PREPARE UNIT RAIL LOAD PLANS

TR2028

Edition A

Training Directorate
United States Army Combined Arms Support Command
Fort Lee, Virginia 23801-1809

6 Credit Hours
Edition date: January 1996

Subcourse Overview

Description

The United States (US) leadership relies on an Army capable of executing US national policy anywhere in the world. As the Army moves toward the turn of the century, it must maintain this capability with a much smaller force. Today's force-projection strategy requires an ability to rapidly deploy worldwide on short notice. Most units will move by rail from home station (HS) to their aerial or seaports of embarkation (A/SPOE). Each unit contains a unit movement planner whose responsibilities involve preparing the unit for deployment through the creation of rail load plans. The unit movement planner must know the--

- Rules and regulations of government rail movement operations.
- Procedures for planning a unit movement plan.
- Preparation procedures for conducting a rail movement.
- Continental United States (CONUS) rail loadout procedures.
- Rail operations in a theater of operations.

Prerequisites

There are no prerequisites for this subcourse.

Doctrine disclaimer

This subcourse reflects doctrine that was current at the time it was prepared. You should always refer to the latest official publications.

Gender disclaimer

Unless otherwise stated, the masculine gender of singular pronouns is used to refer to both men and women.

Terminal learning objective (TLO)

This is the TLO for this subcourse:

Action: Prepare a unit rail loading plan.

Condition: Given this subcourse.

Standard: Identify the procedures for preparing a units rail load plan including:

- Preplanning procedures.
- Rail regulatory requirements.
- Conducting a CONUS rail loadout.
- Conducting rail operations in a theater of operations.

Score 70 percent or higher on the subcourse examination.

Subcourse content

This subcourse contains these lessons:

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The student should use the above publications extracts to take this subcourse.
At the time this subcourse was written, these were the current publications.
In the student's own work situation, he should always refer to the latest publications.

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Grading and certification

This subcourse contains a multiple-choice examination covering the material in the eight lessons. You must score a minimum of 75 percent on this examination to met the objectives of the subcourse. These are the procedures for grading and certifying:

Step	Action
1	Study each lesson in the subcourse.
2	Work through each practice exercise.
3	Complete the exam by marking your answers.
4	Check you answers as you transfer them to the Examination Response Sheet.
5	Use the preaddressed envelope received with this subcourse to forward your completed Examination Response Sheet. **Note:** You will receive your examination score in the mail.

LESSON 1

PREPARING UNIT MOVEMENT PLANS

1-1. Lesson Overview

Description

This lesson will help the student understand and successfully meet the challenges in planning unit rail movements. The unit movement office does not have to face these challenges alone. He can reduce his burden by understanding the complexities of this task. He must also know whom he can turn to for assistance in obtaining movement planning input and other forms of support.

Enabling learning objective (ELO)

This is the ELO for this lesson:

Action: Identify the basic requirements for performing a unit movement to include completing the DA Form 5748-R.

Condition: Given a self-study environment and the materials provided in this subcourse.

Standard: In accordance with the materials provided in this subcourse text and/or the references cited below.

References

These are the references used in developing this lesson:

- FORSCOM/ARNG 55-1, *Transportation and Travel, Unit Movement Planning*, dated 1 October 1993.
- FORSCOM Regulation 55-2, *Unit Movement Data Reporting and Systems Administration*, dated January 1985.
- FM 55-65, *Strategic Deployment by Surface Transportation*, dated October 1995.
- FM 100-17, *Mobilization, Deployment Redeployment, and Demobilization*.
- TB 55-46-1, *Standard Characteristics for Transportability of Military Vehicles and Other Outsize/Overweight Equipment*.

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Lesson content

These are the topics included in this lesson:

1-2. Planning Unit Movements

Introduction

During a unit move, as in all missions, the unit commander is responsible and accountable for what his unit does. But, when planning unit movements, commanders rely heavily on their unit movement officers (UMOs) for successful detailed planning and coordination. Unit movements must be effective and efficient.

Unit movement planning

Unit movement planning is the collecting, analyzing, coordinating, and documenting of information and data required to conduct a unit movement. Unit movement plans are required for--

- Mobilization.
- Deployment.
- Redeployment.
- Demobilization.

Unit movement plan

Appendix A of this subcourse contains a Sample Unit Movement Plan extracted from FORSCOM/ARNG Regulation 55-1. Reserve Components must develop two movement plans, one for movement from HS to mobilization station (MS) and the second plan for movement from the MS to the port of embarkation (POE). These are the three characteristics of a unit movement plan:

- Provides specific responsibilities, functions, and details for each part of a unit deployment from origin to reception in the theater of operations.
- Contains a series of connected steps to be carried out simultaneously or in succession resulting in the programmatic movement of a unit from one location to another.
- Uses a standard 5-paragraph operations order (OPORD) format.

Unit rail movement plans

A unit movement by rail is the most common method for transporting equipment to a MS and/or POE. This equipment is called not to accompany troops (NTAT) and consists of the bulk of the units equipment. These are the procedures for developing a unit rail movement plan:

Continued on next page

Unit rail movement plans, continued

Step	Action
1	Identify the equipment and supplies to be moved by obtaining a list of all Table of Organization and Equipment/Modified Table of Organization and Equipment(TOE/MTOE) and other assigned mission essential equipment. This listing must include all deployable equipment.
2	Identify hazardous, sensitive, and/or classified items for special packaging, labeling, segregating, and placards for movement.
3	Identify your unit's bulk cargo requirements and develop packing lists for containers including lists for all unit vehicles containing cargo.
4	Develop load plans for placing the unit equipment on the railcars. Load planning must consider the maximum use of each vehicle's cargo compartment capacity consistent with the appropriate shipping configuration.
5	Identify the blocking, bracing, packing, crating, and tiedown (BBPCT) material needed to properly protect and secure your equipment on the railcars.
6	Update the automated unit equipment list (AUEL) provided by Forces Command (FORSCOM). Provide routine updates of your unit movement data (UMD) as significant changes occur.

1-3. Identifying What Needs to be Moved

Introduction

The first step in planning a unit movement is the determination of items to be moved. The unit movement officer must identify these items for unit movement operations:

- Personnel.
- Equipment.
- Supplies.
- Baggage.

Moving unit personnel

The requirements for moving personnel are based on the units TOE/MTOE required column. You consider personnel movement on the basis of functions. Your unit will normally move in three elements--

- Advance party consists of a few members from the unit and departs before the main body. The advance party readies the HS, MS, or POE for the arrival of the main body.
- Main body carries the bulk of personnel and equipment
- Rear detachment provides cargo security.

Moving unit equipment

In planning the movement of unit equipment the UMO considers all TOE/MTOE and other mission essential equipment. The UMO ensures that the unit has a listing of all deployable unit equipment. This listing must include the identification of all outsized, oversized, overweight, and hazardous equipment or cargo.

Moving unit supplies

The UMO's responsibilities for planning the moving of unit supplies applies solely to the units basic load of supplies. This means units only plan to move those supplies initially required within the theater to sustain operations. FORSCOM/ARNG 55-1 provides a detailed listing of basic load supplies and planning requirements for the UMO.

Continued on next page

Moving unit baggage

The UMO must also plan for moving unit baggage. This baggage consists of the individual soldier's equipment and gear and authorized personal items. Normally each soldier will have two duffel bags, an "A Bag" and a "B Bag." The "A Bag" contains--

- Uniforms.
- Authorized clothing.
- Personal items.

The "B Bag" contains a soldier's TA-50 gear when not worn by the soldier during the movement.

Identifying categories of equipment

During the process for identifying what needs to be moved, the UMO must also identify categories of equipment for movement. The UMO must identify what needs to accompany troops (TAT) en route. These are the three categories of soldier equipment:

Category	Description
Yellow TAT	Equipment that must be accessible en route. This category includes-- • "A Bag." • Individual weapons. • Unit property.
Red TAT	Equipment that must be available to the unit prior to their arrival in theater. Red TAT equipment includes sensitive cargo requiring special security measures or handling at the POE or priority cargo which must be loaded last and unloaded first.
NTAT	The bulk of a unit's equipment is categorized as NTAT. This equipment normally travels via surface transportation (e.g., railcars or convoys) and is not required by the unit prior to their arrival in theater. Examples of NTAT equipment include-- • Tanks. • Utility trucks. • Containers.

1-4. Identifying Hazardous Cargo

Introduction

All hazardous cargo must be prepared and labeled according to the appropriate regulations As the UMO you must identify your hazardous cargo requirements early for inclusion your unit movement plan so your unit is prepared. Any errors in the packaging, labeling, or shipping of hazardous materials may effect the timeliness of your unit's movement. This lesson provides only an overview of the requirements for shipping hazardous cargo using railcars; consult Title 49, Code of Federal Regulations (CFR) 49, Parts 100-177 for detailed rail shipping requirements.

Movement during mobilization

During mobilization movement, reserve components (RC) will not move ammunition from the HS to the MS. However, RC units will move ammunition basic load (ABL) from the MS to A/SPOE.

Documenting hazardous materials

These procedures are guidelines for shipping hazardous materials. Consult CFR 49, Parts 100-177 for detailed shipping requirements:

Step	Action
1	Determine the proper shipping name and identification number as listed in the Hazardous Materials Table of CFR 49.
2	Determine the class or classes of the hazardous materials as found in CFR 49.
3	Ensure that rail transport is appropriate for the shipment and the packaging, quantity per package, labeling, and separation complies with the rail requirements.
4	Select and apply the proper labels. **NOTE:** Labels are not required for fuel in vehicle fuel tanks.
5	Determine and select the proper packaging.
6	Prepare packing lists listing the hazardous materials packed inside the containers or vehicles first.
7	Determine the proper placards in accordance with CFR 49.
8	Determine segregation requirements for hazardous materials.
9	Ensure special handling codes are used on the AUEL.

1-5. Developing Packing Lists

Introduction

All vehicles, containers, crates, and bundles must display a separate DD Form 1750/DA Form 5748-R showing their complete contents.

DA Form 5748-R

DA Form 5748-R, Figure 1-1, shows the complete contents of the shipping item and the shipment unit number from the AUEL. The AUEL must identify the package. DA Form 5748-R is not required for items not requiring identification, such as--

- Empty vehicles.
- Nested cans.
- Banded shovels.

Also, DA Form 5748-R is not required for a container already listing its complete contents such as a inventory of tools or parts list.

Do not list classified materiel on the DA Form 5748-R.

Preparing DA Form 5748-R

Prepare five copies of the complete DA Form 5748-R. Retain these copies in your unit movement folder until the unit receives deployment notification. Upon receipt of deployment notification distribute the copies as follows:

- One copy inside the container.
- One copy outside the container in a weatherproof cover.
- Two copies to unit representatives at the POE.
- One copy with the unit movement plan.

Completing DA Form 5748-R

These are the instructions for completing DA Form 5748-R:

Block Number	Instructions
1	Enter the name of the deploying unit.
2	Enter the unit identification code (UIC) or bumper number.
3	Enter the transportation control number (TCN) or seal number.

Continued on next page

Completing DA Form 5748-R, continued

SHIPMENT UNIT PACKING LIST AND LOAD DIAGRAM
For use of this form, see FM 55-65, the proponent agency is TRADOC

PAGE ____ OF ____

1. DEPLOYING UNIT		2. UIC OR BUMPER NO	3. TCN OR SEAL NUMBER
4. SHIPMENT UNIT DESCRIPTION			5. DATE PACKED
6. LENGTH	7. WIDTH	8. HEIGHT	12. LOCATION OF CG
9. CUBE	10. EMPTY WEIGHT	11. LOADED WEIGHT	

13. PACKING LIST

CARGO LOC NO a	CONTENTS (Description and Nomenclature) b	TYPE PKG. c	PKG. QTY. d	PKG. WEIGHT e	TOTAL PKG WEIGHT

14. CERTIFICATION. *This certifies that items listed hereon are contained within the specified packages.*

a. TYPED NAME	b. GRADE	c. TITLE
d. SIGNATURE		e DATE

DA FORM 5748-R, MAR 89

Figure 1-1. DA Form 5748-R.

Continued on next page

Completing DA Form 5748-R, continued

Block Number	Instructions
4	Enter a general shipment unit description using phrases such as nuclear, biological and chemical (NBC) defense equipment, motor maintenance spare parts, and office supplies. **DO NOT** use terms such as miscellaneous. Include the line item number (LIN) and applicable index number.
5	Enter the dates the form was compiled and the date the container was packed.
6	Enter the length of the shipment unit.
7	Enter the width of the shipment unit.
8	Enter the height of the shipment unit.
9	Enter the cube of the shipment unit.
10	Enter the employ weight of the vehicle and/or shipping containers.
11	Enter the loaded weight of the vehicle and/or shipping containers.
12	Enter the location of the center of balance (CB).
13	a. Enter the cargo location number numbering the contents sequentially. b. Enter the nomenclature of the contents and the line number from the property book. Highlight all hazardous materials. c. Enter the type of packing using these accepted abbreviations: • bty - battery. • cyl - cylinder. • PC - piece. • PT - palletized. d. Enter the unit of issue such as 1 ea (each). e. For nonhazardous materials, enter the total package weight. For hazardous packages enter the weight of each package separately. Then enter the total package weight.

Continued on next page

Completing DA Form 5748-R, continued

Block Number	Instructions
14	Enter the following preparer of the form information in **blocks a through d**: • Name. • Grade. • Title. • Signature. Enter the date the forma was prepared in **block e**. If the contents include hazardous cargo, then the unit's hazardous cargo certifying official will sign under the hazardous cargo statement.
15	Sketch a load diagram showing-- • The location of each item. • Brief description of the load including potential loading problems and instructions. • The type of container or vehicle. • All blocking, bracing, and packing materials required to secure the cargo within the shipment unit.
16	Self-explanatory.

1-6. Identifying BBT Requirements

Introduction

Blocking, bracing, and tiedown (BBT) includes all materials to protect vehicles, equipment, and other cargo from damage or loss during transit.

Determining BBT requirements

BBT materials must be calculated on the current Association of American Railroads (AAR) Loading Rules. If these AAR procedures are unavailable, there are three sources for determining the BBT material requirements for your units equipment:

- Computerized Movement Planning and Status System (COMPASS) Report.
- Conceptual Rail Load Plan.
- DA Form 2940-R and TM 55-2200-001-12.

COMPASS blocking and bracing materials (BBM) summary

COMPASS rail BBM summary provides planners with detailed rail BBT requirements. The Military Traffic Management Command Transportation Engineering Agency (MTMCTEA) compiles the BBM data based upon current AAR rules. COMPASS maintains this data. These reports are not produced and distributed on a standard basis but units may request these reports from: FORSCOM, ATTN: FCJ4-TRU, Fort McPherson, GA 30330-6000. COMPASS produces two reports which list only list the BBM requirements for vehicles listed on the AUEL report requiring rail transportation. The two the Rail BBM reports are:

- Detail Report, Figure 1-2. The Rail BBM Detail Report lists the BBM requirements for one vehicle. Multiply the number of vehicles times the BBM requirement to produce the total requirement for types of vehicle by LIN.

- Summary Report, Figure 1-3. The Rail BBM Summary Report summarizes the BBM requirement for the unit based upon the unit's AUEL report.

BBM data is developed only for vehicles. In the absence of approved AAR procedures, an estimated bill of materials is compiled based upon procedures for a similar vehicle. If a bill of materials has not been developed, the detailed material listing is annotated “no data available.”

Continued on next page

COMPASS BBM summary, continued

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                                    UNCLASSIFIED

TIME OF RUN -  133          COMPUTERIZED MOVEMENT PLANNING AND STATUS SYSTEM (COMPASS)          PCN0483A
                                  RAIL BLOCKING AND BRACING MATERIAL SUMMARY                    DATE: 13 FEB 85

PREPARED FOR:  FORSCOM REG 55-1                (AAR - ASSN OF AMERICAN RAILROADS-RULES FOR LOADING OPEN TOP CARS)

APPLIES TO     WHPAAA 0218 AV AW          FT WOOD    TX

VEHICLE LIN        DESCRIPTION              QTY      EMPTY WT (LB)     AAR REFERENCE      OTHER REF     DA REFERENCE

F39378     CRANE WHL 30T W/BOOM              4          57380  SEC  , FIG    , WJA      019     TM 55-3810-240-20-1

ENTRY NO          MATERIAL DESCRIPTION, AAR RULES AND REMARKS          QUANTITY (EACH)   LENGTH (IN) (EACH)   WEIGHT (LB) (EACH)

01        RULE NO. 2,SEC 1,AAR
        * (SWING RETAINERS MUST BE INSTALLED          )

02        ITEM B
        * (MATERIAL REQUIREMENT FOR ITEM WITHOUT BOOM          )

03        LUMBER,2X4 IN.                                          24                  18
04        LUMBER,4X12 IN.                                         24                  21
05        NAIL,20D                                               120
06        NAIL,40D                                               168
07        LUMBER,2X4 IN.                                           8                 36

08        CUSHIONING MATERIAL,PAPER                                4                                  2
        * (REFERENCE APPENDIX H TM 55-2100-001-12          )

09        CUSHIONING MATERIAL,BURLAP                               4                                  2
        ** (SUBSTITUTE ITEM FOR ENTRY NO 08)

NOTES:

  1.  DO NOT USE BLOCK PATTERN QUANTITY FOR COMPUTING COSTS; LUMBER & NAILS REQUIRED FOR CONSTRUCTION ARE SEPARATELY IDENTIFIED.

  2.  SEE - TM-55-2100-001-12 - FOR INSTRUCTIONS IN THE USE OF THIS SUMMARY LISTING.

                                    UNCLASSIFIED
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Figure 1-2. Rail BBM Detail Report

Continued on next page

COMPASS BBM summary, continued

UNCLASSIFIED

COMPUTERIZED MOVEMENT PLANNING AND STATUS SYSTEM (COMPASS) PCN04838
RAIL BLOCKING AND BRACING MATERIAL SUMMARY DATE: 13 FEB 85

TIME OF RUN - 133

PREPARED FOR: FORSCOM REG 55-1 (AAR - ASSN OF AMERICAN RAILROADS-RULES FOR LOADING OPEN TOP CARS)

APPLIES TO WHMAA 0228 AV MM FT WOOD TX

MATERIAL DESCRIPTION	TOTAL QUANTITY	TOTAL LINEAR FT	TOTAL BOARD FT	TOTAL WEIGHT (LB)	(COMPUTED BY PURCHASING AGENT) COST/ BD FT	COST/ LB	COST/ ITEM	SUBTOTAL COST
BLOCK PAT NO.16,SEC 6	192							
BLOCK PAT NO.08,SEC 6	52							
BLOCK PAT NO.09,SEC 6	44							
CLAMP,3/8 IN.	908							
METAL FILLER,16GAUGE3IN				64				
LUMBER,2X4 IN.			472					
LUMBER,4X4 IN.			32					
LUMBER,6X8 IN.			1152					
NAIL,20D				40				
NAIL,40D				61				
WIRE ROPE,IWRC 3/8 IN.		1692						

NOTES:

1. DO NOT USE BLOCK PATTERN QUANTITY FOR COMPUTING COSTS; LUMBER & NAILS REQUIRED FOR CONSTRUCTION ARE SEPARATELY IDENTIFIED.
2. SEE - TM-55-2200-001-12 - FOR INSTRUCTIONS IN THE USE OF THIS SUMMARY LISTING.

Figure 1-3. Rail BBM Summary Report.

Continued on next page

Conceptual rail load plan

FORSCOM Form 285-R, Rail Load Plan, Figure 1-4, provides a conceptual rail load plan for loading vehicles and containers on railcars. This form shows what cargo is loaded on a specific railcar. This form also identifies BBT materials for securing the cargo onto the railcar. This form must be kept on file a part of the unit movement plan. It must be revised and tested whenever the unit's load changes. These load cars also allow for easy checking of cargo at terminals and for loss or damage of equipment.

TM 55-2200-001-12

TM 55-2200-001-12, *Technical Manual Transportability Guidance Application of Blocking, Bracing, and Tiedown Materials for Rail Transport* is a reference for blocking and bracing information for any military equipment moving by rail. Use TM 55-2200-001-12 when the COMPASS BBM reports and the conceptual rail load plans fail to supply the appropriate BBT data. TM 55-2200-001-12 is crucial to all aspects of the unit rail load planning process. Figure 1-5 is an extract from a typical page of TM 55-2200-000-12, it includes these items:

- Identification of the type of cargo depicted and the type of railcar on which it is loaded.
- Illustration of the cargo, including letters pointing out the location of the securing blocking.
- Description of the BBT, materials for the cargo, including the number of each for the cargo as a whole.
- Notes for additional conditions for meeting rules or requirements for setting all blocking and bracing materials.

When listing the BBM for any vehicle, use TM 55-2200-001-12 and find the page referencing the specific vehicle. Then write down the materials mentioned in the description.

Continued on next page

TM 55-2200-001-12, continued

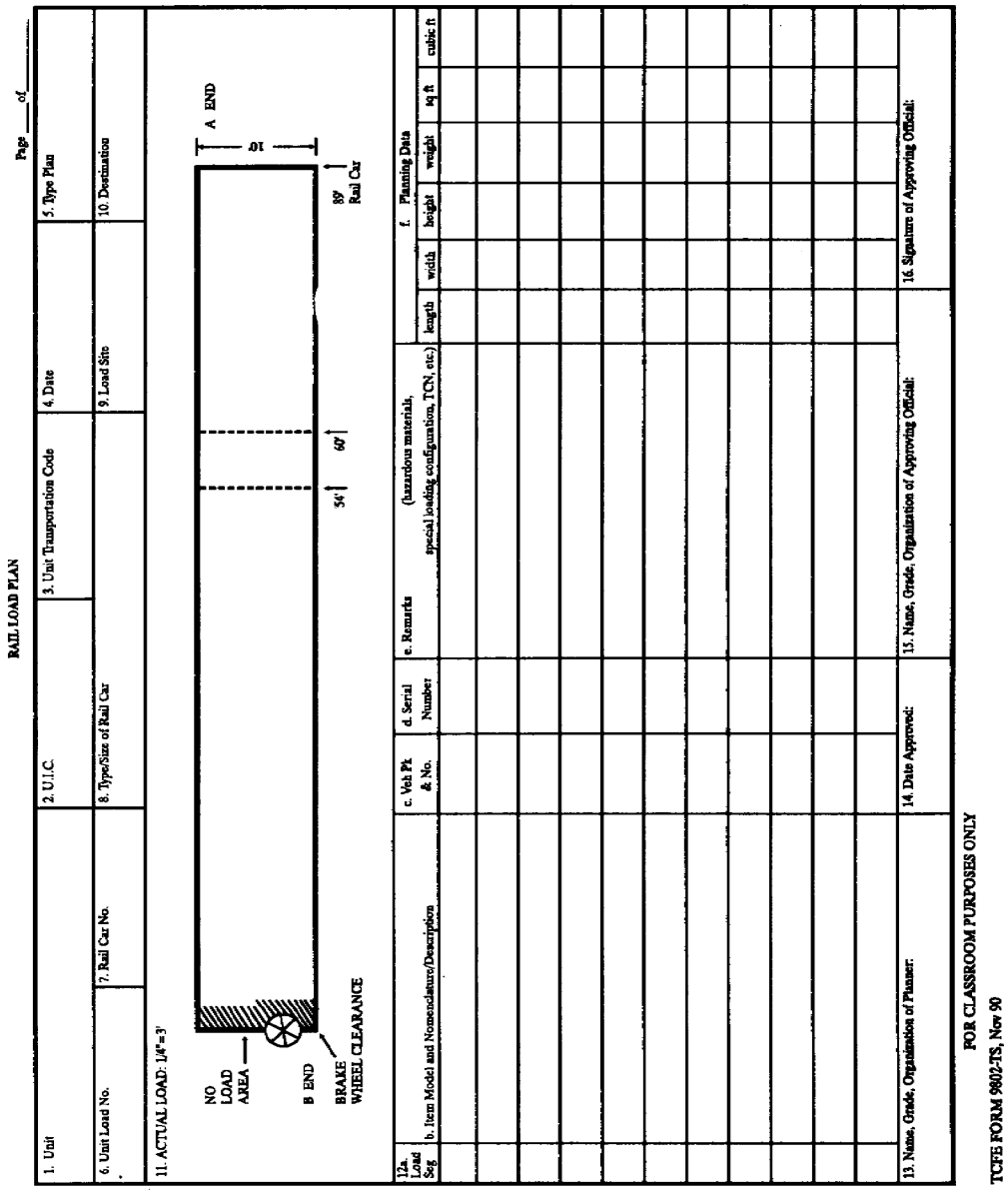

Figure 1-4. FORSCOM Form 285-R, Rail Load Plan (front).

Continued on next page

TM 55-2200-001-12, continued

17. Dunnage Requirements:							
a. Vehicle/Trailer	b. 2" x 6" No/Length	c. 2" x 4" No/Length	d. Chocks No/Pattern	e. Cable No/Length	f. Clamp No/Size	g. Thimble No/Size	h. Nails No/Size
18. TOTALS							

Reverse of TCPE Form 9802-TS, Nov 90

Figure 1-4. FORSCOM 285-R Rail Load Plan (back) (continued).

Continued on next page

TM 55-2200-001-12, continued

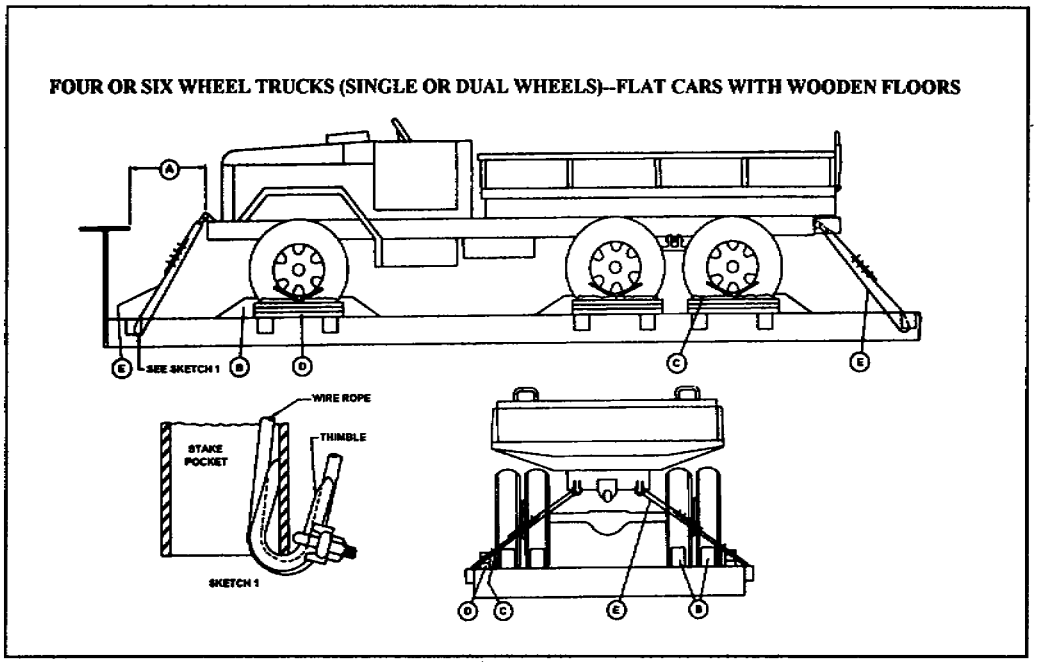

Figure 1-5. Extract from TM 55-2200-001-12.

1-7. Maintaining UMD

Introduction

The Army uses UMD to plan and execute the movement of Army units. As a result, UMD must be maintained current and accurate at all times. UMD is automated and input into COMPASS using the Transportation Coordinator-Automated Command and Control Information System (TC-ACCIS). The COMPASS supports:

- Planning.
- Strategic mobility analysis.
- Movement execution.
- Command and control for mobilization and deployment purposes.

UMD reports

Accurate UMD reporting is essential and must reflect a unit's planned or actual movement requirements. These are the four basic types of UMD reported by units:

UMD Report	Description
Mobilization UMD (MOB UMD)	MOB UMD is reported by RC units. This report reflects all unit assets moving from the unit HS, alternate site, or storage site to the MS and unit equipment located at the MS. MOB UMD reflects what is moving and its moving configuration.
Preparation for Overseas Movement UMD (POM UMD)	POM UMD reflects movement requirements for deployment only. It depicts the equipment a unit will deploy and its shipping configuration. A POM UMD report is required for each deployable Active Component (AC) unit and each activated or mobilized RC unit.
Tailored UMD	Tailored UMD reflects all unit assets moving from the unit home location to an objective area. It may be used for any special purpose plan, exercise, or contingency including: • Joint Training Exercise. • Command Post Exercises. • Sea Emergency Deployment Readiness Exercises. • Special movement requirements such as disaster relief or civil disturbance.

Continued on next page

UMD reports, continued

UMD Report	Description
Deployment UMD (DEP UMD)	Reflects all unit equipment moving from the Support Installation (SI) or MS by all applicable modes of transportation. DEP UMD includes personnel and method of conveyance.

Types of UMD reports

There are two UMD report types for unit submission to FORSCOM--

- Initial reports.
- Update reports.

Initial UMD reports

Initial reports during the unit's first submission into FORSCOM's master unit movement data base maintained in COMPASS. Prior to submitting an initial report, the supporting unit movement coordinator (UMC) must request the addition of the unit's UIC into the data base.

Update UMD reports

Units file update UMD reports whenever there are significant changes in the unit's transportation requirements. A significant transportation change is defined as any increase or decrease in movement requirements resulting in the addition or subtraction of one or more railcars, semi-trailers, trucks, passenger conveyances, or requires the allocation of more or less aircraft or ship deck space. A thorough knowledge of the AUEL is necessary to successfully maintain and report UMD.

Continued on next page

AUEL report

The AUEL report is the primary document in the unit's transportation movement/deployment plan. It is a product of COMPASS and reflects the UMD reported to FORSCOM. The AUEL is the most commonly used UMD report. These are the two types of AUEL reports:

- AUEL Report - UMD Detail.
- AUEL Report - UMD Summary.

Appendix B of this subcourse contains a publication extract from FORSCOM Regulation 55-2 identifying the key data elements of the AUEL Report - UMD Detail and the AUEL Report - UMD Summary.

