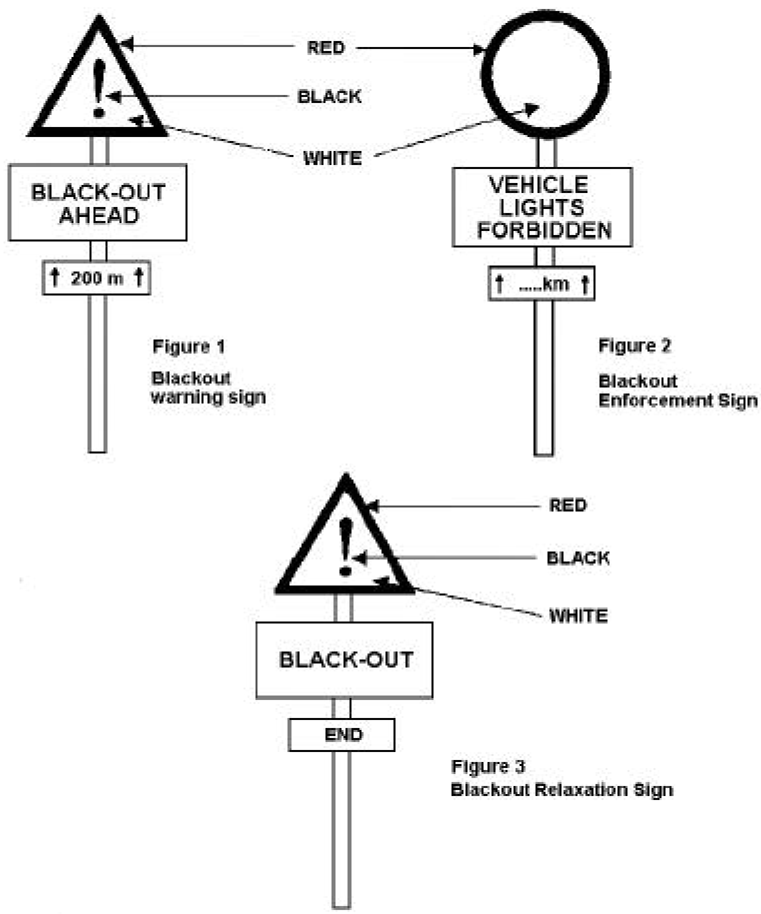
In such cases the language or languages used will be determined by the authority erecting the sign.

ANNEX B TO
STANAG 2174
(Edition No 4)

BLACKOUT SIGNS, WARNING, ENFORCEMENT, AND RELAXATION SIGNS

1. Blackout warning, enforcement, and relaxation signs are illustrated below.

2. The warning sign shall indicate the distance from the commencement of the blackout enforcement area.



3. The enforcement sign will indicate the distance for which the Blackout restrictions are operative.

ANNEX C TO
STANAG 2174
(Edition No 4)

GUIDE SIGNS

1. **ROUTE MARKERS**. The following are examples of route markers (colours are black and white):

Figure 1A
Axial Route 205
Front going traffic straight on

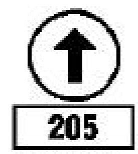


Figure 1B
as for 1A

Figure 2A
Axial Route 205
Front going traffic turn right

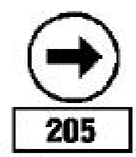


Figure 2B
as for 2A

Figure 3A
Axial Route 205
Rear going traffic straight on

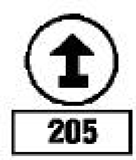


Figure 3E
as for 3A

Figure 4A
Axial Route 205
Rear going traffic turn right

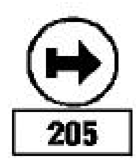


Figure 4B
as for 4A

Figure 5A
Lateral Route
North going traffic turn right

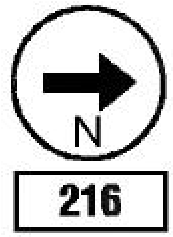


Figure 5B
as for 5A

2. **DETOUR SIGNS**

Figure 6A
Detour to Axial Route 205

Figure 6B
as for 6A

Figure 7A
Detour to Axial Route 205
Rear going traffic turn right

Figure 7B
as for 7A

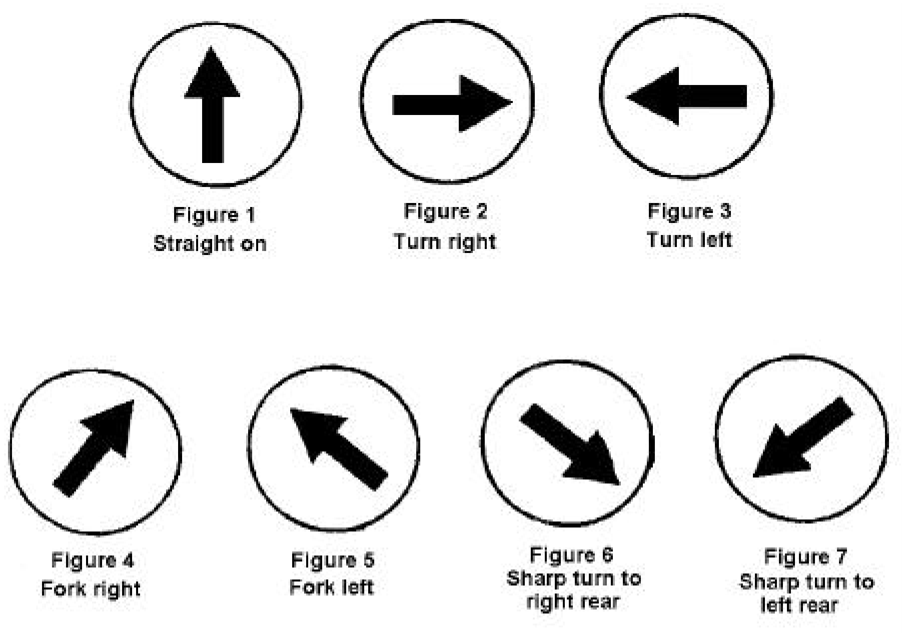
NOTES:

a. Figures 1A to 7A show the normal route and detour markers.

b. Figures 1B to 5B show the alternative route markers which can be prepared with directional discs and Figures 6B and 7B show alternate detour signs. In these cases the indication of the route markers is shown under the directional disc or sign.

3. **DIRECTIONAL DISCS**

a. Directional discs (black arrow on white circular background) will be used to indicate the following on axial and lateral routes.



b. Directional discs used on axial routes with stream of traffic moving from the front line to the rear is to be of the "barred arrow". They are to give the same indications as in Figures 1 through 7 above.

c. Normal directional discs (i.e., those with a black arrow on a white circular background) are to be used in all cases except on detours, when the detour signs (i.e., those with a black arrow on a white square background, placed with one diagonal vertical) are to be used.

d. The use of the directional discs as given above in no way supersedes the use of regulatory signs provided for in the Geneva Convention 1973 and in Annex B. These regulatory signs are to be used in addition to the directional discs which only indicate a route to be followed. In due course, special signs may be used to replace temporary directional discs.

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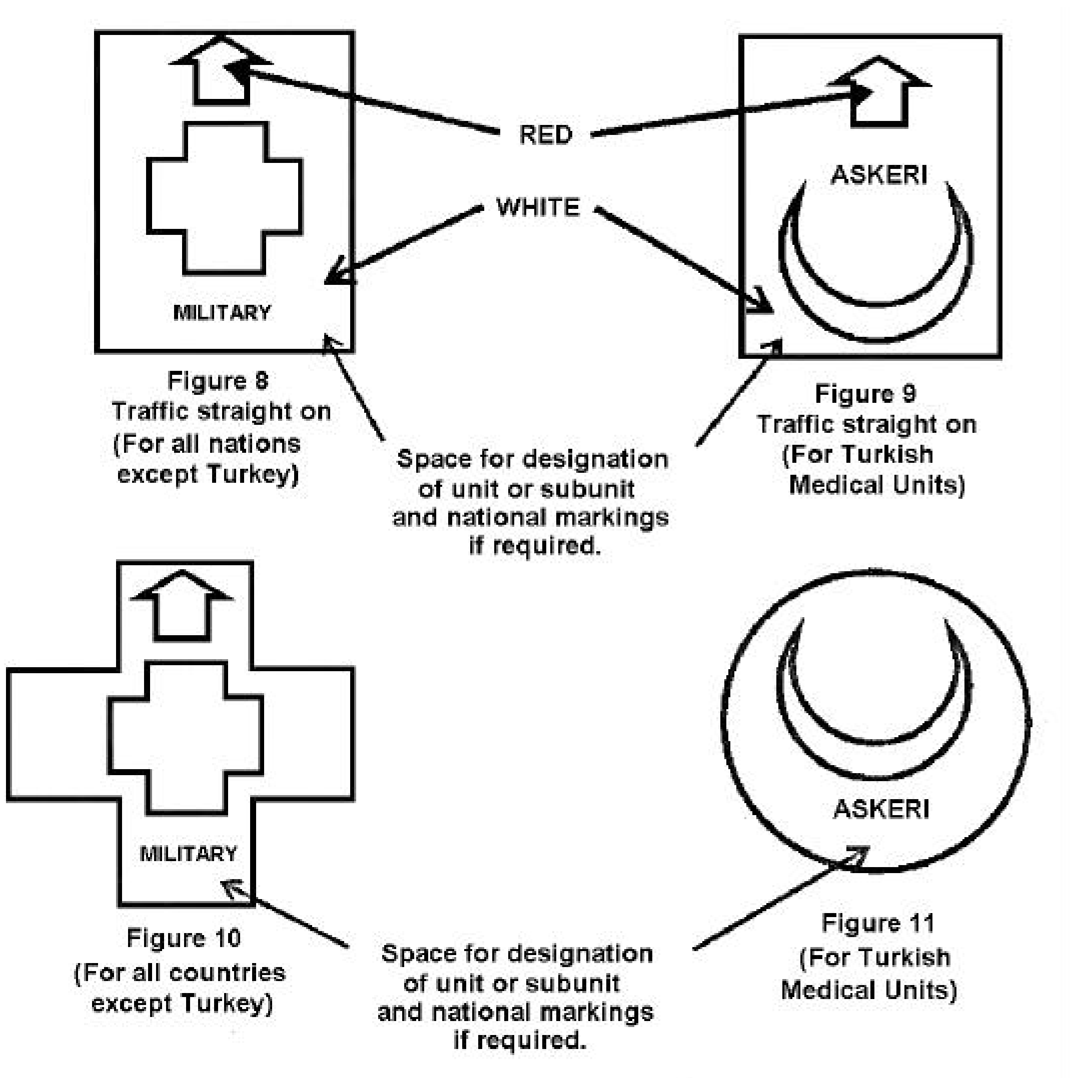
4. **OTHER GUIDE SIGNS**

a. Signs Indicating Evacuating Routes for Military Casualties--Medical Unit Signs.



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b. Signs indicating evacuation routes for civilian casualties.

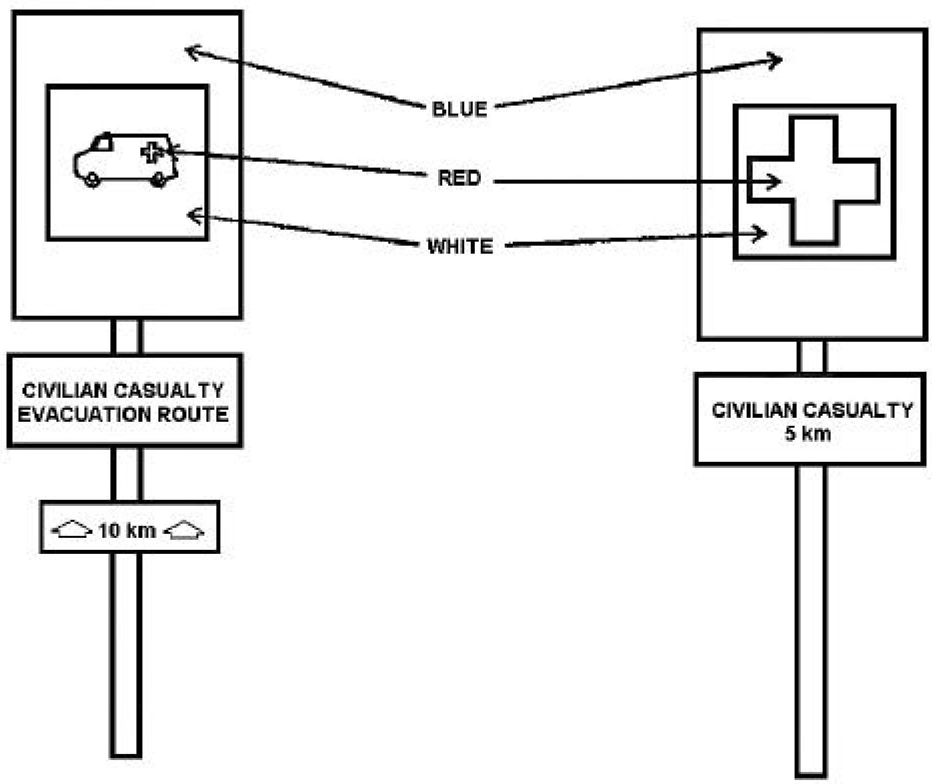

Figure 12
Civilian Casualty Evacuation
Route Directional Sign

Figure 13
Civilian Casualty Treatment
Centre Directional Sign

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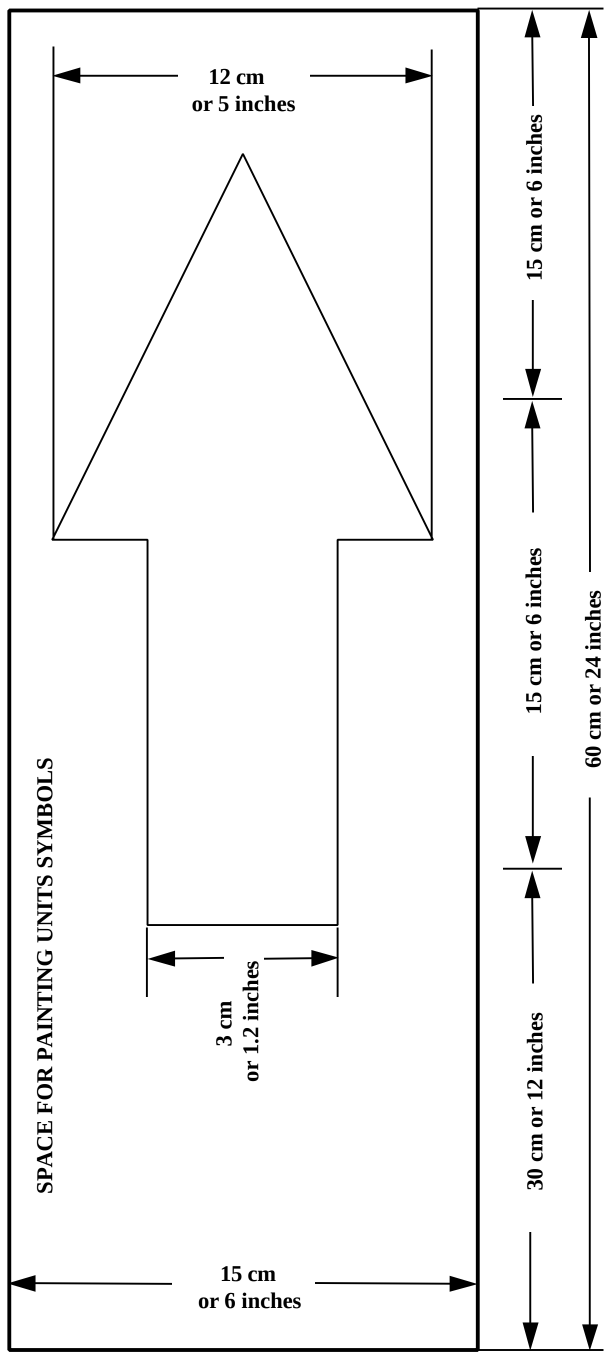
5. **DIRECTIONAL ARROWS**



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STANAG 2174
(Edition 4)

RATIFICATION AND IMPLEMENTATION DETAILS
STADE DE RATIFICATION ET DE MISE EN APPLICATION

NATION	NATIONAL RATIFICATION REFERENCE DE LA RATIFICATION NATIONALE	NATIONAL IMPLE-MENTING DOCUMENT NATIONAL DE MISE EN APPLICATION	IMPLEMENTATION/MISE EN APPLICATION — FORECAST DATE PREVUE			IMPLEMENTATION/MISE EN APPLICATION — ACTUAL DATE DATE REELLE		
			NAVY MER	ARMY TERRE	AIR	NAVY MER	ARMY TERRE	AIR
BE	JS4 Tpt/3/3645 of/du 12.8.77	IF 23				6.79	6.79	6.79
CA	2441-2174(DTRP 2-2-3) of/du 21.12.77	CFP 30-3(10)				12.78	12.78	12.78
DA *	M.204.66/S 2174/MAS ARMY 029318 of/du 19.12.77	HRN 717-1, HRN 818-22				7.79	7.79	7.79
FR	670/DEF/EMAT/SOU/TRT/2 of/du 13.2.78	BOC/PP No 22						
GE	BMVg-Fu S IV 1 Az 03-51-60 of/du 30.1.79	HDU 100/100, HDU 100/900, HDU 311/330				1.79	1.79	1.79
GR *	F.066/32/297954 Dr. 1501 of/du 6.6.80 DPPD, Hgs						1.79	
IT	smd 143/00718/4522.2174 OF/DU 13.1.78					9.78	9.78	9.78
LU	js4 tPT3/3645 OF/DU 12.8.77						6.79	
NL *	nas 02.144/6931/nu OF/DU 21.5.86	VS2-1120/2 VS 55-30 VS 55-40				8.78	8.78	8.78
NO	MAS 1294/86/B/ HST/TREN1NSP/HTK/ HCWSL STANAG 2174 of/du 14.8.86					9.86	9.86	9.86
PO*	MOD PORTUGAL 1463/79-DC of/du 20.8.79	STANAG					1.81	
SP								
TU *	Gn P.P.2307-418-79 And.D MAS.S(2174)544 of/du 26.11.79						1.95	
UK	D/D Mov(A)54/1 of/du 26.11.84	See page iv/voir page iv				10.87	10.87	10.87
US	DARCOM letter DRCIRD of/du 3.2.78					9.78	9.78	9.78

See overleaf reservations (*)
Voir les réserves au verso (*)

RESERVATIONS

DA : The reservations are as follows:

a. Page 6, para. 8. For classification of route networks DA applies the following categories:

- Average traffic routes : Class 30
- Heavy traffic routes : Class 60
- Very heavy traffic routes : Class 120

b. Pages 12-14, paras. 27, 28, 29 and 32, Annex D.
For the time being DA does not apply blackout material, equipment for illuminating signs and balisage

GR : The reservations are as follows:

a. The width of a single road/route for wheeled vehicles and for tracked combat vehicles is narrower for certain routes in the GR area

b. The proposed lighting system is not yet used in Greece

NL : NL cannot execute para. 27.b. because the military vehicles cannot fully meet the requirement on reducing lights

PO : Only applicable on roads classified in peacetime like "Military Roads"

TU : Part 3 (lighting) of the STANAG will not be implemented

NATIONAL IMPLEMENTING DOCUMENT/DOCUMENT NATIONAL DE MISE EN APPLICATION

UK : RMP Manual (Army Code No. 62040) and Road Movement (Army Code No. 71268)

APPENDIX D

EXTRACT OF STANAG 2176 (EDITION 2), PROCEDURES FOR MILITARY ROAD MOVEMENT ACROSS NATIONAL FRONTIERS

Annex :	A.	Example of a Customs Declaration for Crossing a Frontier in Wartime, in a Period of Tension and during Military Exercises

AIM

1. The aim of this Agreement is to standardize the regulations, procedures and forms for military road movements and transport, by including commercial vehicles carrying military cargoes and personnel, across frontiers between the NATO nations.

GENERAL

3. This STANAG is divided into four parts:

Part I	:	General Regulations
Part II	:	Regulations for Passports and Identity Documents
Part III	:	Road Movements Bids and Processing of Military Road Movements and Transport Across Front iers
Part IV	:	Customs Regulations

PART I : GENERAL REGULATIONS

4. a. In accordance with SOFA, these regulations govern the procedures, as well as the format and the contents of the documents required for the movement and transport across frontiers of military personnel and cargoes in peacetime, times of tension, and in wartime.

b. The territorial rights of the responsible civilian and military authorities in planning and controlling military road movements and transport within their respe ctive areas of responsibility will not be affected.

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c. Members of a force shall normally wear a uniform. Subject to any arrangement to the contrary between the authorities of the sending and receiving states, the wearing of civilian dress shall be on the same conditions as for the members of the forces of the receiving state. Regularly constituted units or formations of a force shall be in uniform when crossing a frontier.

d. Members of a force may possess and carry arms on condition that they are authorized to do so by their standing orders. The authorities of the sending state shall give sympathetic consideration to requests from the receiving state concerning this matter.

PART II : REGULATIONS FOR PASSPORTS AND IDENTITY DOCUMENTS

5. In peacetime, in times of tension, and in wartime, when practicable, members of the armed forces, civilian components and their dependents, and locally employed personnel, when crossing frontiers, will carry the following identity and other documents and will present them on demand:

a. Military Personnel:

(1) Military Identity Card with photograph.

(2) NATO Travel Order (STANAG 2026).

b. Civilian Personnel:

Members of a civilian component and dependents shall be so described in their passports.

c. Drivers of motor vehicles on military missions:

(1) Personal documents as required in 5.a. or 5.b. above.

(2) Valid Driving License.

(3) Motor Vehicle Documents.

(4) Drivers' authority for journey.

NOTE: The documents in paragraphs 5.c.(3) and 5.c.(4) above may be combined in one paper.

PART III : ROAD MOVEMENT BIDS FOR AND PROCESSING OF MILITARY ROAD MOVEMENTS AND TRANSPORT ACROSS FRONTIERS

6. General. The provisions, procedures, and forms for submitting Road Movement Bids and for processing military road movements and transport across frontiers are basically the same in peacetime, times of tension, and in wartime. The procedures established for submitting Road Movement Bids and processing initial road movements will not be affected by this STANAG.

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7. Road Movement Bids for Road Movements and Transport Across Frontiers

a. In the following cases, the user will submit to the responsible military movement agency a Road Movement Bid in accordance with STANAG 2155:

(1) For all columns of 20 vehicles or more.

(2) For movements on controlled routes.

(3) For outsize and heavy vehicles (see STANAG 2154).

(4) For vehicles transporting dangerous cargo (for definition see AAP-6).

b. The Road Movement Bid will mention the border crossing point requested.

c. In peacetime, the Road Movement Bid should be submitted to the responsible military movement agencies of each nation concerned two weeks before the start of the movement. For Priority ONE cargo, during times of tension, and in wartime it should be submitted if possible 24 hours before the start of the movement. The deadline for submitting Road Movement Bids for urgent road movements and transport may be further reduced.

Furthermore, in the case of exercises which are planned a long time in advance, it is advisable to inform the responsible military movement agencies at an early date of the planned frontier crossing of formations.

d. The Road Movement Bid may be transmitted by teletype message.

In urgent cases, Road Movement Bids may be submitted by telephone or in person.

e. For road movements, e.g. supply transports which will be repeated for several days in the same way on predetermined roads, one Road Movement Bid may be presented.

8. Measures of the Military Movement Agencies

a. The responsible military movement agency will process the road movement up to the border crossing points.

b. It will then submit the Road Movement Bid to the responsible military movement agency of the receiving country and name the requested border crossing points.

c. The military movement agency of the receiving country will process the Road Movement Bid from the frontier on, and will forward the Movement Credit Granted to the movement agency of the country of origin in accordance with STANAG 2155.

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d. In the case of movement in more than two countries, the above procedure will be repeated for each country.

e. Having received the movement credit(s) granted from the nation(s) concerned, the movement agency of the country of origin will forward the Movement Credit(s) Granted (STANAG 2155) to the user.

f. The Road Movement Bid and the Movement Credit Granted may be transmitted in writing, by teletype message (STANAG 2155) or, in urgent cases, even by telephone or in person.

g. For movements, e.g. supply transports which will be repeated for several days in the same way, one Movement Credit may be granted.

h. In exceptional cases, the responsible military movement agency may grant to the user a limited Movement Credit up to the frontier. After the crossing, the responsi ble military movement agency of the adjoining country will extend this limited Movement Credit and issue it directly to the user with copies for information to all military movement agencies concerned.

PART IV : CUSTOMS REGULATIONS

9. In Peacetime. A force may import free of duty, the equipment for the force and reasonable quantities of provisions, supplies, and other goods for the exclusive use of the force and, in cases where such use is permitted by the receiving state, its civilian component. This duty-free importation shall be subject to the deposit, at the customs office for the nation of entry, of a customs declaration (Form 302) distributed as outlined on the back of the form, signed by a person authorized by the sending state for that purpose. The license numbers of the official vehicles will be listed on a separate page which, marked with an official seal, will be attached to the customs declaration.

10. In Wartime, Periods of Tension and during Military Exercises. Special arrangement for crossing frontiers shall be granted by the Customs authorities to regularly constituted units or formations, provided that the customs authorities concerned have been duly notified in advance. The customs formalities will be simplified by using the following procedure:

a. Road Movements and Road Transport Across Frontiers With a Movement Credit

The responsible military movement agency of the country of origin will report to the appropriate customs authorities, the requested border crossing point, and the time scheduled for the crossing.

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All persons and vehicles moving on this Movement Credit may cross the frontier without any additional formalities.

b. Road Movements and Road Transport Across Frontiers Without a Movement Credit

The responsible unit commander will present to the customs agency at the border crossing point a written certificate - Annex A - , in addition to his military identity card and the NATO Travel Order.

The measures referred to on the certificate are to be carried out in accordance with national military regulations.

Implementation of the Agreement

11. This STANAG will be considered to have been implemented when the necessary orders/instructions have been issued directing the forces concerned to put the procedures/provisions contained in this STANAG into effect.

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ANNEX A to
STANAG 2176
(Edition No.2)

Customs Certificate

I . . . .

of . . . .

certify that all the necessary measures have been taken to ensure that the personnel of this convoy are carrying no prohibited goods or goods in excess of the allowances as laid down in current orders and in accordance with SOFA.

Vehicles: . . . .

Convoy State: Officers: . . . .

Other Personnel: . . . .

Date: . . . .

. . . .
(Signature)

. . . .
(Rank)

APPENDIX E

THE AMERICAN TRUCKING ASSOCIATIONS, INC SUMMARY OF SIZE AND WEIGHT LIMITS

This appendix contains material summarized from the Motor Carrier Advisory Service, published by the American Trucking Associations, Inc. For expanded current information including size and weight exceptions, fees, reciprocity and other state regulations governing truck operations, users should refer to the MCAS, which is available as a subscription service. For more about this service, call 1-800-ATA-LINE (Catalog #L0040).