AUEL report - UMD detail

Figure 1-6 shows an example of an AUEL Report - UMD Detail. The detail listing reflects the individual pieces of unit equipment and its--

- Dimensional characteristics.
- Method of transportation.
- Square footage.

AUEL report - UMD summary

Figure 1-7 shows an example of an AUEL Report - UMD Summary. The summary report reflects the detail information by--

- Mode of transportation.
- Equipment tonnage/square feet.
- Movement requirements.

UMD reporting format

The format for reporting UMD meets specific needs for planning, executing movements or deployments, and compiling with automated data processing and electronic transmission requirements. FORSCOM Form 900-R series worksheets are the approved format for UMD reporting. The format for reporting UMD must be strictly followed. These are the FORSCOM Form 900-R series and their record type, title, form number, and a brief description:

Continued on next page

UMD reporting format, continued

Record Type	Title	Form Number	Description
A	Header and Strength Data	900-R	Identifies the reporting unit and personnel strength. It indicates an "Add" or "Change" submission for updates to the unit data in the FORSCOM data base.

Continued on next page

UMD reporting format, continued

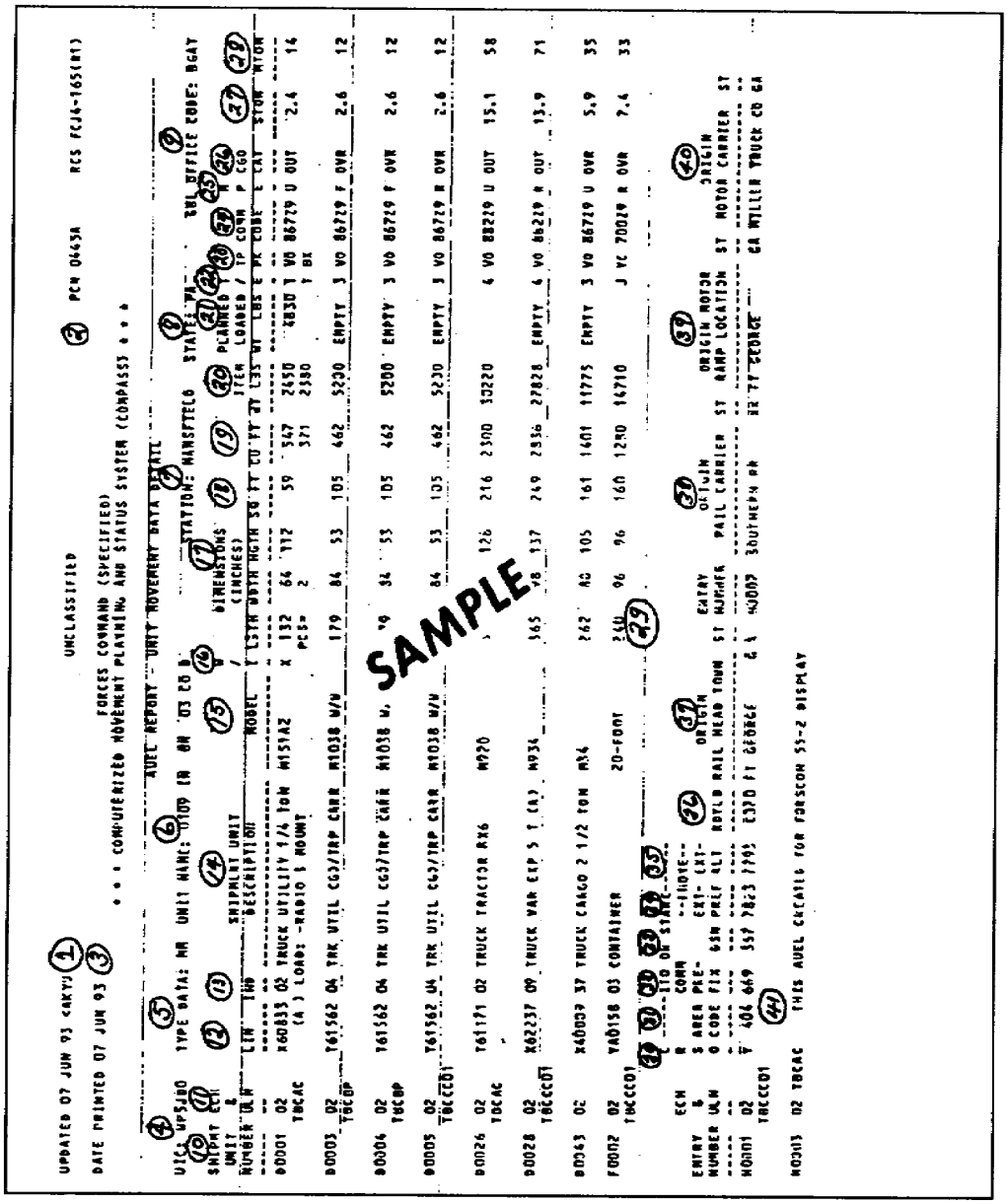

Figure 1-6. AUEL Report--UMD Detail.

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UMD reporting format, continued

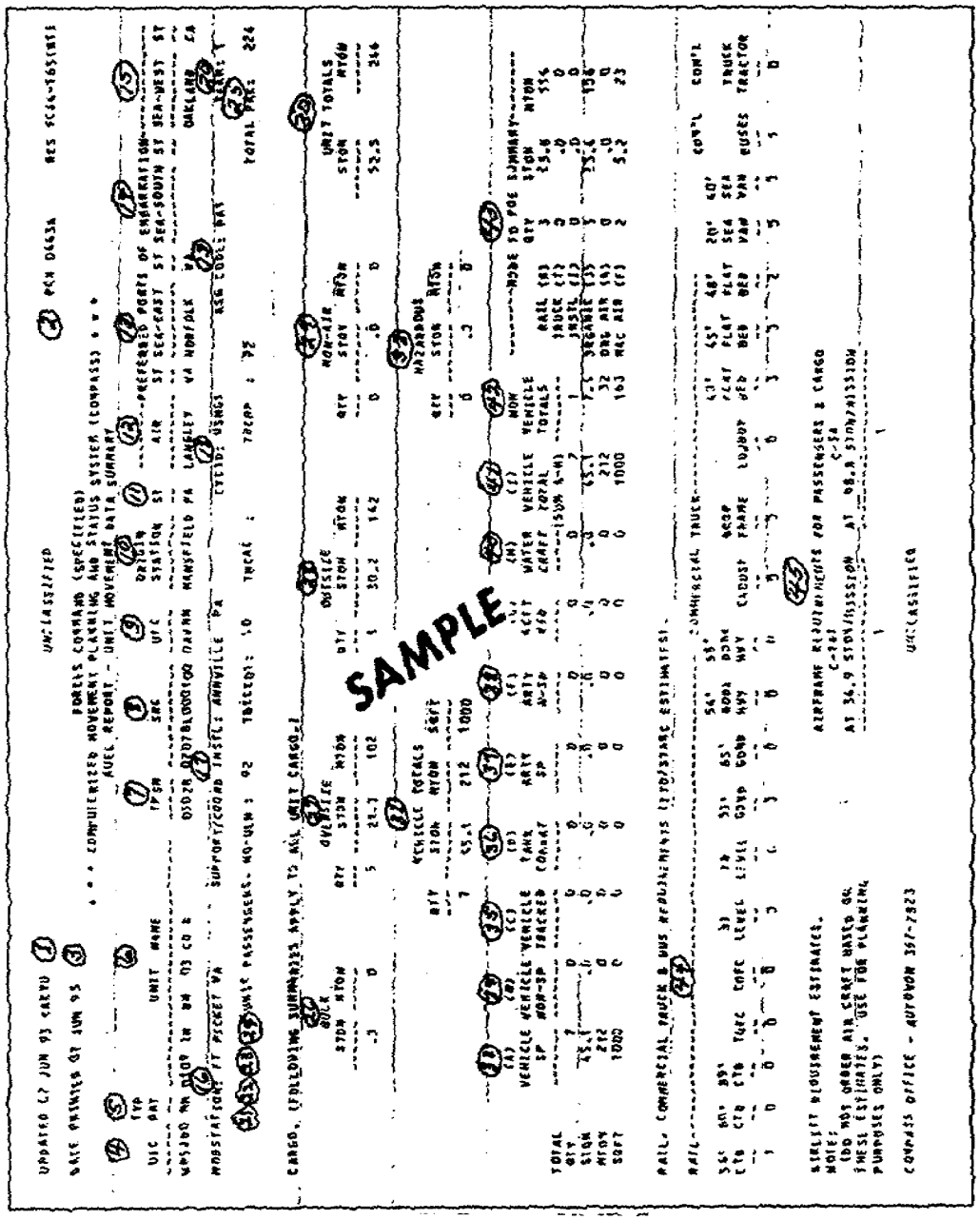

Figure 1-7. AUEL Report--UMD Summary.

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UMD reporting format continued

Record Type	Title	Form Number	Description
D	Vehicle Data Worksheet	900-1-R	Reports vehicles in a shipping configuration.
E	Vehicle Loading Data Worksheet	900-2-R	Reports cargo loads assigned to specific vehicles or containers. This worksheet is a requirement for all vehicles or containers carrying cargo. There must be at least one "E" record for each "D" record with a load.
F	Special Handling Cargo Worksheet	900-3-R	Reports cargo that is-- • Palletized, containerized, unitized, crated, or banded together. • Security classified. • Not loaded on vehicles.
G	Load Data Worksheet	TBD	Reports cargo loads assigned to specific containers. This form is required for all containers carrying cargo. There must be at least one "G" record for each "F" container record with a load.
J	Rail Commercial Truck and Bus Requirements Worksheet	900-4-R	Reports the transportation officer's estimate of transport equipment for moving the unit from origin, HS, or storage site to the POE or MS.
H	Remarks Data Worksheet	900-5-R	Provides an explanation, clarification, or additional information on the data reported.

Continued on next page

UMD reporting format, continued

Record Type	Title	Form Number	Description
H0001	Contingency Standing Route Order (CSRO)	900-5-R	Provides a CSRO. Complete this form only if a CSRO is desired.
H0002	CSRO	900-5-R	Provides explanations or clarifications of additional information pertaining to the data reported.
B	The Deployment Reporting Record	TBD	Reports deployment departure. This form is required during deployments and may be required to report exercise departures. TC-ACCIS is the only method of reporting this record.

Using the FORSCOM forms

Use these rules when entering dam on the FORSCOM Form 900-R series worksheets:

Rule	Description
1	The alpha letters I and O are not authorized data characters in the UIC.
2	The alpha letter O can only be used in the description portion of the E, F, G, and H record types.

Continued on next page

Reporting UMD

UMD updates are managed by numbered armies in the continental United States (CONUSA) geographical area. Updates must be received at FORSCOM in a machine readable format not later than the first working day of the scheduled month. Units having no UMD changes must submit a NO CHANGE report by submitting the unit's--

- UIC.
- Type Data Code (TDC).
- New submission date and transaction code in the format of the header record.

Units participating in exercises will not submit NO CHANGE REPORTS. As a minimum, UMD reporting will be in accordance with this schedule:

CONUSA Geographical Region	AC Reports (POM UMD)	US Army Reserve (USAR) Reports (MOB UMD)	National Guard (NG) Reports (MOB UMD)
1	OCTOBER	FEBRUARY	JULY
1 (MW)	JULY	DECEMBER	MAY
2	SEPTEMBER	APRIL	MARCH
5	JULY	NOVEMBER	APRIL
6	APRIL	JANUARY	JUNE

1-8. Lesson Summary

Summary

This lesson briefly described the procedures for preparing unit load plans. Every unit must prepare a plan for moving the unit's equipment and personnel. During this lesson we discussed the--

- Importance of unit movement planning.
- Characteristics of a unit movement plan.
- Items identified during unit movement operations.
- Considerations for the movement of hazardous cargo.
- Preparation procedures for DA Form 5748-R.
- BBT requirements for transport.
- UMD reports and maintenance procedures.

1-9. Lesson 1 Practice Exercise

Instructions

The following items will test your grasp of the material covered in this lesson. There is only one correct answer for each item. When you have completed the exercise, check your answers with the answer key that follows. If you answer any item incorrectly, study again that part of the lesson which contains the portion involved.

Item 1

What is unit movement planning?

A. The development of a plan for transporting oversized unit equipment into a theater of operations.
B. The collecting, analyzing, coordinating, and documenting of information and data necessary to conduct a unit movement.
C. The identification of hazardous, sensitive, and/or classified unit items for special packaging, labeling, segregating, and placarding for movement.
D. The identification of blocking, bracing, packing, crating, and tiedown materials required for protecting and securing your unit's equipment during a unit rail movement.

Item 2

How is the bulk of unit equipment classified?

A. Red TAT.
B. Yellow TAT.
C. NTA.
D. Priority NTAT.

Item 3

How do unit movement planners determine detailed BBT requirements?

A. AUEL Report.
B. TC-ACCIS.
C. Conceptual Rail Load Plan.
D. COMPASS BBM Summary Report.

Continued on next page

Item 4

Which of the following references provides blocking and bracing information for any military equipment moving by rail?

A. TM 55-2200-001-12.
B. FORSCOM/ARNG 55-1.
C. FM 55-65.
D. FM 55-1.

Item 5

What is the purpose of UMD?

A. To provide functions and details for each part of a units deployment.
B. To outline a series of connected steps to be carried out simultaneously to move a unit from one location to another.
C. To plan and execute the movement of U.S. Army units.
D. To identify categories of equipment for movement.

1-10. Lesson 1 Practice Exercise Answer Key and Feedback

Item	Correct Answer and Feedback
1	B. Unit movement planning is the collecting, analyzing, coordinating, and documenting of information and data to conduct a unit movement. Page 1-3.
2	C. The bulk of a unit's equipment is classified as NTAT, not to accompany troops. Page 1-3.
3	D. Unit movement planners determined their detailed BBT requirements using the COMPASS BBM Summary Report. Page 1-X.
4	A. TM 55-2200-001-12 provides blocking and bracing information for any military equipment moving by rail. Page 1-15.
5	C. The purpose of UMD is to plan and execute the movement of Army units. Page 1-19.

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LESSON 2

IDENTIFYING RAIL REGULATORY REQUIREMENTS

2-1. Lesson Overview

Description

The Army's force-projection strategy requires an ability to rapidly deploy worldwide on short notice. Most units will move by rail from their home station to their A/SPOE. Efficient and effective rail movements require that unit movement officials familiarize themselves with and understand the applicable--

- Rules.
- Regulations.
- Procedures.
- Documentation.
- References.

Enabling learning objective (ELO)

The ELO for this lesson is:

Action: Identify rail regulatory guidance and tiedown procedures for loading military vehicles and equipment on railcars. The identification will include types of railroad equipment and railcar components, markings , and characteristics.

Condition: Given a self-study environment and the material in this subcourse.

Standard: In accordance with the subcourse materials provided and/or the references cited below.

Continued on next page

References

The material in this lesson was obtained from:

- FORSCOM/ARNG Regulation 55-1, *Unit Movement Planning*, dated October 1995.
- FORSCOM Regulation 55-2, *Unit Movement Data Reporting and System Administration*, dated January 1985.
- FM 55-65, *Strategic Deployment by Surface Transportation*, dated October 1995.
- TM 55-2200-001-12, *Technical Manual Transportability Guidance: Application of Blocking, Bracing, and Tiedown Materials for Rail Transport*.
- ICC RER, *The Official Railway Equipment Register*.

Lesson content

This lesson contains these topics:

2-2. Planning References

Introduction

Army policy requires units in the CONUS to make maximum use of commercial transportation to the POE. Normally, units use rail movements when the traveling distance to the MS or POE exceeds a one-day road-march limitation (400 miles). Rail transport may also be used for travel distances less than 400 miles if the shipment consists of nonroadable equipment. This lesson will assist you in planning your unit's rail movement by identifying the sources of rail regulatory requirements.

FORSCOM/ ARNG Regulation 55-1

FORSCOM/ARNG Regulation 55-1 prescribes policy and assigns responsibilities to commanders at all levels to plan and execute unit movements. These levels include--

- CONUSA.
- US Army Reserve Command (USARC).
- US Army Readiness Groups.
- State Area Commands (STARC).
- Major US Army Reserve Commands (MUSARC).

FORSCOM/ARNG Regulation 55-1 also--

- Provides instructions for planning unit movements by air, sea, and rail.
- Identifies unit movement documentation requirements.
- Provides instructions for the completion of FORSCOM Form 285-1-R, *Request for Transportation and FORSCOM Form 285-5-R, Unit Load Plan*.
- Describes procedures for determining and obtaining BBT materials.
- Illustrates BBT material reports generated by COMPASS.

FORSCOM Regulation 55-2

FORSCOM Regulation 55-2, *Unit Movement Data Reporting and System Administration* directs the maintenance and reporting procedures for UMD to FORSCOM. It also describes the process for compiling BBT material data in the COMPASS data base and for providing BBT material detailed and summary reports for AUEL equipment coded for rail movement.

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FM 55-65

FM 55-65, *Strategic Deployment by Surface Transportation*, provides an overview of the joint operations planning process. It provides detailed descriptions of these three aspects of planning and conducting unit movements:

The two key systems in developing strategic deployment plans the--

- Worldwide Military Command and Control System (**WWMCCS**). WWMCCS comprises the National Military Command System (NMCS) and the command and control systems of the combatant commands.

- Joint Operations Planning and Execution System (**JOPES**). JOPES is used by the Joint Chiefs of Staff (JCS) and provides tools to solve the complex mobility problems associated with deploying and sustaining military forces and their support. JOPES produces operations plans (OPLAN) and OPORD.

The two major computer systems supporting unit movement planning and execution. These systems are--

- **COMPASS** describes unit property and equipment in transportation terms. COMPASS also produces the AUEL report showing individual shipment units panned for unit movements.

- **TC-ACCIS**, a automated system, facilitates the processing of transportation information at the installation and unit levels.

The actions for preparing personnel and equipment for deployment and the roles of the Installation Transportation Officer (ITO), the UMC, and the Deployment Support Brigades (DSB).

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TM 55-2200-001-12

TM 55-2200-001-12, *Technical Manual Transportability Guidance: Application of Blocking, Bracing, and Tiedown Materials for Rail Transport*, is the bible for railcar loading. This manual provides the Association of American Railroads (AAR) basic rules for railcar loading. Additionally, TM 55-2200-001-12 contains extracts from these regulations and publications:

- FORSCOM/ARNG Regulation 55-2, illustrating and explaining the COMPASS generated BBM Detail List.
- AR 55-355, *Military Traffic Management Regulation,* describing the procedures for ordering rail carrier equipment.
- Trailer Train Company *Equipment Brochure* listing and describing special-purpose railcars.

TB 55-46-1

TB 55-46-1, *Standard Characteristics for Transportability of Military Vehicles and Other Outsize/Overweight Equipment*, provides dimensions, weight, and cube of military vehicles, vehicles-mounted equipment, and other outsize or overweight equipment. TB 55-46-1 provides data in columnar tables identifying:

- Army TOE LIN and associated index numbers.
- National stock numbers (NSN) and sets of major end items with the appropriate TOE LIN.
- Disassembled-vehicle component codes.
- Roadable -or nonroadable- vehicle identifier codes.
- Type of equipment codes.
- LIN and component descriptions.
- Shipping configuration codes.
- The number of pieces.
- Dimensions, weight, and cube.
- Cargo-vehicle load limits--weight, height, and cube.
- Index numbers of major end items related to the disassembled components.
- Cargo load indicators for various types of aircraft.
- Cargo category codes indicating if an item is non-air transportable, outsized, oversized, or bulk.
- Heavy lift and dimension codes indicating the item of equipment in short tons and if it is under or over 35 feet in any dimension.

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MTMCTEA Pam 55-19

MTMCTEA Pan 55-19, *Tiedown Handbook for Rail Movements*, is a pocket-sized handbook providing soldiers with a convenient job aid for securing military vehicles and equipment on open-top railcars. MTMCTEA Pamphlet 55-19 contains--

- AAR railcar loading rules information.
- Tips and common mistakes noted during actual loadout exercises.
- Illustrations, diagrams, and bills of BBT materials for a variety of military vehicles.

Interstate Commerce Commission (ICC) Railway Equipment Register (RER) 6411-Y

The ICC RER 6411-Y, The Official Railway Equipment Register, is published annually on behalf of the railroads and private car companies of North America. The RER--

- Shows, by car number, the type, dimensions, and capacities of freight cars and tank cars.
- Provides freight connections and interchange junction points for connecting carriers.
- Includes billing addresses and reporting marks for private car owners.

2-3. Identifying Tiedown Material Rules

Introduction

Now that you have learned the primary references for moving equipment by rail let's summarize some of the AARs general rules for loading open-top railcars. This section does not cover all the rules, but rather highlights those addressing tie-down procedures for railcar loads.

Rule 1: Inspection and compliance

Rule 1: Inspection and compliance contains these four components:

Notification of shippers.

- Shippers must notify carriers of the intent to load concentrated weights of heavy commodities when ordering cars.
- The AAR will notify shippers and carriers by wire or other expeditious means when implementing a new or revised figure correcting a hazardous practice.

Acceptability of shipment at interchange. If a load arriving at a carrier interchange junction point does not comply with applicable AAR figure, circular letter, or revision, acceptability will be governed by the waybill provided it was issued prior to the effective date of the change.

Use of tarpaulins or other covers. Tarpaulins or other covers protecting the load during transit must be secure to prevent them from working loose and becoming an operational safety hazard.

Agreement of proper securement methods between shipper and carrier.

- When lading requires flat cars longer than 60-feet, the shipper and originating carrier must confer and agree to securement requirements in addition to those shown in the AAR for 60-foot cars.
- The shipper and originating carrier must confer as to the appropriate blocking and bracing methods for loads not covered by a specific AAR figure.

Rule 2: Brake wheel clearance

Rule 2: Brake wheel clearance. Figure 2-1 shows the minimum requirements for brake wheel clearance. Increase the brake wheel clearance as much as consistent with the proper location of the load.

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Rule 2.: Break wheel clearance, continued

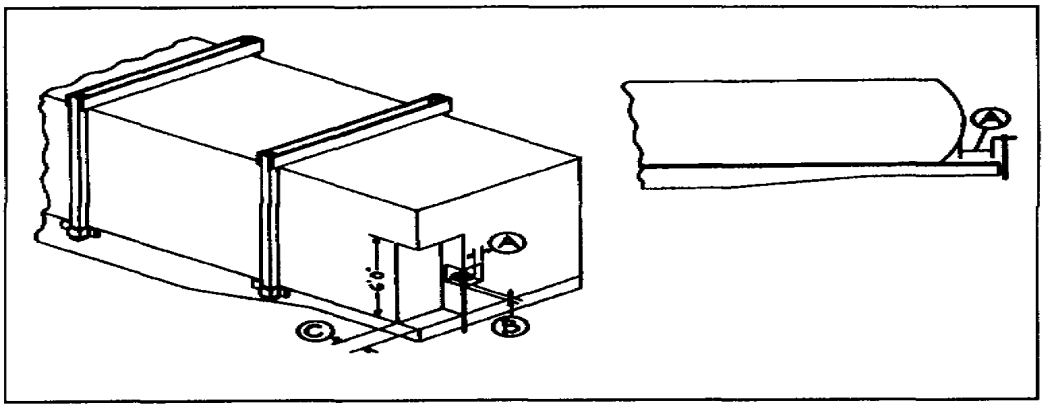

Figure 2-1. Brake Wheel Clearance.

Item A applies to all railcars except those carrying liquid, on tanks and similarly shaped cargo. Item A shows a 6-inch brake wheel clearance--

- Behind the brake wheel.
- On both sides of the brake wheel.
- Above the brake wheel.

Item B shows a 4-inch clearance underneath the brake wheel.

Item C indicates a minimum clearance from the end of the car to the load, extending from the brake-wheel center to the side of the car and 6 feet above the car floor. On gondola cars this space may be utilized from the car floor to 4 inches below the brake-wheel bottom.

Rule 3: Wood securement items, quality and species

Rule 3: Wood securement items, quality, and species of woods acceptable for use as blocking or bracing materials. Only wood of good, sound quality, straight-grained, and free of decay and strength-impairing knots is acceptable for use. Appendix B contains extracted pages from TM 55-2200-0010-12 showing the types of wood acceptable for use.

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Rule 4: Single cars, maximum load weight

Rule 4: single cars, maximum load weight. The weight load on a car must not exceed the load limit stenciled on the railcar. The weight of material loaded, when uniformly distributed from the truck centers to the ends of the car, must not exceed 30 percent of the stenciled load limit, that is 15 percent at each end as shown in Figure 2-2. Figure 2-3 shows load concentrated at specific points. These load concentrations between body bolsters and end sills must not exceed these percentages:

Location	Permissible Concentrated Load Percent of Stenciled Load Limit
Center line of bolster	50
1/4 distance between bolster center and end sill	30
1/2 distance between bolster center and end sill	15
3/4 distance between bolster center and end sill	10
At end sill	7.5

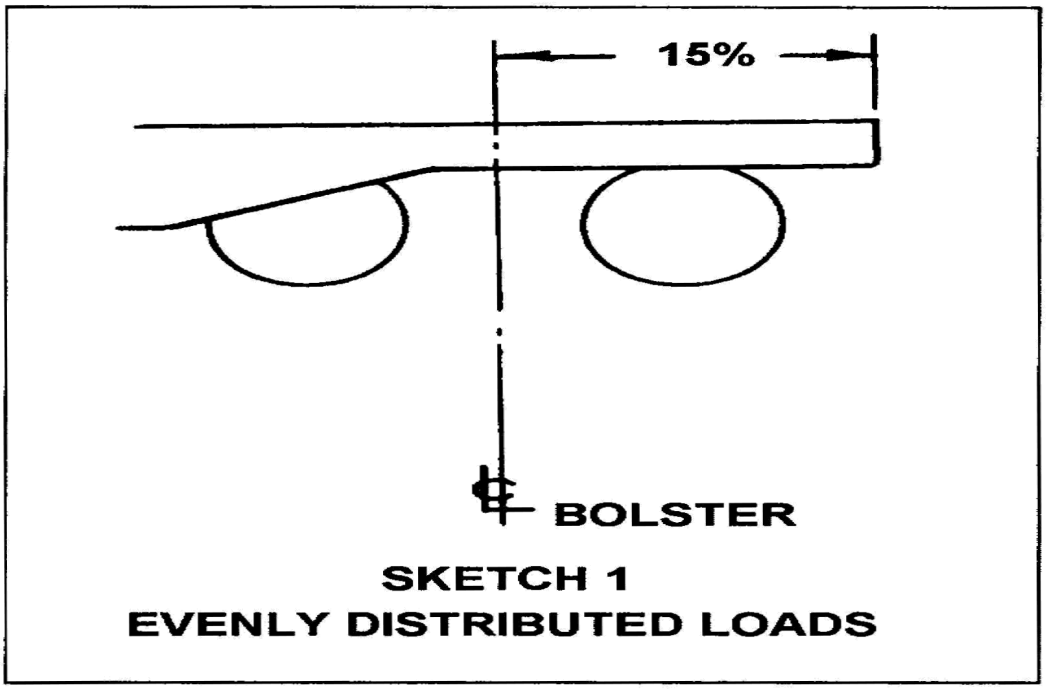

Figure 2-2. Evenly Distributed Loads.

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Rule 4: Single cars, maximum load weight continued

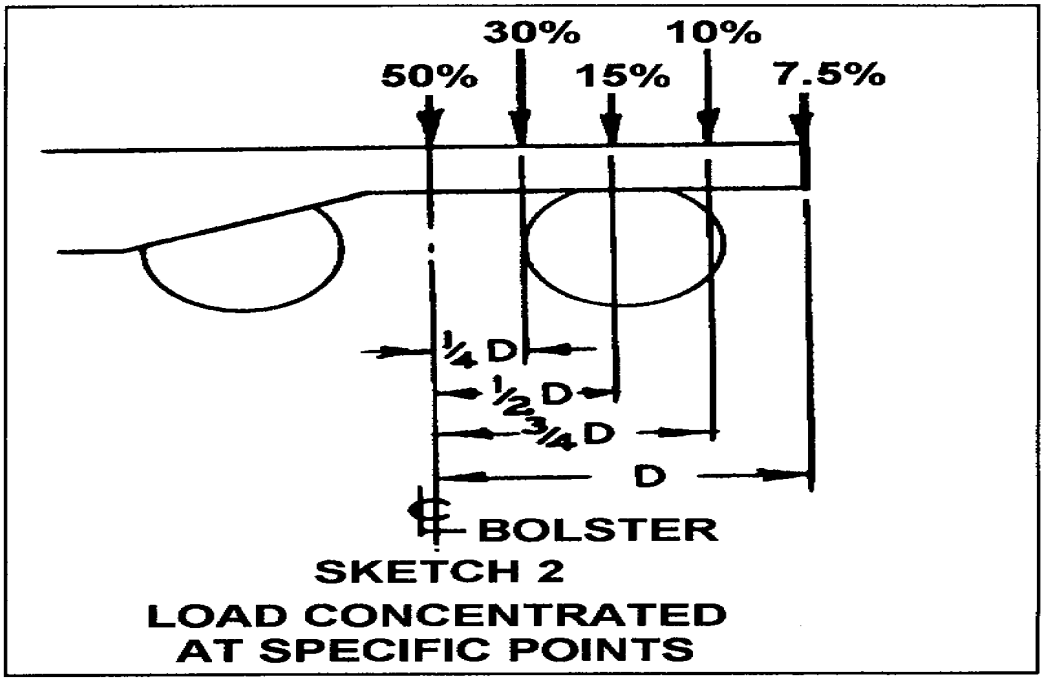

Figure 2-3. Load Concentrated Specific Points.

Load weights may not exceed the percentages of stenciled load limits shown in the diagrams unless the car owner designates exceptions, by note, in the RER. The weight concentration percentages apply to loads whose center of gravity is located on the longitudinal center of the car.

- Figure 2-4 shows center load concentrations for flatcars with fish-belly centers and side sills, and all flatcars built after 01 January 1965.
- Figure 2-5 shows center load concentrations for flatcars not equipped with fish-belly centers and side sills built prior to 01 January 1965.
- Figure 2-6 shows the center load concentrations for gondola cars.