SUMMARY OF U.S. SIZE & WEIGHT LIMITS

 January 1996

STATE	HEIGHT	WIDTH	LENGTH (FT-IN)						
			Tractor-Semitrailer Combinations				Twin Combinations		
	In Feet/ Inches	In Inches	Truck (Single Unit)	Semitrailer Length on Interstate &National Network*	Semitrailer Length Off National Network*	Overall Combination Length on Other Roads	Semitrailer or Trailer on Interstate & National Network	Twin Combination Length on Other Roads	Straight Truck + Trailer
Alabama	13-6	102[3]	40-0	57[7]	53-6[7]	NR	28-6	28-6[8]	53-6
Alaska	14-0	102	40-0	48	45	70	95[12]	75	75
Arizona	14-0[2]	102[3]	40-0	57-6	53/NR[10]	65[10]	28-6	NR	NR[20]
Arkansas	13-6	102	40-0	53-6	53-6	NR	28	NR	NS
California	14-0	102	40-0	48/53[7]	NR[7]	65[7]	28-6	75	65
Colorado	13-0[2]	102	45-0	57-4	57-4	70[18]	28-6	70[18]	70
Connecticut	13-6	102	45-0	53[7]	48/53[*,7]	NR	28	NP	60
Delaware	13-6	102[3]	40-0	53	NR	60	29	NP	60
Dist. of Columbia	13-6	102[3]	40-0	48	NR	55	28	NP	55
Florida	13-6	102[3]	40-0[5]	53/57-6[*,7]	53/57-6[*,7]	NR	28	NR	—[20]
Georgia	13-6	102[3]	60-0	53[7]	48/53[9]	60/67-6[9]	28	NP	60
Hawaii	14-0	108	45-0	NR	45	60	NR	65	65
Idaho	14-0	102	45-0	53	48/53[*]	65	68	61[12]	75
Illinois	13-6	102[3]	45-0	53[7]	53[7]	65[7,11]	28-6	65[11]	60
Indiana	13-6	102	40-0	53[7]	53[7]	NR[7]	28-6	NR	60
Iowa	13-6	102	40-0	53	53	NR	28-6	NR	65
Kansas	14-0	102	42-6	59-6	59-6	NR	28-6	NR[16]	65
Kentucky	13-6	102[3]	45-0	53	NR	65	28	65	65
Louisiana	13-6	102[3]	40-0	59-6	NR	65	30	NP	65
Maine	13-6[1]	102	45-0	48/53[*,7,8]	48[7]	65[7]	28-6	NP	65
Maryland	13-6	102[3]	40-0	53[7,8]	48	NR	28	NP	55[6]
Massachusetts	13-6	102	40-0	48/53[*,8]	48/53[*,8]	NR	28	NR[20]	60
Michigan	13-6	102[3]	40-0	53[7]	50	NR	58[21]	58[21]	59[6]
Minnesota	13-6	102	40-0	53[7]	53[7]	75	28-6	NP	75
Mississippi	13-6	102	40-0	53	53	NR	30	NR	NR
Missouri	13-6[2]	102	40-0	53	NR	60	28	65[15]	65[15]
Montana	14-0	102	55-0	53	53	75	28-6	28-6	75

SUMMARY OF U.S. SIZE & WEIGHT LIMITS (continued)

STATE	HEIGHT	WIDTH	LENGTH (FT-IN)						
			Tractor-Semitrailer Combinations				Twin Combinations		
	In Feet/ Inches	In Inches	Truck (Single Unit)	Semitrailer Length on Interstate &National Network*	Semitrailer Length Off National Network*	Overall Combination Length on Other Roads	Semitrailer or Trailer on Interstate & National Network	Twin Combination Length on Other Roads	Straight Truck + Trailer
Nebraska	14-6	102[3]	40-0	53	53	NR	65[12]	65[12]	65
Nevada	14-0	102	40-0	53	53	70	28-6/NR[18]	70[18]	70
New Hampshire	13-6	102	40-0	53[7,8]	53[7]	NR	28	28	NS
New Jersey	13-6	102[4]	40-0	53[7,8]	48	NR	28	NP	62
New Mexico	14-0	102	40-0	57-6	57-6	65[18]	28-6	65	65
New York	13-6	102[3]	40-0	53[7]	48	65	28-6	NP	65
North Carolina	13-6	102[3]	40-0[5]	53[7]	NR[17]	60[17]	28	NP	60
North Dakota	14-0	102	50-0	53	53	75[9]/88[9]	53[9]	75[9]/88[9]	75[9]
Ohio	13-6	102	40-0	53	53	NR	28-6	NR	65
Oklahoma	13-6	102[4]	45-0	59-6	53	NR	53	29	70
Oregon	14-0	102	40-0	53	53[17]	60[17]	68[12]	60[12]	75
Pennsylvania	13-6	102[3]	40-0	53[7]	NR[8]	60	28-6	NP[8]	60
Rhode Island	13-6	102	40-0	53[7]	48-6/53[7,8]	NR	28-6	NP	NS
South Carolina	13-6[2]	102	40-0[5]	53[7]	53[7]	NR	28-6	NP	NR[20]
South Dakota	14-0	102	45-0	53	53	NR[18]	81-6[12,14,16]	81-6[12,14,16]	80
Tennessee	13-6	102	40-0	50[7]	50[7]	NR	28-6	28-6	65
Texas	14-0	102	45-0	59	59	NR	28-6	NR	65
Utah	14-0	102	45-0	53[7]	53[7]	NR[7]	61[12]	61/NR[12]	65
Vermont	13-6	102	60-0	53[7,8]	48	65	28	NP	60
Virginia	13-6	102[3]	40-0	53[7]	NR[17]	65[17]	28-6	NP	65
Washington	14-0	102	40-0	53/56[*]	53/56[*]	NR	61/68[*,12]	61/68[*,12]	75
West Virginia	13-6[2]	102[3]	40-0	53[7]	NS	60[19]	28-6	NP	60[19]
Wisconsin	13-6	102	40-0	53[7]	53[7]	65	28-6	NP	65
Wyoming	14-0	102	60-0	60	60	NR	81[12]	81[12]	85

SUMMARY OF U.S. SIZE & WEIGHT LIMITS (continued)

 January 1996

STATE	WEIGHT (LBS)						
	Axle Limits (lbs)				Gross Weight Law	Maximum Allowable Gross Weight in Pounds	
	Single	Tandem	Tridem	Tire Width (lbs./inch)	Type of Restriction (On Interstate, on other routes)	Interstate	Other Roads
Alabama	20,000[36]	34,000	42,000	NS	Formula B	80,000	80,000[34]
Alaska	20,000	38,000	42,000	550[36]	Formula B[37]	—[37]	—[37]
Arizona	20,000[36]	34,000	42,500[23]	NS	Formula B, Table A[31]	80,000[38]	80,000
Arkansas	20,000[36]	34,000	54,000[40]	NS	Spec. Limits, Form. B[29]	80,000	80,000
California	20,000[36]	34,000	42,500[23]	NS	Modified Table B, Table A[31]	80,000	80,000
Colorado	20,000	36,000[22]	54,000[23]	NS	Formula B, Table A[31]	80,000[38]	85,000
Connecticut	22,400	36,000	42,500[23]	600	Formula B w/specific limits	80,000	80,000
Delaware	20,000	34,000[22]	42,500[23]	NS	Formula B, Spec. Limits[28]	80,000	80,000
Dist. of Columbia	22,000	38,000	41,500[23]	NS	Table A[31]	80,000	80,000
Florida	22,000	44,000	66,000	605	Formula B, Table A[30]	80,000	80,000
Georgia	20,340	34,000[35]	42,500[23]	NS	Formula B	80,000	80,000
Hawaii	22,500	34,000	42,500[23]	NS	Formula B, Spec. Limits[28]	80,000	88,000
Idaho	20,000[36]	34,000[34]	42,000[23]	600[26]	Formula B	80,000[38]	105,500
Illinois	20,000[19]	34,000[19]	42,000	NS	Formula B, Table A[31]	80,000	73,280
Indiana	20,000	34,000	42,500[23]	800	Formula B	80,000	80,000
Iowa	20,000	34,000	42,500[23]	NS	Formula B	80,000	80,000
Kansas	20,000	34,000	42,500[23]	600[26]	Formula B	80,000	85,500
Kentucky	20,000[22,36]	34,000[22,25]	48,000[22, 25]	700	Formula B, Spec. Limits[28]	80,000	80,000[22]
Louisiana	20,000[22]	34,000[22]	42,000[22]	650	Formula B	80,000[34]	80,000[34]
Maine	20,000[22]	34,000[22]	42,000[22]	600	Formula B[28]	80,000	80,000[34]
Maryland	20,000[35,36]	34,000	42,500[23]	NS	Formula B	80,000	80,000
Massachusetts	22,400	34,000	54,000	800	Formula B	80,000	80,000
Michigan	20,000[19,36]	34,000[19]	39,000	700	Formula B	80,000[34]	80,000[34]
Minnesota	20,000[39]	34,000	42,000[22]	600[26]	Modified Form. B, Table A[31]	80,000[39]	80,000[39]
Mississippi	20,000	34,000	42,500[23]	550	Formula B	80,000	80,000
Missouri	20,000	34,000	NS	NS	Formula B, Table A[31]	80,000	73,280
Montana	20,000	34,000	42,000	500[27]	Formula B	80,000[38]	80,000

SUMMARY OF U.S. SIZE & WEIGHT LIMITS (continued)

STATE	WEIGHT (LBS)						
	Axle Limits (lbs)				Gross Weight Law	Maximum Allowable Gross Weight in Pounds	
	Single	Tandem	Tridem	Tire Width (lbs./inch)	Type of Restriction (On Interstate, on other routes)	Interstate	Other Roads
Nebraska	20,000	34,000	42,000[23]	___[27]	Table B	80,000[38]	95,000
Nevada	20,000	38,000	42,000[23]	NS	Modified Table B	80,000[38]	80,000
New Hampshire	20,000[22,29]	34,000[29,35]	34,000[35]	NS	Formula B	80,000	80,000[34]
New Jersey	22,400	34,000[22]	56,400[23]	800	Modified Form. B, Spec. Limits	80,000	80,000
New Mexico	21,600	34,320	NS	600	Table A[31]	86,400	86,400
New York	22,400	34,000[22,32]	42,500[23]	800	Formula B[32], Table A	80,000	80,000
North Carolina	20,000	38,000	42,500[23]	NS	Formula B	80,000	80,000
North Dakota	20,000	34,000	42,500[22,23]	550	Formula B	80,000[38]	105,500
Ohio	20,000	34,000	42,500[23]	650	Formula B, Table A[24]	80,000	80,000
Oklahoma	20,000	34,000	42,000[23]	NS	Table B	80,000[38]	90,000
Oregon	20,000	34,000	42,500[23]	600	Modified Table B	80,000[38]	80,000
Pennsylvania	20,000[22]	34,000[35]	42,000	800	Formula B[29]	80,000	80,000
Rhode Island	22,400	36,000	NS	NS	Modified Formula B	80,000	80,000
South Carolina	20,000	34,000[22]	NS	NS	Spec. Limits, Table B[33]	80,000	80,600
South Dakota	20,000	34,000	___[38]	600	Formula B	80,000[38]	Form. B
Tennessee	20,000	34,000	42,000[23]	NS	Formula B	80,000	80,000
Texas	20,000	34,000	42,000	650	Formula B	80,000	80,000
Utah	20,000[36]	34,000	42,000	NS	Formula B	80,000[38]	80,000
Vermont	20,000[22,36]	34,000[22]	42,500[22,23]	600	Formula B, Table B	80,000	80,000
Virginia	20,000	34,000	42,500[23]	650	Table B	80,000	80,000
Washington	20,000[36]	34,000	42,000	600[26]	Table B	105,500	105,500
West Virginia	20,000	34,000	42,500[23]	NR	Table B	80,000	80,000[19]
Wisconsin	20,000	34,000	42,000[23]	NS	Modified Formula B	80,000	80,000
Wyoming	20,000[36]	36,000	42,500[23]	600[27]	Formula B, Spec. Limits[28]	117,000	117,000

SUMMARY OF U.S. SIZE & WEIGHT LIMITS (continued)

All states have adopted the following standards governing vehicle width, length, and weight.

WIDTH: 102" (exclusive of safety devices) on the Interstate/National Network.

LENGTH: Minimum 48' semitrailer in a tractor-semitrailer combination or a 28' semitrailer in a twin or doubles combination on the Interstate and National Network. No overall length is allowed to be set by the state on the qualifying highways. [Autotransporters: 65', except 75' stinger-steered, 3' front and 4' rear overhang. For state-by-state adoptions, contact National Automobile Transporters Association in Detroit, MI, 313-965-6533.]

WEIGHT: 20,000 lbs. single axle, 34,000 lbs. tandem axle and maximum gross weight of 80,000 lbs., including enforcement tolerances, on the National System of Interstate and Defense Highways. Gross weight and axle groupings must conform to weight limitations provided by federal bridge formula (see other side for formula and chart). Access of 1 mile minimum must be allowed to and from the Interstate to terminals and facilities for food, fuel, repairs, and rest.

GENERAL FOOTNOTES
NR - Not Restricted
NP - Not Permitted
NS - Not Specified
* - Longer trailers may be allowed in some states under permit situations or though federal STAA preemption

FOOTNOTES - Height
[1] ME - 14' load height
[2] AZ - 14' except where posted; CO - 14' 6" on certain highways; MO - 14' on Interstates and designated routes; SC - 14' autocarriers; WV - height may vary depending on route traveled

FOOTNOTES - Width
[3] 96" on other roads and roads with less than 12' lane widths; IL - 96" on non-designated roads unless otherwise posted; KY, MD, MI, MO, VA - 102" on all designated routes plus access, otherwise 96"; NY - 10' lane widths (excluding New York City) and on all qualifying and access highways; PA - approved highways only; NE - 96" on several state highways; WV - 10' lane widths
[4] NJ - 102" on all roads with 11' lane widths, divided highways; OK - 96" on all roads with less than 20' surface width

FOOTNOTES - Length
[5] Two-axle truck 35'
[6] MD - 60' on designated highways, with access; MI - 65' on designated highways
[7] Internal measurement generally from kingpin to center of rear axle also governs length limit; AL - 41' (measured from kingpin to the center of the rear axle assembly); CA - 40' (measured from kingpin to rearmost axle, or 38' on single axle trailer; over 48' trailer on National Network); CT - 41' (measured from kingpin to rearmost axle); FL - 41' (measured from kingpin to center of rear axle or rear group of axles); GA - 41' (measured from center of kingpin to center of tandem axle assembly, 67' 6" overall length limit); IL - 42' 6" (measured from kingpin to rearmost axle, over 48' trailer); IN - 40' 6"/42' 6"/43' (measured from kingpin to rear axle, over 48' 6" trailer manufactured after 12/31/84/over 48' trailer, mfg. before 1/1/85/Interstate with 10-mile access); ME - 38' (measured on trailers over 45' from center rear tractor axle to rear semitrailer axle), 53' (43' kingpin to center of rearmost axle of semitrailer); MD - 41' (measured from kingpin to center of rear axle); MI - 40' 6" (measured from kingpin to center of rear axle, trailer over 50'); MN - 41' (measured from kingpin to center of rear axle group, over 48' trailer); NH - 41' (measured from kingpin to center of rear tandem axle assembly, over 48' trailer); NJ - 41' (measured from kingpin to center of rear axle group); NY - 41' (measured from kingpin to center of rear axle group, over 48' trailer); NC - 41' (measured from kingpin to center of rear axles); PA - 41' (measured from kingpin to center of rear axle group); RI - 41' (measured from the kingpin to the center of the rear axle); SC - 41' (measured from kingpin to center of rear

SUMMARY OF U.S. SIZE & WEIGHT LIMITS (continued)

axle on a single axle semitrailer, measured from kingpin to center of tandem axle assembly on a two-axle semitrailer); TN - 41' (measured from kingpin to center of rear axle assembly, over 48' trailer), 50' (measured from kingpin to rear of trailer); UT - 40' 6" (measured from kingpin to center of rear tandem); VT - 41' (measured from kingpin to center of rear axle group); VA - 41' (measured from the kingpin to the rearmost axle or a point midway between the rear tandem axle); WV - 37' (measured from last tractor axle to first semitrailer axle); WI - 41' (measured from kingpin to rear axle; if kingpin is exceeded 48' trailer length applies) NOTE: OTHER EQUIPMENT AND MEASUREMENT RESTRICTONS MAY APPLY

8 AL - except roads of less than 12' lane width; MD - Interstate and designated routes; MA - all national highways and most state highways; NH, VT - Interstates only; NJ - all roads with 11' lane widths, divided highways; ME - by specific route approval for 53' trailers; PA - by specific route approval for 53' trailers/twin combinations; RI - on approved routes only

9 GA - 53' trailer, 67' 6" overall on state-designated system; ND - National Network 110', state-designated highways 88', all other roads 75'

10 Trailer length may exceed limit as long as overall length is not exceeded; permit may be necessary

11 Measured as wheelbase between steering axle and rearmost axle on certain state highways, otherwise 55' measured from bumper to bumper on other roads for tractor-semitrailer combinations

12 Measured from front of first trailer to rear of second trailer, including connecting device; ID - 75' overall if trl/connector/trl exceeds 61'; OR - 60' overall trailer limit on group one highways only, 68' overall trailer limit allowed on designated routes only; SD - maximum trailer length 45'; UT - no overall length limit if trailing units measure 61' or less; WA - combined trailer length of 68' with a permit; WY - 48' semitrailer, 40' trailer limit

14 SD - sum of trailers plus tow bar (tow bar not to exceed 19')

15 Allowed on designated state highways at 65', but state sets 55' limit on certain other highways

16 Semitrailer and/or trailer limits apply; KS - 28' 6"; SD - 45' semitrailer, 28' 6" trailer

17 OR - 60' includes unlimited trailer length, but permitted on group one highways only, 65' max with 53' trailer; NC - unlimited trailer length/60' overall, state routes only; VA - unlimited trailer length/65' overall, state routes only

18 Overall length limit does not apply when trailer length limit is not exceeded

19 State may further restrict limits on certain roads

20 Single unit limits govern; FL - 28' on trailer

21 MI - Measured from front of first trailer to rear of second, but if trailer length does not exceed 28' 6", 58' limit does not apply

FOOTNOTES - Weight

22 Higher limits allowed off Interstate (including tolerance where applicable); CO - 40,000 lbs.; DE - 40,000 lbs.; KY - certain commodities only; ME - 22,000 lbs. if 73,280 or less; MN - 43,000 lbs./9' axle spacing; NY - 36,000 lbs.; PA - 22,400; SC - 35,200 lbs. if GVW 75,185 lbs. or less, 39,600 lbs. on state routes

23 Axle spacings - 8' - NE, NJ, TN, WA, WV, WI; 8' + - ID, NY; 9' - AZ, CA, CO, CT, DE, DC, GA, HI, IN, IA, KS, MD, MS, NV, NC, ND, OH, OK, OR, SD, VT, VA, WI, WY

24 OH - Formula B applies to Interstates and either Formula B or Table A applies to all non-Interstate highways; IL - Federal Bridge Formula applies

25 42" -96" tandem, 42" - 120" triaxle

26 ID - Vehicles mfg. before 7/1/87, 800 lbs.; KS - 600 lbs. on steering axle for wide based tires only, all other axles 575 lbs.; MN - 500 lbs. limit on new vehicles mfg. after 8/1/91, all vehicles after 8/1/96; except steer axle 600 lbs. per inch; WA - 600 lbs. on steer axle and all other axles mfg. before 8/1/93; 500 lbs. on all axles (except steer axle) mfg. after 7/30/93

27 Excludes steer axle from limit; NE - subject to tire rating; WY - 750 lbs. steer axle limit

28 Specific limits apply off Interstate

29 Formula B applies over 73,280 lbs. gross weight

SUMMARY OF U.S. SIZE & WEIGHT LIMITS (continued)

[30] Formula B applies over 73,271 lbs. gross weight

[31] Table A applies off Interstate, generally - check with state for additional limitations

[32] Formula B applies over 71,000 lbs. gross weight; under 71,000, Table A

[33] Table B applies over 75,185 lbs. gross weight on Interstate

[34] Maximum allowable axle weight limited to 13,000 lbs. with one 32,000 lb. tandem axle, and an 18,000 lb. steering axle, 11 axles up to 164,000 lbs. with proper spacings; AL - 84,000 lbs. on 6 axles; ID - 37,800 lbs. on non-Interstate System, GVW cannot exceed 80,000 lbs.; LA - 83,400 lbs. on Tridem on Interstate, 88,000 lbs. off Interstate; ME - 6 axles 100,000 lbs. on Interstate, 100,000 lbs. off Interstate; NH - 99,000 lbs. plus 5% tolerance on 6 axles

[35] Higher weight limits apply for vehicles under 73,280 lbs. GVW (73,000 lbs. in MD)

[36] Steer axle limit of 12,000 lbs., except AK, ID - 600 lbs./in. tire width governs; AZ - 12,000 - 20,000; CA - 12,500 (with some exceptions); ID - 20,000 lbs. or must meet tire width; MD - subject to rated tire capacities; MI - subject to tire size, axle spacing; UT - tire rating not to exceed 20,000 lbs.; WY - 12,000 - 14,000

[37] AK - outer bridge governs, but inner bridge limits apply for multitrailer configurations (only applicable to tractor and 1st trailer) cannot exceed tire/axle weight, 3,000 lbs. tolerance

[38] LCVs - Over 80,000 lbs., Formula B with permit; CO - axle limits and state weight formula applies; NV - on other roads with a permit; OK - 90,000 lbs. with a permit; SD - axle spacing > 96" , weight limited by Formula B

[39] MN - 18,000 lbs. single axle and 73,280 lbs. GVW on 5-axle combination (check with state)

[40] AR - 50,000 lbs. if not in compliance with Formula B

DETAILED STATE ACCESS PROVISIONS

The Surface Transportation Assistance Act requires states to provide reasonable access by 48-foot, 102-inch vehicles to and from the Interstate and National Network highways. Access provisions listed below are currently in effect for states not allowing access on all state roads and highways. States will provide a map and/or listing showing the permissible routes.

USDOT rules stipulate that all STAA vehicles must be allowed up to 1 mile access to terminals and to food, fuel, repairs, and rest, effective June 1, 1991. Beyond 1 mile, a carrier may request approval of a route to points of loading and unloading, to which the state must respond within 90 days.

The following states allow unlimited access for at least 48-foot, 102-inch vehicles (and to the extent the state allows them on the National Network, 53-foot trailer combinations) on state highways: Arkansas, Colorado (57-foot 4-inch semitrailers on state highways), Connecticut (48-foot, 102-inch), Hawaii, Idaho, Indiana (all public roads, local restrictions may apply), Kansas (all roads/highways), Maine, Maryland, Massachusetts (all state/local roads), Mississippi, Montana (all roads/highways), Nebraska, Nevada (all public roads: 53-foot, 102-inch; 28-foot, 6-inch), Ohio (all public roads, local restrictions may apply), Oklahoma, South Carolina, South Dakota, Tennessee, Texas (all roads/highways), Utah (all public roads, local restrictions may apply), Washington, Wyoming.

ALABAMA

Width, twin combination: All roads except county roads of less than 12-foot lane widths.
Tractor-semitrailer: 53 feet - 102-inches allowed same as width.

ALASKA

Width, tractor-semitrailer, twin combination: 5 miles off federal designated and specially designated routes.

ARIZONA

Width: Access over existing truck routes to terminals and facilities for food, fuel, repairs, and rest.
Tractor-semitrailer, twin combination: All roads, depending on width (57-foot trailers on Interstate and primary roads - 10 miles off Interstate).

CALIFORNIA

Width: All roads except as posted.
Tractor-semitrailer, twin combination: Access to and from National Network allowed for services. Movement allowed up to 1 road mile from signed interchange; terminals--movement for terminal access on state highways allowed only on signed routes (signs are: S = services, T = terminals). NOTE: Movement for terminal access on city or county roads allowed along signed routes. Contact appropriate city or county for particular provisions for unsigned routes.

DETAILED STATE ACCESS PROVISIONS (continued)

CONNECTICUT
Width: All roads.
Tractor-semitrailer, twin combination: Access restricted to 1 mile off the National Network for food and fuel (beyond that, by permission from state DOT, various restrictions apply for 53-foot semitrailers).

DELAWARE
Width, tractor-semitrailer, twin combination: Interstate and all US-numbered routes except as posted. Access up to 1 mile off the Interstate and US routes for food, fuel, repairs, and terminals. Access beyond 1 mile by permit only.

DISTRICT OF COLUMBIA
Width, tractor-semitrailer: If kingpin setting is 41 feet or less, unlimited, otherwise by permit.
Twin combination: Access by permit only.

FLORIDA
Width: All roads except where posted.
Tractor-semitrailer: Unlimited.
Twin combination: All roads except where posted.

GEORGIA
Width: 102 inches on all roads with 12-foot lane width.
Tractor-semitrailer, twin combination: STAA access from National Network designated for certain routes beyond 1 mile. Additional designated routes restrict overall length to 67 feet, 6 inches.

ILLINOIS
Width, tractor-semitrailer, twin combination: Access of 5 miles on state highways and designated local roads to points of loading and unloading and to facilities for food, fuel, repairs, and rest.
Weight: Access for vehicles over 73,280 lbs on local routes if posted.

IOWA
Width, tractor-semitrailer, twin combination: Unlimited access. Livestock and stinger-steered autotransporters may leave designated system by direct route to points of pickup and delivery.

KENTUCKY
Width, tractor-semitrailer, twin combination: Unlimited access.

LOUISIANA
Width, tractor-semitrailer, twin combination: Access restricted to 10 miles to terminals and facilities for food, fuel, repairs, and rest.

DETAILED STATE ACCESS PROVISIONS (continued)

MAINE
Width: All roads.
Tractor-semitrailer, twin combination: Access restricted to 2 miles in rural areas and 1 mile in urban areas; permit required for operations beyond; unlimited for trailers over 45 feet with 38-foot kingpin limit measured from rear tractor axle to rear semitrailer axle.

MARYLAND
Width, twin combination: Shortest practical route between a designated highway and a truck terminal, or point of origin or destination for cargo, or up to 1 mile to facilities for food, fuel, repairs, or rest.

MICHIGAN
Width, tractor-semitrailer, twin combination: Access restricted to 5 miles on state highways only.

MINNESOTA
Width: All roads.
Tractor-semitrailer, twin combination: Access allowed between designated highways and facilities for food, fuel, repairs, and rest, points of loading and unloading for HHG and livestock carriers, "or for the purpose of providing continuity of route." Designated highways consist of the Interstate System, divided highways having 4 or more lanes, and other state designated roads.

MISSOURI
Width, tractor-semitrailer, twin combination: Access restricted to 10 miles.

NEW HAMPSHIRE
Twin combination: Access by permit only.
Tractor-semitrailer: Allowed 1 mile off the National Network to facilities for food, fuel, repairs, and to terminals.

NEW JERSEY
Twin combination: Access up to 1 mile, free permit required for greater distances.
Tractor-semitrailer: All roads (48-foot - 96-inch combinations);102-inch equipment on state designated routes (all roads with 11-foot lane widths).

NEW MEXICO
Width: All roads.
Tractor-semitrailer, twin combination: Access (and deliveries) within 20 miles of the Interstate system and designated highways.

DETAILED STATE ACCESS PROVISIONS (continued)

NEW YORK
Width: 102 inches on all highways with 10-foot lane widths (excluding New York City) and on all qualifying and access highways.
Tractor-semitrailer, twin combination: Access restricted to 1 mile on any highway from the interchange or intersection of a qualifying highway; other specified routes to be authorized by state DOT upon carrier petition.

NORTH CAROLINA
Width, tractor-semitrailer, twin combination: Access by application beyond 3 miles.

NORTH DAKOTA
Width: All roads.
Tractor-semitrailer, twin combination: Access available on all state highways; vehicles over 75 feet in overall length access via designated state highways.

OKLAHOMA
Width: No access provisions but allowed on any road having surface width of 20 feet or more (4-lane divided highways).
Tractor-semitrailer: Semitrailer length restricted to 59 feet, 6 inches with 5 miles access off National Network.
Twin combination: Semitrailer or trailer length restricted to 53 feet off the federal system with 5 miles access.

OREGON
Width, tractor-semitrailer, twin combination: Access up to 1 mile from National Network, except where posted, and on designated routes (up to 53-foot trailer).

PENNSYLVANIA
Tractor-semitrailer, twin combination: One mile from National Truck Network. No access allowed from state-approved routes. Access for 102-inch wide, 48-foot trailers, 53-foot trailers, and 28-foot, 6-inch twins allowed on previously approved routes or with written approval of state DOT through access approval process.

RHODE ISLAND
Width, tractor-semitrailer: 48-foot semitrailer all roads, 53-foot semitrailer approved routes only.
Twin combination: Access up to 1 mile off National Network, beyond 1 mile access through state DOT approval.

SOUTH CAROLINA
Width, tractor-semitrailer: All roads.
Twin combination: Up to 5 miles of network routes to facilities for food, fuel, repairs, rest, and to terminals as defined in SC Regulation 63-391(8); other access by

permission.

DETAILED STATE ACCESS PROVISIONS (continued)

VERMONT

Width: All roads.

Tractor-semitrailer: 48-foot - unlimited within 65 feet overall, 53 feet - 1-mile access, beyond that by route- and company-specific permit.

Twin combination: Access without permit limited to 1 mile for fuel, food, lodging, repairs.

VIRGINIA

Width, tractor-semitrailer, twin combination: Access restricted to shortest possible route not to exceed 1 mile. Access allowed on routes exceeding 1 mile with prior approval by state DOT.

WEST VIRGINIA

Width, tractor-semitrailer, twin combination: Access restricted to 2 miles including points of loading and unloading.

WISCONSIN

Width: All roads except where posted.

Tractor-semitrailer, twin combination: Access not to exceed 5 miles including points of loading and unloading or staging or vehicle assembly facilities.

LONGER/HEAVIER COMBINATIONS/TURNPIKE/TOLL ROAD OPERATIONS

The operations outlined below are authorized by rules and regulations of the state and are subject to change with little or no notice. The notations do not describe twin 28-foot combinations on the Interstate, but rather longer vehicles (doubles and triples) not prescribed in the Surface Transportation Assistance Act. All US turnpikes allow twin 28-foot, 6-inch combinations. Detailed information concerning the required permits and fees may be obtained from individual state agencies.

ALASKA-- Longer doubles allowed year-round on National Network and permit routes, restricted to axle weights under Formula B. Triple trailer combinations allowed on specified routes during the summer months on a permit basis. Longer doubles having maximum 48-foot trailer and/or combined trailer length not to exceed 95 feet are allowed on the National Network year-round. Triples have a maximum 28-foot, 6-inch trailer, 120-foot overall length, weight governed by bridge formula. Certain other power unit and driver certification requirements apply.

ARIZONA-- Longer doubles combinations and triple trailer combinations are allowed only on I-15, and are subject to 129,000 lbs GVW and 105 feet in length. Longer doubles also allowed on certain routes entering Arizona from border states that allow longer doubles (limited access in Arizona); triples--certain routes entering Arizona from border states, 92-foot overall length, 121,000 lbs on 9 axles, 123,500 lbs on 10 axles.

COLORADO-- The state allows the operation of twin 48-foot turnpike doubles, 48-foot - 28-foot, 6-inch Rocky Mountain doubles, and 28-foot, 6-inch triple trailer combinations on Interstates 25, 70 (not all), 270, 76, and 225. Overweight permit is obtained from DOT in Denver with a tractor-specific annual fee. Designated facility must be within 10 miles of Interstate. Vehicles must comply with axle weight limitations and GVW is limited by Formula B, Table A or 110,000 lbs whichever is least.

FLORIDA-- The Florida Turnpike Authority allows twin 48-foot trailers to operate on the turnpike, subject to 116-foot length and 147,000 lbs GVW limitations.

IDAHO-- Doubles combinations limited to 48-foot trailer length, 105-foot overall length, and 105,500 lbs GVW under annual permit. Triple trailer combinations limited to 105-foot overall length and 105,500 lbs GVW.

INDIANA-- The Indiana Toll Road Commission will authorize the movement of twin 48-foot, 6-inch trailer combinations not exceeding 127,400 lbs GVW on the toll road. Contact the commission in Granger for permit information. Triple trailer combinations are allowed on the toll road only subject to 28-foot trailer length, no overall length limit, and 127,400 lbs GVW.

LONGER/HEAVIER COMBINATIONS/TURNPIKE/TOLL ROAD OPERATIONS (continued)

KANSAS--The Kansas Turnpike Authority allows turnpike doubles and triple trailer combinations subject to 119-foot overall length limit and 120,000 lbs GVW. Triples combinations subject to driver and equipment standards, and specific routing (motor freight truck terminals within 5-mile radius around Goodland to Colorado border on I-70; motor freight truck terminals in Baxter Springs to Oklahoma border on US 69); permits issued by Kansas DOT. Kansas DOT also issues special permits for access to turnpike from a motor freight truck terminal within a 20-mile radius from the eastern toll booth and within a 10-mile radius from any other toll booth.

MASSACHUSETTS--The Massachusetts Turnpike Authority allows twin 48-foot trailer combinations under an annual permit. Gross weight cannot exceed 127,400 lbs and equipment must be certified. No triple trailer combinations are allowed.

MONTANA--Rocky Mountain doubles, 81-foot combined trailer length (maximum 48-foot semitrailer), no overall length limit. Triples combinations, 105-foot length (using cab-over tractor), 110-foot (conventional), 28-foot, 6-inch trailer; operations limited to Interstates and within 2 mile radius of services or terminal (authorization required beyond 2 miles).

NEBRASKA--The state will allow triple trailer combinations not exceeding 105 feet in overall length as long as the trailers are empty and the carrier maintains $1 million in insurance. Such combinations are permitted west of Highway 50 and must originate from a staging area no more than 6 miles from the Interstate. Turnpike doubles maximum 105 feet, Rocky Mountain doubles maximum 95 feet. GVWs from 80,000 lbs to 95,000 lbs allowed with special permit up to 10 days.

NEVADA--The state will allow twin 45-foot trailers or combinations not exceeding 48 feet for the first trailer and 42 feet for the second trailer (heavier trailer in the lead) and triple trailer combinations subject to a 105-foot overall length and 129,000 lbs GVW.

NEW YORK--The New York Thruway Authority allows twin 48-foot turnpike doubles subject to 114-foot overall length, 143,000 lbs GVW, and equipment and driver certification. No triple combinations are allowed.

NORTH DAKOTA--The state allows 75-foot Rocky Mountain doubles, 110-foot triples, and 110-foot turnpike doubles at GVWs up to 105,500 lbs on Interstates (with permit) and on state designated highways.

OHIO--The Ohio Turnpike Authority will allow a tractor-semitrailer and short doubles combination no longer than 75 feet or turnpike doubles up to 90 feet without a permit. Both are subject to 127,000 lbs GVW. Combinations exceeding 90 feet must obtain an operating permit, which includes mileage-based fees. Special permission required on doubles travel.

LONGER/HEAVIER COMBINATIONS/TURNPIKE/TOLL ROAD OPERATIONS (continued)

OKLAHOMA-- The state allows triple 29-foot trailer combinations up to 90,000 lbs on Interstate and 4-lane highways (5-mile access) permit required. Also allows Rocky Mountain and turnpike doubles up to 90,000 lbs on Interstate and 4-lane highways (5-mile access) permit required.

OREGON--Allows triple trailer combinations up to 105 feet overall under either a single trip or an annual permit, but trailers must be consistent in size to within 6 feet, and gross weight cannot exceed 105,500 lbs. Also allows doubles combinations with a maximum trailer length of 40 feet, combined trailer length of 68 feet, and 105,500 lbs GVW. Both double and triple trailer combinations allowed on designated highways only.

PENNSYLVANIA-- The Pennsylvania Turnpike Authority will allow twin 28-foot, 6-inch trailers on the turnpike, subject to an overall length of 85 feet and 100,000 lbs GVW. Triple trailer combinations are not allowed.

SOUTH DAKOTA--Triples: 110 feet overall, 129,000 lbs maximum GVW, allowed on Interstates plus designated state highways; turnpike doubles and Rocky Mountain doubles: 110 feet overall, 129,000 lbs maximum GVW allowed on Interstates plus designated state highways; triple trailer lengths limited to 28 feet, 6 inches and double trailer lengths limited to 48 feet with offtracking requirements. Single trip permit required for above listed combinations.

UTAH--Under annual permits, triple trailer combinations not exceeding 105 feet in overall length, truck and two-trailer combinations with trailers of equal length not exceeding 95 feet in overall length, Rocky Mountain doubles not exceeding 98 feet in overall length, and twin trailer combinations not exceeding 105 feet in overall length may be operated on the Interstate and designated highways. Under quarterly or annual permits, two-unit combinations not exceeding 77 feet in overall length or Formula B may be operated on all highways. Also under quarterly or annual permits, three-unit combinations up to 92 feet in overall length with gross weight determined by Formula B limits may be operated on all roads. Utah also allows 129,000 lbs under permit. Autotransporters with two stinger-steered trailers not exceeding 105 feet in overall length on the Interstate may obtain annual permits.

WASHINGTON-- The state will allow doubles, trailers with a combined trailer length of 68 feet, provided that if the trailer-trailer length exceeds 61 feet with or without load, the vehicle must be operated under permit. Twin 28-foot, 6-inch trailers may operate at 61 feet without permit. No triple trailer combinations are allowed.

WYOMING-- Rocky Mountain doubles with the combined length of trailers not exceeding 81 feet and meeting required axle gross weights are legal statewide. Wyoming allows over 117,000 lbs GVW under special permit for non-Interstate highways.

INTERSTATE/NATIONAL NETWORK ALLOWABLE GROSS WEIGHT
(FEDERAL BRIDGE FORMULA)

GROSS WEIGHT LAW

States have adopted the Federal Bridge Formula for travel on the Interstate and other public highways either by formula (Formula B) or by chart (Table B), with the exception of the states found at Table A. Variations may occur due to rounding language adopted or not adopted by the respective state. Table B appears as provided by the Federal Highway Administration.

TABLE B (in 1,000 lbs)								
Distance in feet between the extremes of any group of 2 or more consecutive axles	Maximum load in 1,000 lbs. carried on any group of 2 or more consecutive axles							
	2 axles	3 axles	4 axles	5 axles	6 axles	7 axles	8 axles	9 axles
4	34.0							
5	34.0							
6	34.0							
7	34.0							
8 and less	34.0	34.0						
more than 8	38.0	42.0						
9	39.0	42.5						
10	40.0	43.5						
11		44.0						
12		45.0	50.0					
13		45.5	50.5					
14		46.5	51.5					
15		47.0	52.0					
16		48.0	52.5	58.0				
17		48.5	53.5	58.5				
18		49.5	54.0	59.0				
19		50.0	54.5	60.0				
20		51.0	55.5	60.5	66.0			
21		51.5	56.0	61.0	66.5			
22		52.5	56.5	61.5	67.0			
23		53.0	57.5	62.5	68.0			
24		54.0	58.0	63.0	68.5	74.0		
25		54.5	58.5	63.5	69.0	74.5		
26		55.5	59.5	64.0	69.5	75.0		
27		56.0	60.0	65.0	70.0	75.5		
28		57.0	60.5	65.5	71.0	76.5	82.0	
29		57.5	61.5	66.0	71.5	77.0	82.5	
30		58.5	62.0	66.5	72.0	77.5	83.0	
31		59.0	62.5	67.5	72.5	78.0	83.5	
32		60.0	63.5	68.0	73.0	78.5	84.5	90.0
33			64.0	68.5	74.0	79.0	85.0	90.5
34			64.5	69.0	74.5	80.0	85.5	91.0
35			65.5	70.0	75.0	80.5	86.0	91.5
36			66.0*	70.5	75.5	81.0	86.5	92.0
37			66.5*	71.0	76.0	81.5	87.0	93.0
38			67.5*	71.5	77.0	82.0	87.5	93.5
39			68.0	72.5	77.5	82.5	88.5	94.0
40			68.5	73.0	78.0	83.5	89.0	94.5
41			69.5	73.5	78.5	84.0	89.5	95.0
42			70.0	74.0	79.0	84.5	90.0	95.5
43			70.5	75.0	80.0	85.0	90.5	96.0
44			71.5	75.5	80.5	85.5	91.0	96.5
45			72.0	76.0	81.0	86.0	91.5	97.5

FORMULA B: **W = 500 (LN/N-1 + 12N + 36)**

W = maximum weight in pounds carried on any group of two or more axles computed to nearest 500 pounds.
L = distance in feet between the extremes of any group of two or more consecutive axles.
N = number of axles in group under consideration.

TABLE B (in 1,000 lbs)								
Distance in feet between the extremes of any group of 2 or more consecutive axles	Maximum load in 1,000 lbs. carried on any group of 2 or more consecutive axles							
	2 axles	3 axles	4 axles	5 axles	6 axles	7 axles	8 axles	9 axles
46			72.5	76.5	81.5	87.0	92.5	98.0
47			73.5	77.5	82.0	87.5	93.0	98.5
48			74.0	78.0	83.0	88.0	93.5	99.0
49			74.5	78.5	83.5	88.5	94.0	99.5
50			75.5	79.0	84.0	89.0	94.5	100.0
51			76.0	80.0	84.5	89.5	95.0	100.5
52			76.5	80.5	85.0	90.5	95.5	101.0
53			77.5	81.0	86.0	91.0	96.5	102.0
54			78.0	81.5	86.5	91.5	97.0	102.5
55			78.5	82.5	87.0	92.0	97.5	103.0
56			79.5	83.0	87.5	92.5	98.0	103.5
57			80.0	83.5	88.0	93.0	98.5	104.0
58				84.0	89.0	94.0	99.0	104.5
59				85.0	89.5	94.5	99.5	105.0
60				85.5	90.0	95.0	100.5	105.5
61				86.0	90.5	95.5	101.0	106.5
62				86.5	91.0	96.0	101.5	107.0
63				87.5	92.0	96.5	102.0	107.5
64				88.0	92.5	97.5	102.5	108.0
65				88.5	93.0	98.0	103.0	108.5
66				89.0	93.5	98.5	103.5	109.0
67				90.0	94.0	99.0	104.5	
68				90.5	95.0	99.5	105.0	
69				91.0	95.5	100.0	105.5	
70				91.5	96.0	101.0	106.0	
71				92.5	96.5	101.5	106.5	
72				93.0	97.0	102.0	107.0	
73				93.5	98.0	102.5	107.5	
74				94.0	98.5	103.0	108.5	
75				95.0	99.0	103.5	109.0	
76				95.5	99.5	104.5		
77				96.0	100.0	105.0		
78				96.5	101.0	105.5		
79				97.5	101.5	106.0		
80				98.0	102.0	106.5		
81				98.5	102.5	107.0		
82				99.0	103.0	108.0		
83				100.0	104.0	108.5		
84					104.5	109.0		
85					105.0			
86					105.5			
87					106.0			
88					107.0			
89					107.5			
90					108.0			
91					108.5			
92					109.0			

	* 68,000 may be carried on tandem axles spaced at least 36 feet apart.
NOTE:	States that have a "table" in their law [*See Type of Restriction on page*] may have slight weight differences for selected axles/distances due to rounding.
NOTE:	All states applying Table B or Formula B restrict Interstate highways to 80,000 lbs (except those with grandfather rights).
NOTE:	The higher 8-foot tandem weight is not a requirement of Formula B, but rather is an interpretation by the federal government, and has not necessarily been adopted by individual states.

TABLE: A ALLOWABLE LOADS

Distance	Arizona	California					Colorado	Florida	Illinois		
		2 Axles	3 Axles	4 Axles	5 Axles	6 Axles			3 Axles	4 Axles	5 Axles
4	34.0	34.0	34.0	34.0	34.0	34.0	44.0	44.0			
5	34.0	34.0	34.0	34.0	34.0	34.0	45.0	44.0			
6	34.0	34.0	34.0	34.0	34.0	34.0	46.0	44.0			
7	34.0	34.0	34.0	34.0	34.0	34.0	47.0	44.0			
8	42.0	34.0	34.0	34.0	34.0	34.0	48.0	44.0			
9	42.5	39.0	42.5	42.5	42.5	42.5	49.0	48.5			
10	43.5	40.0	43.5	43.5	43.5	43.5	50.0	49.4	41.0		
11	44.0	40.0	44.0	44.0	44.0	44.0	51.0	50.3	42.0		
12	50.0	40.0	45.0	50.0	50.0	50.0	52.0	51.3	43.0		
13	50.5	40.0	45.5	50.5	50.5	50.5	53.0	52.2	44.0		
14	51.5	40.0	46.5	51.5	51.5	51.5	54.0	53.1	44.5		
15	52.0	40.0	47.0	52.0	52.0	52.0	55.0	54.0	45.0	50.0	
16	52.5	40.0	48.0	52.5	52.5	52.5	56.0	54.9	46.0	50.5	
17	53.5	40.0	48.5	53.5	53.5	53.5	57.0	55.8	47.0	51.5	
18	54.0	40.0	49.5	54.0	54.0	54.0	58.0	56.8	47.5	52.0	
19	54.5	40.0	50.0	54.5	54.5	54.5	59.0	57.7	48.0	52.5	
20	55.5	40.0	51.0	55.5	55.5	55.5	60.0	58.6	49.0	53.5	
21	55.0	40.0	51.5	56.0	56.0	56.0	61.0	59.5	50.0	54.0	
22	56.5	40.0	52.5	56.5	56.5	56.5	62.0	60.4		54.5	
23	57.5	40.0	53.0	57.5	57.5	57.5	63.0	61.3		55.5	
24	58.0	40.0	54.0	58.0	58.0	58.0	64.0	62.3		56.0	
25	58.5	40.0	54.5	58.5	58.5	58.5	65.0	63.2		56.5	
26	59.5	40.0	55.5	59.5	59.5	59.5	66.0	64.1		57.5	
27	60.0	40.0	56.0	60.0	60.0	60.0	67.0	65.0		58.0	
28	60.5	40.0	57.0	60.5	60.5	60.5	68.0	65.9		58.5	
29	61.5	40.0	57.5	61.5	61.5	61.5	69.0	66.8		59.5	
30	62.0	40.0	58.5	62.0	62.0	62.0	70.0	67.8		60.0	
31	62.5	40.0	59.0	62.5	62.5	62.5	71.0	68.7		60.5	
32	63.5	40.0	60.0	63.5	63.5	63.5	72.0	69.6		61.5	
33	64.0	40.0	60.0	64.0	64.0	64.0	73.0	70.5		62.0	
34	64.5	40.0	60.0	64.5	64.5	64.5	74.0	71.4		62.5	
35	65.5	40.0	60.0	65.5	65.5	65.5	75.0	72.3		63.5	
36	66.0	40.0	60.0	66.0	66.0	66.0	76.0	73.2		64.0	
37	66.5	40.0	60.0	66.5	66.5	66.5	77.0				
38	67.5	40.0	60.0	67.5	67.5	67.5	78.0				
39	69.0	40.0	60.0	68.0	68.0	68.0	79.0				
40	70.5	40.0	60.0	68.5	70.0	70.0	80.0				

TABLE: A ALLOWABLE LOADS (continued)

Distance	Arizona	California					Colorado	Florida	Illinois		
		2 Axles	3 Axles	4 Axles	5 Axles	6 Axles			3 Axles	4 Axles	5 Axles
41	72.5	40.0	60.0	69.5	72.0	72.0	81.0				
42	74.0	40.0	60.0	70.0	73.3	73.3	82.0				72.0
43	75.0	40.0	60.0	70.5	73.3	73.3	83.0				73.0
44	75.5	40.0	60.0	71.5	73.3	73.3	84.0				73.3
45	76.0	40.0	60.0	72.0	76.0	80.0	85.0				
46	76.5	40.0	60.0	72.5	76.5	80.0					
47	77.5	40.0	60.0	73.5	77.5	80.0					
48	78.0	40.0	60.0	74.0	78.0	80.0					
49	78.5	40.0	60.0	74.5	78.5	80.0					
50	79.0	40.0	60.0	75.5	79.0	80.0					
51	80.0	40.0	60.0	76.0	80.0	80.0					
52		40.0	60.0	76.5	80.0	80.0					
53		40.0	60.0	77.5	80.0	80.0					
54		40.0	60.0	78.0	80.0	80.0					
55		40.0	60.0	78.5	80.0	80.0					
56		40.0	60.0	79.5	80.0	80.0					
57		40.0	60.0	80.0	80.0	80.0					
58		40.0	60.0	80.0	80.0	80.0					
59		40.0	60.0	80.0	80.0	80.0					
60		40.0	60.0	80.0	80.0	80.0					
61											

TABLE: A ALLOWABLE LOADS (continued)

Distance	Minnesota				Missouri	New Mexico	New York	Ohio	Wyoming	D.C.
	3 Axles	4 Axles	5 Axles	6 Axles						
4					32.0	34.3	38.0			
5					32.0	35.1	39.0			
6					32.0	35.9	40.0			
7	37.0				32.0	36.7	41.0			
8	38.5				33.2	37.4	42.0	48.0		37.0
9	43.0				34.4	38.2	43.0	48.0		38.1
10	43.5	49.0			35.6	39.0	44.0	48.0	43.5	39.1
11	44.5	49.5			36.8	39.8	45.0	48.0	45.0	40.2
12	45.0	50.0			38.0	40.6	46.0	48.8	48.0	41.3
13	46.0	51.0			39.2	41.3	47.0	49.7	50.0	42.3
14	46.5	51.5	57.0		40.4	42.1	48.0	50.6	52.0	43.4
15	47.5	52.0	57.5		41.6	42.9	49.0	51.5	54.0	44.5
16	48.0	53.0	58.0		42.8	43.7	50.0	52.4	54.0	45.6
17	49.0	53.5	59.0		44.0	44.5	51.0	53.3	54.0	46.7
18	49.5	54.0	59.5		45.2	45.2	52.0	54.2	56.0	47.8
19	50.5	55.0	60.0		46.4	53.1	53.0	55.1	58.0	48.8
20	51.0	55.5	60.5	66.0	47.6	54.0	54.0	56.0	62.0	49.9
21	52.0	56.0	61.5	67.0	48.8	54.9	55.0	56.9	64.0	51.0
22	52.5	57.0	62.0	67.5	50.0	55.8	56.0	57.8	65.0	52.1
23	53.5	57.5	62.5	68.0	51.0	56.7	57.0	58.7	66.0	53.1
24	54.0	58.0	63.0	68.5	52.0	57.6	58.0	59.6	66.0	54.2
25		59.0	64.0	69.0	53.0	58.5	59.0	60.5	66.0	55.3
26		59.5	64.5	70.0	54.0	59.4	60.0	61.4	66.0	56.4
27		60.0	65.0	70.5	55.0	60.3	61.0	62.3	66.0	57.4
28		61.0	65.5	71.0	56.0	61.2	62.0	63.2	66.0	58.5
29		61.5	66.5	71.5	57.0	62.1	63.0	64.1	66.0	59.6
30		62.0	67.0	72.0	58.0	63.0	64.0	65.0	67.0	60.7
31		63.0	67.5	73.0	59.0	63.9	65.0	65.9	68.0	61.7
32		63.5	68.0	73.5	60.0	64.8	66.0	66.8	69.0	62.8
33		64.0	69.0	74.0	61.1	65.7	67.0	67.7	70.0	63.9
34		65.0	69.5	74.5	62.2	66.6	68.0	68.6	71.0	65.0
35		65.5	70.0	75.0	63.5	67.5	69.0	69.5	72.0	66.2
36		66.0	70.5	76.0	64.6	68.4	70.0	70.4	73.0	67.2
37		67.0	71.5	76.5	65.9	69.3	71.0	71.3	74.0	68.1
38		67.5	72.0	77.0	67.1	70.2		72.2	75.0	68.9
39		68.0	72.5	77.5	68.3	71.1		73.1	76.0	69.7
40		69.0	73.0	78.0	69.7	72.0		74.0	76.0	70.6

TABLE: A ALLOWABLE LOADS (continued)

Distance	Minnesota				Missouri	New Mexico	New York	Ohio	Wyoming	D.C.
	3 Axles	4 Axles	5 Axles	6 Axles						
41		69.5	73.3	79.0	70.8	72.9		74.9	76.0	71.4
42		70.0		79.5	72.0	73.8		75.8	76.0	72.3
43		71.0		80.0	73.3	74.7		76.7	76.0	
44		71.5				75.6		77.6	76.0	
45		72.0				76.5		78.5	77.0	
46						77.4		79.4	77.4	
47						78.3		80.0	78.3	
48						79.2			80.0	
49						80.1				
50						81.0				
51						81.9				
52						82.8				
53						83.7				
54						84.6				
55						85.5				
56						86.4				
57										
58										
59										
60										
61										

APPENDIX F

VEHICLE OPERATIONS IN DIFFICULT TERRAIN

Military drivers must be able to adapt their skills to varying and often difficult terrain. This appendix contains information that will help drivers to perform safely and effectively in extreme conditions.

F-1. GENERAL OPERATIONAL GUIDELINES. The following general guidelines apply:

- When driving in mud or sand, or on rocky terrain, deflate tires (as recommended in your vehicle operator manual).
- Areas composed of water-soaked mud, clay, or silt may require the placement of logs, brush, gravel, wire netting, or other material to support the passage of vehicles. Such areas should be crossed carefully and without stopping, using low gear and all-wheel drive.
- Engage front-wheel drive for operation in soft sand or mud, and usually on rocky terrain. Low gear is also usually necessary on rocky terrain.

F-2. STARTING, STEERING, AND STOPPING. Techniques for starting, steering, and stopping on difficult terrain include:

- When starting in soft sand, select a low-gear range. Generally, second gear in low range is most effective.
- Start slowly and smoothly.
- Avoid unnecessary shifting of gears, especially in soft or poor traction areas.
- Avoid areas or patches of soft sand when possible. When this is unavoidable, increase speed before entering the soft sand area to gain momentum and maintain traction.
- In areas of soft, uncrusted sand and in rocky terrain, follow in the tracks of preceding vehicles whenever possible.
- When operating a vehicle over a sand dune, approach the dune as squarely as possible. Avoid going up on an angle.
- Use brakes sparingly to stop in soft sand. Permit the vehicle to roll to a halt.
- When stopping or halting on sand or other similar soft surfaces, stop or halt on a downhill slope (no matter how slight) to gain a starting advantage.
- Straddle undergrowth but avoid straddling rocks or boulders that might damage the underparts of a vehicle.

F-3. VEHICLE CARE. The following guidelines apply to vehicle care:

- Reinflate tires immediately upon leaving sand or rocky areas where deflation was required.
- Keep valve caps on all valves and carry spare valve caps. Check tire inflation.
- Inspect tires frequently. Remove stones or other foreign matter embedded in tires and remove rocks from between dual tires.
- Check engine temperature and oil pressure gauges frequently.

- Inspect fan belt, water pump, radiator, and radiator hoses frequently. Check closely for leaks and fan belt tension.
- If the engine overheats (for example, temperature gauge registers over 200^{o}F), halt and check for the following:

  - Loose or broken fan belt. Adjust or replace if necessary.
  - Weak or broken radiator hoses.
  - Level of coolant in radiator. Add water if required.
  - Proper fit and pressure of radiator cap.
  - Accumulated debris or material around radiator exterior that may interfere with proper radiator cooling.

Lastly, face the vehicle into the wind and run the motor at a fast idle.

- If overheating persists, stop the engine to prevent engine damage.
- If a fuel line vapor lock occurs during operation, pump the accelerator a few times or choke the engine slightly.
- If a vapor lock causes difficulty in starting, place a wet cloth around the fuel pump and the fuel filter to condense the vapor.
- Check the air cleaner more frequently than usual.
- Wipe and clean filler nozzles and the spouts of fuel containers before refueling.
- When water has to be added to the battery, use distilled water if possible. Avoid desert water. It usually has a high salt content.
- Inspect body bolts, springs, spring mountings, and accessories more frequently than usual for evidence of looseness or damage caused by the abnormal shock and vibration from operating over rough terrain.
- Change the oil more frequently than normal during operations in the desert or rough terrain. A drop of oil from the dipstick may be rubbed between the fingers to determine the presence of a foreign or gritty substance.
- Wipe oil can spouts clean before adding engine oil. Clean away accumulations of sand or dirt from the oil filler hole.
- After operating in sandy or dusty terrain, remove the air filter and the crankcase oil filler cap. Clean and dip in engine oil, allowing the excess oil to drain off before replacing.
- Inspect and clean constant-velocity joints frequently.

F-4. FREEING VEHICLES STUCK IN SAND OR MUD. Most military vehicles have sufficient power in low gear to pull out of sand or mud, provided the wheels gain traction. If a vehicle is stuck or is about to become stuck--

- Use the lowest gear (forward or reverse) for the pullout effort.
- Use all-wheel drive if the vehicle is so equipped.
- Use brush, logs, wire netting, gravel, rocks, or other available materials under the wheels to gain traction.
- When forward progress is stopped, try to back up slightly and then start forward with sufficient power to overcome the resistance of sand and mud. Also, selecting a new forward course may offer a traction advantage.
- Clear away sand or mud from in front of all the wheels. This will often allow the truck to pull free and regain forward progress.

- If it becomes evident that continued operation of a vehicle under its own power will only cause it to sink deeper in the sand or mud, use the vehicle winch or a tow vehicle.
- Disengage the trailer if a trailered load has swung to one side or doubled up on the towing vehicle. Maneuver the towing vehicle into the line of direction of the trailer, reengage it, and move off in the new direction.

F-5. PRECAUTIONS FOR OFF-THE-ROAD OR DIFFICULT TERRAIN. Observe the following precautions when driving off-the-road or over difficult terrain:

- Guard against mechanical troubles by making all proper vehicle inspections and by driving as recommended.
- Use fuel economically in sandy or rocky terrain because fuel consumption is high in such operations.
- Use water sparingly in areas where it is in short supply.

For further discussion of operational difficulties, consult FM 21-305, the appropriate vehicle manual, or relevant publications listed in this manual's references.

APPENDIX G

VEHICLE OPERATIONS IN ADVERSE WEATHER

This appendix contains information and guidelines that will help drivers and mechanics to operate and maintain motor vehicles during winter weather. For information covering winterization, arctic techniques, engine enclosures, auxiliary starters, and cold temperature expedient devices, see FMs 9-207, 31-70, and 31-71.

G-1. EFFECTS OF LOW TEMPERATURES ON MATERIALS. When materials essential to motor vehicle operations are exposed to low temperatures, the following occurs:

- Rubber becomes stiff and brittle. Radiator and heater hoses may crack and break if handled roughly. Also, after a vehicle has been parked for several hours, its tires develop flattened-out areas and have little resiliency. The tires will soften once normal operations are resumed.
- Water freezes and expands. Expansion in restricted areas exerts tremendous power and may split radiators or crack engine blocks.
- Canvas becomes stiff and brittle. It is difficult to fold, unfold, or use without damaging.
- Glass conducts heat poorly and may crack or shatter if subjected to a sudden increase in temperature. Do not apply sudden, intense heat to clear or deice vehicle windows or windshield.
- Engine oils become thick and flows poorly. This results in poor lubrication of the engine until warmed by normal operation. Thickened oils also creates a drag on the engine, making starting more difficult.
- Grease becomes hard and thick and loses lubricating properties until it is warmed by normal operations.

CAUTION

Dry, cold weather creates excessive amounts of static electricity in clothing and in liquids being transported. Exercise extreme caution when refueling vehicles to prevent fire and/or explosion caused by the discharge of static electricity. Static electricity should be removed by grounding vehicles or fuel containers before refueling. Personnel should ground themselves by touching the metal of a vehicle or fuel container, away from the openings.

G-2. DRIVING. The basic rules for driving in cold weather encompass all the rules that apply in normal conditions. However, the added hazards of snow and ice greatly increase the need to observe these rules. Before engaging in cold weather operations, all drivers must be thoroughly trained in winter driving techniques.

G-3. VISIBILITY. Good all-around visibility is essential to safe, cold weather driving. To achieve optimum visibility during cold weather--

- Remove all ice, snow, and fog from all windows before operating vehicle.
- Keep all windows and mirrors clear at all times during operations.
- Use defrosters and windshield wipers to keep the windshield free of ice, sleet, snow, and fog.
- Keep inside and outside rearview mirrors clean and properly adjusted.
- Use headlights during snowstorms and periods of reduced visibility according to local SOPs and the tactical situation.
- Increase gaps between vehicles when exhaust gases cause ice fog.
- Use a guide when backing the vehicle or where assistance is required in picking a trail in deep snow.

G-4. TRACTION FOR DRIVING OR STOPPING. Use the following techniques to increase traction for driving or stopping:

- Use chains in deep snow or on ice. Chains increase traction for both starts and stops.
- Use brush and burlap under the wheels to aid in moving through deep snow. Use sand and gravel for passage over icy areas.
- Apply brakes using a feathering or pumping action. Jamming the brakes will lock the wheels and cause skidding.
- Keep pioneer tools readily available on vehicles to remove snow, cut brush, and so forth.

G-5. ADDED GUIDELINES FOR SAFE OPERATIONS. Guidelines for safe vehicle operations in cold weather also include the following:

- Never leave the engine of a vehicle running when you are sleeping in the cab or passenger compartment of the vehicle. Exhaust gases are deadly.
- Always adjust vehicle speeds to road conditions.
- Maintain the proper interval between vehicles; allow more space for bad road conditions. (Stopping distances on ice and snow are greatly increased.)
- Slow down before going around a curve.
- Make turns and stops slowly and steadily.
- Keep the vehicle cab windows open slightly when the heater is in use.
- When halting, do not block the roadway. Pull onto the shoulder but only after it is checked. Snow may conceal ditches, culverts, or other obstructions.
- Do not overcrowd the vehicle cab. This restricts the driver's ability to operate his vehicle properly and safely.
- At halts, check vehicles to ensure that they are trouble-free and in good operating condition.
- Keep lights, mirrors, and windows free of snow, sleet, frost, or fog.
- Ensure that vehicle operators and maintenance personnel are properly trained and thoroughly familiar with the operation and maintenance of vehicles in extreme cold (FM 9-207).