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Rule 4: single cars, maximum load weight continued

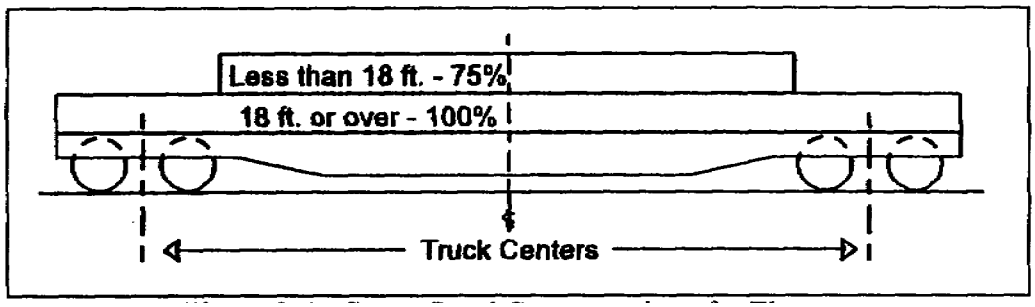

Figure 2-4. Center Load Concentrations for Flatcars with Fish-belly Centers and Side Sills.

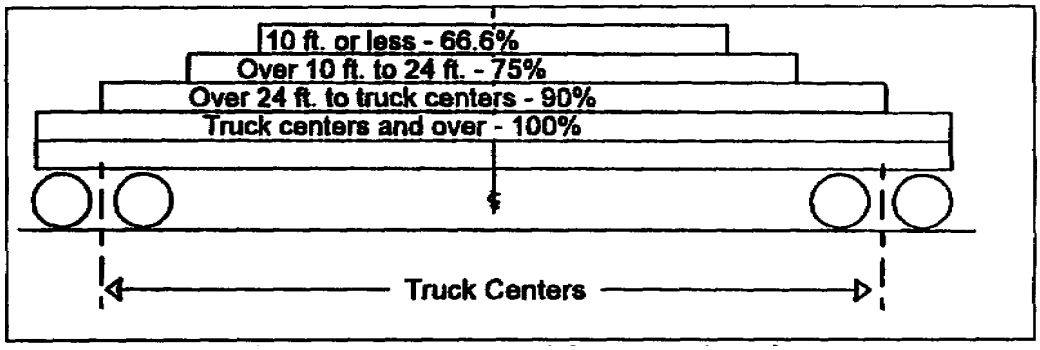

Figure 2-5. Center Load Concentrations for Flatcars Not Equipped with Fish-belly Centers and Side Sills..

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Rule 4: Single car, maximum load weight, continued

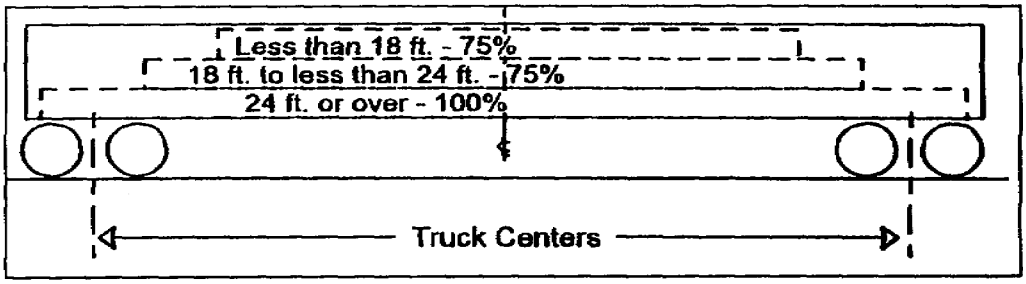

Figure 2-6. Center Load Concentrations for Gondola Cars.

Rule 5: Location of load -- all cars

Rule 5: Location of load--all cars. This rule states that the weight of the load on one truck must not exceed one-half the stenciled load limit. The load must be equally distributed along both sides of the railcar for the entire length of the load. Equalize the weight using a ballast if you cannot distribute the load evenly across the car.

Secure all loads to prevent the load from falling off the railcar.

Large, heavy materials not covered by the individual AAR figures should be loaded with the largest dimension on the floor to prevent tipping. When the load weight exceeds 25 tons and total vacant space across the car exceeds 8 inches, secure the load to prevent its moving or tipping to the sides of the car.

Secure items with high centers of gravity or narrow bases to prevent them from tipping over during transit.

Secure single trailers to the hitch at the end of the car to ensure locating the trailer wheels near the center of the car.

Continued on next page

Rule 7: Overdimension all loads

The height, width, and length of a load on one car for unrestricted movement must be within the outline diagram published in *Railway Line Clearances*.

Secure overdimensional loads adequately using lading equipped with doors or other accessories (including machinery with adjustable treads or wheels, liable to become loose and extend into line clearances).

Secure cylindrical objects which may rotate or those with protrusions.

Rule 8: Idler cars

Rule 8: Idler Cars describes the procedures for using idler cars. Use idler cars when the load projects beyond the end sill of the carrying car, or when necessary to space two carrying cars, used for handling a long load. When using idler cars Maintain a four-inch clearance below the overhanging portion of a load and any part of the idler car which the load may contact.

Figure 2-7, Idler Car Single End Overhanging Load uses space on idler cars for loading in accordance with these provisions--

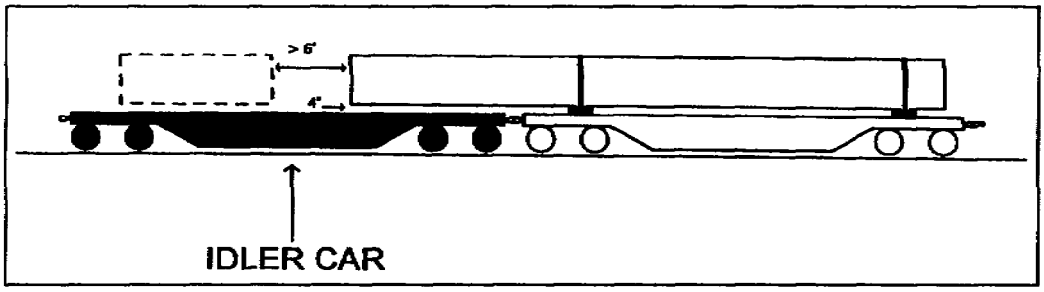

Figure 2-7. Idler Car Single End Overhanging Load.

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Rule 8: Idler cars, continued

- Cars with conventional draft gears--locate the end of the load no less than 2 feet from the end of the overhanging load.
- Cars with sliding or end-of-car cushioning devices, locate the end of the load no less than 6 feet from the end of the overhanging load.

Rule 14: Nails, staples, and lag screws

Rule 14: Nails, Staples, and Lag Screws dictates the use and type of hardware for securing a load. Unless otherwise specified, use either common or cement-coated nails designated by penny-weight. When using power-driven nails or spaces, increase the number of nails specified in the applicable AAR figure by one-third. When using lag screws as a substitute for nails, pre-drill holes and torque by a mechanical means. Do not hammer lag screws.

Rule 15: Attachment devices

Rule 15 pertains to all attachment devices including bolts, nuts, rods, bands, wires, wire rope, cable, chains, non-metallic strapping, band or wire protectors, points of attachment, substitutions, turnbuckles, and constant tensioning devices.

Device	Requirements
Bolts, nuts, rods, and washers	• Use rods or bolts with rolled threads of the same diameter as US standard cut-threads. Do not bend the threaded portion of the rods or bolts. • Use a plate or plates when using rods for tiedowns passing through large diameter holes in the lading. The plates must be of sufficient strength to prevent bending in between the lading and at the nut of the rod. • Do not use rods with open hook-ends on either the load or the car. • To retain nuts in their original position and prevent them from backing off, nick , chisel-hack, flatten, or distort three or more threads on the rods or bolts behind every single or double nuts or nuts tack-welded to rods. • Bending rods around stake pockets and welding the overlapping portion to the main rod is prohibited.

Continued on next page

Rule 15: Attachment devices, continued

Device	Requirements
Wire, high tension and common	• Machine tension high tension wire requirements the location of the twist-tie or washer attachment not more than 6 inches from the point of anchorage. • Secondhand or reclaimed high tension bands, wire, or common wire may not be reused.
Securement devices, (Figure 2-8)	When using wire rope or cables-- • Overlap the ends at least 12 inches and secure with U-bolt cable clips. • Protect wire rope and cables at all sharp corners and edges. Use thimbles to prevent sharp turns. • Tighten using turnbuckle or suitable tensioning device or twist it taut using a rod, bolt, or pipe. • Do not allow them to contact one another to prevent chafing and wear. When using holes, slots, stake pockets, and strap anchors-- • Points of attachment must be as strong as the securement. • Do not lock turnbuckles by welding the turnbuckle to threads. • Welding lading and chains to the car is prohibited. When using chain and chain assemblies-- • Pass chains around or through stake pockets with the grabhook engaging the chain. • The tying of chains for any purpose is prohibited. • The use of bolts to repair broken chains or secure the ends of chains is prohibited. • Use clevis type grabhooks unless the grabhooks carry the appropriate manufacturer's permanent and distinctive mark identifying the grade of the hook. • The number of securing chains should equal the weight of the load divided by the chains' working load limit (WLL) using a minimum of three chains.

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Rule 15: Attachment devices, continued

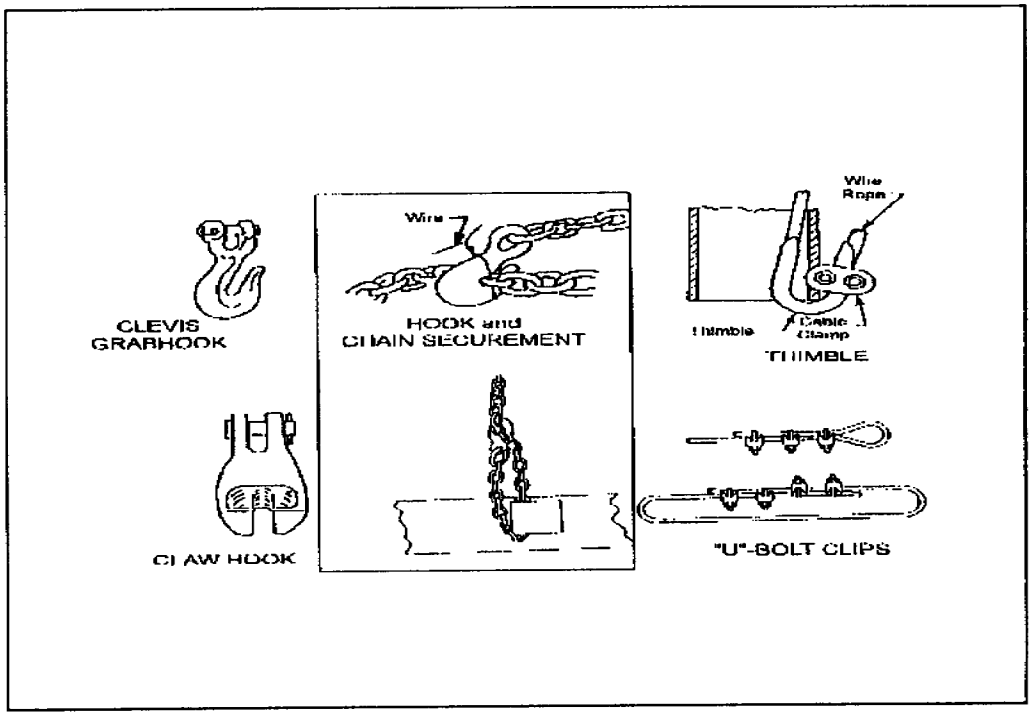

Figure 2-8. Securement Devices.

Calculating chain requirements

k. When calculating the number of chains for securing commodities subject to rolling, the number of chains should equal the weight of the load divided by the WLL, multiplied by two. Use a minimum of four chains, two in each direction.

Continued on next page

Strapping

These are the requirements for using strapping:

- Use a metallic strapping unless specified in TM 55-2200-001-12.
- If high tension bands and high tension wires are of equal or greater breaking strength, they may substitute for each other.
- Chains or cables of equal or greater breaking strength may be substituted for high tension bands.
- High tension bands, high tension wires, or common annealed wires may not substitute for rods, bolts, or flat bars with threaded ends.

2-4. Identifying Railcars

Introduction

Now that you are acquainted with the rules governing lading on open-top railcars, we will discuss the different types of railcars available. We will also describe some of the car components and explain some of the common railcar loading terms.

Railcar designations

These are the three basic types of railcars:

- Flatcars.
- Gondola cars.
- Special-purpose cars.

Flatcar designations

These are the designations for flatcars:

Designation	Description
FA	Car with superstructure or containers for transporting set-up vehicles. Not suitable for miscellaneous commodities.
FB	Car with permanently-attached moveable bulkheads or ends.
FBC	Bulkhead car equipped with center beam above deck.
FC	Car equipped for piggyback service, such as-- • Trailer-on-flatcar (TOFC). • Container-on-flatcar (COFC).
FCA	Articulated, multi-unit car equipped for piggyback service.
FD	Car with depressed center between trucks to provide lading overhead clearance.
FM	General service flatcar with no sides or ends.
FW	Car with lading lowering-hole for overhead clearance.

Gondola car designations

These are the designations for gondola cars:

Designation	Description
GB	Open-top car with fixed sides, fixed or drop ends, and a solid bottom.

Continued on next page

Gondola car designations, continued

Designation	Description
GD	Open-top car with fixed or drop ends, solid bottom, and side doors for dumping.
GW	Open-top, well-hole car with fixed sides and ends and one or more depressions for lading overhead clearance.

Special railcar destinations

These are the designations and descriptions for special-purpose railcars:

Designation	Description
TTX	Includes 89-foor cars equipped with hitches and standard-gear end-of-car cushioning devices for trailer and military service. Cars have either standard decks or low decks with fish-belly center sills and steel floors.
HTTX	69-foot, fish-belly, center-sill cars equipped with special heavy-duty tiedown anchors. These cars also have moveable and retractable chain assemblies contained in channels along the car sides and adjacent to the center sill on each side. The chain assemblies have WLLs of 11,250 pounds.
ITTX	Standard deck 89-feet or flush deck 89-feet 4 inch cars. These cars are equipped with special adjustable and fold-away pedestals and moveable ratchet winches. These cars are used to transport trailer tractors loaded saddleback style.
OTTX	These are the same basic cars as the HTTX. These cars have special tiedown channels on each side and adjacent to the center sill on each side. The channels have moveable, retractable winches equipped with 6,600 pound WLL chain assemblies.
TTDX	This is a flush-deck, 89-foot, 4-inch car equipped with -- • Moveable screw-type winches. • 11 meters long, 250 pound WLL chains. • Hydraulic draft gears. TTDX cars transport military vehicles loaded in semi-saddleback style.

Continued on next page

Car components

These are the railcar components as referred to in the AAR rules:

Component	Definition
Bolster, body	Transverse members of the underframe over the trucks. It transmits the longitudinal load to the trucks through the center plates.
Brake wheel	The wheel attached to the end of a brake shaft. When manually turned this wheel applies the brakes.
Center sill	The center longitudinal member of the car underframe.
Deck	The wood floor of a flat railcar.
Flooring	The layer of material on top of the underframe of a railcar providing direct support of the lading.
Release lever	A rod with a bent handle usually attached to the end sill. This rod opens the lock of an automatic coupler and uncouples cars without going between them.
Side sills	The outside longitudinal members of the car underframe.
Stake pockets	Metal receptacles attached to the sides or ends of flat cars. These receptacles serve as attachment points for securement devices such as wire rope, or chains, the other end attaches to a vehicle.

Terminology

These are the definitions of common terminology used to describe railcar loading procedures:

Term	Definition
Bearing pieces	Bearing pieces are materials placed on the car floor, underneath the lading, to facilitate loading and unloading the railcar. Bearing pieces-- • Maintain 4-inch clearance between overhanging portion of load and idler car. • Distribute weight of lading over the car floor.
Blocks	Wood material securing lading in place using nails, bolts, or wires.
Braces	Materials retaining lading or blocking in position.

Continued on next page

Terminology, continued

Term	Definition
Capacity	The nominal load in pounds or cubic feet that a railcar is designed to carry.
Chock block	Concave or mitered blocking pieces used to secure objects in place.
Clamping piece	Wood member placed across the top of a load to keep the load secured in place. The clamping piece is secured to the railcar or stake pockets with rods. It also secures moveable parts on machinery or vehicles.
Double load	A shipment requiring two carrying cars.
Floating load	A load prepared as a unit with space between the unit and the car ends with the end blocking omitted. This permits the lengthwise movement of the load to dissipate shocks.
Gross weight	The total of the light or empty weight of a car plus the total weight of the lading permitted, or load limit, on the car. The gross weight is the maximum weight permitted on the rails.
Interchange	Cars of one carrier placed in service with another carrier, cars moving to one rail line to another, and the junction at which the interchange occurs.
Rigid brace load	Lading secured by blocking and other means to prevent movement of the lading during transit.
Separators	Material placed crosswise between layers of a load to-- • Facilitate loading and unloading. • Provide level support for additional layers. • Provide space to apply securement items.
Snubbed load	A loading method which restricts the lengthwise movement of the load using: • Anti-skid plates. • Lag screws. • Other restraining devices.

Continued on next page

Terminology, continued

Term	Definition
Tare weight	The weight of any empty freighter. Also, light weight.
Thimbles	Metal protectors for preventing the cutting or breaking of cable securement at sharp points.
WLL	WLL refers to the maximum load, in pounds, which should be applied to a chain.

2-5. Identifying Railcar Markings

Introduction

The AAR specifies the markings appearing on railcars. These markings identify--

- Car owner.
- Load limit.

The RER explains all of the car-owner reporting marks assigned by the AAR. This lesson provides an overview of those markings.

CONUS stenciled markings

These are the stenciled markings on railcars in CONUS and OCONUS:

Stenciled Marking	Description
Reporting marks	Reporting marks include-- • Owner identity code. • Car number.
Capacity	The nominal load, or load limit, in pounds, and cubic feet for cars other than flatcars and tank cars, which the car is designed to carry.
Light weight	The empty weight of the car.
"A" end of car	The end of car opposite the end where the brake wheel is located.
"B" end of car	The end of the car where the brake wheel is located. If both ends have brake wheels, the letters: "A" and "B" are stenciled on both sides near the car ends.

Continued on next page

RER railcar listings

Tables

The RER railcar listings describe the characteristics of all available railcars. for each owner of the railcars list these items:

- AAR mechanical designation.
- Car type code.
- Description.
- Inside and outside dimensions.
- Car type code
- Door opening height and width.
- Capacity in thousands of pounds and cubic feet, or rated gallons for tank cars.
- Number of cars of each type available.

2-6. Lesson Summary

Summary

During this lesson we identified the key references used in planning unit rail movements in accordance with the AAR general rules. We also discussed--

- Railcar loading and tiedown rules for open-top railcars.
- Railcar components and terminology used in conducting railroad operations.
- Railcar characteristics and markings.

2-7. Lesson 2 Practice Exercise

Instructions

The following items will test your knowledge of the materials covered in this lesson. There is only one correct answer for each item. When you complete the exercise, check your answer with the answer key and feedback sheet.

Item 1

Which of the following appears on railcars within CONUS?

A. Owner code, empty weight, and car size in cubic feet.
B. Car number, capacity in cubic meters, and load limit.
C. Tare weight, nominal load in tons, and car number.
D. Light weight, owner code, and A, B, or AB brake wheel designator.

Item 2

What are the outside longitudinal members of a car's underframe?

A. Center sills.
B. Bearing pieces.
C. Bolster bodies.
D. Side sills.

Item 3

Which publication provides freight connections and interchange junction points for connecting carriers?

A. *The Official Railway Equipment Register*.
B. *The* AAR *General Rules Governing the Loading of Commodities on Open-Top Cars*.
C. *Railway Line Clearance*.
D. FM 55-65, *Strategic Deployment for Surface Transportation*.

Continued on next page

Item 4

What publication states the rules for loading military vehicles on railcars?

A. FM 55-65, *Strategic Deployment for Surface Transportation*.
B. FORSCOM/ARNG Regulation 55-2, *Unit Movement Data Reporting and Systems Administration*.
C. TB 55-46-1, *Standard Characteristics for Transportability of Military Vehicles and Other Outsize/Overweight Equipment*.
D. TM 55-2200-001-12, *Technical Manual Transportability Guidance: Application of Blocking, Bracing, and Tie-down Materials for Rail Transport*.

Item 5

What publication provides instructions for completing a FORSCOM Form 285-1-R and a FORSCOM Form 285-5-R?

A. FORSCOM/ARNG 55-1, *Unit Movement Planning*.
B. FM 55-5, *Strategic Deployment for Surface Transportation*.
C. FORSCOM/ARNG 55-2, *Unit movement Data Reporting and Systems Administration*.
D. TM 55-2200-001-12, *Technical manual Transportability Guidance: Application of Blocking, Bracing, and Tie-down Materials for Rail Transport*.

Item 6

Under which of the following conditions do CONUS-based units use rail transportation?

A. The shipment includes tactical vehicles and travel; distance to the SPOE exceeds 300 miles.
B. Travel distance to the SPOE is less than 400 miles and the shipment consists of nonroadable equipment.
C. The shipment includes tactical vehicles and the travel distance is less than a one-day road march.
D. Travel distance to the SPOE is less than 400 miles and the shipment consists of roadable equipment.

Continued on next page

Item 7 Which COMPASS AUEL Reports lists materials required for loading railcars?

A. UMD Detail.
B. UMD Summary.
C. BBM Summary.
D. Type Unit Characteristics Data (TUCHA).

Item 8 Which publication illustrates tips and common mistakes noted during actual loadout exercises?

A. MTMCTEA Pam 55-19.
B. TB 55-46-1.
C. *The Official Railway Equipment Register*.
D. FM 55-65, *Strategic Deployment for Surface Transportation*.

Item 9 How much clearance must shippers maintain underneath the brake wheel?

A. At least six inches.
B. A minimum of 4 inches.
C. Twelve inches.
D. Six feet above the railcar floor.

Item 10 Which code designates a car equipped for piggy-back service?

A. FC.
B. FA.
C. FB.
D. FD.

2-8. Lesson 2 Practice Exercise Answer Key and Feedback

Item	Correct Answer and Feedback
1	C. Railcars within CONUS must stencil these items on each railcar: • Light weight. • Owner identity code. • A, B, or AB brake wheel designator. Page 2-3.
2	D. Side sills are the outside longitudinal members of a car's underframe. Page 2-20.
3	A. The Official Railway Equipment Register provides freight connections and interchange junction points for connecting carriers. Page 2-6 and ICC Ref 6411-Y.
4	D. TM 55-2200-001-12 Technical Manual Transportability Guidance: Application of Blocking, Bracing, and Tiedown Materials for Rail Transport, states the rules for loading military vehicles on railcars. Page 2-5 and TM 55-2200-001-12.
5	A. FORSCOM/ARNG Regulation 55-1 FORSCOM form 285-1-R Unit Movement Planning, provides completion instructions. FORSCOM/ARNG Regulation 55-1, and FORSCOM Form 185-5-R. Page 2-3.
6	B. CONUS-based units use rail transportation when the travel distance to the SPOE is less than 400 miles and the shipment consists of nonroadable equipment. Page 2-3.
7	The COMPASS produced AUEL BBM Summary Report lists materials required for railcar loading. Page 2-3.

Continued on next page

8	A. MTMCTEA Pam 55-19 illustrates tiedown patterns for railcar loads. Page 2-6.
9	B. Shippers must maintain a minimum clearance of four inches underneath the brake wheel. Page 2-8.
10	A. The code FC designates a railcar is equipped for piggyback service. Page 2-18.

LESSON 3

PREPLANNING A UNIT RAIL MOVE

3-1. Lesson Overview

Introduction

The unit movement officer will plan rail load procedures, supervise loading operations, and ensure appropriate securing methods are used. He must also know the type of equipment required for conducting rail loadout and unload operations. This lesson will describe the procedures for planning a unit rail move including:

- Maintaining the unit movement plan.
- Obtaining a breakdown of unit equipment.
- Identifying available rail equipment.
- Determining rail siding capabilities.

Enabling learning objective (ELO)

The enabling learning objective for this lesson is:

Action: Prepare a unit for rail movement to include:

- Maintaining the unit movement plan.
- Obtaining a breakdown of unit equipment.
- Identifying available rail equipment.
- Determining rail siding capabilities.

Condition: Given a self-study environment and the material provided in this subcourse.

Standard: In accordance with the subcourse material provided and/or the references cited below.

Continued on next page

References

The material in this lesson was obtained from these references:

- FORSCOM/ARNG 55-1, *Unit Movement Planning*, dated October 1993.
- FM 55-1, *Transportation Operations* dated October 1995.
- FM 55-15, *Transportation Reference Data*, dated June 1986.
- FM 55-17, *Terminal Operations Coordinator's Handbook* dated September 1990.
- FM 55-65, *Strategic Deployment by Surface Transportation*, dated October 1995.
- TM 55-2200-001-12, *Application of Blocking, Bracing, and Tiedown Materials for Rail Transport*.
- MTMCTEA Pam 55-19, *Tiedown handbook for Rail Movements*.
- *The Official Railway Equipment Register*, dated May 1992.

Lesson content

This lesson covers these topics:

3-2. Maintaining the Unit Movement Plan

Introduction

The unit requires rail movement plans to successfully organize, coordinate, and execute a unit rail move. The rail movement plan is part of the unit movement plan. The movement plan is maintained in at least three places:

- Unit standing operating procedures (SOP).
- Battle book.
- Unit movement folder or binder.

Unit SOP

The unit movement SOP is the most effective means of ensuring a proper state of readiness within the unit. The movement SOP defines the general and specific functions for the unit to successfully deploy. The SOPs outline daily unit operations and actions which occur automatically upon receipt of a warning order for unit movement.

Unit movement plans

Unit movement plans define specific responsibilities, functions, and details for each part of a units deployment from HS to POE. Units maintain movement plans for each move the unit must make. Unit movement plans contain detailed preparation steps for performing an actual deployment. An effective unit movement plan requires careful preplanning, coordination, and support from all levels in the chain of command. The UMC must approve all unit movement plans. After approval, movement plans are scenario-specific and maintained in a central unit location.

Battle book

The battle book is a comprehensive planning document for accomplishing the units movement in the theater of operations. The battle book includes-

- An index.
- The units mission.
- The organization, staffing, and actions required to achieve a mission-ready posture.
- A copy of pertinent information from the OPLAN or time-phased force deployment list (TPFDL).
- Pre-positioned war reserve (PWRS) information.

Continued on next page

Battle book, continued

- Advance party worksheet.
- Photographs and maps of all critical areas the unit will pass, A/SPOE, and convoy routes.
- Operations appendix.
- Director of personnel and telephone numbers.

Unit movement folder

The unit movement folder consists of administrative and operations sections. The **administrative section** contains--

- Index.
- Movement plan requirements and statement of implementation.
- Orders for key unit movement personnel including the--
  - -- UMO.
  - -- Unit movement noncommissioned officer (NCO).
  - -- Load teams.
  - -- Hazardous cargo certifying personnel.
- Alert roster.
- Unit equipment shortages.
- BBCPT materials.
- Supply lists and prepared requisitions.
- Coordination requirements for plan execution.
- Instructions unique to the unit.

The **operations section** contains--

- An AUEL.
- Requirements for commercial transportation.
- DD Form 1265, *Request for Convoy Clearance*, if applicable.
- DD Form 1266, *Request for Special Hauling Permit*, if applicable.
- FORSCOM Form 285-R, *Rail Load Plan*, if applicable.

Continued on next page

Requirements for unit movement plans

The unit commander, intermediate level authority, and the UMO will ensure unit movement plans meet these requirements:

- Guidance for developing vehicle load plans and tests.
- Vehicle load plans for cargo-carrying vehicles.
- Provisions for all organizational equipment and supplies moving on unit vehicles.
- Identification of supplemental transportation requirements as required.
- Arrangements for supplemental transportation.
- Plans for procuring packing materials and shipping containers.
- Plans for updating and testing all aspects of the unit movement plan.

Preplanning a unit rail movement

Efficient, effective unit rail movements to the port of embarkation do not just happen; they require preplanning. As a unit movement officer you may be responsible for preparing a unit rail load plan or modifying an existing rail load plan. These are the three steps for preplanning a unit rail move:

Step	Action
1	Obtain a breakdown of unit equipment listed by size category.
2	Make assumptions regarding available rail equipment.
3	Determine rail siding capabilities you will use during your unit's rail loadout.

3-3. Obtaining a Breakdown of Unit Equipment

Introduction

The first step in planning a unit rail movement is identifying the unit's equipment.

AUEL report

The AUEL maintains a listing of the units movement data. During the rail preplanning phase you must evaluate your AUEL and ensure it is accurate and complete.

Deployment equipment list (DEL)

Using the AUEL report, TOE, MTOE, CTA, and PWRS unit movement personnel will develop a DEL. This list responds to the requirements of the TPFDL issued with the OPLAN. The DEL lists each piece of equipment deploying with the unit. The DEL groups equipment according to size and dimensions including weight and cube: For example:

- Commercial utility cargo vehicles (CUCV) and then trailers (M416).
- Small trucks between 3/4 and 2 1/2 tons.
- Trailers for small trucks.
- Trucks, 2 1/2 ton.
- Trailers for 1/2-ton and 5-ton trucks.
- Tractors, semi-truck, under 100-inch width.
- Trailer, semi-truck, greater than 100-inch width.
- Outsize, oversize, or overweight pieces of equipment.
- Track vehicles under 100-inch width.
- Track vehicles greater than 100-inch width.

Then the UMO determines if the equipment is TAT, NTAT, or priority NTAT.

3-4. Identifying Available Rail Equipment

Introduction

Following the determination of your unit's DEL you must determine how to move it to the POE. This requires you to know the types of available rail equipment. The ITO is responsible for obtaining the railcars but you may be required to identify the cars your unit requires for movement. To make determinations concerning your unit you must know--

- The sizes, dimensions, and shipping configurations of the equipment to be moved.
- The sizes, dimensions, and carrying capacities of the available railcars.