G-6. PREPARING FOR OPERATIONS. To prepare for cold weather operations--

- Always carry a shovel on the vehicle. The removal of snow or ice from in front of or behind the wheels may enable a stuck vehicle to clear itself.
- Wear gloves. Avoid touching subzero chilled metal with bare hands. If tools must be used, tape or wrap the handles.
- Move vehicles slowly and carefully after they have been standing in the cold for a significant period.
- Distribute loads as evenly as possible to equalize traction on the wheels. Reduce load capacities in severe cold weather.
- When appropriate or permissible, block up the rear end of the engine hood to allow warm air from the engine to flow over the windshield. This will aid in keeping it clear.
- Shield the lower half of the radiator with prepared winterfronts, shutters, cardboard, or other available material to aid in maintaining normal operating temperatures.
- Use grass, straw, or other insulating materials on the cab floor (and bed of troop-carrying vehicles) to help keep feet warm if the vehicle has no heater or in case the heater fails to function.
- Check tire pressure before operations. Increase the pressure about 10 percent for severe cold weather operations.
- Use auxiliary type heaters to warm engines before starting when temperatures dip below -25^{o} F (-3.9^{o} C).
- Observe all instruments, gauges, and warning lights during warm-up to avoid engine damage.
- Warm up engines to operating temperatures before moving or accelerating.

G-7. MAINTENANCE AND SERVICE. Use the following techniques to maintain and service vehicles during cold weather:

- Change engine oil more frequently to reduce the possibility of contamination.
- Keep the crankcase ventilator clear to avoid condensation of moisture and fuel vapors in the crankcase.
- Keep fuel tanks and containers as full as possible to prevent moisture from condensing and freezing in fuel lines. Keep fuel tank and container caps (covers) tightly closed to prevent the entry of snow, ice, and moisture.
- Drain fuel filters frequently.
- Use proper antifreeze and do not mix types. Allow for heat expansion of the coolant when filling radiators.
- Frequently check and clear relief vents on transfer cases, transmissions, and axles.
- Make complete changes of engine and gear oils when required. Avoid mixing various types or grades. Use lighter oils when recommended by the manufacturer.
- Clear snow, slush, and ice from wheels, suspension, and brake systems immediately after stopping to prevent freezing and resulting damage.
- Park vehicles on brush, logs, sand, or other dry surfaces to prevent tires from freezing to the ground.
- Do not attempt to break free a vehicle frozen in place in a parking or halt area by using its own power to rock or jerk it loose. Use another vehicle to tow (or push) the frozen vehicle.
- Avoid using sharp or pointed tools to free tires frozen to the ground.

G-8. TRUCK AND CONVOY OPERATIONS. Use the following techniques during cold weather truck and convoy operations:

- Exercise care in cross-country operations. Improper operation through or over brush, branches, stumps, and rocks may cause damage to radiators, lights, tires, and vehicle undercarriages.
- Recover vehicles that bog down in mushy ice or break through ice as quickly as possible to prevent their freezing in.
- As required, provide each vehicle with--

  - Driver's personal gear and field equipment.
  - Vehicle maintenance tools.
  - Operational rations for emergency use.
  - Extra engine oil, fuel, and antifreeze.
  - Tow and tire chains.
  - Pioneer tools.
  - Strip maps.
  - Fire starters.
  - Highway flares and safety kits.

- Inspect brake lines frequently. Remove accumulations of slush, ice, and snow to prevent line breakage.
- If you are uncertain about a difficult stretch of road, stop and look the situation over before proceeding.

CAUTION

A snow-covered road may conceal an icy road surface. Be careful when driving on fresh snow.

- At a difficult piece of road or a snow drift, let the lead vehicle go through before driving more vehicles into the same spot. If the lead vehicle becomes stuck, it may be necessary to pull it out backwards.
- When approaching a difficult spot, shift the vehicle into low gear and then keep moving. Stopping to shift gears after reaching a bad spot may cause the wheels to spin and dig in and the vehicle to become bogged down.
- If the vehicle is stuck, rocking the vehicle forward and backward by rapidly shifting between low and reverse may provide a long enough solid track for the vehicle to gain enough momentum to go through.
- When stopping on any slippery road, apply the brakes gently. Jamming or slamming on the brakes may cause a bad skid. This is especially true on ice or light snow.
- Never depend on brakes when descending a slippery hill. Shift into a lower gear at the crest and use the engine for braking on the down slope.
- Chains serve a good purpose in snow or mud but are less effective on ice. A few shovels full of sand or earth scattered over an icy grade create as much or more traction than chains.

- Never accelerate quickly on slippery roads. Doing so may cause one wheel to spin while the other remains idle, resulting in a skid.
- To overcome a skid, turn the front wheels in the direction of the skid. The momentum of the vehicle will carry it in a straight line parallel to the original path, and you should regain control.
- Avoid ruts that may cause a skid or bruise a tire. When halting for some time, chock the wheels if possible. Leave the hand brake off. This prevents the brakes from becoming frozen in a locked position.
- Before parking a vehicle and if conditions permit, apply the brakes severely several times. This heats the brake shoes and drums and helps to rid the drums of any water that may have accumulated.
- When crossing on ice over frozen streams, keep the cab doors open. You may need to leave in a hurry if the ice is thin.
- Know and use proper signals. This is most important in winter driving when roads are treacherous and visibility is poor.
- Remember that when sleet or snow is melting on the roads, it may be freezing or frozen on bridges.
- When driving in a heavy snowstorm, in rain or fog, or under other poor visibility conditions, use vehicle lights to warn other drivers of your position. Keep your lights on the regular driving beam, not on high beam.
- If visibility becomes zero, stop and wait for better conditions.
- If the radiator antifreeze is lost and a new supply is unavailable, add light lubricating oil or fuel oil to the radiator liquid. This will get the vehicle back to its base or on to the next point where antifreeze can be obtained. (Flush the radiator thoroughly before replacing the coolant.)

APPENDIX H

ROADNET EVALUATION

Road evaluation at any level is more than a review of the road network, surface treatments, and bridge capacities. It encompasses all aspects of logistics preparation of the battlefield (such as friendly and enemy activity, weather, and terrain). This appendix addresses factors that should be considered in evaluating a road network.

H-1. MAPS AND OTHER DATA. Movement planning begins by studying maps of the area that offer general alignment, comparative surfacing, and information on bridges and tunnels. If operations are to be sustained, add data from other sources such as the following:

- Topographic maps.
- Air photographs.
- Ground reconnaissance.
- Reports of travelers or inhabitants.
- Construction plans of highways and bridges.
- Engineers, military police, and movement control units.

H-2. ROAD CHARACTERISTICS. Road characteristics include elements of design and construction that influence vehicular travel, such as--

- *Turns*. Sharp hairpin turns, particularly in mountainous terrain, may restrict the use of some larger military vehicles.
- *Width of road*. Width determines the size of vehicles and number of traffic lanes that can be accommodated.
- *Type of road*. Engineers classify roads into three basic types:

  - Type X, all-weather.
  - Type Y, all-weather (limited traffic due to weather).
  - Type Z, fair weather.

Classification is based on the road's ability to withstand weather effects. It considers road surface material, type of construction, alignment, grades, and other features. Roads are type classified by the worst section.

a. **Military Load Classification**. Military load classification is a load capacity rating system that assesses the effects of vehicle weight and type upon roads and bridges. Road classification is based on the lowest bridge military load classification number for each road or route considered.

See FM 55-15 for steps in estimating highway tonnage capabilities under varied conditions. See FM 5-36 for information on road characteristics and classifications.

b. **Obstructions**. Obstructions are natural or manmade obstacles, or a combination of the two (including obstacles created by enemy action), that hinder or stop movement over a given section of road. Obstructions are critical points that include--

- Reductions in overhead clearance. Look for overhead wires, low overhanging tree branches, overpasses, underpasses, clearances, bridges, and tunnels.
- Reductions in road width. Look for narrow tunnels and bridges and overhanging or encroaching buildings.
- Reductions in road capacity. Look for bridges, fords, or ferries having less capacity than the road.
- Steep grades (7 percent or greater) and sharp curves (radius less than 30 meters).
- Weather restrictions, such as ice, snow, and mud slides. Fog and floods can hinder or stop traffic but should only be considered obstructions when they regularly obstruct roads.
- Contaminated or damanged areas.

H-3. CLIMATE, TERRAIN, AND WEATHER. Climate and terrain should be considered together. Their greatest effect is on off-road or cross-country motor movement operations. Terrain evaluation is the study of how soils, vegetation, climate, and land forms help or hinder the employment of military units and equipment. Road movement planners evaluate terrain to determine the ability to move vehicles and equipment without interruption and with minimum exposure to observation and direct fire.

Climate is a condition produced by temperature, humidity, precipitation, wind, and light in an area over an extended period. Climate influences long-range plans for an area of operations. Weather is the local, day-to-day condition of the atmosphere. Daily operations are concerned with weather.

Extremes of climate and weather impact motor operations by their effects on personnel and equipment. Cold climates reduce the efficiency of personnel. Bulky clothing limits movement in performing maintenance and operational duties. Hot, humid climates reduce energy and increase physical discomfort and the likelihood of disease. Over time, heat and high humidity reduce the life expectancy of all equipment and add to the problems of maintenance, repair, and replacement. Rust and corrosion are accelerated. Mildew and rot rapidly attack unprotected clothing and leather products.

Extremes of weather affect the daily maintenance and operation of motor vehicles. Low temperatures require protection of cooling systems to prevent freezing, fuel additives to prevent frozen fuel lines, and protection to make starting easier. Tire life may be reduced; metals may become brittle and break. Batteries lose efficiency and may freeze or crack. Severe freezing may require extensive road repairs after each thaw, particularly in early spring. Extremely high temperatures may increase the number of breakdowns from overheating.

H-4. TERRAIN EVALUATION. Terrain evaluation considers all factors of the operational environment in relation to the capabilities and limitations of the task equipment. In all military motor transport operations, terrain evaluation should be done for every new mission. The source of information, the techniques, and the results of terrain evaluation vary with the operational environment. See FM 55-15 to find how to evaluate terrain. Terrain evaluation at unit level is made to select the most suitable route to accomplish the mission most effectively under the circumstances.

It is based on information gained from observation and ground reconnaissance, aided and expanded by maps, photos, and local intelligence. Carefully weigh this information against known capabilities and limitations of the vehicles and the training or experience of the drivers. Weather, rather than climate, is the most important variable. Even in a well-developed area with a good roadnet, a driver may be required to make an off-road detour to bypass a roadblock or section of damaged highway. The habit of constant terrain evaluation enables him to make a quick decision and prompt selection of the most practical route.

H-5. COMBINED EFFECTS. Adverse conditions for motor vehicle operation and military motor movement are usually caused by combinations of terrain, climate, and weather. The effects of climate on terrain include:

- Amount of vegetation.
- Amount and frequency of precipitation.
- Average moisture content of soils.
- Size and type of water obstacles.

Weather conditions may reduce highway speeds, increase congestion, and be a major cause of accidents. Fog, rain, snow, ice, and high winds restrict movement on highways as well as travelling cross-country. In planning off-road movement and movement on unimproved roads and trails, consider the type and character of soils along with climate and weather. Vegetation may serve as an indicator of soil type and trafficability. It may also be an obstacle to movement even though it provides cover and concealment. Soils are made up of disintegrated rock in the form of sand or clay (structure) and disintegrated organic material (humus). Their capacity to support traffic depends on both structure and the amount of moisture present.

The condition of the soil is important when planning for off-road movement. The following briefly outlines major soil characteristics and the effects of climate and weather. Snow characteristics are also included since the effects of snow on motor movement are considered in the same manner as soil effects. Normal topsoil is a mixture of clay, silt, or sand and decomposed vegetation. Mud is clay and silt. All soils containing large amounts of these substances will become soft and pliable when wet. Silty soil becomes dusty and loose when dry. Clay soil dries hard and firm, making a good road surface. Rain has little effect on silty soil but may make clay roads greasy, reducing trafficability.

a. **Sand**. Fine sand gives excellent support and traction when firmly compacted and dampened. Coarse sand does not compact well. It dries rapidly and is an obstacle to motor movement.

b. **Snow**. The effects of snow are unpredictable and vary with temperature changes. Trafficability in snow depends on its strength, traction, and resistance. Light, new-fallen snow up to 20 inches (50 centimeters) deep may offer no serious obstacle to the average military vehicle. However, 8 inches of grainy, sandlike “sugar snow” may make wheeled vehicle operations impossible. In extreme cold, snow has the same traction as dry soil. Near- or slightly above-freezing temperatures drastically reduce traction on hard-packed snow surfaces.

APPENDIX I

CONVERSION TABLES

This appendix gives the linear and liquid measure and weight equivalents of US units to metric units and vice versa. The metric system is a decimal system of weights and measures in which the gram (.0022046 pound), the meter (39.37 inches), and the liter (61.025 cubic inches) are the basic units of weight, length, and capacity respectively. Also included are conversion factors for the most commonly used measurements and weights.

LINEAR MEASURE

Kilometers to miles (km x .621 = mi) (km ÷ 1.609 = mi)	Miles to kilometers (mi x 1.609 = km) (mi ÷ .621 = km)
1 = 0.62	1 = 1.61
2 = 1.24	2 = 3.22
3 = 1.86	3 = 4.83
4 = 2.48	4 = 6.44
5 = 3.10	5 = 8.05
6 = 3.72	6 = 9.66
7 = 4.34	7 = 11.27
8 = 4.96	8 = 12.88
9 = 5.58	9 = 14.49
10 = 6.21	10 = 16.10
20 = 12.42	20 = 32.20
30 = 18.63	30 = 48.30
40 = 24.84	40 = 64.40
50 = 31.05	50 = 80.50

LIQUID MEASURE

Gallons (US) x 3.785 = liters
Gallons (US) x 0.8327 = gallons (imperial)
Gallons (US) x 3.332 = quarts (imperial)
Quarts (US) x 0.946 = liters
Quarts (US) x 0.2082 = gallons (imperial)
Quarts (US) x 0.8327 = quarts (imperial)
Pints (US) x 0.473 = liters
Liters x 0.2642 = gallons (US)
Liters x 1.057 = quarts (US)
Liters x 0.2201 = gallons (imperial)
Liters x 0.8804 = quarts (imperial)

LIQUID MEASURE (continued)

Gallons (imperial) x 1.201 = gallons (US)
Gallons (imperial) x 4.802 = quarts (US)
Gallons (imperial) x 4.545 = liters
Quarts (imperial) x 0.3001 = gallons (US)
Quarts (imperial) x 1.201 = quarts (US)
Quarts (imperial) x 1.136 = liters

WEIGHTS

Short ton (US) = 0.91 metric ton
Long ton (US) = 1.02 metric tons
Pound (US) = 0.45 kilogram

SIMPLIFIED CONVERSION FACTORS FOR QUICK COMPUTATION

The following are accurate to within 2 percent:

- Inches to centimeters -- Multiply by 10 and divide by 4.
- Yards to meters -- Multiply by 9 and divide by 10.
- Miles to kilometers -- Multiply by 8 and divide by 5.
- Gallons to liters -- Multiply by 4 and subtract 1/5 of the number of gallons.
- Pounds to kilograms -- Multiply by 5 and divide by 11.

APPENDIX J

ROAD MOVEMENT PLANNING

Units that move convoys on MSRs, ASRs, or other controlled routes must understand how these routes are controlled and how to use them. Convoy operations require two types of control--area and organizational. This appendix focuses on area control. Both organizational and area control are discussed in detail in Chapter 5 of this manual.

J-1. AREA CONTROL. The commander who controls the area/terrain through which convoys move exercises area control. This type of control is normally exercised through movement control channels and is known as highway regulation.

a. **Highway Regulation**. Highway regulation involves planning, routing, scheduling, and deconflicting the use of routes to facilitate movement control. It seeks to provide order, prevent congestion, and enforce movement priorities. The goal of highway regulation is to sustain movements according to the commander's priorities and make the most effective and efficient use of road networks.

Responsibility for highway regulation rests with commanders having area jurisdiction. The highway regulation mission is performed by--

- The TMCA and transportation battalions (MC) in the COMMZ.
- The transportation battalion (MC) in the corps rear area.
- The DTO in the division rear area.
- The brigade S4 in the brigade rear area.

MC detachments may perform highway regulation when assigned a geographical area of responsibility within the COMMZ or corps rear area. The TMCA, movement control battalions, and DTO monitor highway regulation in subordinate command areas. Based upon the tactical situation, they may also regulate some of these routes.

b. **Clearance Requests**. A request to move on a controlled route is known as a movement bid. A movement bid is a form or message that details the itinerary of the move, the number and types of vehicles, and movement planning information. The authority to move is passed to the moving unit as a movement credit. A movement credit is an alphanumeric identifier.

Units needing to move on controlled routes that require a movement credit must request and receive clearance before beginning movement. Units use the traffic circulation plan and the highway regulation plan to obtain information on the road networks and determine if a movement bid is required. The request is submitted through logistics channels to the DTO or corps/EAC MC detachment within whose area the movement originates. Based on procedures established in SOPs, the request may be transmitted in hard copy, electronically, or verbally. Figure J-1, page J-2, shows a sample movement bid.

TO: 502 MCC	THRU: 51st Trans Bn	FROM: 151st Trans Co	DATE: 15 Feb XX EXT # 46061

SECTION I. MOVEMENT DATA

MOVING UNIT	CONVOY CDR	START POINT	RELEASE PT	TYPE OF MOVEMENT
150th Trans Co	CPT Nedry	GRID: ND610397 LOC: Smith	GRID: NE010900 LOC: Dover	Unit Move

MOVEMENT DATE: 1 Mar XX | SP TIME: 0800 | MOVEMENT CREDIT # 3

CONVOY ORGANIZATION	# SERIALS	SERIAL GAP	#MU	MU GAP	VEH GAP	RATE OF MARCH
	3	10 Min	3	5 Min	100m	50

CHECK POINTS	DISTANCE (KM) BETWEEN PTS	ARRIVE	CLEAR	ROUTE DESCRIPTION	CRITICAL PTS/ HALTS
CP4 (SP)		0800	0833	MSR Dart	
CP8	10	0812	0845	MSR Dart	
CP5	15	0830	0903	MSR Dart	
CP1	10	0842	0915	MSR Dart	
CP13 (RP)	5	0848	0920	MSR Dart	

SAMPLE

SECTION II. VEHICLE/LOAD DATA

CONVOY COMPOSITION, OVERSIZE/OVERWEIGHT VEHICLES

# OF TRACKS	# OF WHEELS	HEAVIEST VEH/WT/MLC
	87	M915/M872 Tractor Trailer, 53,401, 45MLC

QTY	MODEL	DESCRIPTION	LOAD INFO	L	W	H	WT	OTHER/HAZ MAT
95	M915/M872	TRACTOR/TRAILER		668	96	115	53,401	
5	M1009	CUCV		192	95	75	6,720	
2	M936A2	WRECKER		362	97	118	36,010	

REQUESTER'S NAME, TITLE, PHONE: 1LT Christy, Pltn Ldr, 868-6315

SIGNATURE:

SECTION III. AUTHENTICATION

MOVEMENT CLEARED BY: ____________________

AT DTG: ____________________

CLEARANCE PASSED TO: ____________________

AT DTG: ____________________

Figure J-1. Sample movement bid

The DTO, MC detachment, or transportation battalion (MC) reviews and considers movement bids based on command priorities for the type of movement and the unit requiring movement. They either schedule the movement as requested or, if a credit cannot be granted, notify the unit and schedule the move at a different time or on a different route. Movement credits are returned to the requesting unit through the same channels used for the request.

J-2. PLANNING FACTORS. Planning factors are basic to the process of planning and organizing convoys. This section provides the formulas and information necessary to plan highway movements and develop movement tables.

a. **Movement Measurement**. Movements are measured by calculating how long it takes to move a convoy over a route. These calculations involve time and distance factors.

Movement planners should use rate of march in performing movement calculations. The rate of march is the average number of kilometers expected to be traveled in any specific time period. Because the rate of march is an average, it compensates for short periodic halts and short delays caused by congestion. It does not include long halts, such as those for consuming meals or for overnight stops. March rate is expressed in kilometers or miles in the hour.

b. **Time-Distance Factors**. Time and distance factors are used to perform a wide range of calculations for planning highway movements and to develop movement bids or movement tables.

(1) ***Distance factors***. Distance factors are expressed in kilometers or meters. The terms used to describe distance factors are as follows:

- *Road distance*--the distance from point to point on a route, normally expressed in kilometers.
- *Gap*--the space between vehicles, march units, serials, and columns. It is measured from the trail vehicle of one element to the lead vehicle of the following element. The gap between vehicles is normally expressed in meters. The gap between march elements is normally expressed in kilometers.
- *Road space*--the length of roadway that a convoy occupies. It is measured from the front bumper of the lead vehicle to the rear bumper of the trail vehicle and includes all gaps inside the column. Road space is normally expressed in kilometers.

(2) ***Time factors***. Time is expressed as a quantity of hours or minutes. The following are terms used to describe time factors:

- *Time distance*--the amount of time required to move from one point to another at a given rate of march. It is the time required for the head of a column or any single vehicle of a column to move from one point to another at a given rate of march.
- *Time gap*--the amount of time measured between vehicles, march units, serials, or columns as they pass a given point. It is measured from the trail vehicle of one element to the lead vehicle of the following element.
- *Pass time*--the amount of time required for a convoy or its elements to pass a given point on a route.

c. **Arrive and Clear Time Calculations**. To complete a movement bid, the moving unit must calculate the arrive and clear time at SPs, en route CPs, and RPs. Arrive and clear times are not the same as time factors. Time factors measure a quantity of time or distance. Arrive and clear times are actual times as displayed on a clock.

The arrive time is the time the first vehicle in the column will arrive at an SP, CP, or RP. The arrive time is derived from the time distance. The clear time is the time the last vehicle in the column will clear that SP, CP, or RP. The clear time is derived from the pass time. The planner must determine the arrive and clear time for the entire column, consisting of the serials and march units within that column.

Calculate arrive times as follows: The arrive time at the SP is the same as the SP time. To calculate the arrive time at the first CP, take the distance from the SP to the first CP, divide by the planned rate of march, and multiply by 60 (minutes). Add this amount of time distance to the arrive time at the SP to determine the arrive time at the first CP.

EXAMPLE: Distance from SP to first CP: 10 km
March rate: 50 KMIH

Solution: $10 \div 50 = .20$ hours x $60 = 12$ minutes

If the arrive time at the SP is 0800, then the arrive time at the first CP will be 0812.

To calculate the arrive time at the second CP, take the distance from the first CP to the second CP, divide by the planned rate of march, and multiply by 60 (minutes). Add this amount of time distance to the arrive time at the first CP to determine the arrive time at the second CP.

EXAMPLE: Distance from first to second CP: 15 km
March rate: 50 KMIH

Solution: $15 \div 50 = .30$ hours x $60 = 18$ minutes

If the arrive time at the first CP is 0812, then the arrive time at the second CP will be 0830.

Continue this method to calculate the arrive time at succeeding CPs to the RP.

To calculate the clear times at each CP, planners must determine the pass time. Calculating pass time requires four calculations: density, time gaps, road space, and pass time.

$$\text{Density} = \frac{1{,}000 \text{ (meters)}}{\text{vehicle gap + avg length of vehicle}}$$

NOTE: Vehicle gap is expressed in meters, representing the gap between vehicles. Average length of vehicle is expressed in meters, representing the average length of the most common vehicle in the column.

EXAMPLE: If the vehicle gap is 100 meters and the average vehicle length is 18 meters, then--

$$\text{Density} = \frac{1{,}000}{100 + 18} = \frac{1{,}000}{118} = 8.5 \text{ vehicles per km}$$

Time gaps = [(number of march units - 1)
x march unit time gap]
+ [(number of serials - 1)
x (serial time gap - march unit time gap)]

EXAMPLE: If a column has two serials with two march units in each, the time gap between march units is 5 minutes and the time gap between serials is 10 minutes, then--

Time gaps = [(4 - 1) x 5] + [(2 - 1) x 5] =
[3 x 5] + [1 x 5] = 15 + 5 = 20 minutes

$$\text{Road space} = \frac{\text{number of vehicles}}{\text{density}} + \frac{\text{time gaps x rate}}{\text{60 (minutes)}}$$

NOTE: Time gaps in the road space calculation are the total time gaps calculated for the column.

EXAMPLE:

number of vehicles	=	87
density	=	8.5 per km
rate	=	50 KMIH
time gaps	=	20

$$\text{Road space} = \frac{87}{8.5} + \frac{20 \times 50}{60} = 10.2 + 16.7 = 26.9 \text{ km}$$

NOTE: In this example, the column will occupy 26.9 km of road space.

$$\text{Pass time} = \frac{\text{road space x 60}}{\text{rate}}$$

EXAMPLE: Continuation from above

$$\text{Pass time} = \frac{26.9 \times 60}{50} = \frac{1{,}614}{50} = 32.2 \text{ or } 33 \text{ minutes}$$

NOTE: Always round up pass time regardless of the decimal value.

In this example, the clear time at the SP is 33 minutes after the first vehicle crosses the SP. If the arrive time at the SP is 0800, the clear time at the SP will be 0833. If the arrive time at the first CP is 0812, the clear time at the first CP will be 0845. Use this same method to calculate the arrive and clear times at succeeding CPs to the RP. This movement can be depicted as follows:

CP	ARRIVE TIME	CLEAR TIME
1	0800	0833
2	0812	0845
3	0830	0903

The pass time will stay the same throughout the route as long as the march rate and density do not change. If the march rate or density changes, then recalculate the pass time to determine the new clear time.

d. **Rest Halts**. While the march rate compensates for short halts, it does not include scheduled rest halts. Scheduled rest halts must be planned for during the movement planning process. Rest halts can either be scheduled at a CP or between CPs.

Planners should understand that scheduled rest halts require time to get vehicles off the road and staged, time to rest, and time to get vehicles back on the road. If 10 minutes is to be allowed for the rest halt, then 15 minutes should be scheduled. The extra time is needed to get vehicles on and off the road.

If a rest halt is scheduled at a CP, the arrive time at the CP does not change. The only thing that will change is the clear time at that CP and the arrive and clear time at succeeding CPs. The clear time must be adjusted by the scheduled halt time.

If a rest halt is scheduled between CPs, then the arrive and clear times at the next CP must be adjusted by the scheduled halt time.

Continuing with the previous example, if a 15-minute rest halt is planned between CP 2 and CP 3, the following adjustments to CP 3 are needed:

CP	ARRIVE TIME	CLEAR TIME
1	0800	0833
2	0812	0845
3	0845	0918

Note the 15-minute delay in arriving and clearing CP 3. If the rest halt was planned at CP 2, the following adjustment to the clear time at CP 2 and both the arrive and clear times at CP 3 are necessary:

CP	ARRIVE TIME	CLEAR TIME
1	0800	0833
2	0812	0900
3	0845	0918

Note the 15 minute delay in clearing CP 2, arriving at CP 3, and clearing CP 3.

e. **Movement Tables**. The procedures just described are used to calculate the arrive and clear times for an entire unit movement. That information is of no use to subordinate serial and march unit commanders. They will need to know the specific arrival and clear times for their serials and march units. Therefore, the movement planner must develop movement tables for these subordinate elements of the column.

Continuing with the example, you are assigned to the 150th Medium Truck Company, equipped with M915 tractors and M872 semitrailers. The company is augmented with an additional medium platoon. The unit will move from its present location to a new area and you must plan the move. You have read both the highway regulation plan and the traffic circulation plan and selected a route. The route requires that you submit a movement bid. The route you select is MSR DART. You will SP at CP 4 and RP at CP 13. You intend to SP at 0800. The following represents your route and the distances involved.

(SP) CP 4 to CP 8 = 10 km
CP 8 to CP 5 = 15 km
CP 5 to CP 1 = 10 km
CP 1 to CP 13 (RP) = 5 km

You calculate your time distance as follows:

Time Distance:

SP to CP 8 = 10/50 x 60 = 12 minutes
CP 8 to CP 5 = 15/50 x 60 = 18 minutes
CP 5 to CP 1 = 10/50 x 60 = 12 minutes
CP 1 to RP = 5/50 x 60 = 6 minutes

Your augmented company has 87 vehicles, which you divide into two serials with two march units in each serial. (You could have chosen to have all four march units in one serial.)

The first march unit has 22 vehicles with vehicles having an 18 meter average length. Calculate pass time for this march unit as follows:

Density = 1000/100 + 18 = 1000/118 = 8.5 vehicles per kilometer
Time Gaps = 0 (because you are calculating for only one march unit)

$$\text{Road Space} = \frac{22}{8.5} + \frac{0 \times 50}{60} = 2.6 \text{ kilometers}$$

$$\text{Pass Time} = \frac{2.6 \times 60}{50} = 3.1 \text{ minutes} = 4 \text{ minutes}$$

REMINDER: Round up pass time regardless of the decimal value.

You then develop a movement table for the company movement. Table J-1 shows the completed movement table showing the arrive and clear times for each march unit in the company.