Determining shipping characteristics

When determining the shipping characteristics a discussed previously, TB 55-46-1 lists the shipping configurations and dimensions of most types of military equipment. These listings will help you determine the best type load for a railcar.

Rail equipment

When making assumptions about available rail equipment you must first be familiar with the types of available rail equipment. There are four basic types of railcars:

- General purpose flatcars.
- Gondola cars.
- DODX flatcars.
- Boxcars.

General purpose flatcars

Flatcars are popular choices for cargo shipments because you can load equipment in double- and triple-deck superstructures resulting in a more economical transportation cost per mile. These flatcars can handle 75 percent of their load limit for concentrated loads and 100 percent for uniformly distributed loads. Flatcars are well-suited for shipping prepackaged weather-proof containers. These flatcars have either welded or riveted steel underframes. Flatcars are equipped with stake pockets for fastening tie-down devices. These stake pockets are welded on the sides and ends of the cars to prevent load slippage.

Continued on next page

General purpose flatcars

Figures 3-1 and 3-2 illustrate a tie-down device and a stake pocket anchor. The Army uses flatcars to transport--

- Assault boats.
- Vehicles.
- Cranes.
- Lumber.
- Large-crated loads.
- Cargo containers.

These are three types of general purpose flatcars and a description of each:

General purpose flatcars	Characteristics
89 Foot, Figure 3-3	• Metal deck cushioned rubrail. • Chain tie-downs. • May have 4-inch high metal sides and arms with spanners built on the ends. • Maximum usable width is 100 inches up to the height of the arms.
68 Foot, Figure 3-4	• Wooden decks. • Can be used for chain tie-downs and blocking and bracing. • No sides. • Accommodates equipment of almost any width.
Multilevel, 89 Foot, Figure 3-5	• Adjustable metal decks. • Chain tie-downs. • Requires ramps or clearance for landing. • Headroom between decks is adjustable and must be considered and reviewed carefully. For example, if the bi-level flatcar has a roof, then the second deck may have headroom measuring 94-inches or 103-inches depending on the adjustment of the second deck.

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General purpose flatcars, continued

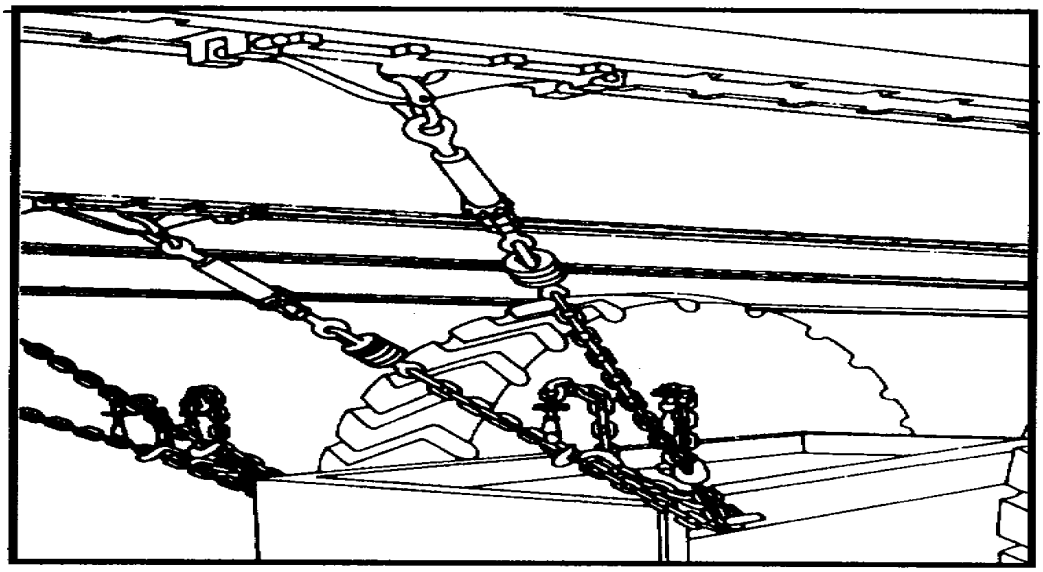

Figure 3-1. Tie-Down Device

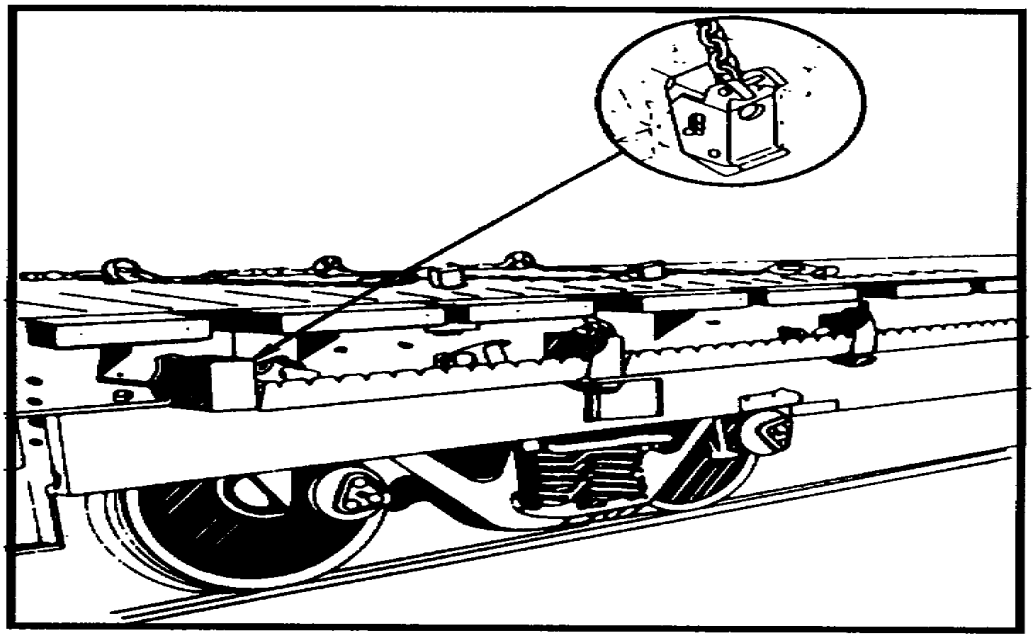

Figure 3-2. Stake Pocket Anchor.

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General purpose flatcars, continued

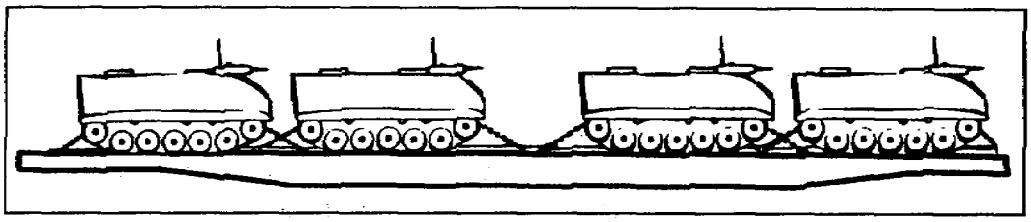

Figure 3-3. 89-Foot Flatcar.

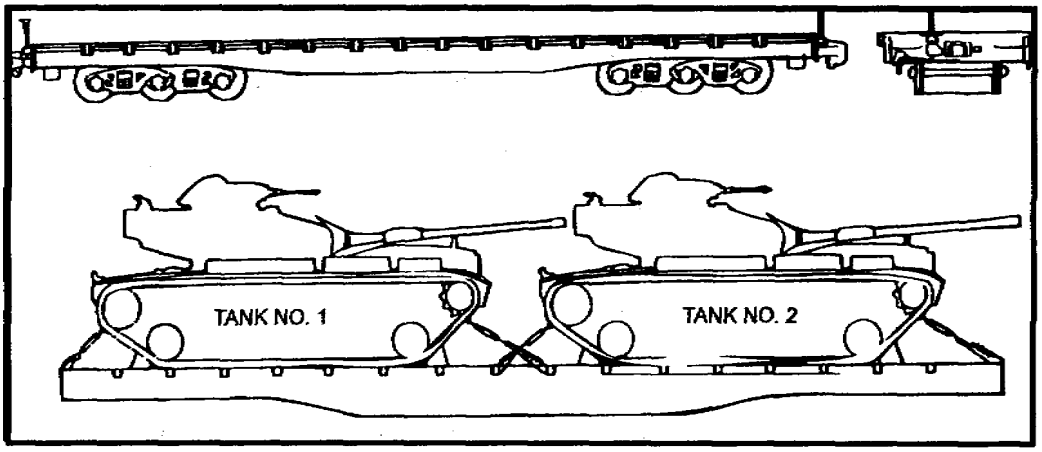

Figure 3-4. 68-Foot Flatcar.

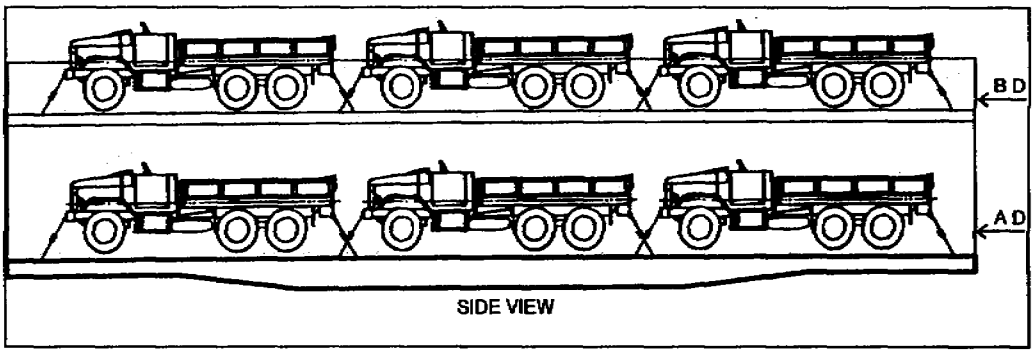

Figure 3-5. Multilevel, 89-Foot Flatcar.

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DODX flatcars

DODX flatcars, Figure 3-6, are the US Government's fleet of heavy duty railcars for transporting tanks and other heavy armored vehicles. The 140-ton DODX flatcar uses a heavy-duty load securement system. It uses four steel flush-mounted channels running its entire length. Each anchor has a load binder connecting it to a 1/2-inch alloy chain. Vehicles are driven or roiled to the appropriate place on the flatcar and secured by the alloy chain.

Commercial flatcars

The Army also uses commercial flatcars. These flatcars are available in 60- and 89-foot lengths and come equipped with chains. The OTTX flatcar, Figure 3-7, is an example of a commercial flatcar. The OTTX has many military transportation applications. This flatcar has a 149,000 to 155,500-pound load carrying capacity. The OTTX has four tie-down channels:

- Two along the sides, the saddleback winch, Figure 3-8.
- Two down the center of the car; the rocking ratchet winch, Figure 3-9.

Gondola cars

Gondola cars, Figure 3-10, are primarily used for container express (CONEXs). Gondola cars must--

- Have ends.
- Be free of debris.
- Be at least 9-feet wide.

The gondola car is ideal for shipping CONEXs and large shelters. One 68-foot gondola car can accommodate ten CONEXs. A 57-foot car can fit eight CONEXs. Gondola cars have high and low sides, end and side doors, drop doors in the floors at the ends of the car, and swinging side doors.

Boxcars

Boxcars, Figure 3-11, have roof, sides, ends, and doors protecting the cargo from weather. Boxcars have varying dimensions ranging from interior lengths of 40-feet, six-inches to 86-feet, six-inches. Side doors on these cars are at least 10-feet wide.

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Rail equipment, continued

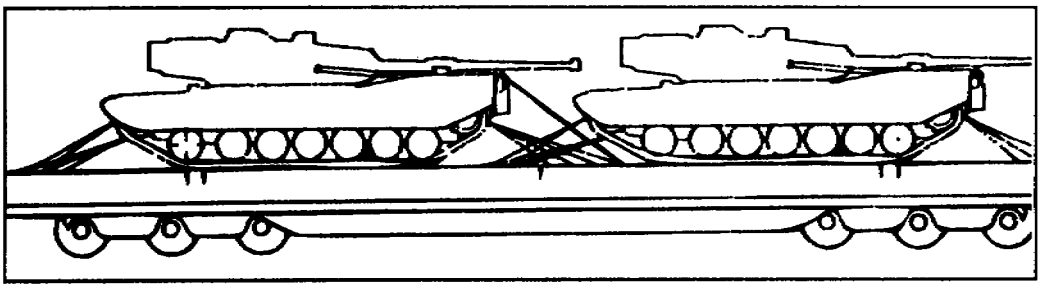

Figure 3-6. DODX Flatcars.

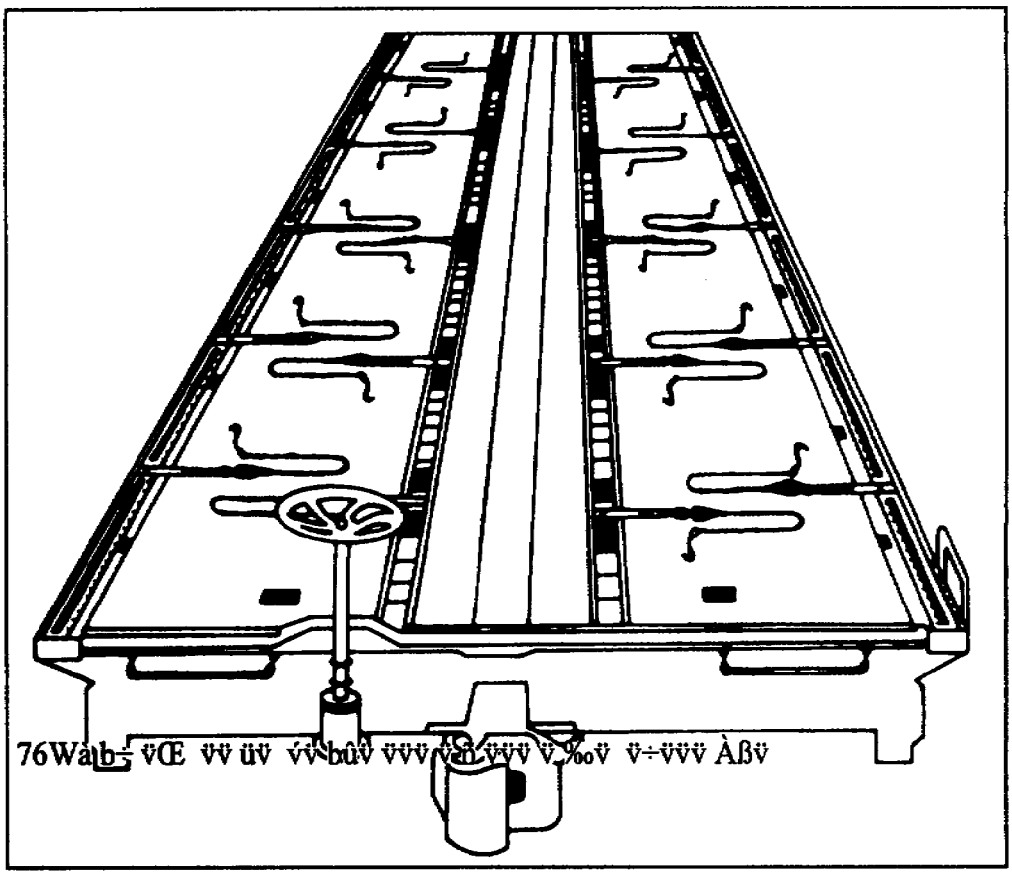

Figure 3-7. OOTX Flatcar.

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Rail equipment, continued

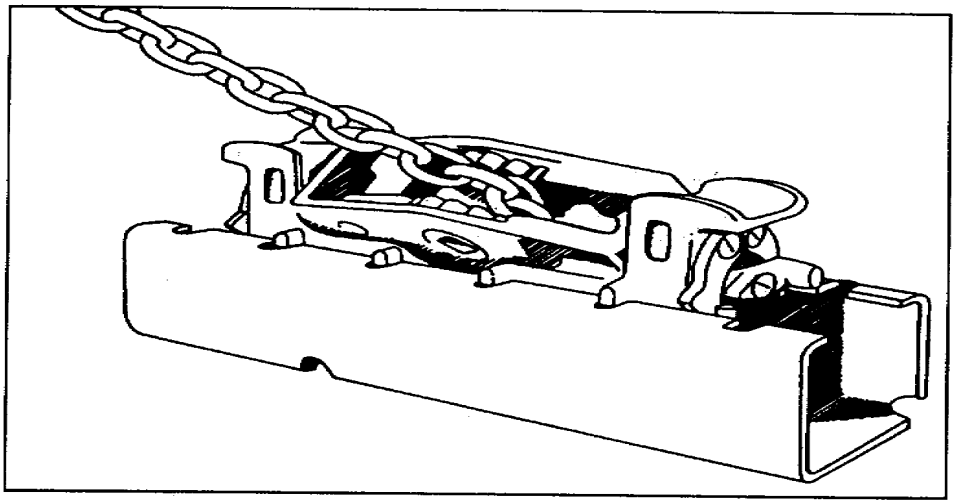

Figure 3-8. Saddleback Winch.

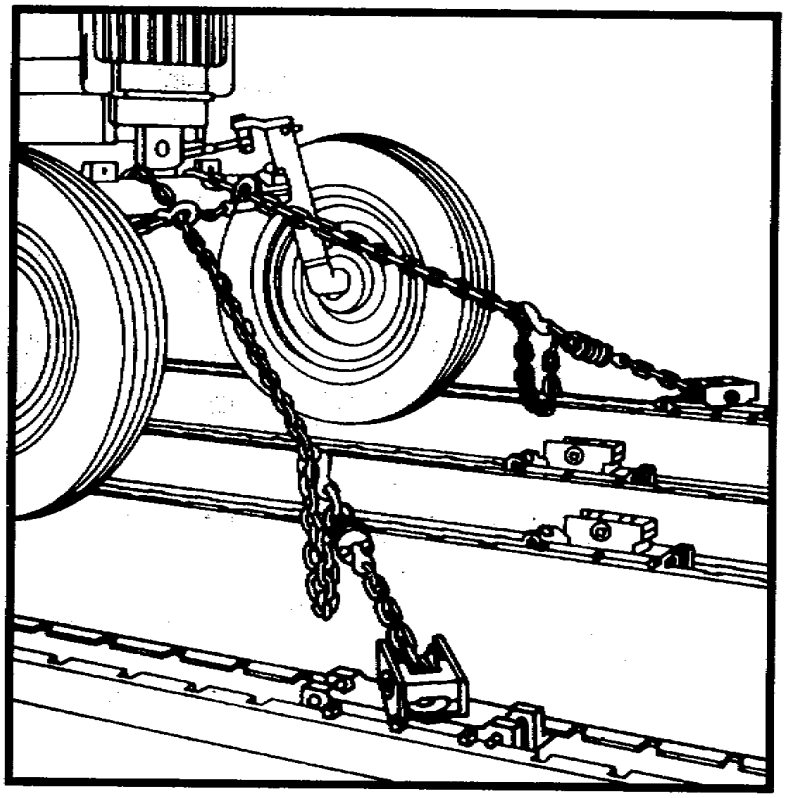

Figure 3-9. Rocking Ratchet Winch.

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Rail equipment, continued

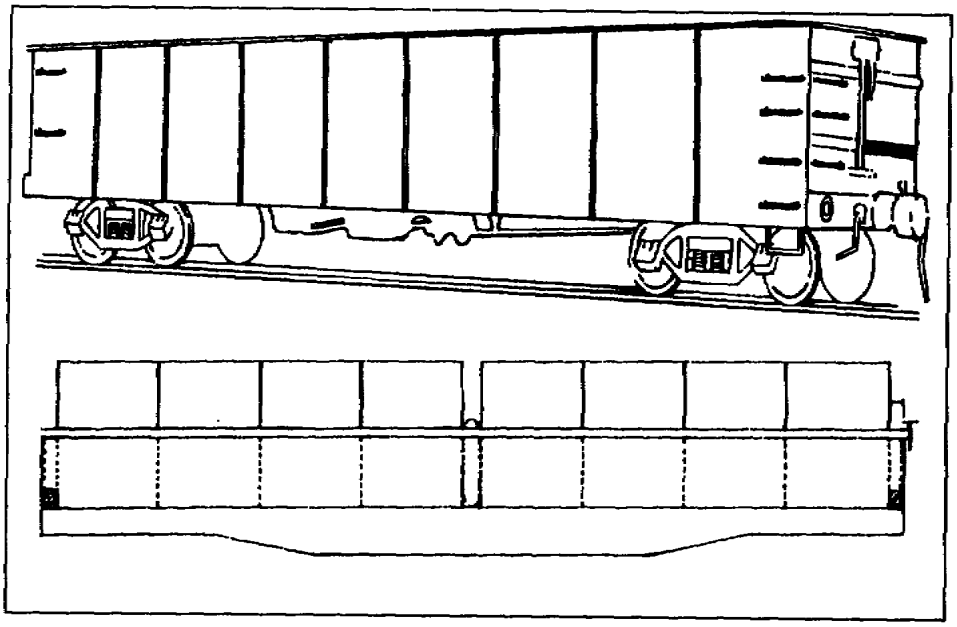

Figure 3-10. Gondola Car.

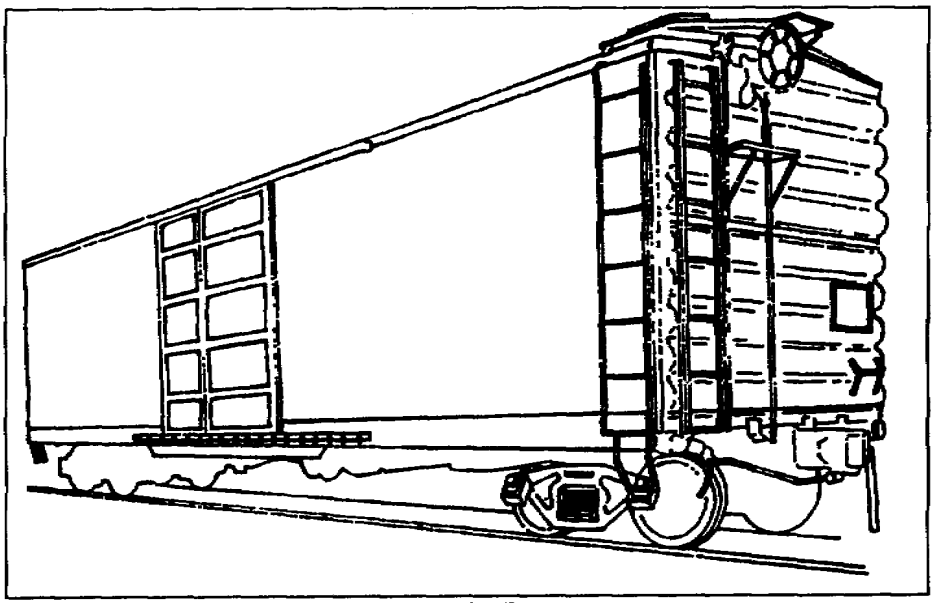

Figure 3-11. Boxcar.

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TOFC

The TOFC transports highway trailers, Figure 3-12. These cars use a retractable pedestal mounting for securing trailers. The TOFC combines the flexibility of a 45-foot highway trailers and the efficiency of a railcar load by loading one or two trailers on an 89-foot rail flatcar. Figure 3-13 shows a trailer being lifted by a piggy packer.

Well-hole flatcar

The well-hole or depressed center flatcar, Figure 3-14, provides additional overhead clearance for freight or equipment which cannot be carried on a standard flatcar. The depression in its floor accommodates equipment not meeting overhead clearance limitations on a standard railcar.

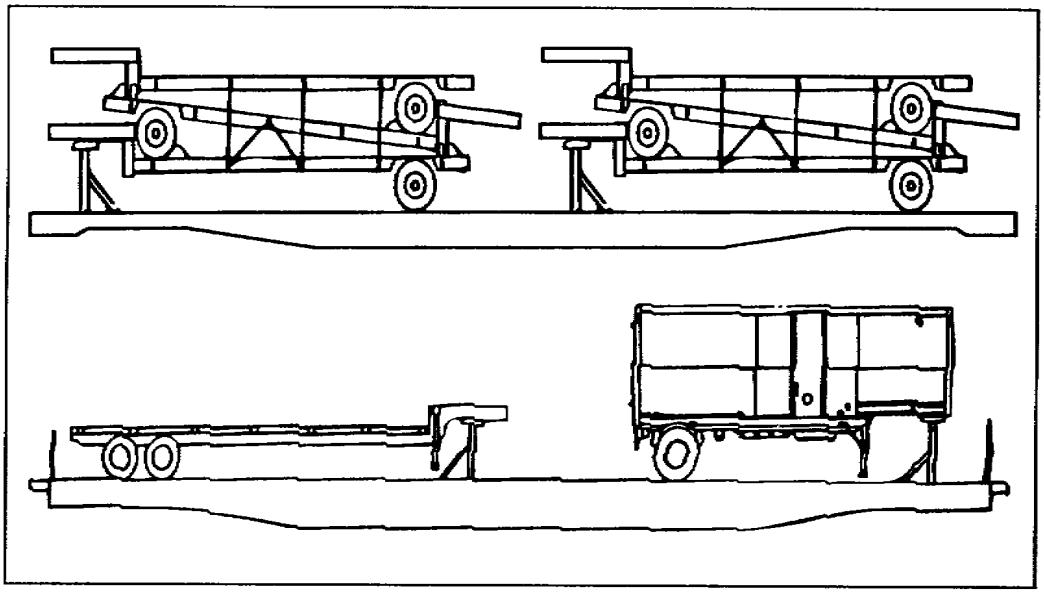

Figure 3-12. TOFC.

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Rail equipment, continued

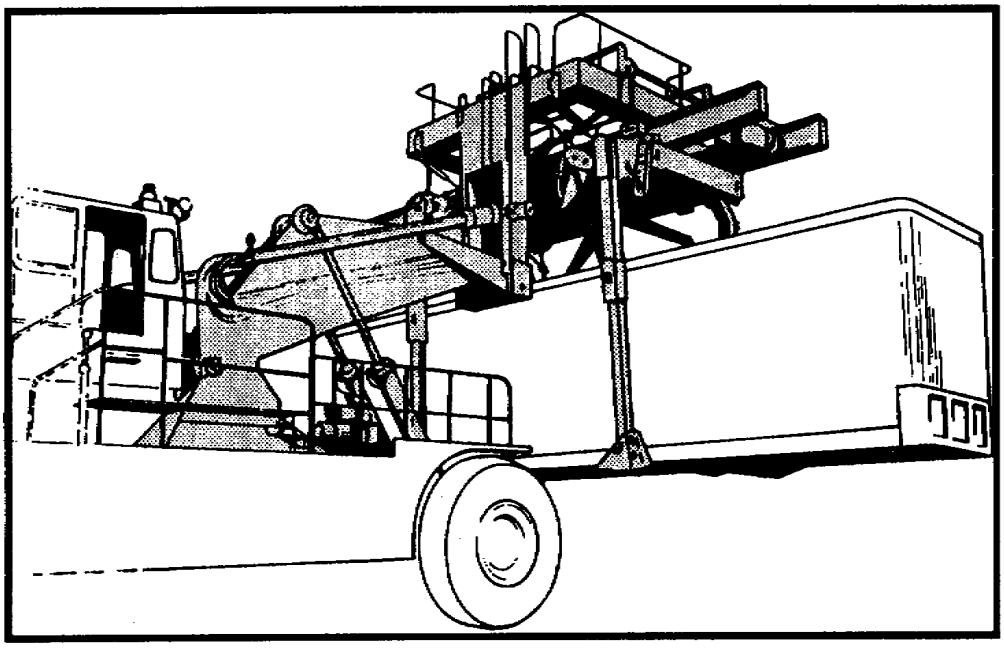

Figure 3-13. Piggy Packer.

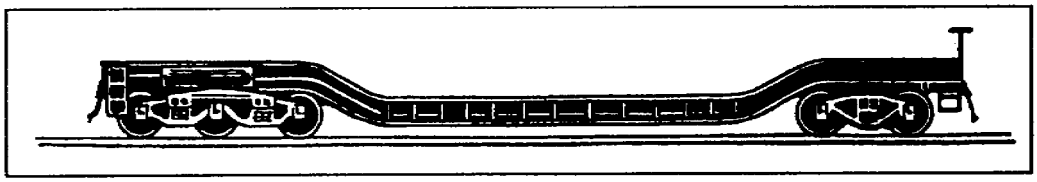

Figure 3-14. Well-Hole Flatcar.

3-5. Determining Rail Siding Capabilities

Introduction

You must also determine the capacities of the rail sidings being used in your unit during the rail loadout.

Rail siding requirements

You must identify these rail siding requirements before any detailed rail planning can be done. Rail siding requirements are also important for unloading the train. The determination of these requirements identifies the need for cranes or other special equipment during the offloading of the railcars. Determine these capabilities of the rail siding:

- Capacity, in length, of usable space on each siding.
- Weight height, and size limits of ramps.
- Overhead restrictions.
- Track bed load limits.
- Locations and square footage of assembly and holding areas.
- Availability and capacity of cranes.
- Expertise of crane operations.
- Availability of block and bracing, wire, and other items.
- Availability, sizes, and capabilities of locomotives.
- Time available for loading.

3-6. Lesson Summary

Summary

All units must develop rail movement plans to successfully organize, coordinate, and execute a unit rail move. This plan is maintained in these three places:

- Unit SOP.
- Battle book.
- Unit movement folder.

The AUEL facilitates your maintaining a listing of UMD. This report assists you in developing a DEL. Once you determine your DEL, you must identify the most efficient way of transporting your equipment. To make these determinations you must know the sizes, dimensions, and shipping configuration of the equipment to be moved and of the available railcars. These are the four basic types of railcars:

- General purpose flatcar.
- Gondola car.
- DODX flatcar.
- Boxcar.

3-7. Lesson 3 Practice Exercise

Instructions

The following items will test your grasp of the material covered in this lesson. There is only one correct answer for each item. When you have completed the exercise, check your answers with the answer key that follows. If you answer any item incorrectly, study again that part of the lesson which contains the portion involved.

Item 1

Which of the following unit maintained documents defines the general and specific functions for the unit to successfully deploy?