Table J-1. Completed movement table

150 Trans Co			
March Unit 1	Arrive	Clear	
	CP 4 0800	0804	
	CP 8 0812	0816	
	CP 5 0830	0834	
	CP 1 0842	0846	NOTE 5-MINUTE TIME GAP
	CP 13 0848	0852	BETWEEN MARCH UNITS
March Unit 2			
	CP 4 0809	0813	
	CP 8 0821	0825	
	CP 5 0839	0843	
	CP 1 0851	0855	NOTE 10-MINUTE TIME GAP
	CP 13 0857	0901	BETWEEN SERIALS
March Unit 3			
	CP 4 0823	0827	
	CP 8 0835	0839	
	CP 5 0853	0857	
	CP 1 0905	0909	NOTE 5-MINUTE TIME GAP
	CP 13 0911	0915	BETWEEN MARCH UNITS
March Unit 4			
	CP 4 0832	0836	
	CP 8 0844	0848	
	CP 5 0902	0906	
	CP 1 0914	0918	
	CP 13 0920	0924	

Note how the time distance is used to determine the arrive times. Also, that the pass time is added to each arrive time to obtain the clear time. If you compare the arrive and clear times of this movement table with the arrive and clear times calculated for the entire convoy, you will notice a slight deviation in the clear time at the RP. This is due to the rounding up of each march unit's pass time.

f. **Diverting and Rerouting**. Convoy commanders should realize that not all scheduled convoys will move according to scheduling. Traffic disruptions may be caused by enemy action that destroys bridges, damages MSRs, or contaminates MSRs. They may also be caused by refugees clogging an MSR, breakdowns, weather, or degradation of road surfaces. Highway regulation authorities may issue instructions to units to hold movements that have not begun or to issue new routing instructions, hold movements at a staging area or CP if they have already begun, or reroute movements at a CP. Units must comply with these instructions as issued.

J-3. COMPLETING A MOVEMENT BID. Movement bids must contain all information pertaining to the unit movement. The following guidance will assist you in completing a movement bid such as the one shown in Figure J-1.

1. TO: The appropriate movement manager responsible for highway regulation in your area. This organization may be the DTO, movement control battalion, TMCA, or MC detachment.
   THRU: The higher headquarters or MC detachment servicing your area.
   FROM: The unit submitting the movement bid.

2. MOVING UNIT: Name of the moving unit.

3. CONVOY CDR: Convoy commander's name.

4. START POINT/RELEASE POINT: The SP should be located at a point along the MSR that will allow a march unit to be at the proper interval and rate. The RP should be at a point along the MSR that will allow the march unit to clear the RP without bunching up or slowing from planned rate of march. Include a six-digit grid coordinate and the nearest town or other quickly identifiable location.

5. TYPE OF MOVEMENT: Identify the kind of movement; for example, unit move or resupply convoy.

6. MOVEMENT DATE/SP TIME: Date and time the convoy will arrive at the SP.

7. MOVEMENT CREDIT: This space is reserved for the movement control unit that will issue the movement credit. When you receive permission to move, this will be returned and a movement credit number will be assigned. This number will be written on each vehicle in the convoy.

8. CONVOY ORGANIZATION: Identify the number of serials and march units that you will need to control your convoy. You also establish the time gaps between serials and march units as well as the vehicle gap.

9. RATE OF MARCH: Enter the rate of march you used to plan the movement.

10. CHECKPOINTS: List the CPs you will use along your route. Ensure the CPs are known to the movement agency. These may be established as part of the traffic circulation plan and should be used by all units moving through the area of operations.

11. DISTANCE BETWEEN POINTS: The measured distance stated in kilometers.

12. ARRIVE AND CLEAR TIMES: Identify the arrive time and clear time at each checkpoint. Use the times that you calculated using the planning formulas as explained earlier in this appendix.

13. ROUTE DESCRIPTION: Use the MSR names identified in the highway regulation plan or the traffic circulation plan. When MSRs are not previously identified, use the local highway or road designation.

14. CRITICAL POINTS/HALTS: Identify planned halts for refueling or driver rest. These locations may be at a checkpoint or between checkpoints. Also identify any critical points that you want to bring to the attention of the movement planner.

15. NUMBER OF TRACKS: Identify the total number of tracked vehicles that will travel in the convoy.

16. NUMBER OF WHEELS: Identify the total number of wheeled vehicles that will travel in the convoy.

17. HEAVIEST VEH/WT/MLC: Identify by model the heaviest vehicle class that will be in the convoy. Include the vehicle weight and MLC. Vehicle weight may be found in TB 55-46-1. The MLC should be affixed to the right front of the vehicle. FM 5-36, Appendix C, lists common vehicles and their MLC.

18. VEHICLE CHARACTERISTICS AND INFORMATION: List the total number of vehicles of each model type that will travel in the convoy. Vehicle data may be found in TB 55-46-1. Include peculiar load information that will assist movement managers in routing the convoy. All hazardous material must be identified.

19. REQUESTER'S NAME: Identify a point of contact with telephone number in case there are questions and changes to be coordinated. This point of contact should be familiar with the convoy organization and the data that was used in filling out the form.

20. SECTION III: This section is reserved for the agency that processes your movement bid. The agency uses this space for movement bid accountability and internal control.

APPENDIX K

CONTROLLING MOTOR TRANSPORT EQUIPMENT

Various records and reports are used to control motor transport equipment and analyze unit operations. This appendix discusses the purpose and disposition of each of these documents.

K-1. TRAILER RECEIPT. The trailer receipt establishes responsibility for trailers and their conditions and serves as a receipt for both empty and loaded trailers. It is prepared by the unit dispatching the trailers. Three copies are made as follows:

- *Original* -- used to show acceptance from one column commander or individual driver to another column commander or individual driver or terminal or transfer point OIC.
- *Second* -- retained by the driver or column commander.
- *Third* -- retained by the dispatcher.

K-2. DAILY YARD CHECK. The daily yard check is made at a designated hour each day by units responsible for terminal operations. This report provides information on the location of empty and loaded trailers, including the destination of loaded trailers, and also shows deficiencies. It is divided into two sections: section 1, empty trailers; and section 2, loaded trailers. Deficiencies are noted in the remarks column and specified by section (1 or 2). This report is forwarded to the operations section of the next higher headquarters.

K-3. DAILY OUTGOING TRAILER REPORT. The daily outgoing trailer report shows all semitrailers dispatched since the previous day’s report. It includes the load class, departure time, and destination of each trailer. The report is sent to the operations section of the next higher headquarters along with the daily yard check.

K-4. WEEKLY TRAILER LOCATION REPORT. The weekly trailer location report is completed by the senior motor transport command. It shows the status, by battalion, of all semitrailers controlled by the command. The report includes information on trailer location, length of time at present location, and whether they are loaded or empty. The report is filled out on a specific day each week. Battalion commanders can use the report to determine if, where, and how trailers are being mismanaged or misused.

NOTE: The terms "loaded" or "empty" are shortened to "L" or "E." For example, a loaded trailer that has been at a terminal 18 days is shown as "L18."

K-5. CONSOLIDATED OPERATIONS REPORT. The consolidated operations report is used to analyze unit performance and plan future operations. It is completed daily by each battalion engaged in line haul and forwarded to the senior motor transport command. Commanders use report data to compute unit performance. For example, a commander can compare the performance of one truck company with another. Most entries to the consolidated operations report are taken from truck company reports. Unit averages are figured to the nearest round number (for example, an average of 7.7 would be raised to 8).

Here are some ways to use data for operational information:

- To learn the number of vehicles available for dispatch, subtract the figure in the "On Dispatch" column from the figures in the "Operational" column.
- To learn the rate of movement, divide the miles by the hours en route.
- To find passenger-miles, multiply the miles per passenger run by the total passengers.
- To find ton-miles, multiply the miles per cargo run by the total tons.

APPENDIX L

CONTAINER INSPECTION CHECKLIST

This appendix provides criteria for inspecting containers. Container inspections aid in determining liability for container damage and/or loss and should be made both at the time of pickup and delivery. Inspection forms should be required and may be prepared and reproduced locally. The following checklist contains basic criteria that should be included when evaluating containers.

- *Container Exterior*.

  ☐ Container exterior is free of holes, cuts, or severe dents.
  ☐ All hinges, fasteners, doors, reflectors, and lifting eyes are in good condition (not broken, bent, or otherwise damaged), and secure.

- *Container Interior*.

  ☐ Container interior is free of holes or breaks in roofing, floor, and sides.
  ☐ Interior is free of loose debris.

- *General*.

  ☐ Container is of proper size (meets mission requirements).
  ☐ Container is in serviceable condition (if not serviceable, request replacement).

APPENDIX M

MOBILIZATION MOVEMENT AND CONTROL

In CONUS, each state establishes rules, procedures, and laws that govern the use of public highways. Counties, cities, and municipalities may establish added restrictions for the use of their respective county or city routes. No vehicular movement that exceeds these legal limitations or regulations, or that subjects highway users to unusual hazards (including movement of explosives or other dangerous cargo), will be made over public highways without prior permission from the appropriate state, local, and/or toll authority. These terms require that military convoys have an approved convoy clearance to travel on public highways and roads. This appendix discusses the agencies involved and coordination required in obtaining approval to operate military convoys in CONUS. A military convoy can be defined as one of the following:

- Any group of six or more vehicles temporarily organized to operate as a column, with or without escort, proceeding together under a single commander.
- Ten or more vehicles per hour dispatched to the same destination, over the same route (except during mobilization and deployment, then all movements to a mobilization station will require a convoy clearance).

Five or fewer vehicles operating as a column, with or without escort, proceeding under a single commander (if one or more vehicles require the submission of a DD Form 1266).

M-1. SOURCES OF CONVOY CLEARANCE APPROVAL. Within the Army, there are two primary focal points for coordinating and obtaining convoy clearance approval. AC units coordinate with their respective ITO. RC units (both NG and AR) coordinate with the ARNG STARC in their respective home station state. Within the STARC, the SMCC performs convoy approval functions. Since the STARC already has a close working relationship with the state, it has been selected to become the approval authority for all convoy movement. Upon order from FORSCOM, the SMCC will become the coordinating and approval authority for all Army movement within its respective state. Currently (depending on working agreements within each state), the ITO may request convoy clearance approval from its STARC. However, this procedure is not required.

The STARC SMCC is supervised and controlled by the DMC. The DMC serves as the coordinating agent between FORSCOM, CONUSA commanders, the moving units, and the respective state DOT for managing and controlling military traffic. The STARC refers to the premobilization organization. Upon mobilization, and if federalized, the STARC will be referred to as the JSAC.

M-2. AUTOMATED CONVOY MANAGEMENT IN CONUS. The continental United States is divided into two CONUSAs. These commands are responsible for military operations that take place within their respective areas. Of major concern is the effective management of military convoys within states, crossing state lines, and crossing CONUSA boundaries. Maintaining command and control over military convoys by one command in peacetime is difficult and during mobilization would become impossible.

To assist in centralized convoy management, FORSCOM has developed and implemented a computerized management system known as MOBCON. The MOBCON software uses the NHTN in conjunction with a system of nodes (road junctions, critical points) and links (road segments between nodes). About 380,000 miles of roadway with 28,500 nodes and 45,000 links represent this network. MOBCON software uses the electronic NHTN data base to schedule and deconflict convoys within CONUS. The deconfliction process permits only one convoy to operate over a segment of road at any given time. Normally, this process is accomplished by changing times of movement or rest halt duration. MOBCON usually separates convoys by a 10-minute time gap.

MOBCON provides visibility of all military traffic processed in the system. It links all DMCs and provides a means of communication. A convoy processed in one state and passing through other states has immediate visibility of all MOBCON users. For US Army MOBCON procedures, refer to the SMCC Operations section in this appendix and FORSCOM Regulation 55-1.

M-3. SMCC RESPONSIBILITIES. SMCCs collect, analyze, and consolidate all DOD-organic convoy movements and develop master movement plans for mobilization and deployment. They provide FORSCOM and CONUSA commanders with information about the highway network and status of military motor movements within each state. They approve unit convoy routes, publish march tables, and exercise operational control for the movement of convoys within their respective states. SMCCs provide the communications link between the moving convoy and its command and control headquarters as well as the interface between military (DOD) and civilian (state and US DOT) agencies that control the use of highways, tunnels, and bridges. When the MOBCON program is fully implemented, the SMCCs will accomplish the following tasks:

- Approve all DOD convoys within their states.
- Coordinate convoy movements with civil authorities.
- Monitor and control convoy movements during major exercises, civil emergencies, and mobilization.

NOTE: Each installation must maintain a 24-hour POC (with telephone number) where the police and/or SMCC may call for emergency service.

Special considerations for centralized control of convoys include movement priority, convoy length, time gap, direction of movement, and routing.

a. **Movement Priority**. The senior commander establishes movement priority. During peacetime, all convoys are given the same priority. The senior commander of an exercise or annual training period must establish orders of march and coordinate with the installation or training site responsible for setting gate arrival/departure times. During mobilization, first priority is given to deployment convoys moving to meet port calls established by MTMC. All other convoys receive second priority.

b. **Convoy Length**. Convoys are limited to a maximum of one hour in length. This reduces conflicts and eliminates a long wait while another convoy passes through a node (road junction).

c. **Time Gap**. The central computer adds a ten-minute "tail" to each convoy. Convoy commanders must be aware that another convoy could be scheduled as close as 10 minutes behind or in front of their convoy.

d. **Direction of Movement**. MOBCON software enables the DMC to “fix” either the requested arrival time or the departure time at an installation. This allows the central computer to “backward plan” to meet a specific arrival time or to “forward plan” from a specific departure time. Normally, moves to an installation are “fixed” on arrival time, and departures are “fixed” on departing time.

e. **Routing**. The DMC in each state coordinates with the state DOT to establish approved convoy routes and halt locations. Route selection by the central computer will normally default to interstate highways unless the DMC specifies alternate routes due to traffic congestion, construction, or other restrictive reasons. The DMC’s goal is to always give the convoy commander the most practical and direct route that meets mission requirements and to provide for public safety. The SMCC/DMC is responsible for obtaining the required movement permits from the state DOT for oversize/overweight vehicles and equipment for NG units. Assistance may be provided to others.

M-4. SMCC OPERATIONS. When a DD Form 1265 or DD Form 1266 is received in the SMCC, it is reviewed and essential information extracted. The SMCC translates the data into MOBCON terminology and electronically transmits it to the MOBCON central computer. The computer deconflicts the data with all military traffic in its data base for the route and time requested. After deconflicting the requested convoy movement with all other convoys already scheduled along the route, the MOBCON computer generates data the DMC uses to produce an approved CMO. The CMO is returned to the unit and becomes the approval document for the move. It contains the following information:

- Approved road summary data (Paragraph 1).
- Specific route and time schedule (Paragraph 2).
- En route reporting requirements (if any) (Paragraph 3).
- Remarks (Paragraph 4).

The CMO also contains the CCN. This number will identify the convoy during its entire movement. The CCN is placed on both sides of each vehicle in the convoy and, if possible, on the front and back of each vehicle. It is also placed on the top of the hood of the lead and last vehicles of each march unit. For both peacetime and mobilization/deployment, the CCN for a MOBCON approved convoy is an eight-character, three-part figure that includes the following:

- The two-letter abbreviation of the issuing state (for example VA for Virginia, KS for Kansas, CA for California, and so forth).
- A five-digit control number. Control numbers are assigned in sequence on an annual basis. The first digit is the last digit of the calendar year; the next four digits represent the numerical sequence of the CMOs processed.
- A one-character type-of-movement designator. The types of movement designators are: S--outsize/overweight vehicles; E--explosives; H--hazardous cargoes; and C--all other convoys.

For example, the eighty-first convoy originating in Virginia in 1997 and carrying hazardous cargo will be assigned the convoy number VA-70081-H.

The CMO is valid only for the route and time designated. Convoy commanders must realize that other convoys may be operating within a 10-minute gap before or after their convoys, so meeting road movement times is critical. Commanders should also realize that the routing and times requested on the DD Form 1265 may not be exactly as received on the CMO. Upon receipt, the CMO must be reviewed to ensure that it meets mission requirements; if needed, changes may be requested through the SMCC.

The MOBCON CMO does not differentiate between serials and march units. All divisions of a convoy are referred to as march units. To accommodate all users of the highway network, the DMC must consider public safety, legal requirements, mission needs, and time space (time consumed while a convoy passes any point en route). MOBCON normally limits the time space of a convoy to 1 hour or less. Convoys of 20 vehicles or less are not usually subdivided into serials or march units.

M-5. REQUESTING CONVOY MOVEMENTS. The request for a convoy clearance will be submitted through the STARC to the SMCC to the DMC. ARNG and USAR units must ensure that requests arrive at the appropriate STARC not less than 60 days before the proposed convoy movement. Active component requests must arrive at the appropriate ITO not less than 30 days before the proposed convoy movement. The ITO will process the convoy request and return the approved DD Form 1265 with a CCN. The ITO may coordinate with the DMC for convoy clearance.

NOTE: Obtaining a convoy clearance through the normal procedures will delay mission accomplishment. An emergency request to the appropriate approval authority can be made by telephone or FAX, and the CMO returned by telephone or FAX.

The DMC immediately processes the convoy request, obtains the required highway permits, and provides the CMO to the requesting unit. He advises the unit of toll roads, bridges, and tunnels along the route and provides POCs for further coordination. The DMC also obtains permission from the toll authorities when toll roads, bridges, and tunnels are under the control of an agency other than the state or city government. The procurement of tolls is a unit responsibility.

M-6. ROUTING A CONVOY. The primary goal in routing a convoy is to ensure its safe and timely arrival at destination. The following factors must be considered if this goal is to be met:

- State DOT requirements and restrictions on length, width, height, weight, and cargo types; dates and time of travel.
- The effects of military traffic on the civilian population and emergency operations as well as other military convoys.
- The most practical and direct route available from origin to destination.
- The laws and regulations governing the use of special use routes.

a. **Highway Identification Systems**. The four principal types of highways are the US interstate, US highways, state highways, and county roads. Each type of highway has a different marking and numbering system. However, not all states and counties follow the same system of marking.

(1) ***Markers***. There are four primary types of highway markers (signs). They are as follows:

- US interstate--shield-shaped red, white, and blue sign.
- US highways--shield-shaped white sign with black lettering.
- State highways--round signs.
- County roads--square or diamond-shaped signs.

(2) ***Numbering system***. Under the federal highway numbering system, east-west routes are generally identified by even numbers and north-south routes by odd numbers. Low numbers in each 100 series of the federal highway system usually begin in either the east or north and increase numerically as they progress west or south.

In the Interstate highway numbering system, two-digit odd numbers designate rural routes that generally run north-south (I-75), and two-digit even numbers identify rural routes that generally run east-west (I-64). Routes numbered in the hundreds (I-275) are Interstate spur routes.

The numbering system for US highways is directly opposite of the US Interstate numbering system. Under the US highway numbering system, the low numbers are found in the south and west while the high numbers appear in the east and north.

b. **Route Selection**. The convoy commander selects the best route before completing Section III, Route Data, DD Form 1265 or DD Form 1266. Coordination with the ITO/UMC and/or UMO is paramount.

After making a map reconnaissance of possible routes, it is important to follow up with a ground reconnaissance. The convoy commander may ask the SMCC to recommend one or more routes for evaluation during a ground reconnaissance. The convoy commander may also request that the convoy be routed through specific intersections. Some factors that may influence the route selection, but will not be shown on maps, include the following:

- Maximum weight limitations on bridges and culverts.
- Maximum width and height clearances on highways, bridges, tunnels, and other overhead obstacles. If planning to use a toll highway, bridge, or tunnel, REMEMBER TO CHECK THE WIDTH AND HEIGHT FOR TOLL BOOTH CLEARANCE.

NOTE: Vehicles transporting POL, oxygen, acetylene, or other hazardous materials, or carrying military explosives may be prohibited from using tunnels and otherwise placed under severe operating restrictions, such as routings around large population centers.

c. **Deconflicting Highway Space**. The SMCCs will deconflict road space within their respective states based on movement priority, availability of the requested route, and logistic support requirements. DMCs will schedule convoy movements to maximize the effective use of the highway network. They are authorized to change convoy routes to avoid road space conflicts. Route changes will only be made as a last resort. Adequate service/rest facilities and communications must be available along the alternate routes. The primary goal is to ensure that all convoys are able to arrive at their destinations at or before their latest arrival times.

M-7. MANUAL CLEARANCE REQUESTS AND SPECIAL HAULING PERMITS. The DD Form 1265 or DD Form 1266 should always include the following information: requesting unit UIC; a strip map of the proposed convoy route (four copies with one copy added for each state to be traversed/see local SOP); and the name of the UMC or UMO at the point of origin.

A manual request should be submitted through command channels so that it arrives at the SMCC within the specified time frames. All sections of the form must be completed. In Block 14 (Proposed Routing)--besides the required location and duration of each halt--the convoy commander should identify specific checkpoints. If they are available for use, the MOBCON software will route the convoy through them. Also, in Block 20 (Remarks), the convoy commander may request that specific points be avoided.

Once the convoy clearance request has been reviewed and processed by the approving authority, the unit is issued a CMO. The movement of the convoy to which it applies MUST BE CONDUCTED AS THE CONVOY CLEARANCE DIRECTS. Deviation from clearance instructions is not authorized without prior coordination with the approving authority. It is here that command emphasis is required. The convoy commander must ensure that the routing specified on the approved CMO is followed and that the ETA and ETD are met at each of the checkpoints and rest halts. (MOBCON software schedules convoys at 10-minute intervals.)

The DD Form 1266 is used to request permission to move oversize and/or overweight vehicles on public roads. It should be submitted in four copies with one copy added for each state to be traversed (see local SOP).

NOTES:
1. To determine the legal maximum dimensions and weight authorized for vehicles on the highway, see Appendix E (applicable for all states within CONUS). To compute military vehicle axle weights, refer to Appendix N.
2. Only identical vehicles with loads of uniform weight may be listed on the same DD Form 1266. Each vehicle driver must have a copy of the approved hauling permit.
3. For recurring shipments, a blanket permit may be requested to avoid excess paperwork and processing. Each vehicle must have a separate permit.

M-8. TRANSPORTATION COORDINATOR AUTOMATED COMMAND AND CONTROL INFORMATION SYSTEM. The ITO is authorized to approve convoy movements for AC units departing his installation. All AC units can use TC-ACCIS to prepare DD Forms 1265 and 1266 and to have these requests approved through the installation's established system. The ITO reviews, corrects as necessary, and approves the request. The convoy clearance becomes the signed DD Form with the inclusion of a CCN. This CCN validates the approval process and identifies the convoy during movement. CCNs issued under this system differ from those issued under MOBCON. CCNs in this numbering system have ten characters as follows:

- The first two digits identify the post from which the convoy originates.
- The next four digits are the Julian date.
- The next three digits are the sequence number.
- The last is a single digit type of movement designator.

For example, FE 6270 023 C would be a convoy leaving from Fort Eustis on 26 September 1996; it is the 23d convoy approved on that day; and it is a regular convoy without any special requirements. If desired, the ITO may coordinate with the SMCC of his state and obtain convoy clearances through MOBCON.

M-9. MOBILIZATION CONVOY CLEARANCE REQUESTS. Mobilization convoy clearance requests are prepared by USAR and ARNG units based on the MPES or superseding command guidance. Each unit forwards the request to the DMC through the chain of command and retains a copy for inclusion in its mobilization plan. Upon mobilization, the DMC finalizes the clearance and provides the unit with a CMO. Mobilization convoy clearances are part of the mobilization plan that is validated and approved every two years. The plan should also be updated when significant changes affect a convoy's movement. Changes may include the following:

- Change of mobilization date (M-date).
- Change in convoy release points (gate changes).
- Change in the time length of the convoy of 5 or more minutes.
- Reorganization of the unit.
- Change in the rate of march of 5 or more miles in an hour.
- Addition or deletion of oversize/overweight vehicles.
- Route or halt changes.
- Changes in logistical support requirements.
- Addition or deletion of hazardous cargo.
- Change in number of vehicles in convoy.

M-10. PREPARATION OF THE GRAPHIC STRIP MAP. The strip map shows an itinerary picture of the route over which the convoy will travel. It is not drawn to scale, and this point should be indicated on the face of the map. Items that must be shown on the strip map include the start point, release point, rest areas, routes, major cities and towns, critical points and checkpoints, the distance between checkpoints, and north orientation.

a. **Start Point**. The SP is the location where the convoy must start. At the SP, the convoy comes under the active control of the convoy commander. The convoy is formed (at the SP without stopping) by the successive arrival of the units in it. Once the SP is passed, each unit should be traveling at the rate of speed and vehicle interval stated in the OPORD. When selecting an SP, choose a place that is easily recognized both on the map and on the ground; also ensure that it is easily accessible and located so that any element of the convoy can reach it without moving through another element of the convoy.

b. **Release Point**. The RP is that place where certain elements of the column are released. It must be clearly shown on the strip map. As with the SP, the convoy passes the RP without halting and at the rate and vehicle interval stated in the OPORD.

c. **Rest Areas**. Rest areas provide rest, personal relief, messing, refueling, inspection and maintenance, and schedule adjustment while allowing other traffic to pass. Convoys will halt for 15 minutes during the first hour and then 10 minutes every 2 hours thereafter. Long halts are identified for dining, refueling, and bivouacking. Every effort should be made to ensure that dining and refueling halts coincide. Halt areas must be clearly shown on the strip map.

NOTE: The first halt for 15 minutes allows truck personnel an added 5 minutes to recheck the loads and secure them if necessary.

d. **Routes**. All highways, state routes, and other routes or trails to be used must be shown on the strip map and must be designated by name or number.

e. **Major Cities and Towns**. Besides serving as valuable reference points, cities and towns indicate areas of heavy population concentration. They should be bypassed, if possible, to avoid congestion and/or choke points.

f. **Critical Points and Checkpoints**. Checkpoints are points designated along the route to control the convoy. Choose easily recognized features as checkpoints and clearly identify them on the strip map provided to each driver. CPs are always numbered consecutively.

g. **Distance Between Checkpoints**. In CONUS, distance will always be shown in miles.

h. **North Orientation**. North orientation is a critical feature of the strip map. It is necessary to align the strip map with a standard map.

i. **Additional Data**. The strip map should be detailed but not so cluttered with information that it is unreadable (see Figure M-1). Examples of information to be shown include the following:

- *Route data*. Includes route numbers, major intersections, and mileage between points. Whenever possible, insets or separate strip maps should be made to show routes through metropolitan areas or entrances into rest halts and refueling sites (see Figure M-2, page M-10).
- *Movement control data*. Includes arrival and departure times at the SP, CP, RP, state lines, and all halts. These times must coincide with the CMO.
- *Logistical support data*. Shows the location of all logistical support facilities. Such data includes procedures for requesting/obtaining medical and maintenance support.

M-11. COMMUNICATIONS NETWORKS. Each SMCC must establish a communications network that allows them to maintain communications with en route convoys. The SMCC will also establish communications with other SMCCs and selected federal, state, and local agencies.

a. **En Route Convoys**. During peacetime, convoys are normally not required to report movement progress. During mobilization or selected exercises, special instructions should be provided in Paragraph 3 of the convoy movement order. It may direct the convoy commander to report to the appropriate SMCC on departure, at selected rest halts en route, and on arrival at destination. If HRPTs are available, convoy commanders may be directed to report by tactical radio while moving past the HRPT.

NOTE: The primary means of communication between the SMCC and the convoy commander is the commercial telephone. The SMCCs will list the telephone numbers and radio frequencies to be used by each convoy originating and operating in their states. Long distance telephone calls will be toll free or collect.