A. Battle book.
B. Unit movement SOP.
C. Unit movement folder.
D. Unit movement journal.

Item 2

How does the DEL group unit equipment?

A. According to size and dimensions.
B. Alphabetically.
C. Categorically (such as: TAT, NTAT, etc.).
D. By type load.

Item 3

Which of the following railcars is primarily used for container express?

A. OOTX flatcar.
B. Well-hole flatcar.
C. DODX flatcar.
D. Gondola car.

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Item 4

The determination of rail siding requirements allows for the identification of a requirement for cranes or other special equipment during offloading procedures.

A. True.
B. False.

Item 5

Which type of railcar provides additional overhead clearance for freight or equipment which cannot be carried on a standard flatcar?

A. TOFC flatcar.
B. DODX flatcar.
C. Well-hole flatcar.
D. OOTX flatcar.

3-8. Lesson 3 Practice Exercise Answer Key and Feedback

Item	Correct Answer and Feedback
1	B. The Unit Movement SOP maintains the general and specific information concerning the functions required of a unit for its successful deployment. Page 3-3.
2	A. The DEL groups unit equipment according to its size and dimensions, including weight and cube. Page 3-6.
3	D. Gondola cars are primarily used for container express. Page 3-11.
4	A. True. Rail siding requirements are also important for unloading the train. The determination of these requirements identifies the need for cranes or other special equipment during the offloading of the railcars. Page 3-19.
5	C. Well-hole flatcars provide additional overhead clearance for freight or equipment which cannot be carried on a standard flatcar. Page 3-15.

LESSON 4

IDENTIFYING RAILCAR LOADING PROCEDURES

4-1. Lesson Overview

Lesson description

The UMO is responsible for the correct loading of his unit's equipment onto the railcars. This lesson describes loading procedures, policies, and rules for open-top railcars during CONUS operations.

Enabling learning objective (ELO)

This is the enabling learning objective for this lesson:

Action: Identify the requirements for loading open-top railcars in CONUS.

Condition: Given a self-study environment and the materials provided in this subcourse text.

Standard: In accordance with the subcourse materials provided and/or the references cited below.

References

These are the references used in developing this lesson:

- TM 55-601, *Railcar Loading Procedures*, August 1971.
- TM 55-2200-001-12, *Transportability Guidance: Application of Blocking, Bracing and Tiedown Materials for Rail Transport*.

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Lesson content

These are the topics included in this lesson:

4-2. Identifying the Importance of Loading Practices

Introduction

As a unit movement officer, it is your responsibility to correctly load your unit's equipment onto the railcars. In order to conduct a smooth and efficient loadout, you must know proper railcar loading procedures and policies. These procedures and policies will minimize your efforts and are instrumental in--

- Preventing cargo damage.
- Preventing delay.
- Ensuring safety.

Preventing cargo damage

The use of proper railcar loading procedures prevents cargo damage. If your unit's equipment is damaged during transit it may not be usable by your unit upon arrival in-theater. You must ensure proper blocking and bracing methods are used to prevent jarring or jolting of equipment during switching operations. Also, if damage does occur and the equipment was improperly loaded, the military shipper would be liable for the costs.

Preventing delays

The U. S. military's policy of force projection demands rapid deployments. Any delays could be costly in both lives and credibility. Proper railcar loading procedures assist in preventing delays by identifying those areas you need to be wary of and methods for avoiding them. The railroad is also concerned about delays because of its timetable-oriented operations. Delays also cause confusion and may produce a ripple effect and implicate the entire railway service.

Ensuring safety

As the UMO you must also ensure safety for personnel loading and unloading the railcars. Following standard carloading safety practices and procedures helps prevent disabling or fatal injuries and ensures smooth rail loadout operations. Poorly executed carloading could cause equipment to fall off a railcar, damaging property and injuring military or civilian rail yard personnel.

Estimating railcar requirements

The rules, policies and procedures for railcar loading also assist you in estimating your unit's railcar requirements. The Department of the Army (DA) generally directs the maximum use of available loading space on a railcar so that the carrier's transportation charges are minimized.

4-3. Loading Guidelines

Introduction

Upon receipt of a movement order you may be required to order the railcars your unit requires. Now we will discuss some general guidelines for ordering railcars.

User costs

When determining your railcar requirements you must also be familiar with the user's costs. Railcars should not be too large for the shipment nor so small that two cars are required when a larger one would be sufficient. When planning your railcar orders, use these percentages in determining your requirements:

- 60 percent of the rail flatcars 50-feet or larger.
- 35 percent of the rail flatcars less than 50-feet.
- 5 percent specialized railcars.

Order specifications

When ordering railcars you must provide these specifications to your ITO:

- Type and size of equipment required.
- Location and time railcars must be available for loading.
- Commodity and shipping weight.
- Oversize dimensions, if any.
- Destination.
- Proposed route.

Ordering difficulties

Upon placing your railcar order, contact the appropriate Military Traffic Management Command (MTMC) area commander if you experience difficulties obtaining the quality or quantity of railway equipment ordered.

Load and hold policy

The adoption of a “load and hold” policy as a routine procedure for rail freight military impedimenta (MI) movements is not authorized for these reasons:

Continued on next page

Load and hold policy, continued

- Under normal circumstances, there is enough time to permit a review by all agencies and to provide necessary scheduling to meet the required delivery date (RDD).
- A "load and hold action" ties up a large number of railcars without justification. After the 24-hour, free-time allowance, demurrage charges per car are applied at $20 per day on the first four days; $30 per day for the fifth and sixth days; and $60 per day on the seventh and all subsequent days.
- Adverse public and carrier reaction may result.
- Other competitive modes of transportation might be denied their fair share of traffic when rail equipment is ordered before a definitive traffic management analysis is made.

4-4. Inspecting Rail Equipment

Introduction

The rail yard and the ITO are responsible for ensuring proper loading procedures are followed. To meet this requirement and to ensure unit equipment is transported in a timely and efficient manner, two inspection must be performed:

- Pre-loadout inspection.
- Final load inspection.

AAR rules

AAR loading rules apply to both the railroad and the ITO. These rules state:

- The ITO can refuse to accept a railcar unsuitable for the load he is shipping.
- The railroad can refuse to accept an improperly loaded shipment.

The ITO must perform a pre-loadout inspection to ensure the railcar is suitable for loading. Once the ITO inspects and accepts a railcar it is his responsibility to comply with the AAR loading rules for that car.

Pre-loadout inspection

When railcars arrive at the installation, the ITO or his representative are responsible for performing a pre-loadout inspection. This inspection determines the suitability of the railcars before the cars are placed at platforms ramps or warehouses for loading. When performing a pre-loadout inspection on a closed car you must ensure that--

- Doors and fastenings are operative and in good condition.
- Interiors are clean and dry with sound floors intact.
- Cars are free of residue or refuse from previous loading and foreign matter such a oil, grease, acid, lime, cement, coal dust and contaminating odors such a creosote. These debris and odors may damage equipment.
- Roof and sheathings are sound and tight and walls are free of nails.

Continued on next page

Pre-load inspection, continued

NOTE: Use a nail finder to check for nails in the walls. Make a nail finder by nailing a short piece of wood to a longer piece to form a "T". Use the finder to scrape the walls; it will strike protruding nails.

When performing a pre-loadout inspection on a flatcar you must ensure that--

- Cars are free of residue or refuse from previous loading and foreign matter such a oil, grease, acid, lime, cement coal dust, and contaminating odors such as creosote. These debris and odors may damage equipment.
- Decks are free of bolts, nails, and old blocking.

Inspection responsibilities

Although the responsibility of performing the pre-loadout inspection belongs to the ITO you should also make this your responsibility. If you discover any discrepancies or problems with your railcars, immediately report them to the ITO. You must not accept any railcars with defective wooden floors or unserviceable chains. Once you accept the railcars it is up to you to load them in accordance with AAR rules and regulations.

Final inspection

Perform a final inspection after loading your equipment onto the railcars. During the final inspection you must ensure your unit's load is properly blocked, braced, and meets the loading specifications of the AAR. You must ensure your load conforms to the guidance in TM 2200-001-12, or Section 6 of the AAR regulations. Specifically, during the final inspection you must ensue that your loads are--

- Evenly distributed. Even distribution is characterized by placing half the load weight over each car trunk if possible.
- Within the marked load limits.
- Properly secured by blocks, braces, cables, chains, and other BBT materials in accordance with AAR loading regulations.
- Within the height and width clearance limits of the railroads it will travel.

4-5. Loading Factors

Introduction

You must know the basic factors of railcar loading to prepare a successful load plan. These are the key railcar loading factors to ensure efficient loadout operations:

- Car capacity.
- Hand brake wheel clearances.
- Load limits.
- AAR design.
- Height and width limits.
- Brakes and transmissions.
- Rotating vehicle pats.

Car capacity

To plan a successful rail movement you must know the capacities of the railcars you will use to ship your unit's equipment. Car capacities are restricted by the car size, dimensions, and load limits. All CONUS railway freight cars have the essential railcar capacities stenciled on their sides. These are the railway abbreviations stenciled on the railcars and their definition:

Term	Railway Abbreviation	Definition
Capacity	CAPY	This is the nominal weight of the car. It is expressed in pounds and places the car in a specific tonnage group. The weight capacity of flatcars is rarely reached except with tracked vehicles.
Load Limit	LD LMT	Load limit indicates the maximum safe load weight of the railcar.
Lightweight	LT WT	The actual weight of the empty railcar.

Car sizes

These are the most common sizes of boxcars and open-top cars used on CONUS railroads:

Boxcars -- inside dimensions					
Length		Width		Height	
Feet	Inches	Feet	Inches	Feet	Inches
40	6	8	9	8	7

Continued on next page

Car sizes, continued

Boxcars -- inside dimensions					
Length		**Width**		**Height**	
Feet	**Inches**	**Feet**	**Inches**	**Feet**	**Inches**
40	6	9	2	9	10
40	6	9	2	10	8
50	6	9	2	10	4
50	6	9	4	10	6
Flatcars--standard dimensions					
40	0	9	2	---	---
48	6	9	5	---	---
53	6	10	6	---	---
56	1	10	6	---	---

Hand brake wheel clearances

The AAR specifies clearances for the hand brake wheel. The hand brake is the railcar's parking brake. When loading railcars you must provide sufficient space around the brake wheel to enable rail operating personnel access to it. Figure 4-1, Hand Brake Wheel Clearances, shows a load providing sufficient clearance for the hand brake wheel. These are the AAR specifications concerning the minimum clearances for the hand brake wheel:

- 6 inches in back, on both sides of, and above the brake wheel.
- 4 inches underneath the brake wheel.
- 12 inches from end of car to the load, extending from the center of the brake wheel to the sides of the car and 6 feet above the car floor.

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Hand brake wheel clearances, continued

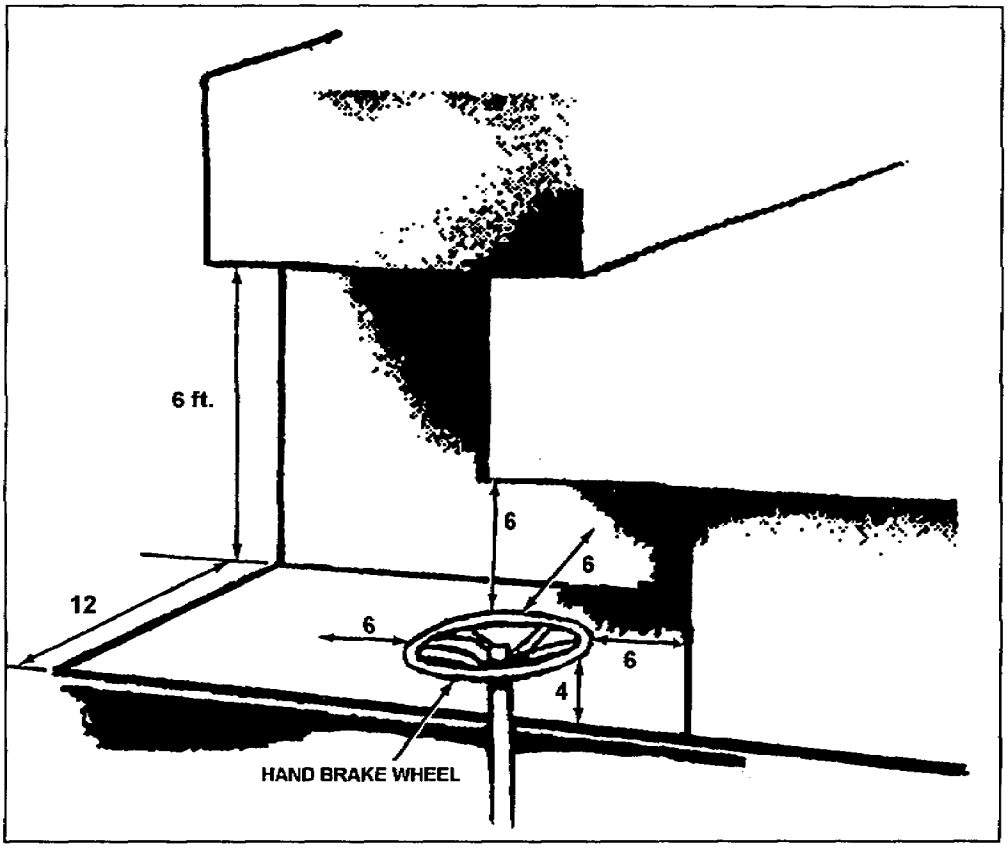

Figure 4-1. Hand Brake Wheel Clearances.

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Load limit

The load limit (LD LMT) as stenciled on the railcar indicates the maximum weight of the load you can place on the railcar. According to the AAR, under no circumstances will the load limit be exceeded. If the load limit figure is not stenciled on the car use the capacity figure which gives the tonnage class of the car. Be careful not to confuse the LD LMT figure with the light weight (LT WT) of the car. The AAR also requires the load to be--

- Balanced on the car so that one side of the car does not carry more weight than the other.
- Distributed so that each car trunk carries no more than half the load limit.
- Protected from tipping by placing the large and heavy items on the car floor.
- Secured if the center of gravity is high to prevent tipping during transit.

Figure 4-2 provides an example of maximum load weight guidance. The LD LMT is 104,000 pounds. Assuming that the truck centers to the end of the car you can load 15,600 pounds at each end of the car.

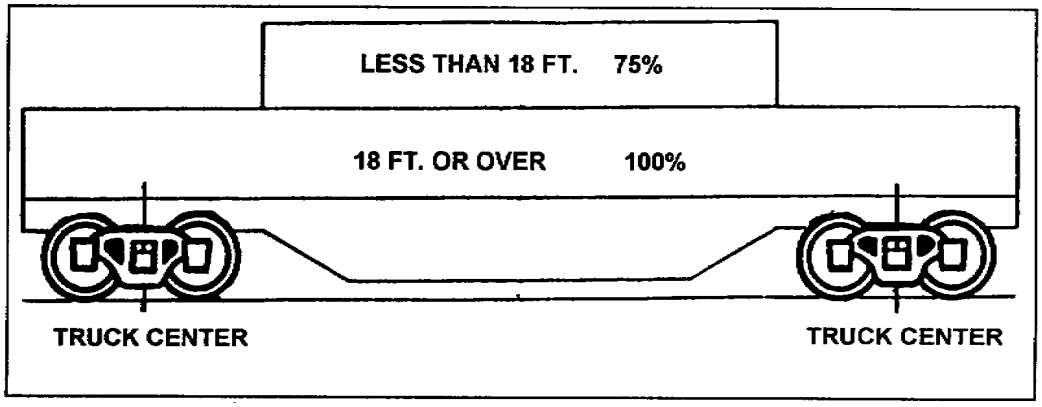

Figure 4-2. Maximum Load Weight Guidance.

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Well-hole car load limits

The well-hole or depressed center flatcar is one of two flatcar designs specified by AAR rules because of carloading differences between truck centers. The well-hole flatcar has reinforced sides and center sills resulting in a stronger underframe and the ability to carry heavier loads. Figure 4-3 shows the percentages of allowable loaded weight for the well-hole or depressed flatcar. If a well-hole car has a LD LMT of 104,000 pounds and the load is 15-feet long, then the weight limit of the load you could carry is 75 percent of 104,000 or 78,000 pounds.

IF load is..	THEN the weight limit of the load is...
less than 18 feet,	75 percent of the LD LMT.
more than 18 feet	100 percent of the LD LMT.

The following figure (Figure 4-3) shows a 66.6% weight limit of 72,800 pounds.

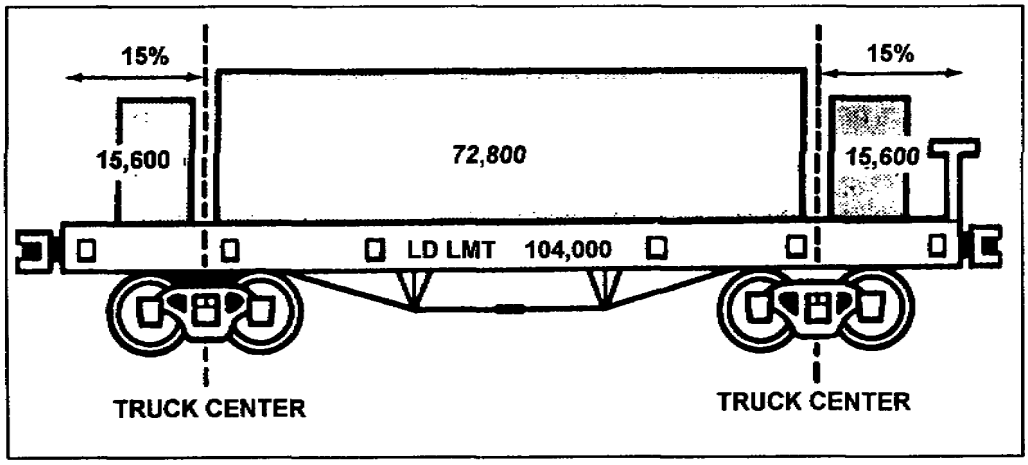

Figure 4-3. Percentages of Allowable Loaded Weight for the Well-Hole Flatcar.

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Standard flatcars

Standard flatcars have percentages of allowable loaded weight lower than those for well-hole cars. Figure 4-4 shows the standard flatcar load limits.

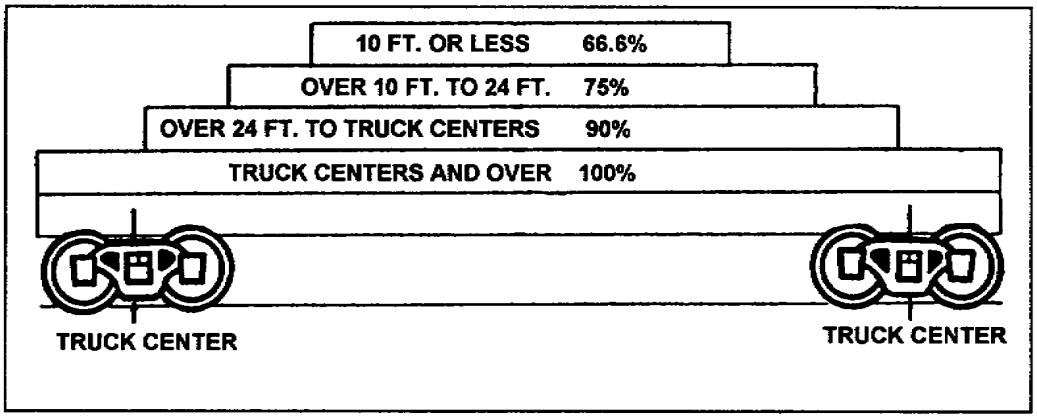

Figure 4-4. Standard Flatcar Load Limits.

Height and width limits

You must ensure the height and width of the railcar load, without overhang, are within the clearance limits of the railroad you are using. You must verify clearance limits over the entire railroad route prior to movement to avoid delays, unsafe loads, and damage to unit and railway equipment. If your equipment exceeds the limitations of the railroad, immediately notify your ITO. The ITO will request assistance from the carrier and obtain a routing allowing your unit's load to move.

The higher a load the narrower it must be to clear tunnels and overhead obstructions. A general rule of thumb is... "when the load exceeds 15 feet, 1 inch measured from Above Top Rail (ATR), it exceeds load limits."

Any load overhanging the railcar is considered outsized and special arrangements must be made to accommodate it.

Continued on next page

Brakes and transmissions

When loading vehicles onto railcars you must ensure the handbrakes are tightly set and the levers are wired, tied, or blocked. The transmission must be in the neutral position and the lever wire tied in placed to prevent accidental starting of the vehicle.

Rotating vehicle parts

When loading vehicles with rotating parts ensure--

- Turrets and guns are locked.
- Vehicles with gun barrels not quipped with built-in gun brackets are secured using 3/8-inch steel cable.
- Booms point toward the rear.
- Crane booms are secured with dunnage and locked down with cables.
- Booms and turrets are secured to face in a trailing position.

4-6. Placing Load Weights

Introduction

Another requirement with which you must be familiar is guidance concerning load weights and their placement on the railcar. The total weight you place on a railcar is determined by the load's length and the type of railcar.

Load weight

These are the rules for loading railcars and determining placement of the load: rules

Rule	Description
1	Determine the weight of the cargo so a railcar with the proper capacity can be spotted for loading. Compare the cargo's load weight with the railcar's load limit.
2	Load no more than 50 percent of the railcar's load limit on either truck center. Weigh the cargo to verify its weight.
3	Do not exceed 15 percent of the load limit when loading cargo from the truck center to the end of the railcar.
4	Balance all loads transversely. If the load's shape places more weight on one side of the railcar than the other, add counterbalances or ballast to achieve a transverse balance.
5	Load large items and items having the greatest weight and largest dimensions on the floor to prevent tipping.
6	Ensure that items with a high center of gravity are well secured to prevent tipping during transit.

Center of gravity

Whenever possible, you want to balance a load on a railcar by lining up the load's center of gravity (CG) with the center of the railcar. But, what happens if you are loading a piece of equipment that cannot be balanced; such as a crane with a boom attached? To solve this problem, the AAR established rules for loading equipment that cannot be centered but has a length less than the distance between truck centers. Figure 4-5 shows the location of CG for different loads in relation to the ratio of the load weight and the load limit of the car.

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Center of gravity, continued

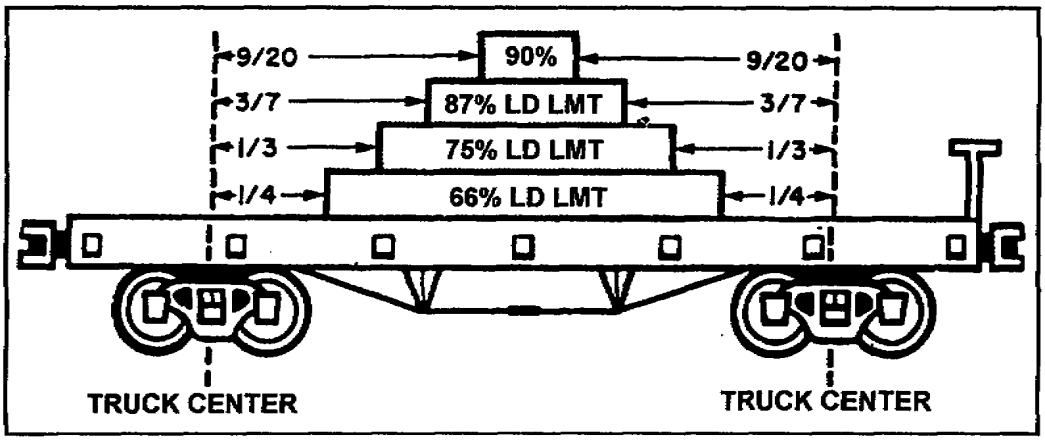

Figure 4-5. Load Weight Placement.

Computing CG

The computing of the CG is extremely important to the proper loading of rail equipment. Using the example of the crane with an attached boom, compute the CG using these assumptions:

- Crane weight = 75,924 pounds.
- Flatcar length = 50 feet.
- LD LMT = 114,000.
- Distance between truck centers = 40 feet.

These are the procedures for computing the CG for this crane:

Step	Action
1	Determine the percentage of the railcar's LD LMT versus the cargo's load weight. • Load weight = 75,924 pounds. • LD LMT = 114,000. 75,924 ÷ 114,000 = .666 or 66.6 percent.

Continued on next page

Computing CG, continued

Step	Action
2	Use Figures 4-5 and 4-6 to verify the CG guidance for the correct position of the percentage of the LD LMT. The 66.6 percent falls within the center of the car because it must be positioned 1/4 the distance from each truck.
3	Multiply the distance it must be positioned from each truck (i.e., 1/4 of the distance) by the distance between the flatcar's truck centers (i.e., 40-feet). 1/4 x 40 = 10. The product, 10, tells us that a proper crane placement is no more than 10-feet from either truck center. Figure 4-6 shows the crane's center of gravity, and its proper placement on the railcar.

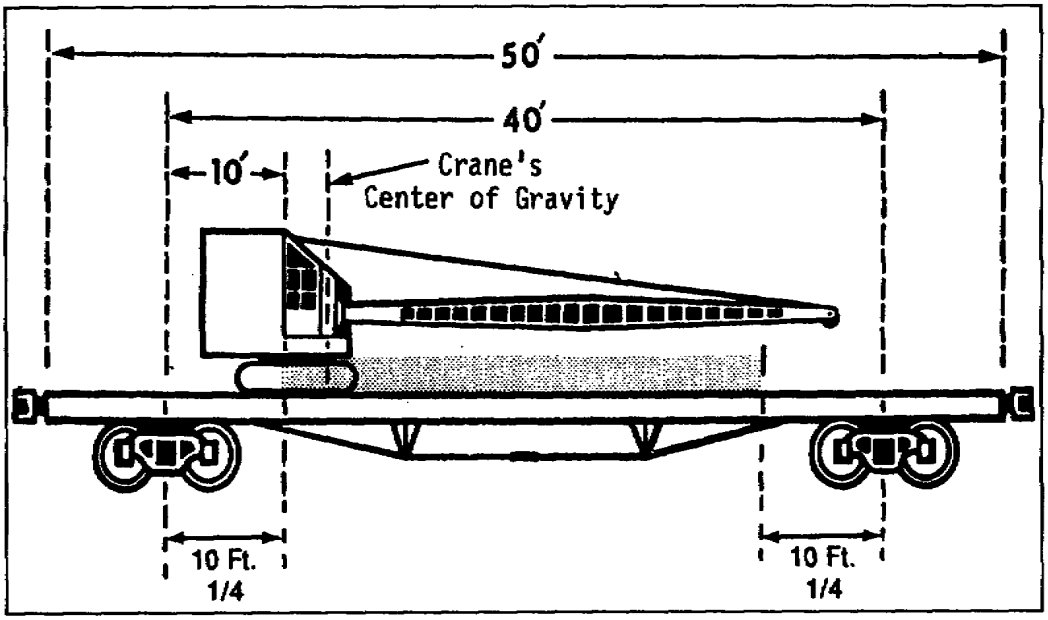

Figure 4-6 Crane's Center of Gravity

4-7. Using Idler Cars

Introduction

Use idler cars when your load protrudes beyond the end sill of the carrying car or when necessary to space two carrying cars for long loads. Use idler cars when--

- Overhanging loads require protection.
- The load is extra long and spacers between two load-bearing cars are required.
- There is overhang from another railcar.

Measure of overhang

The measure of overhang is not dependent upon the distance the load extends past the railcar, but the distance the load extends past the center point of the trucks. For example, a crane with a boom extending beyond one flatcar may require an idler car to protect the overhang. An idler car carries no load weight.

Rules for using idler cars

These are the rules for using idler cars (Figure 4-7):

Rule	Description
1	Maintain a 4-inch clearance below the overhanging portion of the load and any part of the idler car below it.
2	You may use space on the idler car for loading other material. However, the ends of the material must be more than 2 feet away from the ends of the overhanging load.
3	Render the uncoupling mechanisms underneath the load inoperative, but do not disconnect them.
4	Properly block and brace the boom in position.

Continued on next page

Rules for using idler ears, continued

Rule	Description
5	Adhere to the AAR rules governing the lengths and widths of allowable overhang. The AAR bases these rules on the length of the flatcar you are using with the idler cars. As the length of overhang increases, the width of the allowable overhand decreases.

IF the flatcar is 46 feet long AND the length of the load is...	Then the allowable...
50 feet,	• Length of overhang is 11 feet • Width of overhang is 8 feet 8 inches.
60 feet,	• Length of overhang is 21 feet. • Width of overhang is 7 feet.

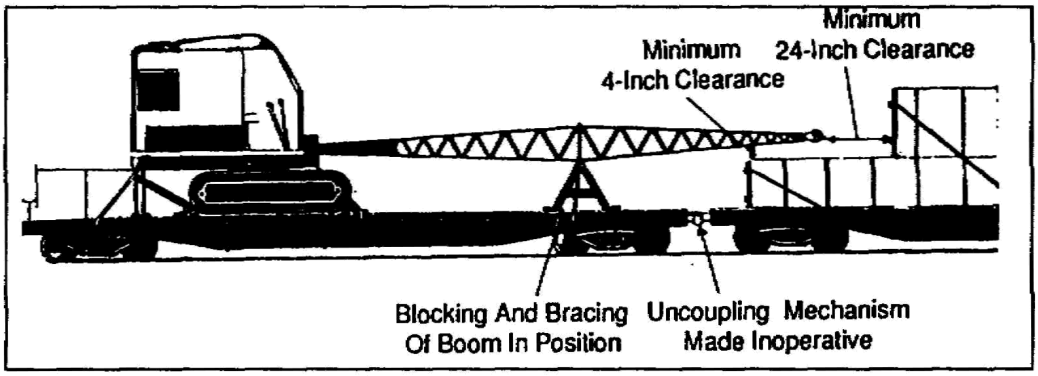

Figure 4-7. Idler Car Rules.

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Fastening overhangs

Do not fasten overhangs to the idler car. As you have seen in the above table as the length of an overhang increases, its allowable width decreases. The AAR established this rule because when a train turns or bends during a curve the railcar carries the weight, not the idler car. As shown in Figure 4-8, if the load were too wide, it would protrude from the side of the idle car, with the potential of striking a nearby object if and when the car negotiated a curve, possibly damaging the equipment or causing an accident.

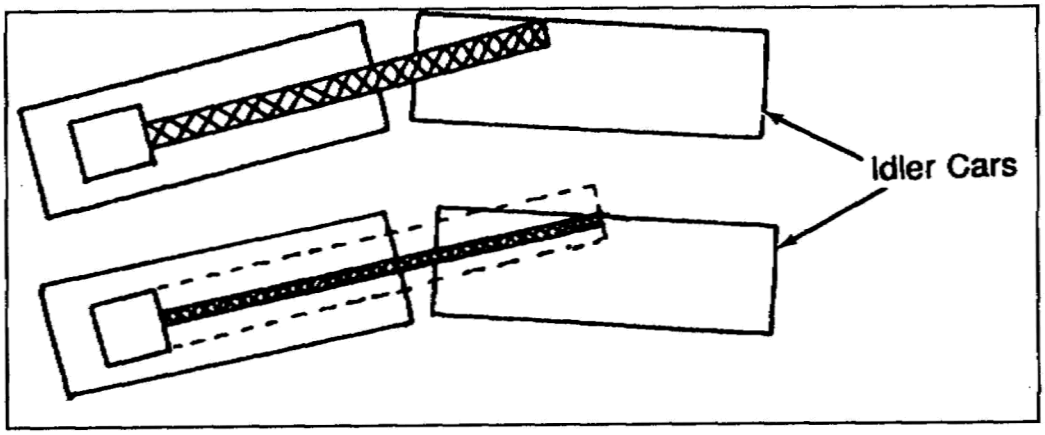

Figure 4-8. Overhang Turning with Idler Cars.

4-8. Loading and Unloading Equipment Requirements

Introduction

You must also be familiar with the equipment required for loading and unloading cargo onto and from a railcar. Normally, this equipment is available to you at the rail loading or unloading site. However, if it is not you must include this equipment when planning your move. These are the three types of loading and unloading equipment:

- Ramps.
- Spanners.
- Cranes.

Ramps

Ramps facilitate the movement of vehicles and other types of wheeled equipment onto and off flatcars. Ramps provide the means of driving vehicles directly on to a flatcar and into the desired position. When the time to unload occurs, the vehicles use the same ramp in unloading to the ground. If ramps are unavailable, follow the following procedures to use the last railcar as an expedient ramp:

Step	Action
1	Detach the end truck from the flatcar body by removing the cotter and brake rod pin.
2	Lower the body onto a supporting wooden block until the coupler pocket rests on the block.
3	Block the sides of the flatcar to rail level and place additional block and timbers to form a runway.

CAUTION: When using another flatcar as a ramp, be careful not to damage the coupler mechanism. If the car is a commercial car, consult the servicing rail company prior to performing this procedure.

Continued on next page

Spanner boards

Per Figure 4-9, spanner boards bridge the distance between the railcars creating one continuous roadbed of the train. Spanners facilitate the circus method of loading railcars. The circus method is the quickest and most common way of loading vehicles. Figure 4-10 shows how spanners facilitate railcar loading. When using the circus method of loading vehicles, a vehicle is driven up the ramp onto the rear car and then moved forward across spanners until it reaches its appropriate location. Army spanners are even built to accommodate tanks, the heaviest equipment of the Army. Figure 4-1 1, shows various configurations for the spanner boards.

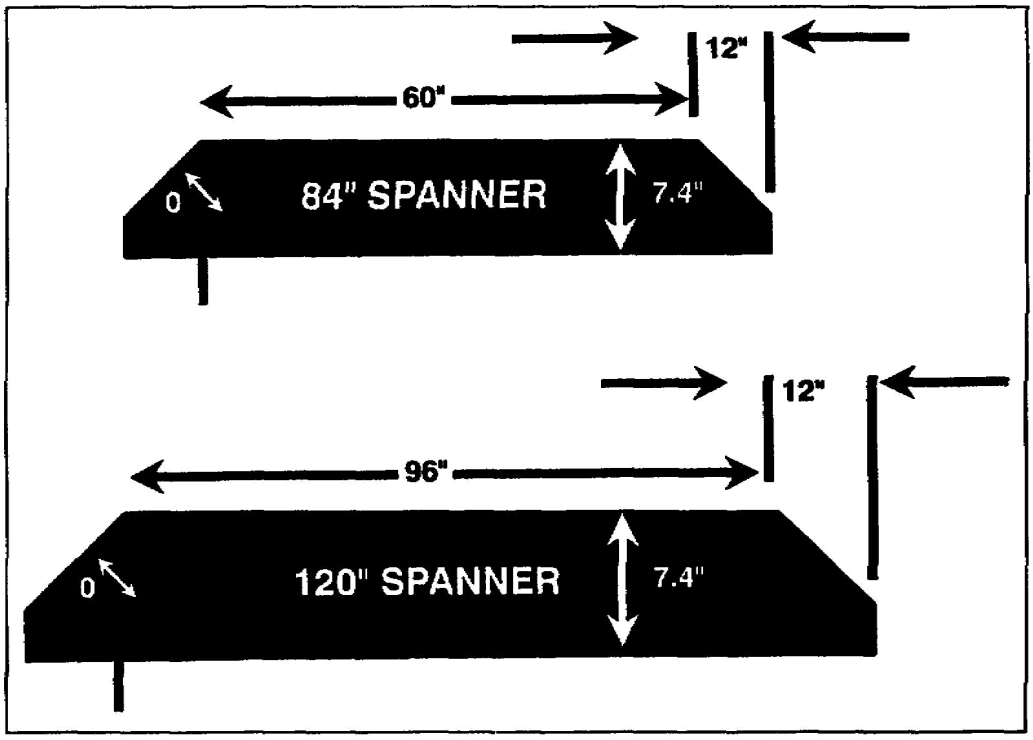

Figure 4-9. Spanner Boards.

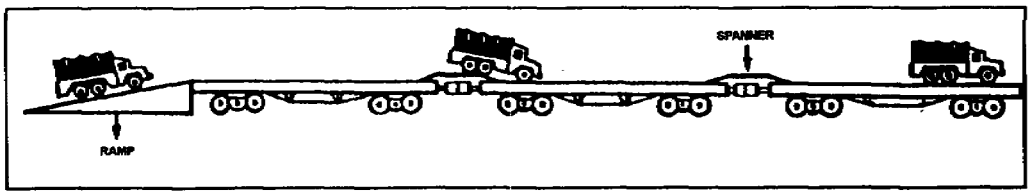

Figure 4-10. Circus Method of Loading Vehicles.

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Spanner boards, continued

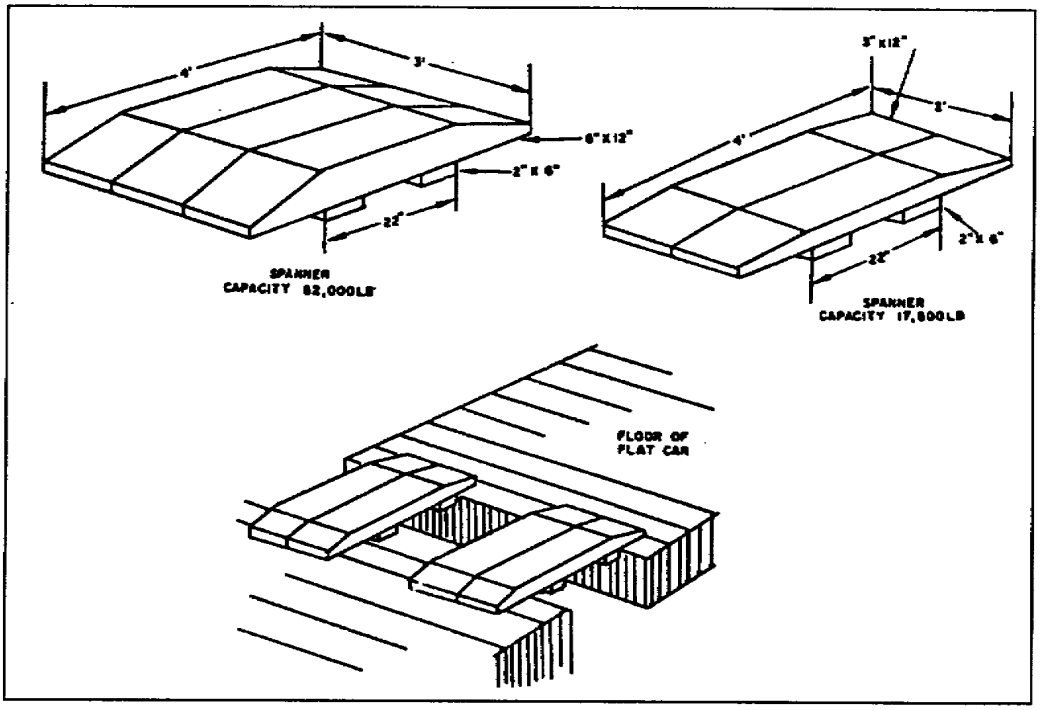

Figure 4-11. Various Spanner Board Configurations.

Angle irons

Angle irons prevent the spanner boards from slipping during use. When using an angle iron, wedge it between the spanner board and the flatcar being loaded. You must ensure that the angle iron is placed in the same direction as the forward movement of the vehicle being loaded.

Using spanners

When using spanners form a 33-degree angle over which the equipment and vehicles must climb. You should be aware that improperly blocked spanner boards can move during use. These are the procedures for overcoming these problems when using spanner boards:

Continued o next page

Using spanners, continued

Step	Action
1	Engage the brake wheels of each railcar.
2	Reduce the 33-degree angle by positioning a 2- x 4-foot, 2- x 6-foot or 2 x 8 foot piece of wood in front of the spanner board.
3	Stop each vehicle prior to its movement over the spanner board and have it proceed using the vehicle's lowest gear.
4	Block spanners using angle irons and ensure there is a 1-foot overhang of the spanner on each railcar.

Cranes

Cranes are frequently used for loading cargo which cannot be reached by other equipment or is too bulky or heavy to be moved otherwise. If your unit requires cranes to perform its railcar loading and unloading operations, notify your ITO so plans can be made for a crane to be positioned at your loading and unloading sites.

4-9. Lesson Summary

Summary

This lesson covered--

- The procedures and guidelines for conducting pre-loadout and final inspections to ensure the operability of the equipment. The material addressed basic loading factors including car capacities and maintaining hand brake wheel clearances
- Load limits which are the maximum load which can be placed on a railcar. The loads must be positioned appropriately on the railcar to maintain the appropriate center of balance.
- Idler cars which serve to protect overhanging loads or act as spacers between two load-bearing cars when the load is extra long. The AAR has established permitted lengths and widths of overhang based on the length of a flatcar used with idler cars.
- Spanners which are used to bridge the distance between railcars. Using spanners you can make the train a continuous road bed.

4-10. Lesson 4 Practice Exercise

Instructions

The following items will test your grasp of the material covered in this lesson. There is only one correct answer for each item. When you have completed the exercise, check your answers with the answer key that follows. If you answer any item incorrectly, study again that part of the lesson which contains the portion involved.

Item 1

The "load and hold" policy authorizes railcar loading upon receipt of a deployment warning order. This policy allows a unit to load their equipment onto railcars and await movement orders.

A. True.
B. False.

Item 2

When performing a pre-loadout inspection on a flatcar, which of the following items must you check?

A. Existence of debris and odors.
B. Operability of doors and fastenings.
C. Clean and dry interiors.
D. Blocking for compliance with AAR loading regulations.

Item 3

What is the purpose of performing a final loading inspection?

A. To ensure type loads are correctly configured.
B. To ensure your load meets AAR loading specifications.
C. To validate your railcar ordering requirements.
D. To ensure compliance with FM 55-65, *Strategic Deployment for Surface Transportation*.

Continued on next page

Item 4

What is indicated by LD LMT as stenciled on a railcar?

A. LD LMT indicates the railcar's center of gravity.
B. LD LMT indicates the point of balance on an empty railcar.
C. LD LMT indicates the maximum weight of the load you may place on the railcar.
D. The minimum weight which may be loaded on the railcar.

Item 5

When is it necessary to use an idler car?

A. When the LD LMT is exceeded.
B. When using another flatcar as a ramp.
C. When the load exceed 15-feet, 1 inch, measured from ATR.
D. When there is overhang from another railcar.

4-11. Lesson 4 Practice Exercise Answer Key and Feedback

Item	Correct Answer and Feedback
1	B. False. The "load and hold policy" is not authorized for these reasons: Under normal circumstances, there is enough time to permit review by all agencies and to provide necessary scheduling to meet the required delivery date (RDD). • A "load and hold action" ties up a large number of railcars without justification. After the 24-hour, free-time allowance, demurrage charges per car are applied at $20 per day for the first four days; $30 per day for the fifth and sixth days; and $60 per day on the seventh and all subsequent days. • Adverse public and carrier reaction may result. • Other competitive modes of transportation might be denied their fair share of traffic when rail equipment is ordered before a definitive traffic management analysis is made. Page 4-4/5.
2	A. When performing a pre-loadout inspection on a flatcar you must check for debris and evidence of other substances which may damage equipment. Page 4-7.
3	B. You must ensure your unit's load is properly blocked, braced, and meets the 1 loading specifications of the AAR. Page 4-7.
4	C. LD LMT indicates the maximum weight of the load you may place on the railcar. Page 4-11.
5	D. Use idler cars when-- • Overhanging loads require protection. • The load is extra long and spacers between two load-bearing cars are required. • There is overhang from another railcar. Page 4-18.

LESSON 5

COMPUTING RAILCAR REQUIREMENTS

5-1. Lesson Overview

Lesson description

When preparing a unit rail load plan, a unit's safe and successful rail load requires computations to determine the following requirements:

- The unit's railcar requirements.
- The installation's railcar storage capabilities.
- The railcar placement capability at the installation loading site.

Enabling learning objective (ELO)

This is the enabling learning objective for this lesson:

Action: Compute railcar requirements to include:

- The number of railcars your unit requires to perform the move.
- The storage capability for railcars at your installation.
- The number of railcars you can spotting for loading.

Condition: Given a self-study environment and the materials provided in this subcourse text.

Standard: In accordance with the subcourse materials provided and/or the references cited below.

References

These are the references used in developing this lesson:

- AR 55-33, *Procedures for handling Through-Bill-of-Lading Household Goods Shipment during Periods of Longshoreman and/or Maritime Strikes*, dated November 1964.
- AR 220-10, *Preparation for Overseas Movement of Units (POM)*, June 1973.
- DoD Reg. 4500.32-R, *MILSTAMP Volume I. With Ch 6*, May 1995
- FM 55-15, *Transportation Reference Data*, January 1986.
- FM 55-65, *Strategic Deployment for Surface Transportation*, Oct 1995.
- TM 55-601, *Railcar Load Procedures*, August 1971.
- TM 55-2200-001-12, *Transportability Guidance: Application of Blocking Bracing, and Tiedown Materials for Rail Transport*.

Continued on next page

Lesson content

These are the topics included in this lesson:

5-2. Computing Railcar Requirements

Introduction

The ITO is responsible for coordinating and procuring your unit's railcar requirements for movement; however, you must provide input to the ITO on the shipping configurations of your unit's equipment. You must also know the capabilities and limitations of the railcar equipment so you can determine the best type load for each railcar.

General panning guidelines

Follow these general load planning guidelines when planning your rail movement:

- Figure your load accurately to minimize the railcar requirements of your unit.
- Prepare accurate planning worksheets to avoid delays during movement operations.
- Normally, place only one category of equipment on a railcar. Each category may be moving in a different location at the POE.

Car selection guidelines

Use these car selection guidelines when determining your railcar requirements:

- Deduct approximately 4 feet from the length of flatcars to allow for tiedown attachments and the hand brake wheel.
- Allow 18 inches between vehicles for securing tie-down devices.

Load planning guidelines

These guidelines will assist you in planning your unit's load:

- Distribute the heaviest items of equipment among as many cars as possible to obtain maximum loads. The government pays the freight for a minimum of 24,000 pounds per car whether or not it is shipped.

NOTE: This weight is subject to the applicable tariff; 24,000 pounds is not a constant number.

Continued on next page

Load planning guidelines, continued

- Couple trailers and other nonmotorized equipment with their prime movers. This coupling saves space, reduces tie-down requirements, and minimizes loading and unloading efforts.
- Think in terms of "type load" for a railcar with a maximum LD LMT of 100,000 pounds.

NOTE: 100,000 pounds is only for planning purposes. Most flatcars have a load limit well above 100,000 pounds.

- Ensure load width on 89 foot railcars is no more than 100 inches due to BBT and clearance considerations. The 100 inch maximum also applies to 118 inch wide flatcars to plan for the use of additional side bracings, if required by the carrier.

Type loads

Type loads are those that repeat themselves. Planning type loads assists you in minimizing your railcar requirements.

For example, if you must load--

- Twenty 2 1/2-ton trucks.
- Ten 3/4 ton trucks.

Then you would load two 2 1/2 ton trucks and one 3/4 ton truck on a railcar, and repeat this loading configuration ten times.

Type load models

During the planning phase, use these type load models of three different railcars to develop your unit rail loading planning:

Continued on next page

Type load models, continued

Railcar	Type Load Model
89 foot chain tie-down flatcars	Load four track vehicles within these requirements: • Less than 100 inches wide. • 25,000 pounds. For example, the M113 series chassis. If necessary remove fenders, skirts, and mortar base-plate brackets.

68 foot commercial wooden-deck, chain tie-down flatcars	• Load two track vehicles weighing about 40,000 to 50,000 pounds each. Examples include--
	  • D7 bulldozer and an M578 recovery vehicle.
	  • M109 and M110 series howitzer.
	
	• Load one track vehicle weighing about 100,000 pounds, such as--
	
	  • Tanks.
	  • Combat engineer vehicles (CEV).
	  • M60 chassis.

68 foot DODX-HD, 140 ton flatcars	Type loads for this flatcar include two-- • M1 tanks. • M60 tanks. • M728 combat engineer vehicles. • M109 self-propelled howitzers.

5-3. Determining Railcar Requirements

Introduction

During this section we will examine four situations and determine the number of railcars required for movement. The solutions for these situations are based upon the type load models.

Situation I

Using the type load models, what are your railcar requirements for transporting 102 M113 series vehicles?

Situation I solution

Remember, four M113 series vehicles fit on an 89 foot flatcar. Determine your railcar requirements by dividing the total number of vehicles (i.e., 102) by the number of vehicles that fit on each railcar (i.e., 4).

102 ÷ 4 = 25.5 railcars.

Obviously you cannot use half of a railcar, so round this number up to 26. You will require 26 railcars to transport your unit's 102 M113-series vehicles. However, remember to leave a 15 to 18 inch space between the loaded vehicles to--

- Maintain proper distance between vehicles.
- Ensure the proper angle of tie-down materials.

Situation II

You must transport 64 CUCVs, each equipped with an M416 trailer. The available railcar equipment is 89 foot bi-levels. Your type load list for 89 foot flatcars indicates you can load four CUCVs and four M416 trailers on an 89-foot space. What are your railcar requirements?

Situation II solution

These are the procedures for determining your requirements for the 89 foot, bi-level railcars:

Continued on next page

Situation II solution, continued

Step	Action
1	Divide the number of vehicle-trailer combinations (i.e., 64) by the number of vehicle trailer combinations which fit on the 89 foot space (i.e., 4). **64 ÷ 4 = 16** decks are required to load these vehicle-trailer combinations.
2	Since these are 89 foot bi-level flatcars, divide the deck requirements by 2. **16 ÷ 2 = 8** 89 foot bi-level flatcars are required to transport this load.

Situation III

You must load fifteen 2 1/2 ton trucks. You also receive last minute notice that you must also load two CUCVs and two M416 trailers. The type load list indicates that three 2 1/2 ton trucks will fit on an 89 foot flatcar with enough room left over for either a CUCV or an M416 trailer. Determine your railcar requirements being sure to provide 16 to 18 inches of space between vehicles.

Situation III solution

Determine your railcar requirements by dividing the number of 2 1/2 ton trucks (i.e., 15) by the number of vehicles which fit on each 89 foot flatcar (i.e., 3).

15 ÷ 3 = 5 89-foot flatcars are required for transporting these vehicles.

Plan to load these vehicles circus style -- three 2 1/2-ton trucks, followed by one CUCV and one M416 trailer until the cars are filled. In each load, the CUCV will be on the first railcar and the M416 on the second.

Continued on next page

Situation IV

Assume you must load your cargo on railcars not fitting into one of the three type load models. This situation requires you to select railcars to accomplish a mission. From this situation, you will see how to plan potential loads when railcar equipment differs from the three type load models.

Fort Stewart has received a tasking to provide vehicles for maneuvers in North Carolina. You must ship these 16 vehicles:

- Eight utility trucks, 1/4 ton, M151.
- Five cargo trucks, 2 1/2, 6x6, M135.
- Three personnel carriers, full tracked, M113.

Vehicles will be shipped in their operational configuration. The tables in Figure 5-1 provides the vehicle loading data equipment characteristics of this equipment. There are no lifting devices at the unloading site in the maneuver area. Your railcar requirements must be selected from this list of available rail equipment. All equipment on this list is 9 feet wide.

	Configuration	Length	Width	Height	Weight	Cube	Loaded Height
Trk Cargo 2 1/2 Ton							
M135	Operational	266.8	91.0	116.3	12,840	1,634.0	81.0
M135	Reduced	266.8	88.0	79.8	12,840	1,084.2	
Trk Utility 1/4 Ton							
M151	Operational	131.8	63.3	71.0	2350	342.8	
M151	Reduced	131.8	63.3	52.5	2350	253.5	
Carrier Pers. Ftrac							
M113	Operational	191.5	105.6	86.5	19,755	1,012.3	
M113	Reduced	191.5	100.0	86.5	19,755	958.6	

Quantity	Type Railcar	LD LMT	Distance Between Truck Centers
14	40-ton flatcar	92,000	30 ft 4 1/2 inches (364 1/2 inches)
3	50-ton flatcar	118,600	32 ft 9 inches (393 inches)
3	50-ton gondola	126,700	30 ft 4 1/2 inches (364 1/2 inches)

Figure 5-1. Vehicle Loading Data Equipment Characteristics.

Continued on next page

Situation IV solution

You must analyze your cargo and the different vehicle combinations which can be loaded on the available railcars. These are the procedures for performing an analysis:

Step	Action
1	Identify and list the characteristics of your cargo: • Length. • Width. • Height. • Weight. • Cube.
2	Identify the characteristics of each available railcar.
3	Consider the height and width of the vehicles.
4	Examine the length and width of the vehicles and determine how many vehicles will fit lengthwise on the available railcars.
5	Load the flatcars on paper.

Step 1: Listing cargo characteristics

Identify and list the vehicle characteristics as shown in Figure 5-1.

Step 2: Identify railcar characteristics

Identify railcar characteristics using one of these references:

- TM 55-46-1.
- FM 55-15.
- TB 55-46.

NOTE: Using gondolas is not an option for your movement because no lift capabilities are available at the destination.

Continued on next page

Step 3: Consider the height and width of the vehicles

When considering the height and width of your vehicles you must identify the tallest and widest vehicles and ensure the railcar can accommodate them. Figure 5-2 shows the truck centers of each railcar.

Figure 5-1 (page 5-8) shows the 2 1/2 ton truck is the tallest vehicle with a height of 116.3 inches. Figure 5-3 indicates a load over 9 feet 7 inches but under 10 feet 1 inch can be as wide as 10 feet and not require a clearance.

The personnel carrier is the widest vehicle, 105.6 inches.

Therefore, the height and weight of this load are within the specified limits, and not too wide for the 108 inch wide flatcars.

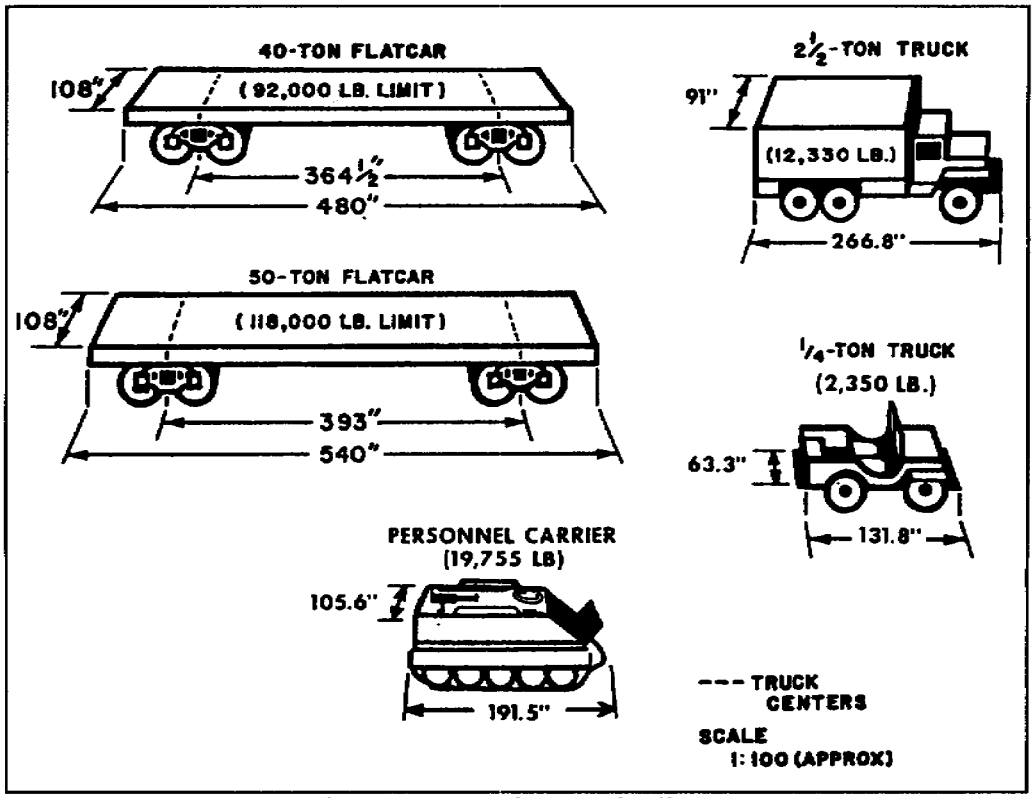

Figure 5-2. Equipment Outlines.

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Step 3: Consider the height and width of the vehicles

Height of Load (measured from top of car platform)		Width of Load		1/2 Width of Load (measured to left or right of centerline of track)	
Ft.	**In.**	**Ft.**	**In.**	**Ft.**	**In.**
9	7	10	8	5	4
10	1	10	0	5	0
11	11	7	0	3	6

Figure 5-3. Height/Width Load Restrictions.

Step 4: Examine vehicle length/width

Examine the length and width of the vehicles and determine how many vehicles will fit lengthwise on the available railcars. This process is a trial and error method and may require several computations before you achieve your most efficient load. Using the following table, list the vehicles, by type, providing the length for each vehicle.

Vehicles	Number of Vehicles		
	1	2	3
1-4-ton truck	131.8	263.6	(395.4)
2 1/2-ton truck	(266.8)	533.6	800.4
Personnel carrier	191.5	(383)	574.5

Continued on next page

Step 4: Examine vehicle length/width, continued

Configuration 1:

Note that the three 1/4 ton trucks can fit on either railcar and provide adequate hand brake wheel clearance (i.e., 12 inches) and distance between vehicles for blocking and bracing (i.e., 18 inches).

395.4 + 12 +18 +18 = 443.4 inches.

Circle this vehicle on your chart to show it is a possible combination.

Configuration 2:

Another possible combination is two 2 1/2 ton trucks on a 50 ton railcar. However, this placement does not allow enough clearance for the hand brake wheel or for blocking. So, circle the 266.8 inches for the 2 1/2 ton trucks.

Configuration 3:

Multiply the length of the personnel carrier by 2 and you see that two personnel carriers could fit on either car. Circle the number 383 inches on your chart; but remember, you still have to check the weight of the equipment.

Step 5: Examine vehicle weight

In this step you will compare the weight of the three configurations with the load limits of each railcar. Now, prepare a new chart substituting vehicle weight for the lengths in inches.

Continued on next page

Step 5: Examine vehicle weight, continued

Vehicles	Number of Vehicles		
	1	2	3
1-4-ton truck	2,350	4,700	(7,050)
2 1/2-ton truck	(12,840)	25,680	38,520
Personnel carrier	19,755	(39,510)	59,265

Refer to Figure 5-2 and note these load limits for each railcar:

- 40 ton car = 92,000 pounds.
- 50 ton car = 118,000 pounds.

Next use the three configurations from step 4 with the following three configurations based on vehicular weight.

Configuration 1:

As we learned in Step 4, three 1/4 ton trucks can fit on either railcar. Check the weight of the load to ensure it complies with the LD LMTs of the railcars. Verify the load's weight by multiplying the number of vehicles by the weight of one vehicle.

3 x 2,350 = 7,050 pounds.

Yes, this combination works well on either flatcar since the total weight is under both limits; therefore, circle 7,050.

Continued on next page

Step 5: Examine vehicle weight continued

Configuration 2:

Examine the weight of the 2 1/2 ton truck. Because of it is length, only one truck can fit on either car; therefore, circle 12,840.

Configuration 3:

Now consider the personnel carrier. The weight for three of them is--

3 x 19,755 = 59,265 pounds.

This does not exceed the LD LMT. However, the length of three carriers does exceed the limit for a 50 ton car; therefore, circle 39,510 for two personnel carriers.

Step 6: Load the flatcars on paper

Now you are ready to begin loading the flatcars on paper. For economy, fill up the 40-ton flatcars first Figure 5-5 shows two possible combinations.