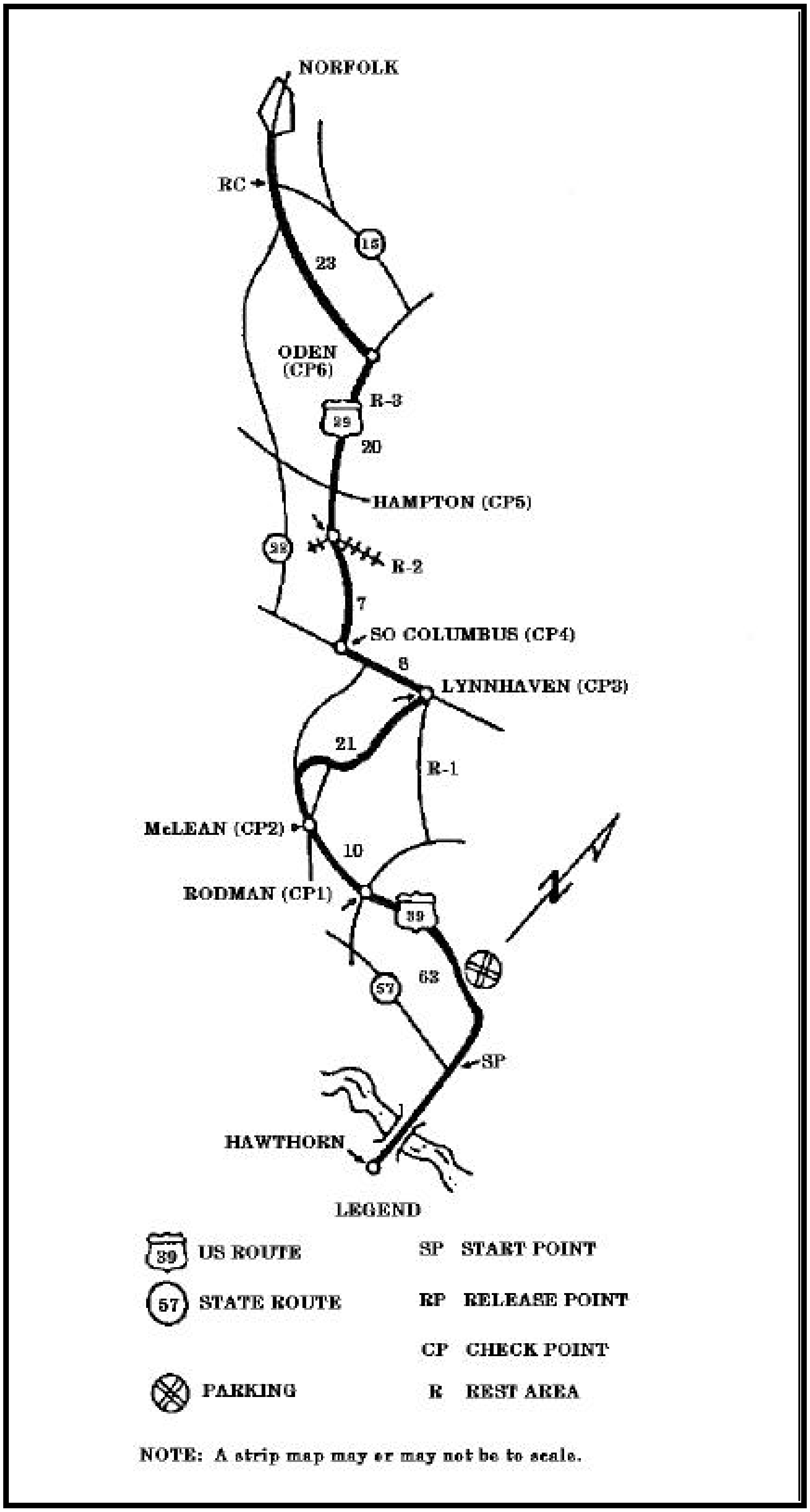


Figure M-1. Sample strip map

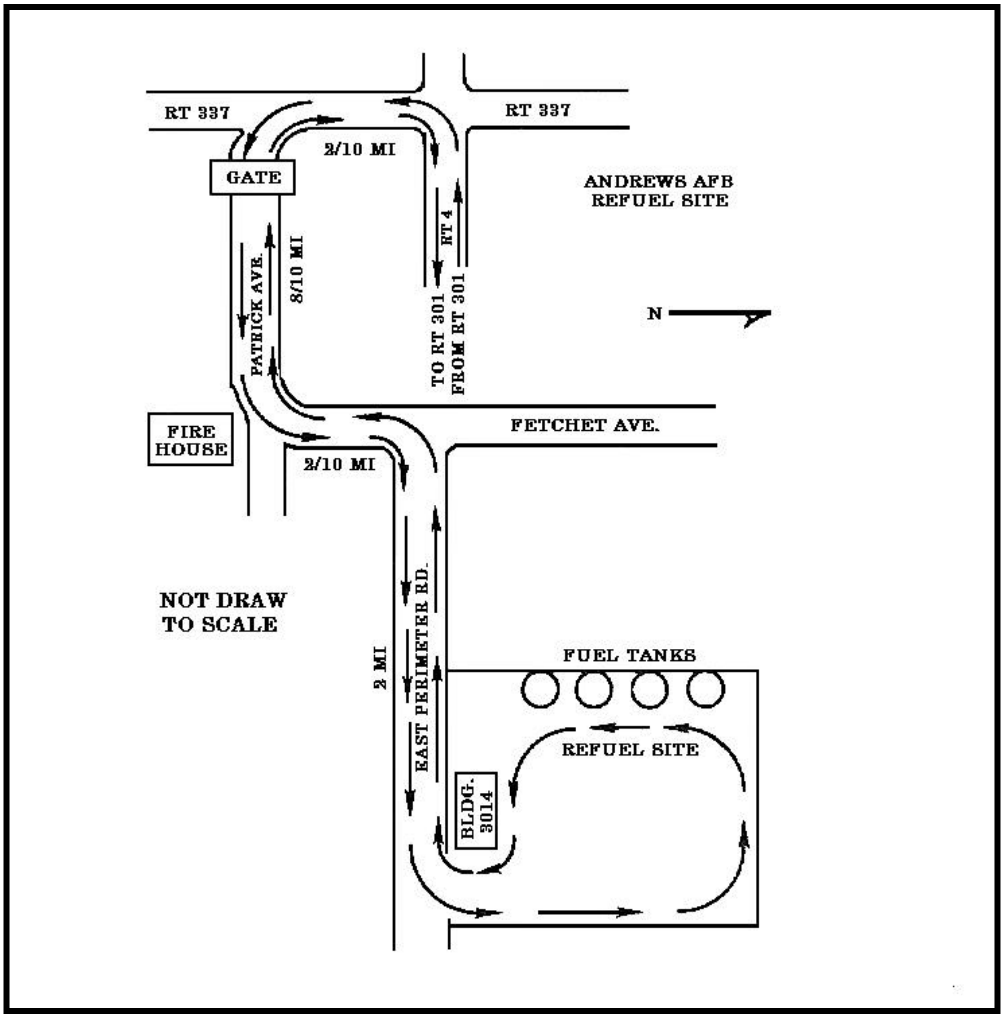


Figure M-2. Andrews AFB refueling site

Convoy commanders will report to the SMCC of the approving state IAW the convoy clearance. They will use the convoy en route report shown in Figure M-3. These reports will be made at designated ERPs along the convoy route. ERPs should be established at rest halts unless movement control procedures dictate otherwise. The ERPs advise the SMCC of emergency requests, security threats, road conditions, traffic and weather information, or any other situation that could affect the road movement. Through this process, the SMCC receives real-time reports on actual highway conditions from moving convoys. The location of each convoy can be graphically displayed. The SMCC can immediately evaluate highway and traffic conditions, congested points, and when necessary, revise convoy routes or movement schedules to ensure a smooth flow of traffic.

NOTE: A convoy commander is not expected to allow the reporting requirement to interfere with the operation of the convoy. Attempts to contact the SMCC should not delay the convoy's scheduled departure by more than 10 minutes. After this amount of time has passed, the convoy commander should leave a message and proceed as scheduled. Contact with the SMCC will be made at the next scheduled ERP.

1. UNIT DESIGNATION:	2. CONVOY NUMBER:	3. LOCATION (GIVE ERP NUMBER, OR DESCRIBE LOCATION):
XXXX	VA00019-C	ERP4

4. ARRIVAL TIME:	5. DEPARTURE	6. ROAD/WEATHER CONDITIONS (DESCRIBE CONDITIONS AFFECTING CONVOY MOVEMENTS):
0900	0910	CLEAR AND DRY

7. CONVOY STATUS: (DESCRIBE OPERATIONAL STATUS OF THE CONVOY TO INCLUDE VEHICLES DISABLED, LOST, RECOVERED, AND ANY OTHER PROBLEMS AFFECTING THE MOVEMENT):

CONVOY ON TIME – NO ROAD PROBLEMS.

8. REQUESTS/INFORMATION FOR SMCC (GIVE REQUESTS FOR SUPPORT OR ANY OTHER INFORMATION CONCERNING THE CONVOY MOVEMENT):

NONE REQUIRED

9. MESSAGES FROM SMCC (COPY ANY INFORMATION/INSTRUCTIONS RECEIVED FROM THE SMCC DURING THE EN ROUTE REPORT):

NONE

Figure M-3. Example of a convoy en route report

b. **Interstate Communications**. Each SMCC will establish communications with SMCCs of adjoining states. Convoy operations in peacetime are generally not a problem. However, during mobilization or deployment the competition for road space and support will be massive. MOBCON addresses this problem. Figure M-4 shows simplified convoy communications between SMCCs in the coordination process between state clearance authorities.

c. **Communications Across CONUSA Boundaries**. The interstate communications network should include the SMCCs in states outside the Army area to the extent possible. Communication is particularly important when processing convoy clearance requests for convoys crossing Army area boundaries.

d. **Interagency Communications**. Each SMCC must maintain effective communications with other agencies involved in the convoy movement; for example, civilian agencies, state police, and logistical support agencies.

e. **En Route Assistance Report**. An en route assistance report requires either the immediate action or a decision by the SMCC and/or coordination with other agencies. Such reports may include emergency requests for medical aid, law enforcement, or security threat assistance; logistical support requests; or a convoy clearance revision.

M-12. CONVOY ARRIVAL TIMES. Three types of convoys operate over the public highways: administrative (peacetime), mobilization, and deployment. The type of convoy determines how the convoy arrival time is found.

a. **Administrative Convoys**. The convoy commander coordinates directly with the installation or the command that directed the move to determine arrival/departure gates and times. Communication with the responsible organization may be made directly by the moving unit or through normal command channels, depending on local command policy.

b. **Mobilization Convoys**. These are convoys conducted for moving mobilized NG and AR units from their HS to their designated MS. The arrival times for these convoys are established by the MS in conjunction with the appropriate SMCC.

c. **Deployment Convoys**. These convoys move military units to a POE. Determining arrival times for these convoys is based on A/SPOE gate arrival times (port calls) and, as in the case of mobilization convoys, is the result of coordination between the installation and the SMCC. Procedures for determining arrival times for both mobilization and deployment convoys are outlined in FORSCOM Regulation 55-1.

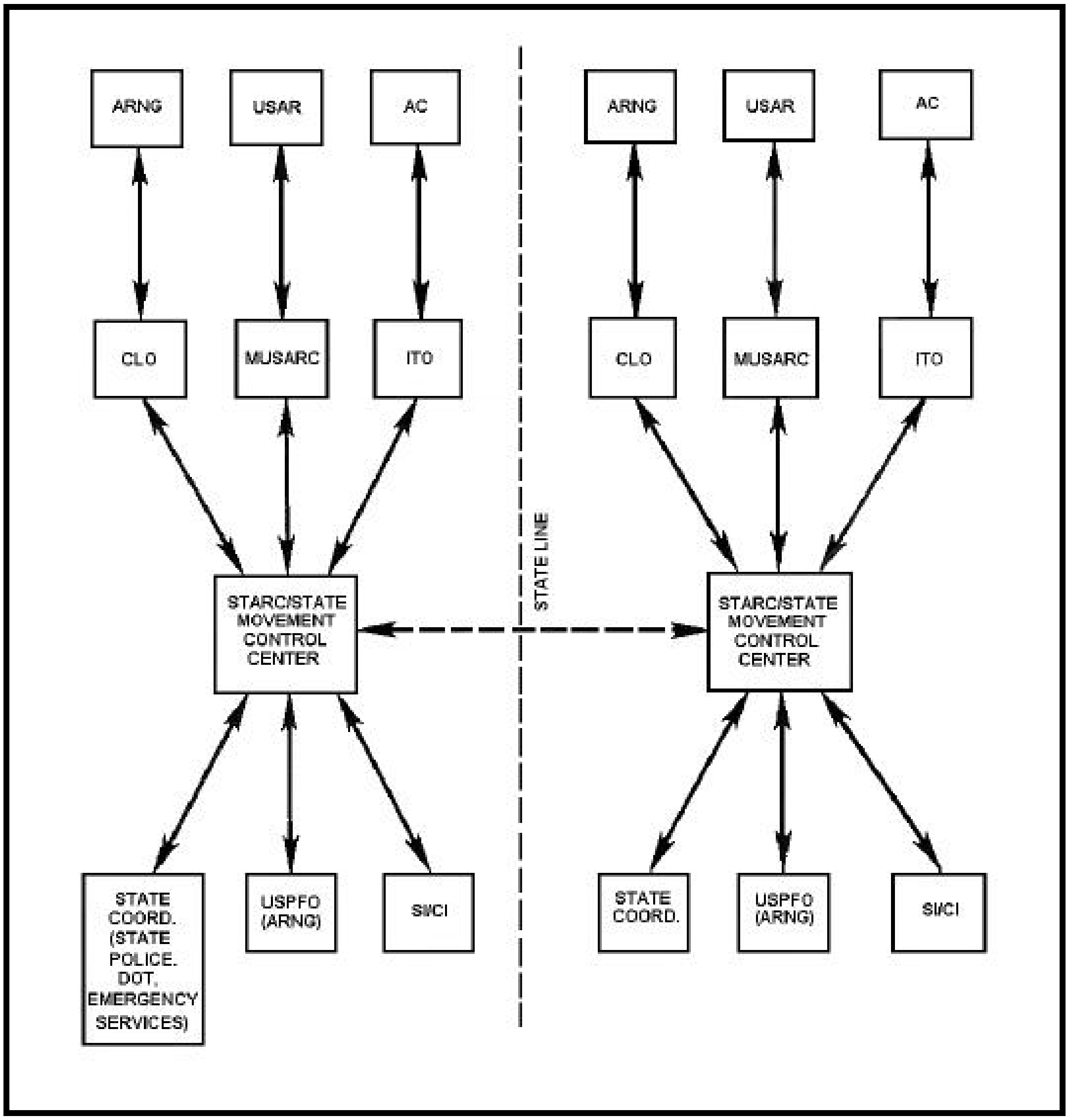


Figure M-4. MOBCON interstate communication

APPENDIX N

MILITARY VEHICLE AXLE WEIGHT DISTRIBUTION FORMULAS AND PERCENTAGES*

Vehicle weight scales are not always available to military field units that are moving truck convoys over CONUS public highways. Therefore, the Army has developed loaded-vehicle axle weight distribution formulas and percentages to help units prepare DD Forms 1265 and 1266. Percentages of maximum GVW are given for estimating the axle weight distribution for a loaded vehicle. Whenever possible, units should use actual axle loads obtained by weighing the loaded vehicle.

N-1. LIMITATIONS. Percentages can be used for any loaded cargo truck and tractor-semitrailer combination. However, to determine vehicle axle load distribution, the following must be available:

- TMs or vehicle data sheet for the particular cargo truck, tractor, and semitrailer.
- Weight of empty vehicle.
- Weight of payload.
- Other necessary dimensions obtained from vehicle TM or data sheet.

N-2. PROCEDURE. Follow these steps to determine axle weight distribution using the percentages in this appendix:

Step 1. Determine GVW.
Step 2. Choose applicable percentages from the table for the number of axles and type of vehicle (see Table N-1, page N-2).
Step 3. Multiply GVW by each percentage to determine various axle weight distributions.
Step 4. Record each weight.

Example: The percentage method. The GVW for an M123/M172A1 tractor-semitrailer combination is 96,500 pounds. This is a five-axle vehicle. Therefore, in the first column labeled "Number of Axles per Vehicle," find 5. To the right of 5 under "Type of Vehicle" is semitrailer and under the "Axle 1" column is 14. Multiply the GVW by 14 percent to find the front axle weight distribution. The "Axle 2" and "Axle 3" columns show 21 percent. Multiply the GVW by 21 percent to determine the weight distribution on each of the second and third axles. The "Axle 4" and "Axle 5" columns show 22 percent. Multiply the GVW by 22 percent to determine the weight distribution on each of the fourth and fifth axles. Record each axle weight distribution.

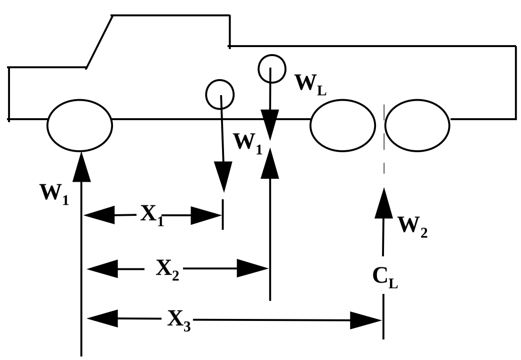
GVW for M123/M172A1 = 96,500 lb
GVW = 96,500 lb x 14 percent = 13,510 lb (front axle weight distribution)
GVW = 96,500 lb x 21 percent = 20,265 lb (2d and 3d axle weight distribution)
GVW = 96,500 lb x 22 percent = 21,230 lb (4th and 5th axle weight distribution)

*Formulas and percentages in this appendix (see Table N-1 and Figure N-1, page N-3) are used in lieu of ATA weight limits only when ATA data (see Appendix E) is not available.

Table N-1. Percentages for axle weight distribution

Number of Axles per Vehicle	Type of Vehicle	Axle 1	Axle 2	Axle 3	Axle 4	Axle 5	Axle 6
3	1 1/4-ton	38	31	31			
	2 1/2-ton	32	34	34			
	5-ton	26	37	37			
	10-ton	24	38	38			
5	Semitrailer	14	21	21	22	22	
6	Semitrailer	8	22	22	16	16	16

CARGO TRUCK



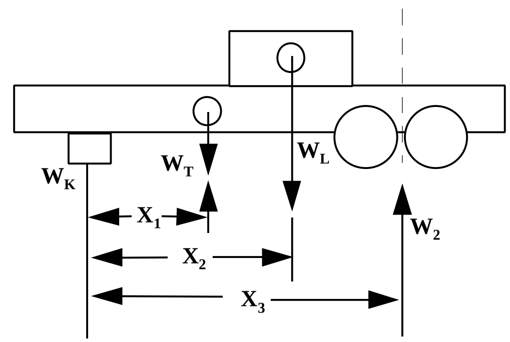
To find the axle weight distribution on the bogie:

$$\frac{W_2 - W_T(X_1) + W_L(X_2)}{X_3}$$

When vehicle has a bogie axle, divide W_2 by 2 to find the axle weight distribution for each axle.

$$W_1 = W_T + W_L - W_2$$

SEMITRAILER



To find the axle weight distribution on the bogie:

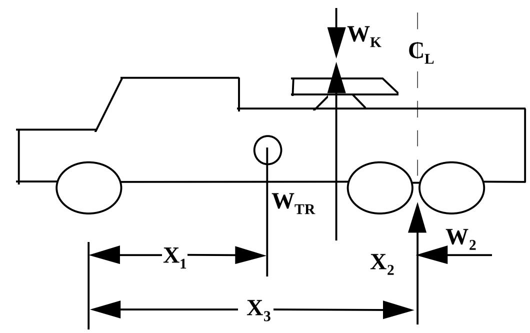
$$\frac{W_2 - W_T(X_1) + W_L(X_2)}{X_3}$$

Divide W_2 by the number of axles to find axle weight distribution for each axle.

$$W_K = W_T + W_L - W_2$$

NOTE: Apply W_K to tractor-truck formulas.

TRUCK TRACTOR



To find the axle weight distribution on the bogie:

$$\frac{W_2 - W_{TR}(X_1) + W_K(X_{3} + X_2)}{X_3}$$

Divide W_2 by 2 to find axle weight distribution for axles 2 and 3.

To find axle weight distribution on the front bogie:

$$W_1 = W_{TR} + W_K - W_2$$

LEGEND

W_1 = wt on axle 1	W_T = wt of trailer	W_{TR} = wt on truck
W_2 = wt on axle 2	W_K = wt on king pin	W_L = wt of load
C_L = center of load		

Figure N-1. Formulas for axle load weight distribution

APPENDIX O

VEHICLE HARDENING

As the nature of conflict changes, so does the threat to logistics units. War and certain other operations--especially peacekeeping or peacemaking--place renewed emphasis on convoy security and reinforce lessons learned in Vietnam.

Current threats include the use of command-detonated and pressure-sensitive mines placed on, above, or along the shoulders of roads traveled by military vehicles and the ambushing of convoys and harassment with sniper fire. These methods of disrupting military operations are highly effective, cheap, require limited time and labor, are easy to coordinate, and can be accomplished by an unsophisticated enemy.

To counter these threats, motor transport units may be provided with security forces and supporting arms firepower. Also, special vehicle-hardening techniques using sandbags and other improvised material have proved successful in protecting convoy personnel, equipment, and cargo. This appendix describes these techniques. Although effective, vehicle-hardening techniques must be tailored to fit the specific environment in which the motor transport units are operating.

O-1. HARDENED VEHICLES. A hardened vehicle is made less vulnerable to the effects of explosives and small arms fire by adding sandbags, armor plating, ballistic glass, and other protective devices. Hardening may make certain vehicle components and cargo less vulnerable. Its primary purpose, however, is to protect the truck's occupants. The protection afforded is significant and often means the difference between injury and death.

The vehicle hardening techniques described here include locally fabricated (improvised) armor kits and sandbags. When an enemy threat exists, consider the following factors in determining the method and extent of vehicle hardening:

- *Flexibility*. Harden vehicles to provide the degree of protection required while maintaining maximum flexibility in vehicle use. Harden the cargo beds of vehicles carrying troops with sandbags. Beds of vehicles carrying cargo are not normally hardened (depending on the cargo).
- *Weight*. All vehicle hardening adds weight to the vehicle. One effect of added weight is to reduce proportionally the amount of cargo that can be carried. Another potential effect is added vehicle maintenance and durability problems. Consider the vehicle's payload capacity when deciding the extent of hardening.
- *Availability*. If it is necessary or desirable to fabricate armor kits, consider the availability of suitable materials and the time needed to complete the project.
- *Types of roads*. To some extent, the roads traveled by motor transport unit vehicles can affect the protection required. Hardtop roads, for example, generally present less hazard from mines than dirt roads. However, do not discount the possibility of ambush along any route. Consult the S2 for the most current information on the situation.

- *Maintenance*. Vehicle hardening normally increases the amount of vehicle maintenance needed and can cause mechanical or structural damage. The sandbags themselves, when used to harden vehicles, also require periodic removal and replacement. If too much weight is added to the vehicle, it may reduce the vehicle's mobility and operational capabilities.

During Vietnam, the Army had three nonremovable armor kits for hardening 1/4-, 2 1/2-, and 5-ton trucks. These kits were later deleted from the inventory. Although no kits are currently available through the Army's supply system, several projects are under way to develop armor plating for use in hostile environments.

O-2. SANDBAGS. Sandbags are effective in reducing the effects of blasts, preventing fire from reaching the driver, and providing protection from small arms fire and fragmentation. Sandbags are usually readily available and do not permanently impair the flexibility of vehicles. Sandbags can easily be added or removed from the vehicle as the situation dictates. One drawback to using sandbags is that their weight limits the vehicle's capability to haul cargo.

All vehicles must be properly maintained according to the operator's -10 TM. Use the procedures below to prepare vehicles for convoy operations.

a. **Cab**. Experience shows that using sandbags to harden vehicle cabs for protection against mine blasts saves lives (Figure O-1). Normally, the cabs of all vehicles subject to detonating mines are hardened. Certain cautions, however, must always be observed. Sandbags should be placed so that they--

- Do not restrict the movement of foot pedals, levers, or controls.
- Do not interfere with the normal functions performed by the driver.
- Do not restrict driver vision.

To reduce the sandblast effect when a mine is detonated near the vehicle, various materials may be placed on top of the floorboard sandbags (such as rubber mats, light metal plates, plywood, or scraps of runway membrane material). Wetting down the sandbags is also effective but contributes to deterioration of the metal.

To properly prepare the vehicle cab, double-stack sandbags under the passenger seat and on the cab floor. Stack the sandbags two high under the driver's seat; in some vehicles this may not be possible. Remove the tools from the BII storage compartment and place them inside the bed. Place sandbags in the storage compartment to give the driver required protection. As an added precaution, place a heavy rubber or fiber mat over the sandbags. This reduces danger from fragments (such as stones, sand, and metal parts from the vehicle).

NOTES:
1. If the tools remain in the BII storage compartment and the vehicle detonates a mine, the tools may become secondary projectiles that can injure the driver. Also, if sandbags cannot be placed under the passenger seat because batteries are located there, then stack the sandbags on the seat. Never place sandbags directly on the batteries.
2. The cab of a 5-ton M923 cargo truck needs about 14 to 20 sandbags, while a 2 1/2-ton truck requires about 12 to 18 sandbags.

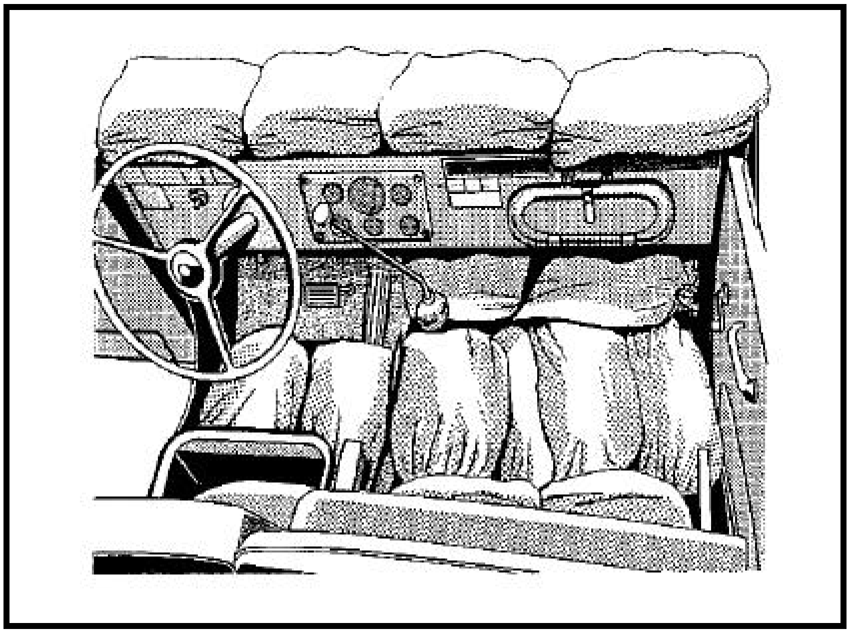


Figure O-1. Proper placement of sandbags in the cab

Attach to the doors locally fabricated 1/4- to 1/2-inch-high hardened, removable armor plates. (Use hooks to attach the steel plates to the window slots). Cover side windows and the front windshield with wire mesh to protect personnel from rocks and grenades. The convoy commander will decide whether to have windshields removed, lowered, or left in place. If the windshield interferes with the use of weapons and blackout operations and must be lowered, place a single layer of sandbags under the windshield, lower the windshield onto the bags, place a second layer of sandbags over the windshield, and then cover both with canvas (Figure O-2, page O-4). Placing sandbags under the windshield ensures that--

- Constant vibrations of the vehicle do not damage the windshield.
- Sand is not blown into the driver's face.
- Glass will not shatter and injure the driver and passenger.

NOTE: Leaving the windshield in place protects against heavy and driving rain, incoming grenades, and decapitation of personnel from wire stretched across the road.

b. **Cargo Bed**. Depending on the type of load, the cargo bed may or may not be hardened. For example, if troops are being transported, the bed needs to be hardened with a double layer of sandbags. The bags also need to be properly fitted to the contours of the vehicle. Stack the bags five high around the sides of the vehicle to add protection. To hold the sandbags in place, construct a support structure and place it inside the bed of the vehicle. This structure can be made by using four-by-fours on the corners and two-by-sixes in between (Figure O-3, pages O-4 and O-5).

NOTE: Caution must be taken to ensure that the sandbags do not exceed the allowable weight of the vehicle bed. Double stacking the sandbags increases the possibility of exceeding the vehicle's payload capacity. The mission, coupled with the enemy threat, must determine the extent of hardening (single- or double- layer sandbags). The bottom line is to ensure soldier safety.

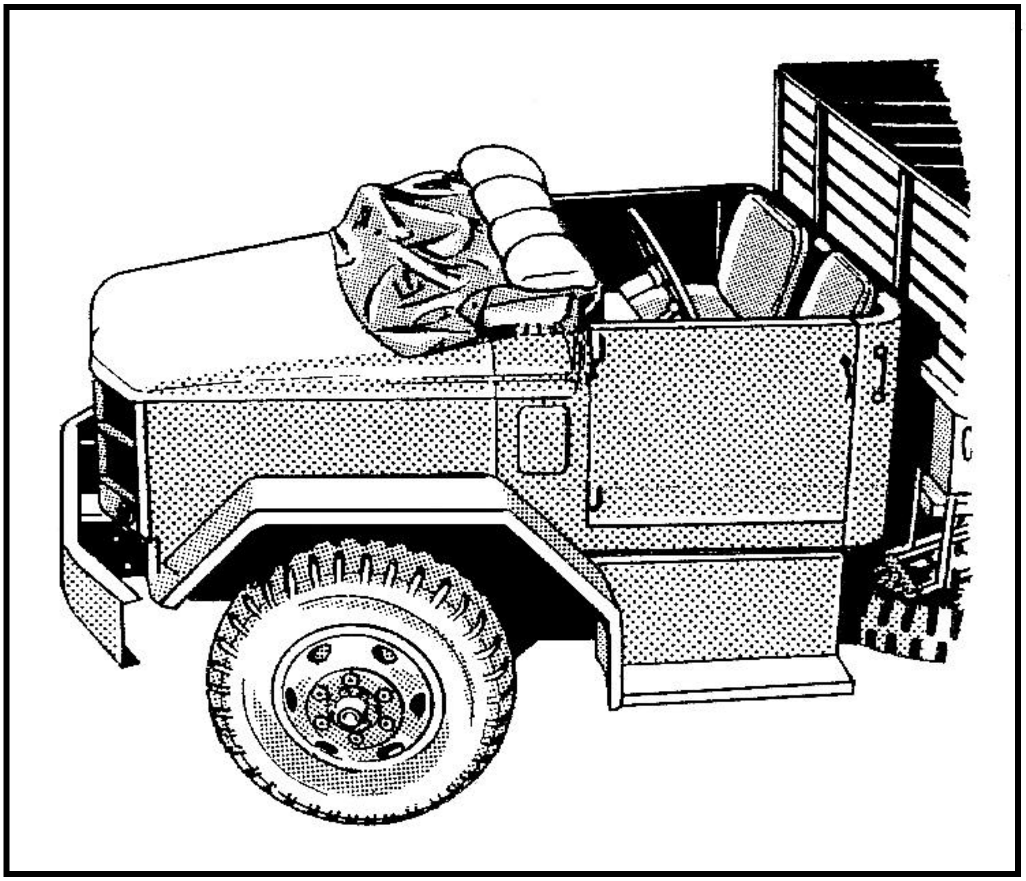


Figure O-2. Proper placement of sandbags under the windshield

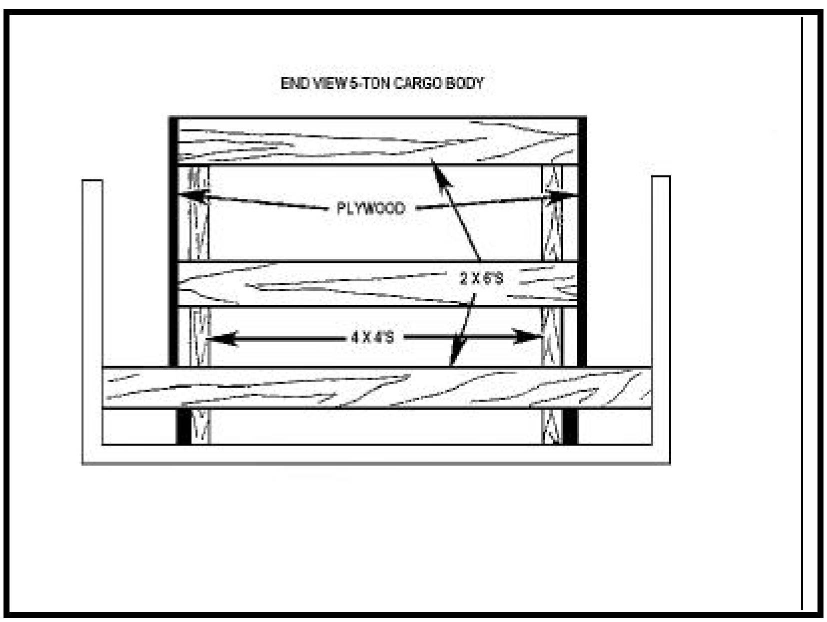


Figure O-3. Support structure for the bed of the truck

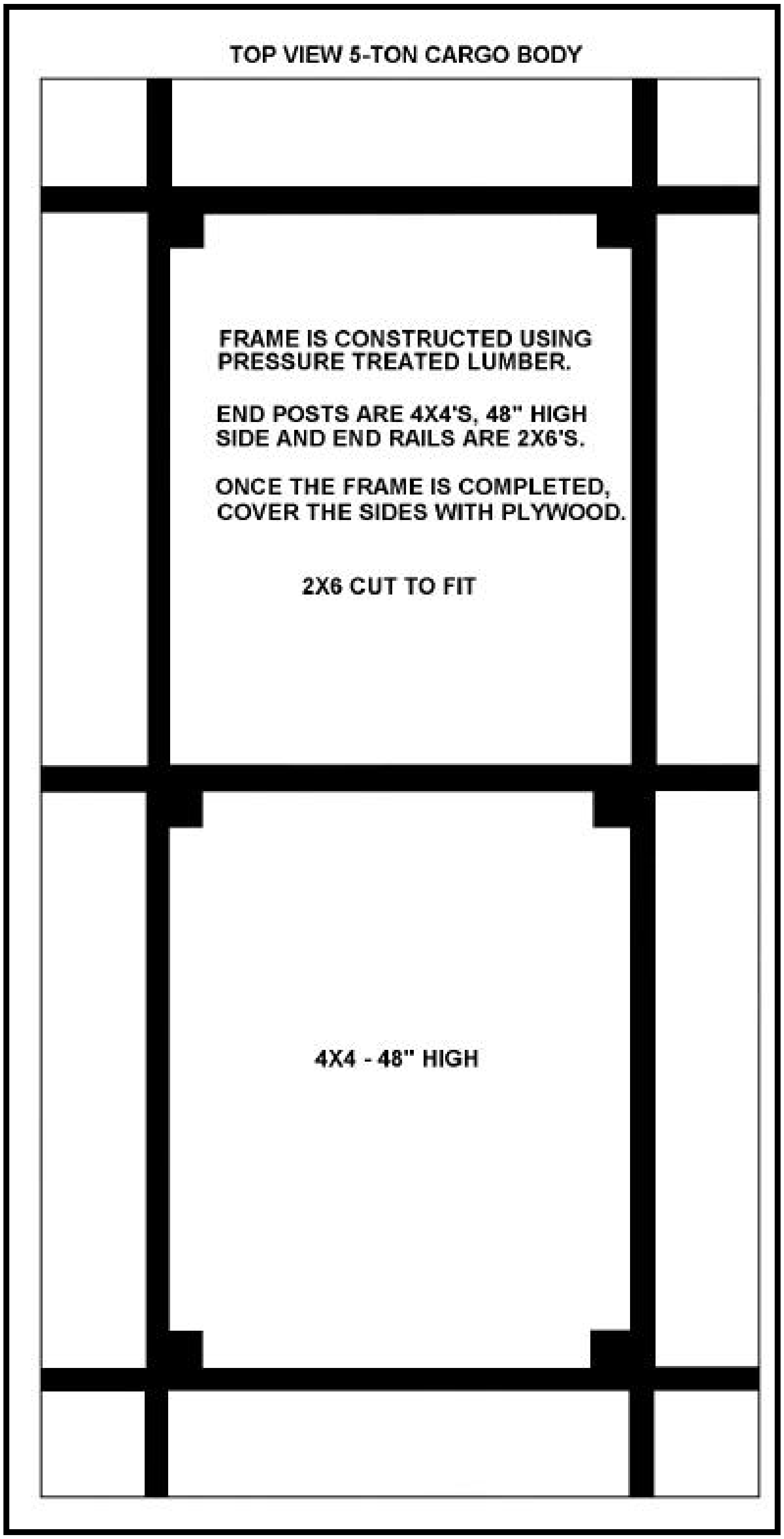


Figure O-3. Support structure for the bed of the truck (continued)

It takes about 226 sandbags (dry, weighing about 40 pounds each) to prepare the bed of a 5-ton, M923 cargo truck. Distribution is as follows: 86 on the floor bed (single layer); 5 high on each side (50 per side = 100 bags); 20 in the front; and 20 in the rear of the bed (Figure O-4).

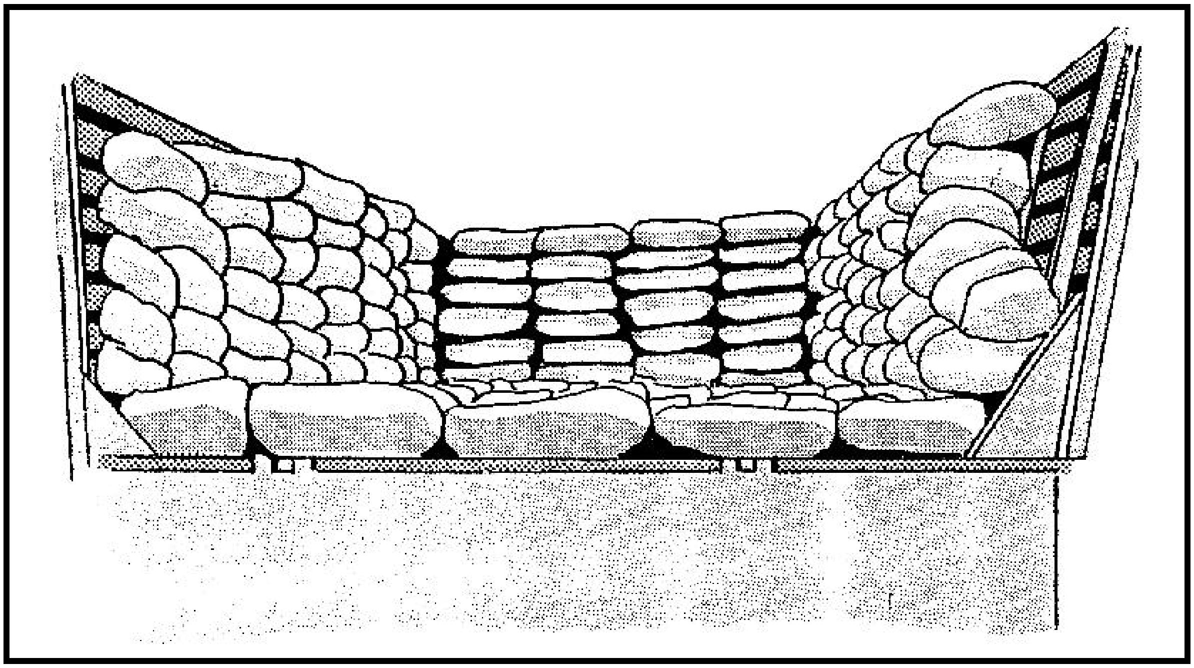


Figure O-4. Sandbagged 5-ton M923 cargo truck

c. **Fuel Tanks**. Protective plating around the fuel tank will lessen the damage to the fuel tank. It will also help to ensure that the fuel tank is not pierced, thus immobilizing the vehicle. This protective measure is especially critical when a vehicle is caught in the kill zone of an ambush. An alternative solution to this problem is to hook up a 5-gallon can of fuel in a safe location for use as an auxiliary fuel tank. This will allow the vehicle to travel a safe distance outside the kill zone if all the fuel is drained from a damaged fuel tank.

NOTES:
1. A 5-ton M923 cargo truck requires about five sandbags to provide top protection. Consider placing protective plating around the sides and bottom of the fuel tank to increase protection.
2. Older vehicles in the Army inventory may still be operating on MOGAS. If a tank filled with MOGAS is ruptured, the fuel may ignite and seriously burn operating personnel.
3. When putting sandbags or protective plating on or around the fuel tank, ensure that the hanger straps of the fuel tank do not crack or break.

O-3. TARPAULINS AND CAB TOPS. There are advantages and disadvantages to using canvas truck tops or tarpaulins, and these should be assessed. Advantages to keeping cargo covered include:

- Ensures that goods are not damaged by prevailing weather conditions.

- Denies intelligence information to the enemy concerning the type of cargo being transported.

Major disadvantages to installing truck tops or tarpaulins include:

- Required removal for loading and unloading operations.
- Interference with the driver's vision and assistant driver's ability to fire to the rear.

O-4. MAINTENANCE OF HARDENED VEHICLES. Hardening vehicles with armor plating places abnormal stresses on the vehicle that can result in early component failure. It is common for engine mounts, cab mount bushings, and bolts to loosen. For this reason, they should be checked, tightened, and replaced regularly. In the past the vehicle deadline rate for hardened vehicles was up to 20 percent greater than for nonhardened vehicles.

Sandbags become torn or punctured in day-to-day use. They also collect and hold water, causing metal surfaces to rust. Added maintenance is required to keep the sandbags in good condition and to prevent rust. Sandbags should be checked periodically and removed or replaced. When the sandbags are removed, the vehicle metal should be cleaned, painted (if necessary), and allowed to dry before the sandbags are replaced. Empty sandbags and ties should always be kept in the vehicle.

NOTE: When sandbags get wet, their weight increases significantly, thus putting added stress on the vehicle.

O-5. FUTURE HARDENING MATERIALS. The hardening materials described in this appendix are those currently available. Lighter, more durable materials are being developed, so the problems now associated with vehicle hardening may be alleviated in the future. Improvements will include: ballistic glass, redesigned seats, ceramic-faced composite steel doors, and armored deflective shields on the undercarriage of the vehicle (on wheel wells and under the cab).

O-6. GUN TRUCKS. Logistical convoys cannot always depend on military police support or added firepower. To provide more firepower for a convoy, units developed the gun truck. The purposes of a hardened gun truck are to--

- Provide a base of fire.
- Help counter enemy attacks.
- Increase survivability of the convoy.

The gun truck is equipped with a crew-served weapons system, preferably in a protective position. In Vietnam this principle worked well and provided convoys a means of self-defense.

Deploy the gun truck in the convoy where it can best provide the needed firepower. If adequate communications assets are available, they should be located with the gun truck and the convoy commander. This enables the convoy commander to call the gun truck forward when needed. (A predesignated signal is required to bring the gun truck forward and inform the crew-served weapon system personnel of the enemy location.) If communications assets are not adequate, pyrotechnics may be used to signal the gun truck to move forward.

The gun truck should not be pulled up right on top of the enemy location. The crew-served weapons on the gun truck can cover a significant distance. Therefore, the vehicle should be situated where it has a clear field of fire to engage the enemy with the maximum effective range of the weapon. If necessary and if available, multiple gun trucks can be used. When using multiple gun trucks in a convoy, overlapping fields of fire greatly increases the convoy's chance of survival.

NOTES:
1. Based on availability, types of weapon systems, and size of the convoy, the placement and number of gun trucks may vary. With company-size and larger convoys, a minimum of two gun trucks should be used to provide overlapping fire. One gun truck for every eight vehicles in the convoy is recommended.
2. Consider using the MK19 or M203 to penetrate prepared defensive positions since small arms fire may not be capable of destroying enemy positions.

Figure O-5 is an example of the gun truck used in Vietnam. It shows the armor plating used for the windshield and doors of the vehicle. It also depicts the layout of the weapon systems mounted on the vehicle with identified firing ports and specific areas of responsibility.

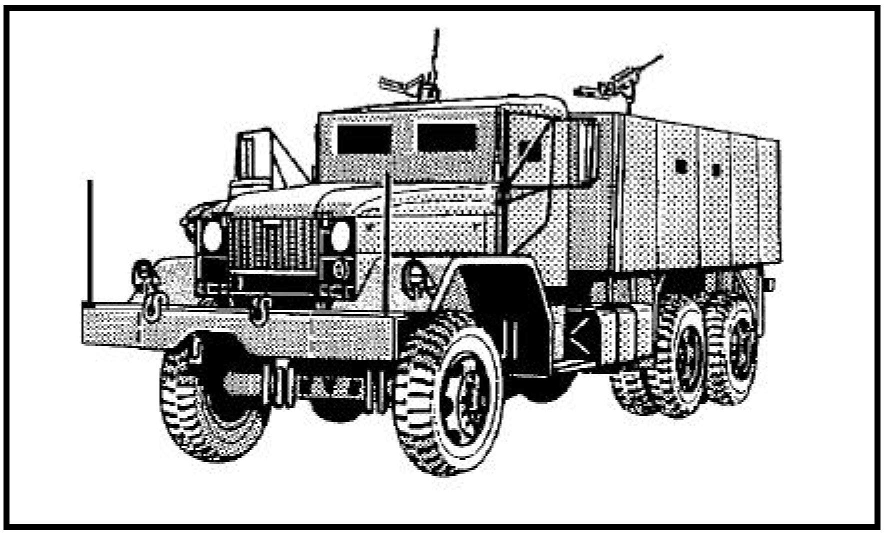
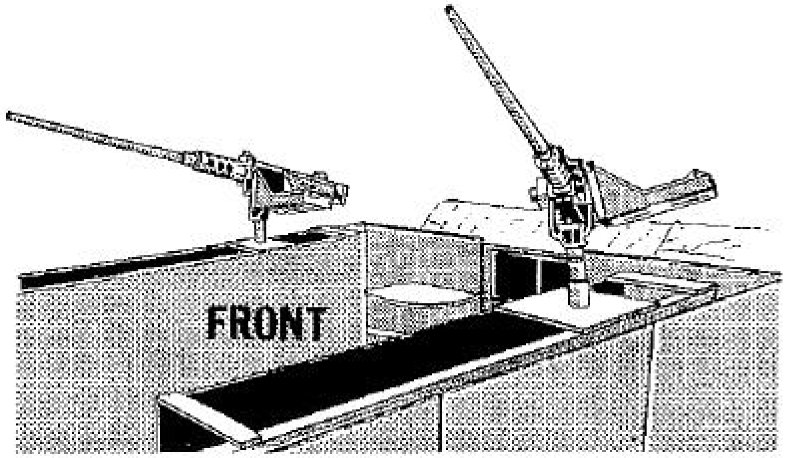


Figure O-5. Gun truck used in Vietnam

Figure O-6 shows how M2 machine guns were mounted on the gun truck using locally fabricated materials.

O-7. BALLISTIC TEST RESULTS. It is critical that the most protective material available be used to harden a vehicle. Ballistic tests show that sand is about twice as effective as clay in hardening vehicles. At a maximum velocity of 3,250 feet per second at a range of zero feet, it takes about .6 feet of sand and 1.2 feet of clay to stop a 5.56-mm round. At a maximum velocity of 2,750 feet per second, it takes about .9 feet of sand or 1.7 feet of clay to stop a 7.62-mm round. Finally, at the maximum velocity, it takes about 1.4 feet of sand or 2.6 feet of clay to stop a 50-caliber round. Using the most protective substance could mean the difference between life and death for our most precious resource--our soldiers.

Table O-1, pages O-10 and O-11, shows the results of mine tests conducted using a variety of C4 explosive charges. It offers insight to the devastating effects and damage that mines can cause.


FRONT

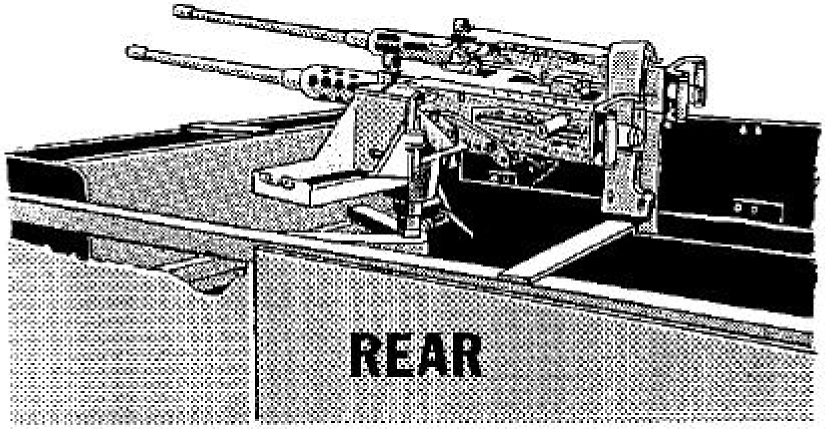

REAR

Figure O-6. M2 machine gun mounted on gun truck

O-8. CAMOUFLAGE AND CONCEALMENT. Camouflage and concealment techniques can be used to make it more difficult for the enemy to spot the convoy. The type of cargo being transported can be disguised or concealed by a tarpaulin. Other effective measures include the following:

- Camouflaging or covering shiny surfaces before convoy departure.
- Painting vehicles in a pattern to blend in with the terrain and break the outline.
- Training operators to look for other means of concealment to break the outline of the vehicle.
- Covering vehicle bumper markings. The vehicle bumper markings can provide a great deal of intelligence information to the enemy.

Table O-1. Mine test table

TEST	RESULTS
12 pounds of C4 under midaxle, right side, exterior tire, top of explosive flush with the ground.	Cargo bed floor was deformed but did not rupture. All bed tie-downs broke except for the two in the front which are spring-loaded. The fuel tank was severely damaged (ruptured) and was thrown away from the vehicle.
12 pounds of C4 under front right tire, 2 inches of soil over the explosive.	The explosion lifted the truck and the front end landed 10 feet away from the initial blast point. Right front panel of the floorboard ripped away from cab walls (12- x 14-inch opening). The cab floor on the blast side near the seat bulged up 3 inches.
12 pounds of C4 under midaxle, left side, interior tire, 2 inches of soil over the explosive.	The explosion lifted the truck and the rear end landed 3 feet away from the initial blast point. Cargo bed floor was deformed and bulged up 2 to 3 inches but did not rupture. Fuel tank ruptured and was thrown 20 feet away from the vehicle. The torso simulator sitting over the midaxle was thrown 10 feet and landed off the cargo bed. The simulator sitting over the rear axle was found still attached to the seat.
12 pounds of C4 under front left tire, top of explosive flush with the ground.	Front left corner of the cab floor separated 6 inches from the cab walls. The cab floor near the driver's seat bulged up 4 inches. Passenger's seat broke in the middle, but torso simulator remained attached to seat. Left front fender and hood were blown away from truck. The explosion lifted the truck and the front end landed 4 feet away from the initial blast point. Floorboard on the right side (blast side) completely ripped open; floorboard on the opposite side separated and lifted 2 to 3 inches. The fire wall near the blast was also damaged.

Table O-1. Mine test table (continued)

TEST	RESULTS
16 pounds of C4 under front left tire, 2 inches of soil over the explosive.	The explosion lifted the truck and the front end landed 7 feet away from the initial blast point. Floorboard on the blast side ripped away from cab walls 15 inches. Minimal damage to floorboard on opposite side.
16 pounds of C4 under midaxle, right side, interior tire, 2 inches of soil over the explosive.	The explosion lifted the truck and the rear end landed 6 feet away from the initial blast point. The cargo bed completely separated from the chassis and landed sideways several feet away. Both torso simulators, which were sitting in the cargo bed, were thrown 40 to 60 feet away from the truck.
16 pounds of C4 under midaxle, left side, exterior tire, top of explosive flush with the ground.	The explosion lifted the truck and the rear end landed 6 feet away from the initial blast point. Cargo bed floor was deformed and bulged up 4 to 5 inches but did not rupture. Fuel tank ruptured and was thrown away from the truck. Both torso simulators, sitting in the cargo bed, were thrown several feet away from their seats. All cargo bed tie-downs broke.
16 pounds of C4 under front right tire, top of explosive flush with the ground.	The explosion lifted the truck and the front end landed 8 to 9 feet away from the initial blast point.

O-9. MINES AND BOOBY TRAPS. Forces engaging in ambush frequently use mines and booby traps. Command-detonated mines are often used to initiate an ambush. Mines may also be planted along the shoulder of the road to harass and interdict. A booby trap system may be used against personnel and equipment. Convoys have employed the following guidelines to effectively limit damage from mines:

- Track the vehicle in front.
- Avoid driving on the shoulder of the road.
- Whenever possible, do not run over foreign objects on the road.
- Avoid potholes and fresh earth on the road.
- Watch local national traffic and the reactions of people on foot (they will often give away the location of any mines or booby traps).
- When possible, arrange for the engineers to sweep the road ahead before the convoy moves over it.
- Use a 2 1/2-ton or larger truck as the lead vehicle instead of a HMMWV. Hard vehicles such as tanks are useful in exploding small mines in front of the convoy.
- Harden vehicles.

    - Use water in vehicle tires when there is a threat of mines exploding under the tires.
    - Increase ground clearance distance between the point of explosion and the vehicle, if possible.

- Use the following personal safety measures:

    - Wear protective equipment.
    - Use safety belts. Ensure seat belts are tight; otherwise, whiplash may occur during an explosion. Also, fasten the seat belt as low as possible on the stomach.
    - Use correct posture. Keep the backbone straight and supported by a backrest (to better absorb shock) and place feet flat on the floor.

- Slow the vehicle's speed to reduce the potential of accidents. Adjust the speed based on the situation.
- Disperse vehicles and maintain intervals.

NOTE: In Somalia, around Mogadishu, the Army experienced command-detonated mines of 30, 50, and 60 pounds. These devices were placed in one of the many potholes in the road and wired for command-detonation. To avoid such obstacles and/or minimize damage, implement the above techniques.

Some indicators that have proven effective in identifying the location of potential mines are--

- Damaged vehicles.
- Signs of digging, holes in the road, potholes, concrete removal, or puddles.
- Boxes along the roadside.
- Wires on the road surface.
- Evidence of vegetation disturbance.
- Disturbances in previous tire tracks.

- Differences in plant growth, such as wilting or dead foliage.
- Irregularities in color or texture of the ground.
- Signs warning local populace.

The enemy is likely to place mines on--

- Frequently used roadways leading to and from construction sites.
- Brush and other traffic obstructions placed on roadways.
- Bridge bypasses.
- Obvious turnarounds and shoulders.

APPENDIX P

SPECIFICATIONS FOR CONVOY WARNING SIGNS

This appendix gives specifications for convoy signs that are highly visible to approaching vehicle operators both day and night. For more information, see AR 55-29.

P-1. DESIGN. Signs reading CONVOY FOLLOWS and CONVOY COMMANDER will be 8 x 50 inches with a 3/8-inch-wide border, inserted 3/8 inch from the sign edge; the legend will be 4 inches high. Signs reading CONVOY AHEAD and CONVOY COMMANDER will be 16 x 50 inches with a 3/8-inch-wide border, inserted 3/8 inch from the sign edge; the legend will be 5 inches high.

P-2. COLOR AND MATERIAL. The same color combination will be used for both the 8 x 50 and 16 x 50 signs. The background will be yellow reflex-reflective sheeting that meets federal specification LS-300A-Type 1, Class 2 or 3, reflectivity 1, color j or reflective paint, which will meet GSA schedules listed under Class 8010. The legend and sign border shall be black nonreflective material with opaque inks compatible with the base material.

P-3. CONSTRUCTION. The finished sign may be applied to any of the following by heat-activated or pressure-sensitive adhesive:

- Unpainted aluminum, .064 gauge.
- Exterior grade plywood (US Commercial Standard CS 44-60).
- Galvanized steel, .064 gauge.

APPENDIX Q

SAMPLE CONVOY BRIEFING

This appendix contains an outline for a comprehensive and effective prebriefing of convoy personnel. It is properly organized and covers the critical information needed to execute any conceivable convoy operation.

- *Situation*:
  - Friendly forces.
  - Support units.
  - Enemy situation.
- *Mission*:
  - Type of cargo.
  - Origin.
  - Destination.
- *Execution*:
  - General organization of the convoy.
  - Time schedule.
  - Routes.
  - Convoy speed.
  - Catch-up speed.
  - Vehicle distance.
  - Emergency measures.
    - Accidents.
    - Breakdowns.
    - Obstacles
    - Separation from convoy.
    - Ambush.
      - -- Action of convoy personnel if ambushed.
      - -- Action of security forces during ambush.
      - -- Medical support.
- *Administration and Logistics*:
  - Control of personnel.
  - Billeting arrangements.
  - Messing arrangements.
  - Refueling and servicing of vehicles, complying with spill prevention guidelines.

- *Command and Signal*:

  - Location of convoy commander.
  - Succession of command.
  - Action of security force commander.
  - Serial commander's responsibility.
  - Arm and hand signals.
  - Other prearranged signals.
  - Radio frequencies and call signs for--
    - Control personnel.
    - Security force commander.
    - Fire support elements.
    - Reserve security elements.
    - Medical evacuation support.

- *Safety*:

  - Hazards of route and weather conditions.
  - Defensive driving.

- *Environmental protection*:

  - Spill prevention.
  - Transporting HAZMAT.

APPENDIX R

CONVOY COMMANDER'S REPORT

This appendix contains a sample convoy commander's report. As presented here, it provides a minimum of operational data. The format is for guidance only and may be modified to meet the requirements of any given situation. For example, the report contains no information on the security forces that may accompany a convoy. In instances where such action is necessary, information requirements covering escort and/or security forces and measures may be added to this format.

CONVOY COMMANDER'S REPORT

______________________	______________
(Appropriate headquarters)	(Unit designation)
______________________	_____________
(Convoy clearance number)	(Date)

____

(Number and type of task vehicles)

____

(Control vehicles)

I. FORWARD MOVEMENT

R-1. CONVOY OPERATING TIME.

• Arrive start point		____________________
• Arrive load point		____________________
• Depart load point		____________________
• Loading time		____________________
• Arrive HRP(s)	No. 1	____________________
(list as needed)	No. 2	____________________
• Depart (clear) HRP(s)	No. 1	____________________
(list as needed)	No. 2	____________________
• Arrive unload point		____________________
• Depart unload point		____________________
• Time at unload point		____________________

R-2. CARGO/PERSONNEL.

- Cargo (STONs) ____________________
- Class/type ____________________
- Number of personnel ____________________

R-3. DISTANCES (SPEEDOMETER READING, LEAD VEHICLES).

- Start point ____________________
- Loading point ____________________
- Forward mileage (no load) ____________________
- Unload point ____________________
- Forward mileage (loaded)
  (load point to unload point) ____________________

R-4. REMARKS. Include data such as location of start point, route conditions, delays encountered and reasons thereof, and other operational information deemed necessary/appropriate; for example, start point, company area.

II. RETURN MOVEMENT

R-1. CONVOY OPERATING TIME.

- Arrive/return load point ____________________
- Depart/return load point ____________________
- Return load time ____________________
- Arrive HRP(s) No.1 ____________________
  (list as needed) No.2 ____________________
- Depart (clear) HRP(s) No.1 ____________________
  (list as needed) No.2 ____________________
- Arrive unload point ____________________
- Depart unload point ____________________
- Time at unload point ____________________
- Arrive unit area ____________________

R-2. CARGO/PERSONNEL.

- Cargo (STONs) ____________________
- Class/type ____________________
- Number of personnel ____________________

R-3. DISTANCES (SPEEDOMETER READING, LEAD VEHICLES)

- Unload point (forward movement) ______________________
- Return load point ______________________
- Return mileage (no load) ______________________
- Return load destination (RP)______________________
- Return mileage (loaded) ______________________
- Arrive unit area ______________________
- Return mileage (no load) ______________________

R-4. REMARKS. Include any operational remarks such as explanation of any asterisks as follows:

*10 vehicles with return load; 40 vehicles return.
**Picked up return load at same place forward load was unloaded.

III. ROUND TRIP DATA

R-1. CONVOY OPERATING TIME.

- Start point time (forward movement) ______________________
- Returned to start point (return movement) ______________________
- Total dispatch hours ______________________
- Deadhead hours (unit to load area; unload area to unit) ______________________
- Total load hours ______________________
- Total unload hours ______________________
- Total operational hours ______________________

R-2. CARGO/PERSONNEL.

- Forward tons/class ______________________
- Return tons/class ______________________
- Personnel forward ______________________
- Personnel return ______________________

R-3. DISTANCE IN MILES.

- Unit to forward load area ______________________
- Forward load area to destination ______________________
- Destination to return load area ______________________
- Return load area to destination ______________________
- Return unload area to unit ______________________
- Deadhead total ______________________
- Operational total ______________________

R-4. REMARKS. Include operational remarks as deemed appropriate to include passengers and/or ton miles; average rate of march, and so forth.

APPENDIX S

COMMUNICATIONS AND COMMUNICATIONS SECURITY

This appendix addresses all aspects of communications and communications security as required for motor transport operations.

S-1. COMMUNICATIONS SUPPORT. The theater army area communications system supports transportation units operating in the COMMZ. In the combat zone--throughout the corps rear area and the field army service area--the Army area communications system provides support. These systems or their extensions support installations such as HRPs and traffic control posts. They supplement the organic capabilities of motor transport units in establishing communications networks.