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Step 6: Load the flatcars on paper, continued

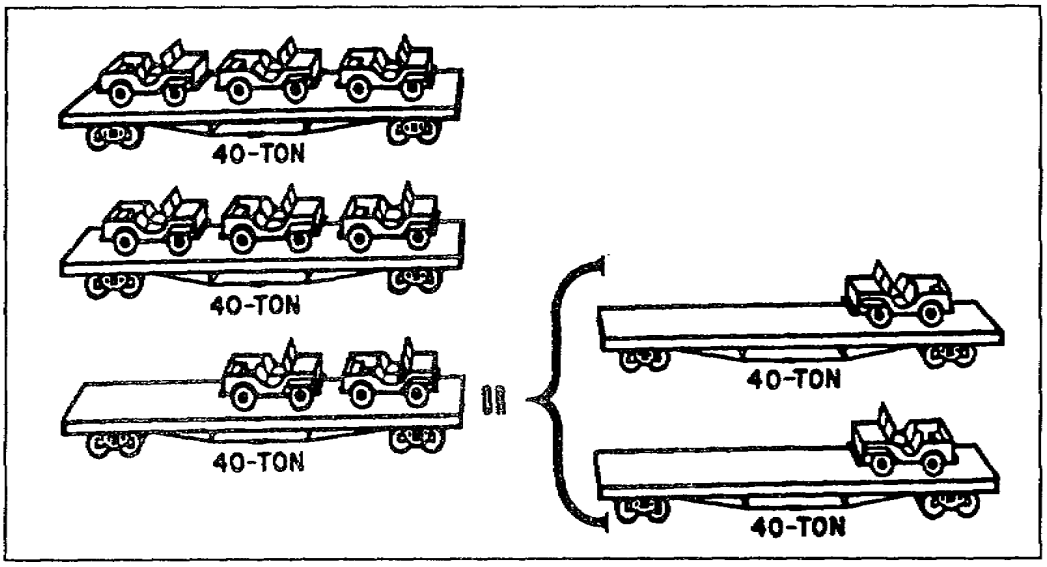

Figure 5-5. Two Possible Loading Combinations.

NOTE: The extra space on two of the flatcars. This space indicates you may need to consider different vehicle combinations.

Figure 5-6 shows the results of combining a load of one 2 1/2 ton truck and one 1/4 ton truck on each 40 ton railcar.

Vehicle	Length, (in.)	Weight, (lb.)
1/4 ton truck	131.8	2,350
2 1/2 ton truck	266.8	12,840
Total	398.6	15,190

Figure 5-6. 1/4 ton Truck and 2 1/2 ton Truck.

Continued on next page

Step 6: Load the flatcars on paper continued

Notice that in this example both the length and width requirements are under limits.

Figure 5-7 combines a personnel carrier with each of the 1/4-ton trucks on a 40-ton car and Figure 5-8 combines a personnel carrier with a 2 1/2-ton car. Notice that neither combination allows adequate space for the hand brake wheel clearance and blocking and bracing materials.

Vehicle	Length (in.)	Weight (lb.)
1/4 ton truck	131.8	2,350
Personnel carrier	191.5	19,755
Total	323.3	22,105

Figure 5-7. 1/4 ton Truck and Personnel Carrier.

Vehicle	Length (in.)	Weight (lb.)
2 1/2-ton truck	266.8	12,840
Personnel carrier	191.5	19,755
Total	458.3	22,105

Figure 5-8. 2 1/2 ton Truck and Personnel Carrier.

However, this combination would work on the 50 ton flatcar.

This is the type of analysis required for selecting the best railcars to serve your needs. There are two possible solutions for Situation IV.

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Solution 1

Figure 5-9 shows the first solution. You could accommodate all the vehicles on eight 40 ton flatcars using this configuration:

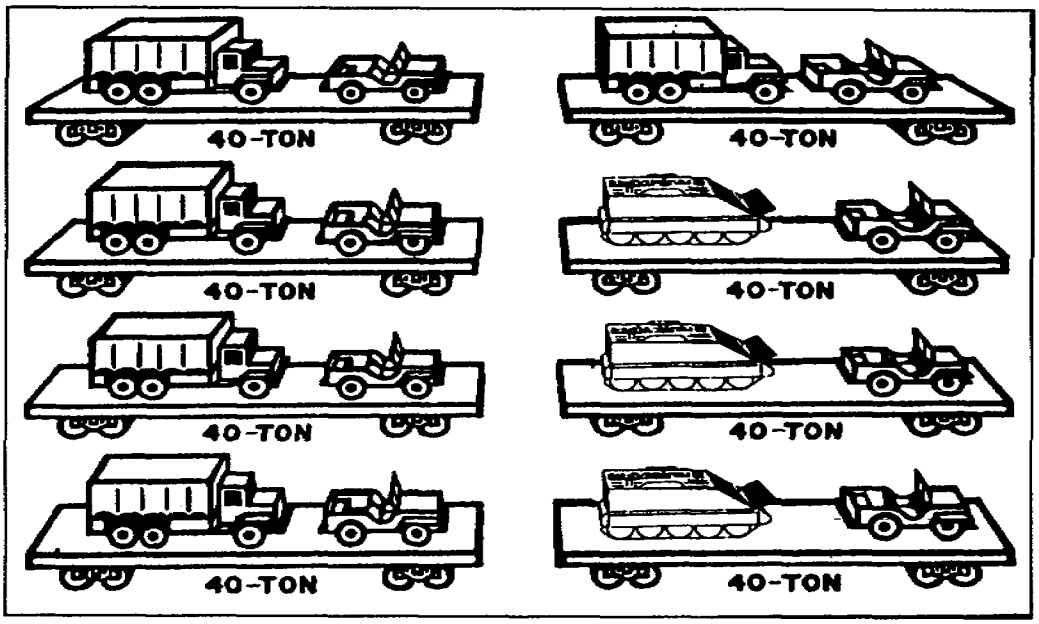

Figure 5-9. Solution One.

Solution 2

Figure 5-10 shows solution 2. This solution uses four 40 ton railcars and three 50 ton railcars.

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Solution 2, continued

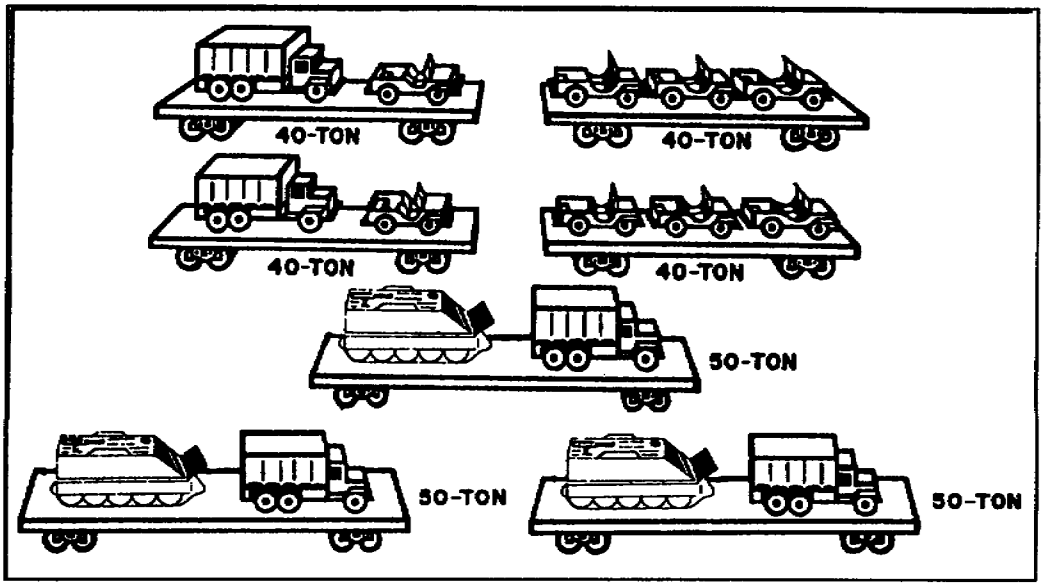

Figure 5-10. Solution Two.

5-4. Determining Rail Storage Capabilities

Introduction

Identifying the installation's railcars storage capabilities enables you to exercise options that are cost effective and more efficient for planning your unit's rail movement. Suppose your installation has a storage capability for 150 railcars but your unit's rail loadout requires 250 railcars. You can reduce demurrage charges by storing 150 cars and coordinating with the railroad to receive the additional 100 railcars when you need them.

Determining storage capabilities

These are the procedures for determining storage capabilities:

Step	Action
1	Identify the available installation trackage by consulting either the ITO or AR 55-357.
2	Convert available track yardage into feet by multiplying the yardage of each track by three.
3	Determine the actual feet of track available by multiplying the total available feet by 60 percent. Only 60 percent of the total track may be used at one time.
4	Divide the available track footage by the total length of each railcar ensuring the inclusion of coupler lengths.
5	Obtain the available track storage footage for that track to the nearest whole number.
6	Repeat steps 1 through 5 for each available track.
7	Add the available track storage footages. The sum equals your available track storage capability.

Situation

The 7th Transportation Motor Transport Battalion is currently stationed at Fort Eustis, Virginia. It has received alert orders for a rail loadout of the unit. You are the S3 in charge of loadout plans and operations. Determine the storage capabilities of Fort Eustis given this information:

- Government trackage connects with the Chesapeake and Ohio railway company at Lee Hall, Virginia.
- The government will perform internal switching.

Continued on next page

Situation, continued

- Side and end ramps are available as well as ramps for loading and unloading bi-level and tri-level cars.
- There are seven spur tracks available for storage of freight cars.
- Only 60 feet long and 10 feet wide wooden deck flatcars are available.

Step 1: Identify available trackage

Your first step is to identify the available installation trackage available. In this example you contacted your ITO and he provided you with the following information (Figure 5-11) concerning the seven tracks at Fort Eustis:

Track Number	Yard Layout
1	1,536 yards
2	1,502 yards
3	1,468 yards
4	1,434 yards
5	1,400 yards
6	1,366 yards
7	1,536 yards

Figure 5-11. Yard Layout.

Step 2: Convert yards to feet

In step 2, convert the track yards into feet by multiplying by 3. Begin the computations using the data for Track 1. Track 1 is 1,536 yards.

1,536 yards x 3 = 4, 608 feet.

Step 3: Determine available footage

Determine the actual footage available for your use, remembering that only 60 percent of the total trackage can be used at any one time. To determine available trackage, multiply the total available track footage (i.e., 4, 608) by 60 percent.

4,608 x .60 = 2,764.8 available track footage.

Continued on next page

Step 4: Determine the storage capability for the track

Step 4: determine the railcar storage capability for Track 1. You know each car is 60-feet long; however you must add on the length of the coupler (i.e., 2 feet) at the end of the car. This is the formula for computing the railcar storage capability for Track 1:

$$\frac{\text{Total available track footage}}{\text{(Railcar Length + Coupler Length)}} = \text{Track storage capability}$$

$$\frac{2{,}764.8}{\text{(60 feet + 2 feet)}} = 44.5934 \text{ feet}$$

Now, round this number, 44.5934, to the nearest whole number. Track 1 can store 45, 60 foot railcars.

Step 5: Repeat for remaining tracks

Repeat steps 1 through 4 for tracks 2 through 7.

Step 6: Determine total capabilities

Add the storage capabilities for each track. This sum is the total available track storage capability at Fort Eustis. This is the answer for our situation:

45 + 44 + 43 + 42 + 41+ 40+ 45 = 300

Fort Eustis can store 300,60 foot railcars at any given time.

5-5. Determining Placement Capabilities

Introduction

Determining railcar placement capabilities is an important rail move planning function. Placement capabilities greatly affect your loadout time estimate which impacts your railroad coordination requirements. Once you have estimated the amount of time a loadout will require, you coordinate with the railroad to provide switching at precisely the time the loadout is completed. This means no demurrage charge to pay. You must also--

- Notify contact agencies.
- Compute number of serials.

Spotting

Spotting is the stopping of a railcar at a point where its side or bottom doors are directly opposite or over warehouse doors, coal chutes, conveyors, elevators, or ramps. You need to determine your spotting capabilities during the planning phase of a rail loadout so you can estimate the time your loadout will require.

Computing spotting capability

Using the yard layouts for Track 7, Figure 5-11, these are the procedures for computing the spotting capability for Track 7, Load Ramp:

Step	Action
1	Convert track yardage to feet by multiplying-- 1,536 yards x 3 = 4,608 feet.
2	Obtain the actual footage available by multiplying by 60 percent-- 4,608 x .60 = 2,764.8 actual available footage.
3	Use this formula to determine the available track footage: Actual available footage ÷ (length of flatcar + length of coupler) 2,764.8 ÷ 62 = 44.593548.
4	Round 44.5934548 to the nearest whole number, and you have the number of 60-foot flatcars that can be spotted on Track 7 -- 45.

Continued on next page

Contact agencies

When preparing to move vehicles form the motor pool to the rail loading site you must contact these agencies:

Agency	Reason
The Provost Marshal	Contact the Provost Marshal to-- • Discover any restrictions on the number of vehicles allowed in a convoy on post. • *Determine time restrictions on movement* on post. • Check on escort requirements or needs.
Area railway companies	Inform area railway companies of the rail movement and request the required railcars.

Importance of coordination

Coordination with the provost marshal and railway companies is extremely important. Suppose you plan to finish part of your loadout at 1300 hours, and as these cars are switched, you now need to bring new cars forward. If the provost marshal has decreed that no vehicles can move on post at 1300, your loadout is delayed and you incur unnecessary demurrage charges.

Computing serials

You may have to compute the number of serials for moving a particular operation to the rail loading site. Your computations are based on the methods of determining load configurations. Follow unit integrity whenever possible. Organize your serials to arrive at the loading site in the same configuration that you plan to load.

5-6. Lesson Summary

Summary

This lesson covered the procedures for--

- Determining railcar requirements.
- Creating type loads for efficiency.
- Determining railcar placement capability.

It also addressed the contact agencies.

5-7. Lesson 5 Practice Exercise

Instructions

The following items will test your grasp of the material covered in this lesson. There is only one correct answer for each item. When you have completed the exercise, check your answers with the answer key that follows. If you answer any item incorrectly, study again that part of the lesson which contains the portion involved.

Item 1

What are type loads?

A. Loads that distribute the heaviest items among as many railcars as possible.
B. Loads that repeat themselves.
C. Loads considered outsized and/or overweigh according to AAR regulations.
D. Load combinations using the maximum number of available railcars.

Item 2

If your track is 1,434 yards what is its storage capability for 60-foot flatcars?

A. 42.
B. 56.
C. 69.
D. 72.

Item 3

Which of the following agencies must you contact to determine any time restrictions governing rail movement on post?

A. MTMC.
B. Base commander.
C. Area railway companies.
D. Provost marshal.

Item 4

If your track yardage equals 2,567, how many 60-foot flat cars can you spot?

A. 45.
B. 62.
C. 75.
D. 81.

Continued on next page

Item 5

When computing serial loads you must organize them to arrive in the reverse order of how they will be loaded.

A. True.
B. False.

5-8. Lesson 5 Practice Exercise Answer Key and Feedback

Item	Correct Answer and Feedback
1	B. Type loads are loads that repeat themselves. Page 5-4.
2	A. The storage capability for a track of 1,434 yards using 60-foot railcars is 42 railcars. These are the procedures for determining this track's storage capability:

Step	Action
1	Convert the track yardage to feet. 1,434 x 3 = 4,302 feet.
2	Determine the actual footage available for use by multiplying track footage by 60 percent. 4,302 x 0.60 = 2,581.2 available track footage.
3	Compute your railcar storage capability by dividing the total available track footage by the sum of the length of the railcar and coupler length. 2,581.2 ÷ (60+2) = 42.

Page 5-21.

3	D. To determine any on post time restrictions you must contact the Provost Marshal. Page 5-23.

Continued on next page

4 C. You can spot 75, 60-foot flatcars on a track with a yardage of 2,567.

Step	Action
1	Convert track yardage to feet. 2,567 X 3 = 7,701
2	Obtain actual available track footage. 7,701 x 0.60 = 4,620.6
3	Determine available track footage. 4,620.6 ÷ 62 = 74.52
4	Round to the nearest heaviest whole number. 75

Page 5-22.

5 B. When computing serial loads you must recognize them to arrive at the loading site in the same configuration that you plan to load. Page 5-23.

LESSON 6

DETERMINING BLOCKING, BRACING, AND TIE-DOWN REQUIREMENTS

6-1. Lesson 6 Overview

Lesson description

Blocking, bracing, and tie-down materials protect a unit's equipment and the rail equipment which transports it. If military equipment is improperly blocked and braced and results in an accident, the military shipper is liable for damages. This lesson describes the physical forces working against loads and the procedures for blocking and bracing a 2 1/2 ton cargo truck.

Enabling learning objective (ELO)

This is the enabling learning objective for this lesson:

Action: Determine requirements for BBT materials to include the physical forces exerted on loads during transit. Compute your unit's requirement for BBT materials.

Condition: Given a self-study environment and the materials provided in this subcourse text.

Standard: In accordance with this subcourse materials and/or the references cited below.

References

These are the references used in developing this lesson:

- AR 55-33, *Procedures for handling Through-Bill-of-Lading Household Goods Shipments during Periods of Longshoreman and/or Maritime Strikes*, dated November 1964.
- AR 220-10, *Preparation for Overseas Movement of Units (POM)*, June 1973.
- DoD Reg. 4500.32-R, *MILSTAMP Volume I. With Ch 6*, May 1995
- FM 55-15, *Transportation Reference Data*, January 1986.
- FM 55-65, *Strategic Deployment for Surface Transportation*, Oct 1995.
- TM 55-601, *Railcar Load Procedures*, August 1971.
- TM 55-2200-001-12, *Transportability Guidance: Application of Blocking, Bracing, and Tiedown Materials for Rail Transport*.

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Lesson content

These are the topics included in this lesson:

6-2. Identifying Physical Forces

Introduction

To immobilize a load you must use blocks, cleats, and wire cable or chain to counteract the stress and strain caused by the motion of the flatcar. These are the three physical forces exerted on a load during transit:

- Longitudinal force.
- Transverse force.
- Vertical force.

Longitudinal force, definition

Longitudinal force occurs when a railcar comes to a sudden stop. Even though the railcar has stopped, the load continues moving in the same direction and at the same speed.

The AAR designates blocking pattern 16, Figure 6-1, to counteract this force. These are the procedures for forming pattern 16:

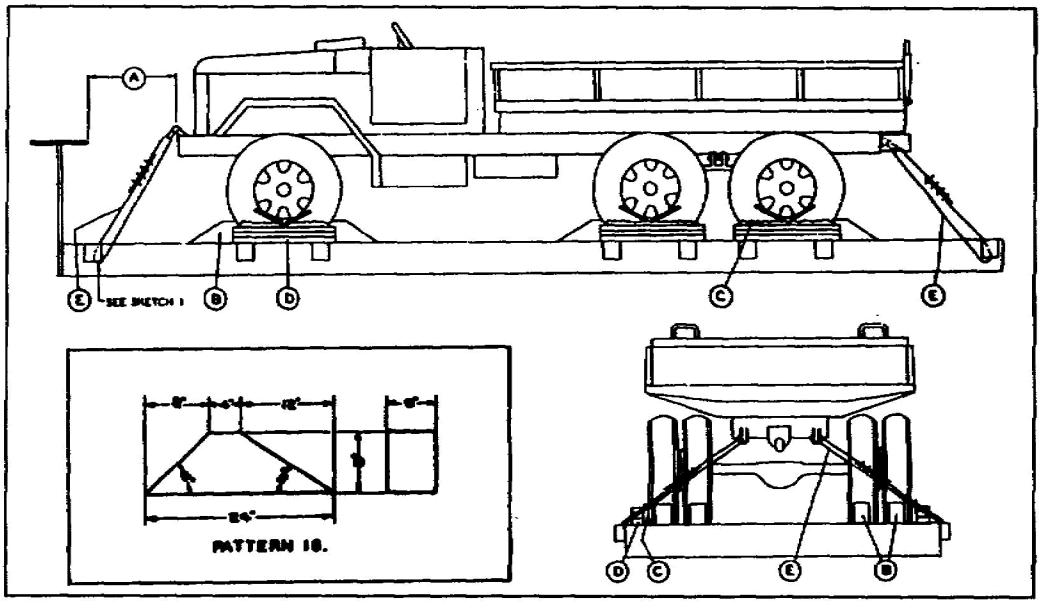

Figure 6-1. Pattern 16.

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Longitudinal force, continued

Step	Action
1	Place blocks at 45 degree angle against-- • The front and rear of the equipment's front wheels. • In front of the inner and outer intermediate wheels. • Behind the inner and outer rear wheels.
2	Nail the heel of the block to the car floor using three forty penny (40D) 5 inch nails and toenail that portion of the block under the tire to the car floor with two 40D nails.
3	Apply protective material and remaining blocks.

NOTE: Four-wheeled vehicles have blocks in the front and rear of each wheel.

Transverse force

Transverse, or centrifugal force, occurs when a train is going around a curve. This force pushes the load closest to the curve toward the outside of the railcar. If your load is not restrained, centrifugal force may push it off the side of the railcar. Use side bracing, Figure 6-2, to counteract this force. Side bracing consists of two 2 feet by 4 feet by 3 feet boards nailed one on top of the other. These are the procedures for side bracing the load:

Step	Action
1	Place the side braces along the outer face of the equipment's wheels.
2	Nail the bottom cleat to the car floor and then nail two more cleats on top.
3	Secure cleats using 20D nails into the deck at right angles to the board for maximum holding power.
4	Place waterproof paper, Figure 6-3, or burlap between the wheel and cleat to prevent the tires from chafing. Also place waterproof paper under the bottom cleat.
5	Extend the waterproof paper 2 inches above the top cleat.

Continued on next page

Transverse force, continued

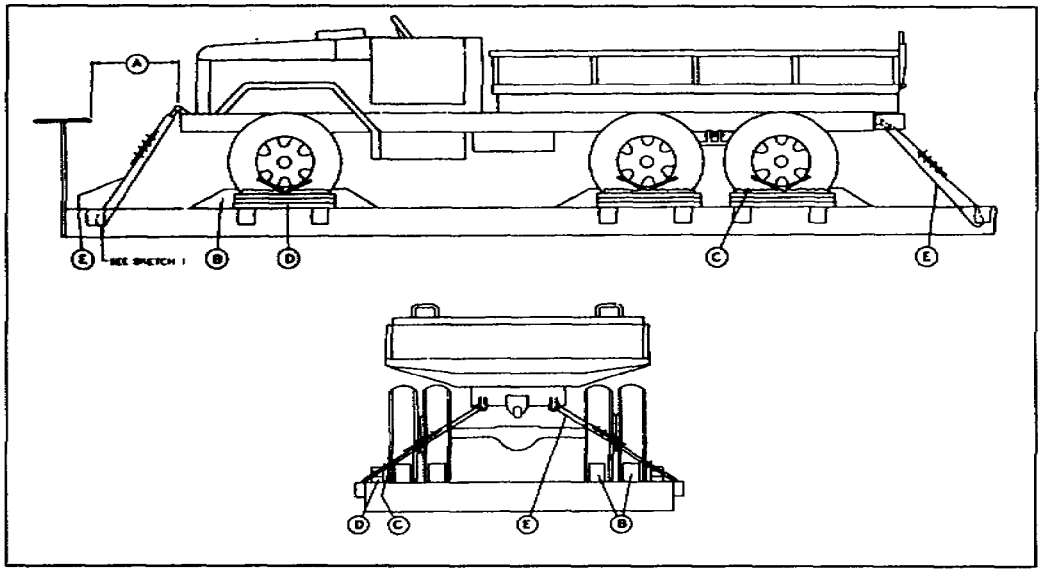


Figure 6-2. Side Bracing.

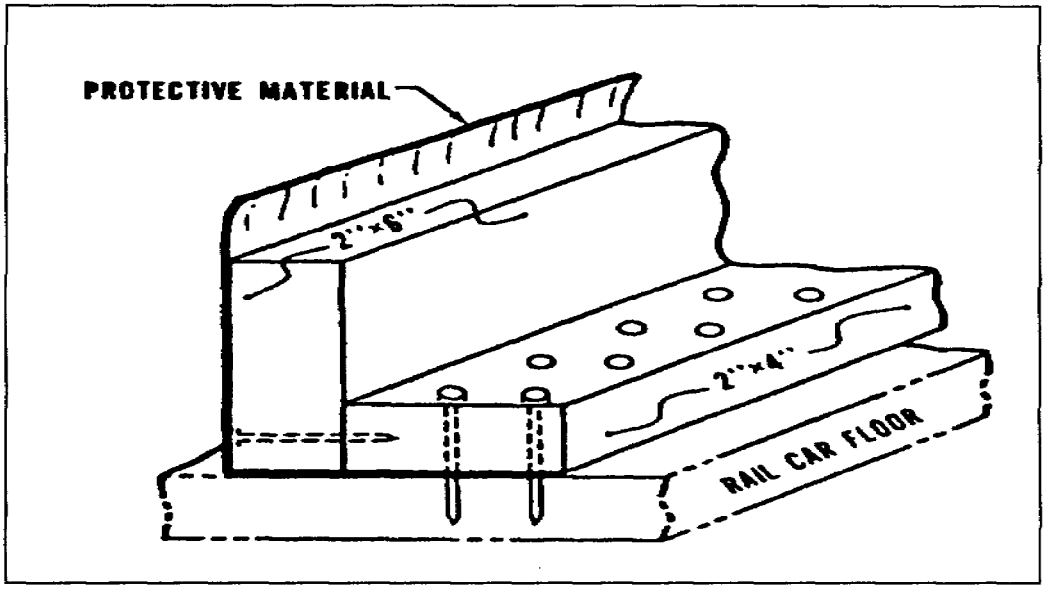


Figure 6-3. Placement of Waterproof Paper.

Continued on next page

Vertical force

Vertical force is caused by bouncing. The greater the roughness of the roadbed, the greater the vertical force exerted. You can counteract vertical force by tying down your equipment as shown in Figure 6-4, Wire Tie-down to Counteract Vertical Force. When tying your load to counteract vertical force use four pieces of the proper width wire rope to tie equipment down to the side stake pockets.

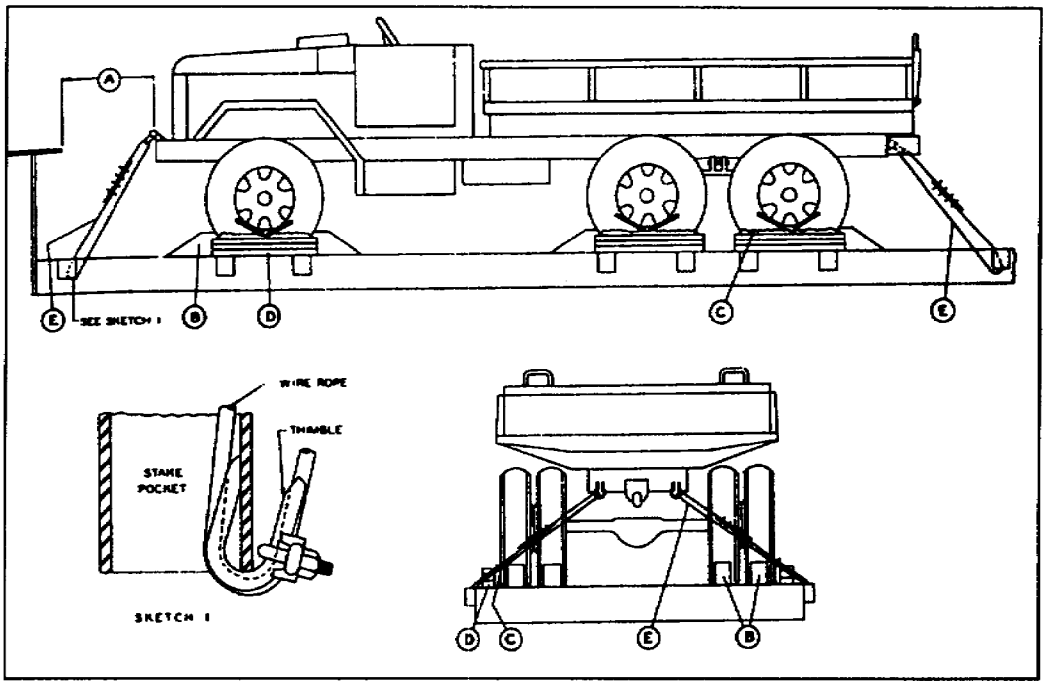


Figure 6-4. Wire Tie-Down to Counteract Vertical Force.

6-3. Identifying Blocking and Bracing Requirements

Introduction

Because military equipment is often heavy, oversized, and sometimes has moveable turrets, arms, or booms, proper blocking and bracing methods are imperative for ensuring the equipment arrives at the POE in good working order. You must ensure that wheels or treads are blocked, chassis are tied down, and moveable parts are secured so the vehicle does not work its way loose during the move.

Determining BBT requirements

Following these guidelines for determining your BBT requirements will save you loading time, aggravation, and money otherwise charged for delays:

- Vehicles are always blocked and braced the same way each time they are shipped.
- All vehicles of the same type must be blocked and braced by the same method.

Using TM 55-2200-001-12

When computing BBM for a specific piece of equipment you must consult TM 55-2200-001-12. These are the procedures for using TM 55-2200-001-12 to compute your BBM for a 3/4-ton utility truck:

Step	Action
1	Using *Figure 6-5, Partial DA Form 2940-R*, find the first type of cargo listed on the unit's DA Forms 2940-R.

UNIT LOADING INVENTORY AND CHECKLIST (WORKSHEET)

ORGANIZATION: 142d TRANS MDM TRK CO
STATION: FT CARSON, COLORADO
TOE: 55-018
DATE: 7 Nov 88

PACKAGE NO.	QUANTITY	DESCRIPTION	DIMENSIONS (L x W x H)	WEIGHT (LB)	CUBE (FEET)	SQUARE* (FEET)
Z001	1	Truck, Utility, 3/4 ton	186.3x79.6x75.0	5275	645.6	102.98
Z002	1	Truck, Utility, 3/4 ton	186.3x79.6x75.0	5275	645.6	102.98
Z003	1	Truck, Utility, 3/4 ton	186.3x79.6x75.0	5275	645.6	102.98
Z004	1	Truck, Utility, 3/4 ton	186.3x79.6x75.0	5275	645.6	102.98
Z005	1	Truck, Utility, 3/4 ton	186.3x79.6x75.0	5275	645.6	102.98
Z006	1	Truck, Cargo 2½ ton 6x6	264.3x95.3x80.9	13,180	1179.2	175.0
Z007	1	Truck, Cargo 2½ ton 6x6	264.3x95.3x80.9	13,180	1179.2	175.0
Z008	1	Truck, Wrecker, 5 ton	354.[illegible]	34[illegible]	2116	241.9
[illegible]	1	[illegible]	256[illegible]	[illegible]	163	170

Figure 6-5. Partial DA Form 2940-R.