Units of the US Army Communications Command (theater) and the field army signal brigade install and operate theater and field army area communications systems. Each system is a network of area Army signal centers. High-capacity trunking systems interconnect the centers that send and receive messages for units in their areas. Center assets may include a telephone central, teletypewriter central, and communications center. Messenger service is usually provided among the various centers. However, units provide their own messengers to and from the area signal center. Each area signal center installs wire lines to units within its area. It also operates a radio wire integration station that interconnects FM radios with the common-user telephone system on a push-to-talk basis.

Distances between a transportation battalion headquarters and its companies usually exceed the organic wire-laying capability and may exceed the range of organic radios. Therefore, the area communications system provides the only communications net for motor transport units. Communications between a transportation unit and the agencies and activities it supports are also provided through this system. For these reasons, it is essential that each company and battalion headquarters be connected to an area signal center.

The signal units operating the area signal centers are equipped to install wire lines to all units within their areas of responsibility on a priority basis. Normally, areas of responsibility are specified by higher authority. Units outside their radius will not be afforded wire service.

A signal SOP from a higher authority usually stipulates the number of telephone circuits between a small extension node and a transportation battalion or company. This number of circuits will be installed by the area signal center upon notification of a unit's move into its area. When moves are planned, the appropriate signal center should be told of the move as far in advance as possible. This will help to ensure timely service to the unit.

The communications officer of each major command is responsible for allocating the type and extent of electrical communications within that command. Transportation unit communications policies and procedures must conform to those established by the major command.

S-2. UNIT COMMUNICATIONS EQUIPMENT. Communications equipment available to transportation units includes radios, telephones, radioteletypewriters, and messengers, as well as visual and sound media. Not all of these means are available to all units.

Radios authorized by TOE to transportation truck units are limited in both range and quantity. They are used mainly for internal communications. In other words, they provide for communication between the headquarters and elements of the unit, both in static and on-the-road operations. The company headquarters radio is used to contact higher headquarters (battalion) and supported and supporting units through a net radio integration facility. It can be used in rear area operations. It can also monitor the rear operations net.

Authorized switchboards and telephones are used to establish internal wire communications systems. The switchboards also terminate wire circuits from the telephone switching at area Army signal centers, thus establishing entry into the communications systems. This provides common-user wire communications between motor transport units and higher headquarters, adjacent units, and supporting and supported units.

S-3. COMMUNICATIONS PERSONNEL. At minimum, unit communications personnel should include a signal officer, radio operator, and switchboard operator. Their functions are critical to unit safety, security, and successful mission accomplishment.

a. **Signal Officer**. The individual designated by the unit commander as the signal officer directs and supervises all phases of the system and equipment and training of unit communications personnel. He should develop adequate communications control and signal operating instructions to take maximum advantage of alternate means of communications under all operating conditions. The signal officer keeps the commander informed of all communications matters and coordinates communications with higher, adjacent, supported, supporting, and subordinate units. In performing other duties, the signal officer--

- Prepares communications plans.
- Assists in the site selection for the unit command post.
- Supervises the installation, operation, and maintenance of the unit communications system.
- Determines communications equipment and supply requirements.
- Supervises or arranges the training of communications personnel, including the training of alternate operators.
- Prepares extracts of SOI for use by communications personnel.
- Maintains liaison with the appropriate node center supporting the area. FM 24-16 provides guidance to unit signal officers in preparing orders, records, and reports pertaining to communications.
- Prepares radio net and wire system diagrams based on organic communications equipment and its employment and nets outside the unit that the unit is part of or monitors. (FM 24-18 and TC 24-21 provide information to assist the unit signal officer in field radio and field wire techniques.)

b. **Radio Operator**. The radio operator is responsible for the proper use of the radio, including the use of correct procedures and adherence to communications security measures. He must be familiar with the SOI with respect to radio procedures, call signs, and security. He performs operator maintenance on his radio equipment. He must know the capabilities and limitations of the radio and must be familiar with the other facilities in the radio net of which the unit is a part.

c. **Switchboard Operator**. The switchboard operator installs, operates, and maintains the unit switchboard. He must know the procedures and techniques for installing and operating field telephone equipment, the capabilities and limitations of the equipment, and the facilities incorporated in the system to which his switchboard is connected. At company and battalion level, he also serves as wireman. He installs and maintains the field wire communications system and performs unit level maintenance on the field wire communications equipment. During the initial installation of the wire net, and depending on distance between unit elements, he may require the assistance of added personnel.

S-4. COMMUNICATIONS EQUIPMENT SUPPLY. Authorized items of communications equipment are prescribed in the TOE. Higher commanders may authorize additional equipment. Initial supply and replacement is made through normal supply channels. The supply sergeant, with the assistance of the signal officer, prepares and submits requisitions for the equipment and supplies.

Repair parts and special tools lists in the equipment technical manual establishes the allowance for stockage of repair parts. Quantities of repair parts authorized for operator maintenance are issued initially with the equipment and are authorized to be kept on hand by the operator.

S-5. MAINTENANCE OF COMMUNICATIONS EQUIPMENT. In motor transport units, the usual procedure for obtaining maintenance services beyond unit-level maintenance is to turn in the equipment to the direct support unit for repair or direct exchange.

Depending on established procedures, and if the attached units have no assigned repairmen, the battalion radio repairman may perform maintenance on unit equipment. Maintenance services beyond his capability are obtained through turn-in of the equipment to the appropriate direct support units.

S-6. SIGNAL OPERATING INSTRUCTIONS. Signal operating instructions are a type of combat order issued for the technical control and coordination of communications within a command. They include current and up-to-date information covering radio call signs and frequencies, a telephone directory, and visual and sound signals. The designated battalion signal officer prepares the battalion SOI in conformance with the SOI of higher headquarters. Truck units attached to the battalion headquarters use only extracts from the battalion SOI. If SOIs are classified, copies of extracts must be safeguarded according to their security classification.

Communications procedures that may be standardized are made a part of the unit SOP. The SOP must not violate instructions disseminated in other types of official publications from higher headquarters.

S-7. WIRE COMMUNICATIONS. Wire communications, which can be used across most terrain and in most situations, include the use of field wires, wire laying and recovery equipment, battery-operated telephones, a switchboard, and associated equipment. Except for the transmission of involved messages, maps, or lengthy documents, wire communication is highly effective. It affords person-to-person conversation with break-in operation (capability of interrupting the conversation) and is generally more secure than radio communication (Figure S-1, page S-4). However, security is never assured when transmitting in the clear.

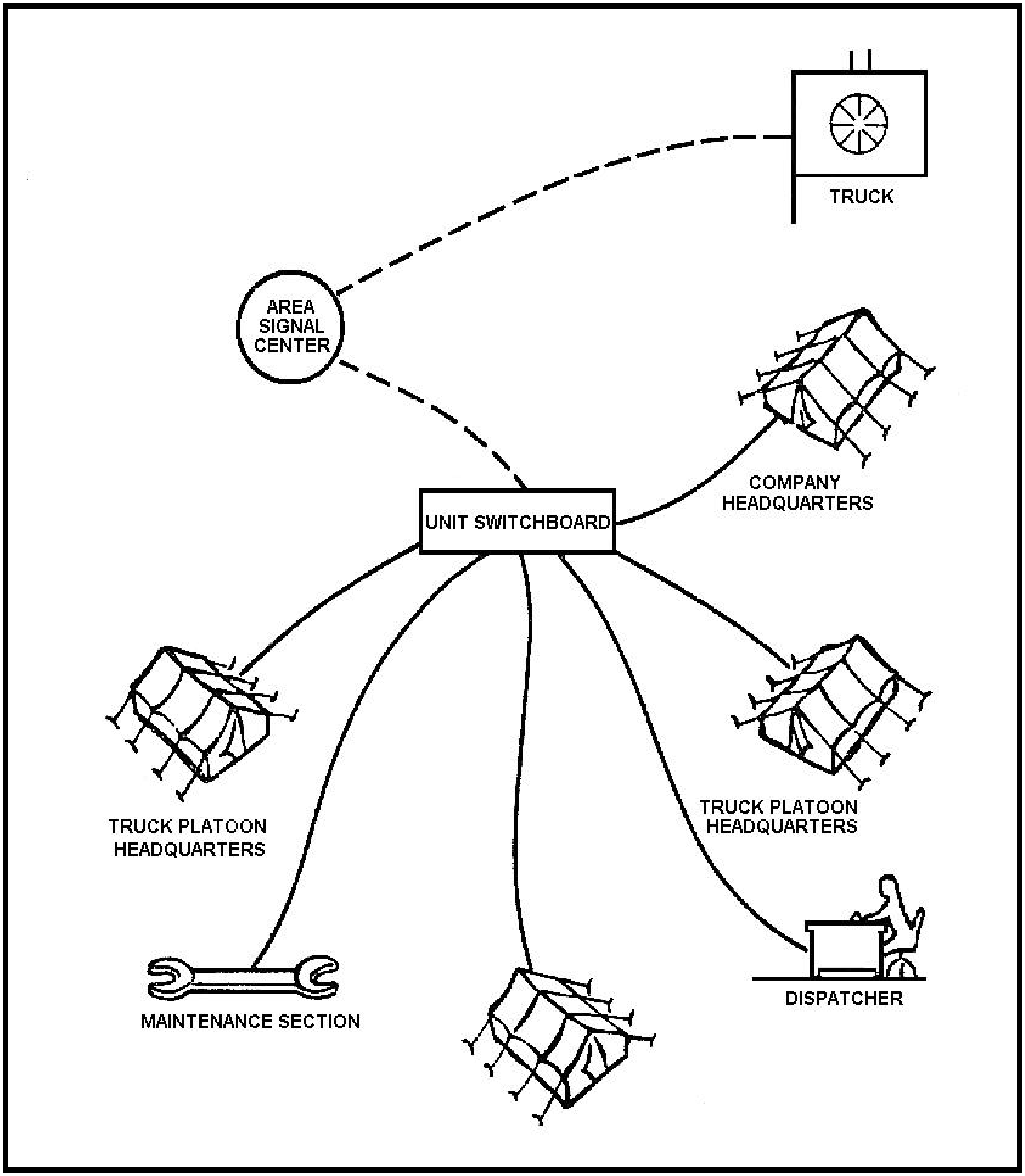


Figure S-1. Typical telephone wire net, transportation truck company

Using battery-operated telephones, the maximum operating range of point-to-point field wire circuits is about 14 to 22 miles (22.5 to 33.5 kilometers). The range of wire communications varies, depending mainly on weather and condition of the wire. Wet weather, poor splices, and damaged insulation reduces the operating range appreciably.

Only a limited number of telephones are made available to a unit by its TOE, and the best possible use should be made of them. Regardless of assignment of the telephones by the TOE, some telephones may be used for purposes other than those for which they are intended. For instance, during the hours of darkness it may be necessary to place all telephones (except those of the commanding officer and the dispatcher) on the perimeter for use by LP/OPs and crew-served weapon positions.

Upon arrival in a new area, emphasis should be placed on immediate installation of telephone lines. First priority should go to the commander, followed by the LP/OPs, then the dispatcher, and finally the operating and maintenance elements.

The time required for wire installation depends mainly on the length of the line and the method by which it is laid (vehicle or manpack). Consider the terrain, routes, weather, enemy action, and visibility in estimating the time required to install a wire net.

Switchboards increase the flexibility of the wire system and reduce the number of wire lines needed. All telephones should be connected to the unit switchboard, which is tied in to the area signal center. The unit switchboard enhances communication with supported and supporting units, higher headquarters, and adjacent units.

Telephones are a quick, efficient means of communication. They should not be used for long reports or orders when more appropriate means are available. During critical periods, use of telephones may be restricted to designated personnel (with the exception of emergency calls).

S-8. RADIO COMMUNICATIONS. Area communications system telephones and facilities are supplemented by comparatively short-range FM radio sets. These sets are used for mobile operations or to supplement common-user communications facilities. Units may also be authorized amplitude-modulated radio teletypewriters. The communication requirements of the unit's mission determine the type and extent of radio facilities provided. See the applicable TOE for specific types and quantities of radio equipment authorized.

Companies are normally provided FM voice radio sets to supplement organic wire systems. These sets are used for the following:

- Control of road movements.
- Command and control of company elements operating away from the company area.
- Communication with higher headquarters when distances permit.

The radios are mounted in vehicles organic to the company. The principal company radio is mounted in the commander's vehicle. Figure S-2, page S-6, shows a sample company radio net.

Radio is particularly vulnerable to enemy EW activities since its radiated electromagnetic energy may be readily detected, intercepted, analyzed, and exploited.

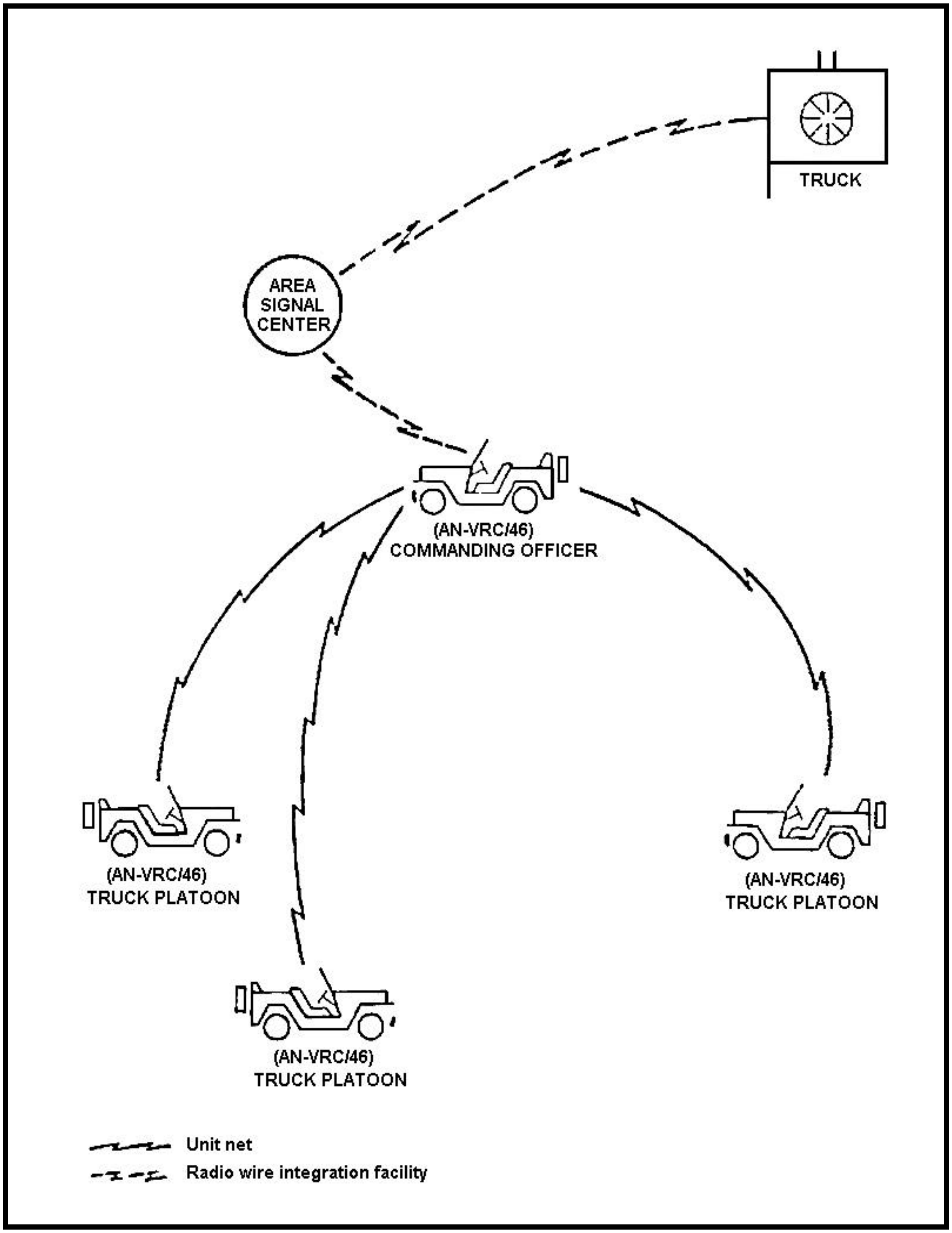


Figure S-2. Typical radio net, transportation truck company

S-9. MESSENGERS. Messenger service is the most effective means of transmitting and delivering lengthy messages and bulky items. Units use messengers to pick up from and deliver to the battalion headquarters or the nearest signal center. Messenger service should be confirmed by other communications or a follow-up message. Although they provide a flexible and reliable service, messengers are vulnerable to enemy action and do not afford the person-to-person conversation provided by communications equipment.

S-10. VISUAL COMMUNICATIONS. Means of visual communications available to all units include flags, lights, pyrotechnics, panels, arm-and-hand signals, and other prearranged visual means.

To preclude attack during movement, transportation units may communicate with friendly aircraft using panel sets. These sets are also used to guide friendly aircraft conducting air-to-surface action in the vicinity of the transportation unit and to indicate drop or landing zones. The panel system and panel recognition code for communication with aircraft is normally spelled out in the unit SOI. Colored smoke provides a ready means for both air and ground communications. For details on the use of panels and other visual signals, see FM 21-60.

S-11. SOUND COMMUNICATIONS. Sound is a supplementary means of communication. Sound signals are kept simple to prevent misunderstanding. They are transmitted by whistles, horns, Klaxons, weapons fire, and other noise-making devices. They are used chiefly to attract attention, to transmit prearranged messages, and to spread alarms. Sound signals are vulnerable to interception, and their use may be prohibited for security reasons. Such signals and their meanings are assigned by commanders. Warning of air, ground, and chemical, biological, or nuclear attack is usually given by this means.

S-12. COMMUNICATIONS SECURITY. Communications security can be defined as follows: that protection resulting from all measures designed to deny unauthorized persons information of value that might be derived from the possession and study of telecommunications or mislead unauthorized persons in their interpretations of the results of such possession and study. The following qualifies as COMSEC:

- Cryptosecurity.
- Transmission security.
- Emission security.
- Physical security of communications security materials and information.

The unit commander should ensure that COMSEC measures are understood and observed by all unit personnel using communications equipment.

Motor transport unit personnel are concerned with all types of COMSEC. However, physical security and transmission security are of primary concern.

a. **Physical Security**. Physical security is the component of COMSEC that results from all physical measures taken to safeguard classified equipment, material, and documents from access or observation by unauthorized personnel. Before vacating a command post or other facility used for communications purposes, check thoroughly for copies of messages or carbons and copies of maps or orders that might prove beneficial to the enemy. Give special attention to SOI items, including their production, distribution, storage, and final disposition when superseded or no longer needed. When an SOI item or an extract of an SOI item is believed to be lost or otherwise compromised, the fact must be reported and the item replaced immediately. The unit commander must specify in the unit SOP precisely how the report is to be made. As a minimum, he usually requires security violations to be reported immediately through communications and command channels.

b. **Transmission Security**. Transmission security is that component of COMSEC that results from all measures designed to protect transmissions from interception and exploitation by means other than cryptoanalysis. Radio is particularly susceptible to interception, direction finding, traffic analysis, and deception. Thus, radio operators must be thoroughly trained in correct communications procedures. They must also be constantly alert so as not to divulge information to the enemy through faulty operating procedures and techniques. Personnel preparing messages for transmission, as well as radio operators, must be aware of the ability of the enemy to obtain information from radio traffic.

S-13. COMMUNICATIONS TRAINING. Normally, communications specialists are trained either at service schools or at unit schools established within the command. When necessary, arrangements for the required training of these specialists may be made through the command's signal officer. At the same time, officers and other communications users may be given general training on radiotelephone procedures, telephone procedures, message writing, and communications security.

The unit signal officer must ensure that all members of the company engaged in communications-electronics have sufficient training to perform their jobs in an efficient and effective manner. Units should be trained in installing, operating, and maintaining their communication systems in fast-moving situations, under all conditions of weather and visibility, and over all types of terrain. All phases of communications training should include COMSEC and electronic counter-countermeasures training.

S-14. COMMUNICATIONS SECURITY PRECAUTIONS. The radio operator guidelines listed here are recommended for observing security practices and precautions. Compliance reduces the possibility of security leaks during radio transmissions. These guidelines should be used by switchboard operators and telephone operators and users. Many also apply to wire communications. They are as follows:

- Do not violate radio silence.
- Do not transmit in a directed net without permission.
- Do not make unnecessary transmissions, such as excessive testing.
- Do not transmit faster than can be received.
- Do not use more transmitting power than necessary.
- Do not tune transmitters with the antennas connected.
- Do not use excessive time to tune, change frequency, or adjust equipment.
- Transmit all messages by the most secure means available.
- Use prescribed radiotelephone procedures to transmit clear-text messages by voice radio.
- Preplan the wording and content of all messages to be transmitted.
- Use prescribed authentication systems and eliminate all unnecessary transmission.

- Carefully consider replies before answering inquiries received by radio. This reduces the possibility of a slip of the tongue that may give out information useful to the enemy.
- Practice and maintain a high standard of net discipline at all times.
- Use message books in preparing messages for transmission. Besides aiding and improving communications security, this practice will provide a record of messages for later reference.
- Use communications channels, both radio and telephone, for transmitting official information only.

Operators are strictly prohibited from using these facilities for personal conversations.

- Use only authorized codes. Locally devised systems can easily be broken by the enemy.
- Make transmissions as brief as possible.
- Never mention rank when transmitting messages.
- Do not use actual names.
- Use prescribed phonetic alphabet.
- Use prowords to limit transmission time.
- Do not use the same authentication twice.
- When in doubt, make the caller authenticate.
- Do not underestimate the enemy's ability to monitor your transmissions.

APPENDIX T

TRAILER INSPECTION CHECKLIST

This appendix contains a trailer inspection checklist that provides both general guidelines and a procedure for inspecting trailers. Items to be inspected are categorized under major systems. For data about a particular type of trailer, see the TM for that trailer.

INSPECTION CRITERIA

- **Trailer Body**.

☐ Trailer body is securely mounted on frame; all mounting bolts are present and properly secured.

■ *Metal bodies*.

☐ Metal bodies are free of dents, cracks, and rusty areas; there is no warping.
☐ Tailgate is securely mounted; it operates freely and fits tailgate opening properly. Tailgate fasteners and chains are in place and serviceable.
☐ Vehicle bodies are kept drained to prevent rust.

■ *Wood bodies*.

☐ Flooring is not cracked, broken, or excessively worn; there is no warping.
☐ Sideboards are in place and in good condition.
☐ Tailgates are properly mounted.

- **Tarpaulins and Bows.**

☐ Bows and racks are smooth and free of splinters.
☐ Bows and racks are serviceable and securely mounted.

NOTE: Bolts in racks and bows should be installed with bolt heads out to prevent damage to canvas.

☐ All tarps and end curtains are on hand and in serviceable condition.
☐ Canvas is mounted correctly (not inside out).
☐ Ropes or straps are not frayed, broken, or missing. Tie-down strap hooks are not bent, broken, or missing.

- **Trailer Chassis**.

  - ☐ Trailer chassis has no cracks, breaks, or broken welds.
  - ☐ Frame is not sprung.
  - ☐ The lunette or kingpin is properly mounted, secured, clean, and lubricated.
  - ☐ Data plates and decals (when used) are secure, clean, and legible.
  - ☐ Chock blocks are in place and properly secured.
  - ☐ Landing legs are not bent; they operate freely.

- **Tires**.

  - ☐ Tires have proper inflation.
  - ☐ Tread is sufficient; there are no cuts, bruises, or breaks.
  - ☐ There is no evidence of unusual wear.
  - ☐ There are no rocks between duals.
  - ☐ Valve caps are in place; valve stems are serviceable.
  - ☐ Spare tire is in place and serviceable.

- **Electrical System and Reflectors**.

  - ☐ All lights are mounted securely and in operating condition.
  - ☐ Wires are not worn or frayed.
  - ☐ Lenses are not cracked or discolored.
  - ☐ Plug receptacle has cap and gasket; spring lid fits properly.
  - ☐ Plug receptacle contacts are serviceable and free of dirt and corrosion.
  - ☐ All reflectors are in place; lenses are not cracked, missing, or painted over.

- **Brake System**.

  - ☐ Air coupling seal is serviceable; dummy coupling, with chain, is present.
  - ☐ Coupling should attach easily; there is no air leak when attached.
  - ☐ Air cylinder on trailer (when applicable) is securely mounted and operates freely.
  - ☐ Cylinder boot is not torn or loose in mounting.
  - ☐ Air lines are free of water (air filter is clean).
  - ☐ The master cylinder reservoir has proper fluid level (see appropriate TM for specifications).
  - ☐ Hand brake is adjusted and operates properly.

GLOSSARY

AA&E arms, ammunition, and explosives
AAP Allied Administrative Publication
AFR Armed Forces Regulation
ALOC air lines of communication
AMC Army Materiel Command
AR Army regulation
ARNG Army National Guard
ARTEP Army training and evaluation program
ASCC Army Service Component Command
ASG area support group
ASL authorized stockage list
ASP ammunition supply point
ASR alternate supply route
ATA American Trucking Associations, Inc.
ATP ammunition transfer point
AVLB armor-vehicle-launched bridge
BII basic issue items
BILI basic issue list items
BSA brigade support area
C^2 command and control
CBU cluster bomb unit
CCN convoy clearance number
cdr commander
CFR Code of Federal Regulation
CHE container-handling equipment
CINC commander in chief
CLK container lift kit
CMO convoy movement order
COFC container on flatcar
COMMZ communications zone
COMSEC communications security
CONUS continental United States
CONUSA numbered armies in the continental United States
COSCOM corps support command
CP check point/command post/control point/ critical point
CPRP Chemical Personnel Reliability Program
CS combat support
CSA corps storage area
CSB corps support battalion
CSG corps support group
CSS combat service support
CTIS central tire inflation system
CUCV commercial utility cargo vehicle
DA Department of the Army
DCSLOG Deputy Chief of Staff for Logistics
DD Department of Defense

DISCOM division support command
DMC defense movements coordinator; division movement control
DOD Department of Defense
DOT Department of Transportation
DS direct support
DSA division support area
DSU direct support unit
DTO division transportation office/officer
EAC echelon above corps
EPW enemy prisoner of war
ERP en route reporting point
ETA estimated time of arrival
ETD estimated time of departure
EW electronic warfare
FCJ4 FORSCOM Joint 4
FM frequency modulated; field manual
FO forward observer
FORSCOM United States Forces Command
FRAGO fragmentary order
FSB forward support battalion
G3 Assistant Chief of Staff, G3 (Operations and Plans)
G4 Assistant Chief of Staff, G4 (Logistics)
GS general support
GSA General Services Administration
GSU general support unit
GTA graphic training aid
GVW gross vehicle weight
HAZMAT hazardous materials
HET heavy equipment transporter
HHD headquarters and headquarters detachment
HMMWV high-mobility multipurpose wheeled vehicle
HN host nation
HRP highway regulation point
HRPT highway regulation point team
HS home station
HTF how to fight
HTH highway traffic headquarters
IAW in accordance with
ISO International Organization for Standardization
ITO installation transportation office(r)
JSAC Joint State Area Command
km kilometer
KMIH kilometers in the hour
LASH lighter aboard ship
LOGCAP Logistics Civil Augmentation Program
LOLO lift-on, lift-off
LOTS logistics-over-the-shore

LP listening post
LSE Logistics Support Element
m meter
MC movement control
MCAS Motor Carrier Advisory Service
MCO movement control officer
M-date mobilization date
MEDEVAC medical evacuation
METL mission essential task list
METT-T mission, enemy, troops, terrain, and time available
MHE materials-handling equipment
MIH miles in the hour
MKT mobile kitchen trailer
MLC Military Load Class
MOADS Maneuver Oriented Ammunition Distribution System
MOBCON mobilization control
MOGAS motor gasoline
MOS military occupational specialty
MP military police
MPES Mobilization Planning and Execution System
MRE meals, ready to eat
MS mobilization station
MSB main support battalion
MSR main supply route
MTMC Military Traffic Management Command
MWO movement warning order
NATO North Atlantic Treaty Organization
NBC nuclear, biological, chemical
NCO noncommissioned officer
NCOIC noncommissioned officer in charge
NG National Guard
NGB National Guard Bureau
NHTN National Highway Transportation Network
OF optional form
OIC officer in charge
OP observation post
OPCON operational control
OPORD operations order
OPSEC operations security
PLL prescribed load list
PLS palletized loading system
POC point of contact
POE port of embarkation
POL petroleum, oils, and lubricants
QSTAG Quadripartite Standardization Agreement
RC Reserve Component
RCAS Reserve Component Automation System
RORO roll-on, roll-off

RP release point
RSOP reconnaissance, selection, occupation party
S3 operations and training officer (US Army)
S4 supply officer (US Army)
SB supply bulletin
SF standard form
SMCC state movement control center
SMCT Soldier's Manual of Common Tasks
SMFT semitrailer mounted fabric tank
SOFA Status of Forces Agreement
SOI signal operating instructions
SOP standing operating procedure
SP start point
SRC Standard Requirement Code
STAA Surface Transportation Assistance Act
STANAG Standardization Agreement
STARC State Area Command
STON short ton
STP soldier training product
TAACOM theater army area command
TACAIR tactical air
TAMMS The Army Maintenance Management System
TB technical bulletin
TC training circular
TCAC theater civil affairs command
TC-ACCIS Transportation Coordinator Automated Command and Control Information System
TCMD transportation control and movement document
TM technical manual
TMCA theater movement control agency
TMT transportation motor transport
TOFC trailer on flatcar
TOE table(s) of organization and equipment
TPU tank and pump unit
TRANSCOM transportation command
TTP trailer transfer point
UAV unmanned aerodynamic vehicles
ULLS unit level logistics system
UMC unit movement coordinator
UMO unit movement officer
US United States
USAR United States Army Reserve
USDOT United States Department of Transportation
veh vehicle
wt weight
XO executive officer

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