Continued on next page

Using TM 55-2200-001-12, continued

Step	Action
2	Locate the page in TM 55-2200-001-12 dealing with 3/4-ton trucks. Figure 6-6, Extract TM 55-2200-001-12, illustrates this page.
3	Using Figure 6-6, find the **Item** column below the illustration. This column contains the same letters which appear in the illustration. These letters identify specific areas of the truck requiring blocking or bracing. For example, the letter "B" of the **Item** column identifies some of the blocking materials for securing the wheels.
4	Locate the **No. of PCS.** column. This column identifies how many pieces of BBM are required for securing a particular area of the truck.
5	Now locate **Description,** the last column. This column describes or identifies the BBM for securing a specific area, for example Block, pattern 16.
6	Copy down the BBM and quantities you require for this truck.

BBM for dual-wheeled vehicles

Notice that Figure 6-6 lists BBM requirements for four- and six-wheel trucks, either singular or dual wheels. You can see that other vehicles have dual wheels in the rear. Since each wheel must be blocked, dual-wheeled trucks require twice the blocking materials of single-wheeled trucks. The 3/4-ton truck has single wheels on four axles for a total of four wheels.

Computing BBM requirements

Next compute the BBM requirements. Using Figure 6-6, item “B” states, “Four wheel vehicles have blocks in the front and rear of each wheel.” Based on this guidance your BBM requirements are--

- Two blocks for each wheel. Multiply the number of wheels by two. You will need eight blocks per four wheel utility truck.
- Five 40D nails. Multiply the number of nails you require by the number of blocks. You will need forty 40D nails for each four wheel utility truck.

Continued on next page

Computing BBM requirements, continued

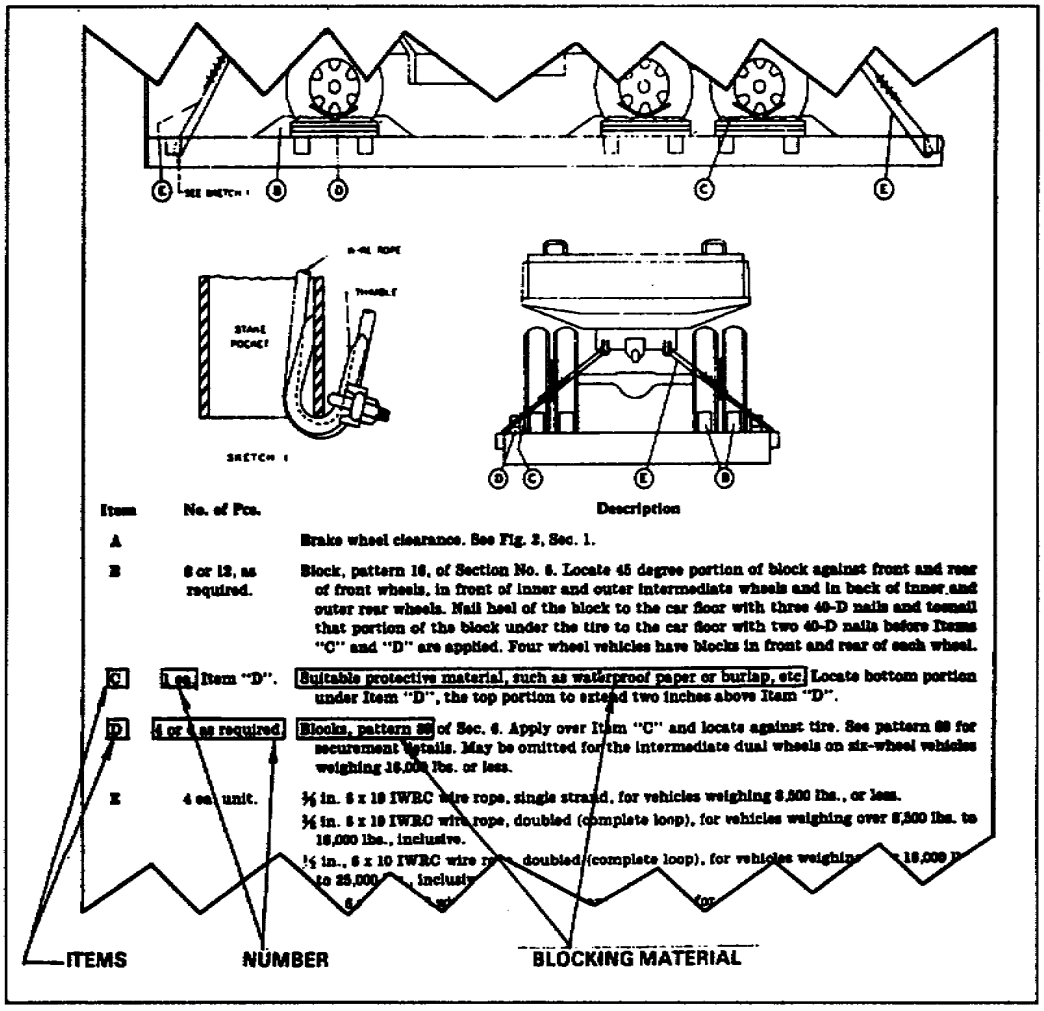


Figure 6-6. TM 55-2200-001-12 Extract Page.

Continued on next page

Computing BBM requirements, continued

Now evaluate your requirements for Item "C". Item C lists protective material placed alongside each wheel. Since it lists 1 for each wheel, you must multiply the number required by the number of wheels. In this example, you need four pieces of protective material for the 3/4-ton utility truck.

Item "D" lists "4 to 6 as required" pattern 89 blocks. Item D fits to the outside of each wheel, a 3/4-ton truck requires four blocks. Pattern 89 is shown in Figure 6-7, Pattern 89.

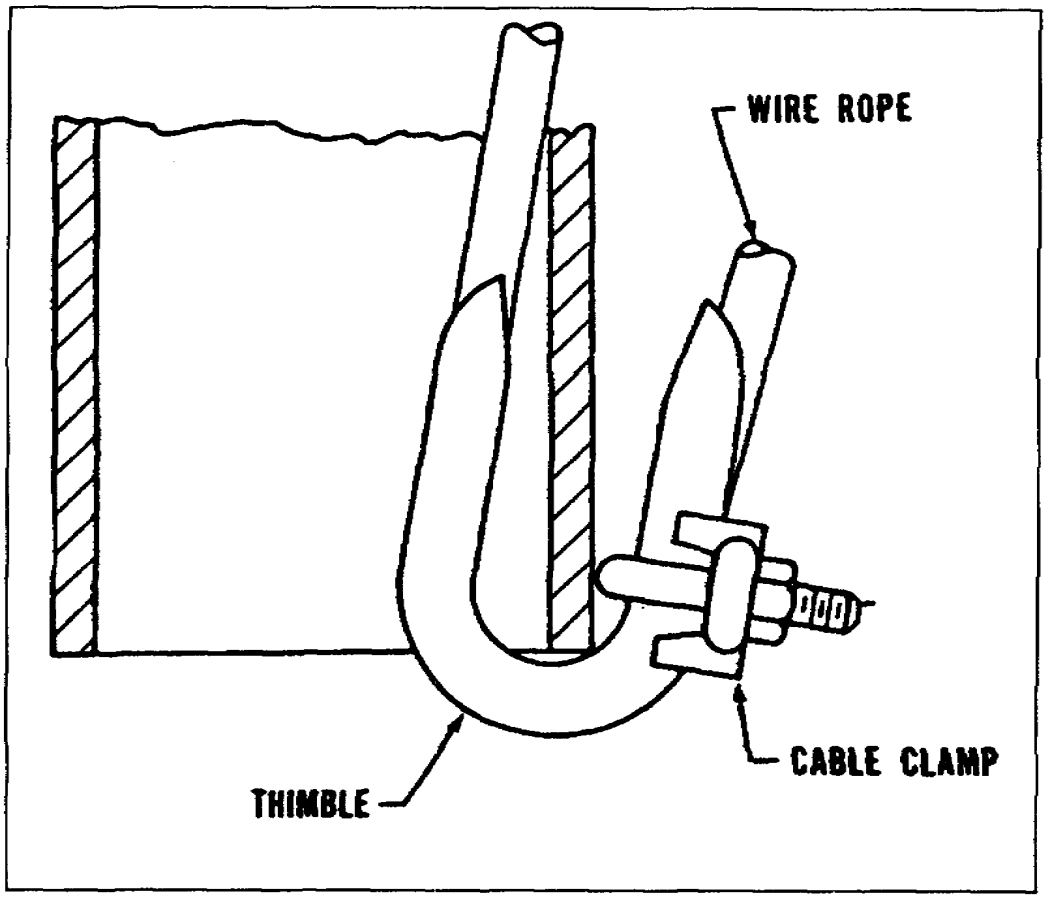


Figure 6-7. Pattern 89.

Continued on next page

Using the pattern diagrams

Notice that Item "D" does not give a requirement for nails. Instead it tells you to "See pattern 89 for securement details." To find out how to secure blocking and bracing, you locate the pattern section of TM 55-2200-001-12. The description of pattern 89 gives you directions for making these blocks at the load site using the required dunnage and 12D and 20D nails. Each block requires five 12D nails and fifteen 20D nails and you require four blocks, one for each wheel, so you will need--

- Twenty 12D nails, 4 wheels x 5 12D nails = 20 12D nails.
- Sixty 20D nails, 4 wheels x 15 20D nails = 60 20D nails.

Determining wire rope requirement

Item E on Figure 6-6 lists the wire rope requirement. Note that "4 ea. unit" are called for regardless of the number of wheels. Also note that the size wire rope depends upon the weight of the vehicle it must hold. Let's say that the 3/4-ton truck weighs 5,275 pounds, putting it in the first class of wire rope. Wire rope is usually supplied by the spool, so you must measure the pieces according to the type of vehicle being secured.

Computing thimble requirements

The last computation involves computing the thimbles for the stake pockets where the cable is fastened. To determine requirements for thimbles and clips, the description section of the TM refers you to General Rules 15(d) and 15(n) in Appendix D. These rules state that a cable clip is required for each thimble to keep the cable from slipping out.

Continued on next page

Computing thimble requirements, continued

NOTE: In practice, a 3/8-inch thimble does not leave room against the stake pocket for a 3/8-inch clip. To deal with this situation, use a cable clip which is at least one or two sizes larger.

To make a cable fast when using a single-strand cable, place two cable clips at each end of the cable

NOTE: Section No. 1, General Rules, Appendix D, TM 55-2200-001-12 shows a table from which you can determine the number of clamps to secure a specific diameter of cable. Rule 15(n) Note (a) states..."When the number of clips and /or clamps shown in the table is used and the clips and/or clamps are properly applied, they will develop 85 percent of the minimum breaking strength of the wire rope and/or cable."

Cable configurations depend upon the weight of the vehicle. A 3/4-ton truck requires only a single-strand tie-down. Therefore, for each cable you will need four cable clips-- two for each end of the cable.

So, you will need a total of 16 cable clips.

4 cables x 4 cable clips for each cable = 16 total cable clips.

BBM summary

Now sum up your BBM list for this 3/4-ton truck. These are your BBM requirements.

Item	Quantity
Pattern 16 blocks	8
40D nails	40
Protective material	4 pieces
Pattern 89 blocks	4
12D nails	20
20D nails	60

Continued on next page

BBM summary, continued

Item	Quantity
3/8-inch wire rope	4 pieces cut to the required lengths
3/8-inch cable clips	16
1/2-inch cable clips	4
3/8-inch thimbles	4

Total BBM requirements

Now that you have computed your BBM requirements for one 3/4-ton utility truck you must compute your total BBM requirements for this truck. Refer to Figure 6-5 and notice that your unit has five of these trucks. Since all the trucks require the same BBM you must multiply the materials you have computed by five. These are the BBM requirements for your unit's five 3/4-ton utility trucks:

Item	Quantity
Pattern 16 blocks	40
40D nails	200
Protective material	20 pieces
Pattern 89 blocks	20
12D nails	100
20D nails	300
3/8-inch wire rope	20 pieces cut to the required lengths
3/8-inch cable clips	80
1/2-inch cable clips	20
3/8-inch thimbles	20

Computing other requirements

When computing BBM requirements for other vehicles remember to look for overlapping types when tracing vehicles in TM 55-2200-001-12. For example, different vehicles are often combined in this TM according to similarities in blocking requirements. Therefore, BBM for two 1/2-ton cargo trucks are listed on the same page as the 3/4-ton utility truck. The differences depend upon the number of wheels to be blocked and the amount of weight requiring restraint by wire rope.

Continued on next page

Computing other requirements, continued	Upon the completion of all BBM for your unit's equipment, total your requirements. These totals are used to order all BBM not on-hand at the rail head. Forward your BBM requirements to your ITO. The post engineers will supply your BBM requirements when conducting your unit's loadout.

6-4. Lesson Summary

Summary

This lesson described the BBT materials required to protect your unit's equipment during a rail movement. The three forces that impact a load during transit are:

- Longitudinal force.
- Transverse force.
- Vertical force.

TM 55-2200-001-12 provides specific BBM requirements for transporting military equipment by rail; however, you must remember to multiply these requirements by the number of vehicles being transported by your unit.

6-5. Lesson 6 Practice Exercise

Instructions

The following items will test your grasp of the material covered in this lesson. There is only one correct answer for each item. When you have completed the exercise, check your answers with the answer key that follows. If you answer any item incorrectly, study again that part of the lesson which contains the portion involved.

Item 1

Which of these physical forces is exerted when a railcar comes to a sudden stop?

A. Transverse.
B. Longitudinal.
C. Vertical.
D. Centrifugal.

Item 2

How do you counteract vertical force?

A. Side bracing.
B. Pattern 16.
C. Wire rope tied to side stake pockets.
D. Pattern 89.

Item 3

If your unit has nine 4-wheel trucks, how many blocks does your unit require?

A. 144.
B. 36.
C. 72.
D. 81.

Item 4

Who supplies your unit's BBM requirements when conducting a rail loadout?

A. UMO.
B. ITO.
C. Post engineers.
D. MTMC.

Continued on next page

Item 5

When rounding a curve, vertical force may cause your load to be pushed off the railcar if not properly secured?

A. True.
B. False.

6-6. Lesson 6 Practice Exercise Answer Key and Feedback

Item	Correct Answer and Feedback
1	B. Longitudinal force is exerted on a load when the railcar comes to a sudden stop. Page 6-3.
2	C. Counteract vertical force by using wire rope of the appropriate size and tying down the equipment to the stake packets. Page 6-6.
3	C. Your unit will need 72 blocks to brace the nine 4-wheel trucks. Each wheel required two blocks one in front and to the rear of each wheel. Multiply the number of wheels by two and multiply the product by the number of vehicles to be transported 4 wheels x 2 blocks per wheel = 8 blocks per vehicle. 8 x 9 = 72 blocks required. Page 6-8.
4	C. Post engineers will provide your unit's BBM requirements when conducting a rail loadout.
5	B. False. Transverse force occurs when a train is rounding a curve and may push your load off the side if it is not properly secured. Page 6-4.

LESSON 7

PREPARING A UNIT RAIL LOAD PLAN

7-1. Lesson 7 Overview

Lesson description

Previous material addressed applicable rail load references, the types of available rail equipment, and the procedures for computing BBM requirements. This lesson discusses the procedures for preparing your unit's rail load plan to include--

- Completing DA Form 2942-R.
- Preparing a conceptual rail load plan.

Enabling learning objective

This is the ELO for this lesson:

Action: Prepare a unit rail load plan by completing DA Form 2942-R for equipment and personnel, planning the placement of vehicles on a railcar, and creating a conceptual rail load plan.

Condition: Given a self-study environment and the materials provided in this subcourse text.

Standard: In accordance with this subcourse text material and/or the references cited below.

References

These are the references used in developing this lesson:

- FORSCOM/ARNG 55-1, *Transportation and Travel, Unit Movement Planning*, dated July 1993.
- FORSCOM Regulation 55-2, *Unit Movement Data Reporting and Systems Administration*, dated October 1993.
- FM 55-65, *Strategic Deployment by Surface Transportation*, dated October 1995.
- FM 100-17, *Mobilization, Deployment, Redeployment, and Demobilization*.
- TB 55-46-1, *Standard Characteristics for Transportability of Military Vehicles and Other Outsize/Overweight Equipment*.

Continued on next page

Lesson content

These are the topics included in this lesson:

7-2. Using the DA Form 2942-R

Introduction

The DA Form 2942-R records the number and type of cars for accommodating your unit's equipment. This form also records passenger car requirements. Let's discuss the procedures for preparing the DA Form 2942-R.

Analyzing the data

The first step is analyzing the AUEL to determine which unit equipment to place on the railcars. You use the AUEL data to prepare the DA Form 2942-R, Unit Train Loading Plan Worksheet. This analysis ensures you make maximum use of a railcar's available space and weight limitations. For example, let us examine a sample AUEL (Figure 7-1). To place equipment properly on railcars you must determine certain characteristics of the equipment to include the following--

- Tallest item.
- Widest vehicle.
- Heaviest vehicle.

NOTE: The DA Form 2942-R example that begins on page 7-5 is based on equipment authorized in a Transportation Company, Medium Truck and uses 70-ton flatcars for the analysis. The flatcars can carry cargo up to a 9 1/2-foot height. For this lesson's purpose, we will use the capacity designation because the load limit may differ from car to car. Therefore, we will use CAPY for 70-ton flatcars--140,000 pounds--as an arbitrary figure. Remember both CAPY and load limit are always expressed in pounds.

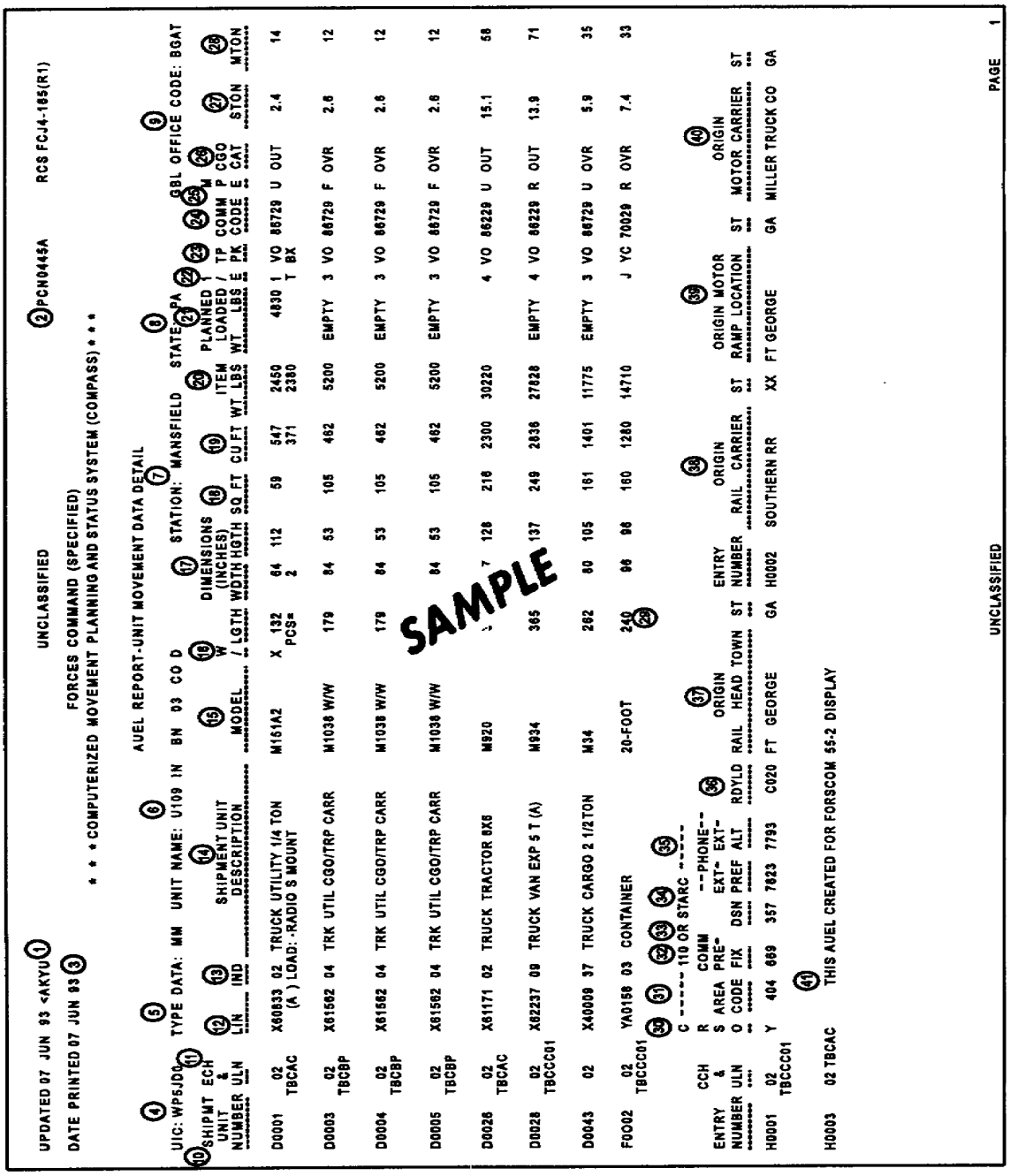
Checking with the carrier

When planning the unit move, you must check with the selected carrier in advance to determine if any of the railcars they provide to you exceed height and width clearance. Based on this data and your vehicles' dimensions, the train will then be routed. It is necessary, therefore, that you submit accurate measurements of your equipment. Any piece of equipment exceeding 15-feet 1-inch in height or 10-feet 8-inches in width maybe considered an outsized load. If for some reason the dimensions change, notify the ITO so he can request assistance from the carrier and obtain routing that allows the equipment to move. This step avoids--

- Delays.
- Unsafe loads.
- Potential damage to military or carrier equipment.

Continued on next page

Checking with the carrier, continued



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UPDATED 07 JUN 93 <AKYU (1) — UNCLASSIFIED — (2) PCN0445A — RCS FCJ4-165(R1)

DATE PRINTED 07 JUN 93 (3) — FORCES COMMAND (SPECIFIED)

* * * COMPUTERIZED MOVEMENT PLANNING AND STATUS SYSTEM (COMPASS) * * *

AUEL REPORT-UNIT MOVEMENT DATA DETAIL

UIC: WP5JD0 (4) TYPE DATA: MM (5) UNIT NAME: U109 IN (6) BN 03 CO D (7) STATION: MANSFIELD (8) STATE: PA (9) GBL OFFICE CODE: BOAT

(10) SHIPMT UNIT NUMBER	(11) ECH & ULN	(12) LIN	(13) IND	(14) SHIPMENT UNIT DESCRIPTION	(15) MODEL	(16) / LGTH	(16) W WDTH	(16) HGTH	(17) DIMENSIONS (INCHES) SQ FT	(18) CU FT	(19) WT LBS	(20) ITEM WT LBS	(21) PLANNED / LOADED WT LBS	(22) E	(23) TP PK	(24) COMM CODE	(25) M	(26) P CGO CAT	(27) STON	(28) MTON
D0001	02 TBCAC	X60833	02	TRUCK UTILITY 1/4 TON (A) LOAD: RADIO S MOUNT	M151A2	X 132 PCS=	64	112	59 2	547 371	2450 2380	4830	1 T	VO BX	85729	U	OUT	2.4		14
D0003	02 TBCBP	X61562	04	TRK UTIL CGO/TRP CARR	M1038 W/W	179	84	53	105	462	5200	EMPTY	3	VO	86729	F	OVR	2.6		12
D0004	02 TBCBP	X61562	04	TRK UTIL CGO/TRP CARR	M1038 W/W	179	84	53	105	462	5200	EMPTY	3	VO	86729	F	OVR	2.6		12
D0005	02 TBCBP	X61562	04	TRK UTIL CGO/TRP CARR	M1038 W/W	84	53	105	462	5200	EMPTY	3	VO	86729	F	OVR	2.6		12
D0026	02 TBCAC	X61171	02	TRUCK TRACTOR 8X8	M920	7	128	216	2300	30220		4	VO	86229	U	OUT	15.1		58
D0028	02 TBCCC01	X62237	09	TRUCK VAN EXP 5 T (A)	M934	365	137	249	2836	27828	EMPTY	4	VO	86229	R	OUT	13.9		71
D0043	02	X40009	37	TRUCK CARGO 2 1/2TON	M34	282	80	105	161	1401	11775	EMPTY	3	VO	86729	U	OVR	5.9		35
F0002	02 TBCCC01	YA0156	03	CONTAINER	20-FOOT	240 (28)	96	96	160	1280	14710		J	YC	70029	R	OVR	7.4		33

SAMPLE

ENTRY NUMBER	CCH & ULN	R S O	AREA CODE	COMM PRE-FIX	DSN	EXT- PREF	EXT- ALT	RDYLD	(37) ORIGIN RAIL HEAD	TOWN	ST	ENTRY NUMBER	(38) ORIGIN RAIL CARRIER	ST	(39) ORIGIN MOTOR RAMP LOCATION	ST	(40) ORIGIN MOTOR CARRIER	ST
H0001	02 TBCCC01	Y	404	869	357	7823	7793	C020	FT GEORGE	GA	H0002	SOUTHERN RR	XX	FT GEORGE	GA	MILLER TRUCK CO	GA	

(29) (30) (31) (32) (33) (34) (35) (36) C ------ 110 OR STARC ------

(41) H0003 02 TBCAC THIS AUEL CREATED FOR FORSCOM 55-2 DISPLAY

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Figure 7-1. Sample AUEL

Continued on next page

Checking with the carrier, continued

Reference Table for AUEL Detail Report		
Key #	**Data Element**	**Definition**
1	Updated	Date unit sent UMD to UMC
2	PCN	Production Control Number
3	Date Printed	Date report printed at FORSCOM
4	UIC	Unit identification code--a six digit alpha numeric code that uniquely identifies an organization. (SORTS input on FORSCOM BIDE file.
5	Type Data Code	A code assigned by FORSCOM which (TD or TDC) identifies the type of UMD on file for different movement plans
6	Unit Name	Unit identity - unit number, branch, and description. SORTS input on FORSCOM BIDE file.
7	Station	This is where the unit is located (origin station). SORTS input of the FORSCOM BIDE File. *NOTE:* Origin station for storage sites (that is type data code S1-S$, S6, S7) is generated by the COMPASS office and not on the BIDE file.
8	State	Unit home state. SORTS input on the FORSCOM BIDE file.
9	GBL Office Code (GBLOC)	Code assigned and used by MTMC for the installation that issues the GBL (AR 55-355).
10	Shipment Unit Number (SUN)	This refers to the record type and entry number. Input by the unit.
11	ECH ULN	A 01, 02, or 03 is required in this field for RC MOB UMD reporting. This should be blank for AC AUEL reports. Unit line number input by unit extracted from Time Phased Force Deployment List (TPFDL). This field should be blank except when use of the ULN is directed .
12	LIN	Line Item Number is a 6 alpha numeric code used to identify equipment type. TB 55-46-1 contains approved LINs that must be varied against the MTOE.
13	Index	Index Number of the lLIN number which identifies the different type models or component items of the LIN. (The Index can be found in TB 55-46-1)
14	Shipment Unit Description	Description of the units equipment based on the reported LIN/LIN Index.
15	Model	The model of the item reported based on the LIN Index
16	W/I	An "X" indicates that the Height of the vehicle has been changed because a load has been placed on the vehicle causing the Height to be higher than the Cargo Load Limit Height found in TB 55-46-1 and the Equipment Characteristics File

Continued on next page

Checking with the carrier, continued

Reference Table for AUEL Detail Report, continued		
Key #	**Data Element**	**Definition**
17	Dimension	The actual shipping length, width, and height in inches of each item reported.
18	SQ FT	The square feet of the item reported.
19	CU FT	The cubic feet of the item reported.
20	Item Wt Lb.	The weight of the item reported. For vehicles that are loaded, the weight of the load will appear below the vehicle weight
21	Planned Loaded Wt	The gross weight of the item reported. For vehicle that contain a load the Vehicle Weight plus the Load Weight equals the Planned Loaded Weight
22	Type Equipment (T/E)	The Type Equipment code of the item reported.
23	TP PK	The Type Pack code of the equipment reported.
24	COMM Code	The Water Commodity and Special Handling Codes for equipment reported. (See MILSTAMP, DoD 4500.32-R)
25	MPE	The Mode to Port of Embarkation/Mobilization Station (MPE/MMS) Shipment codes that were determined and reported by the unit.
26	CGO CAT	A Cargo Category Codes generated using the Second Position of the Cargo Category Code listed in JCS Pub 6, Volume II, Chapter I, Part 5 as follows: NAT Not Air Transportable OUT Outsize will fly in C5 only OVR Oversize will fly in C141 or C5 BLK Bulk Cargo with dimensions less than oversized cargo.
27	STON	The weight in Short Tons of the item being reported. (STON 2,000 pounds).
28	MTON	The Measurement Tons of the item being reported. (MTON cubic feet / 40)
29	Remarks	Explanation, clarification, or additional information required on the AUEL.
30	Contingency STAMDOMG Route Order (CSRO)	If a CSRO is desired a "Y" is reported indicating "yes". If so, data must be entered for data keys 31 through 40. If an "N" (indicating "No") is entered, then keys 31 through 41 will be blank.
31	Area Code	The commercial telephone area code number of the ITO or STARC office.
32	Commercial Prefix	The commercial telephone prefix number of the ITO or STARC office

Continued on next page

Checking with the carrier, continued

Reference Table for AUEL Detail Report, continued		
Key #	**Data Element**	**Definition**
33	DSN	The DSN number of the ITO or STARC office.
34	Phone Ext. Pref.	The preferred telephone extension number of the ITO or STARC office.
35	Phone Ext. Alt	The alternate telephone extension number of the ITO or STARC office.
36	RDYLD	Ready to load date. This is an estimate of the earliest date a unit is expected to be ready to move out from origin. It can be obtained from the Installation or TAG Mobilization Planning Officer.
37	Origin Rail Head	The name of the Rail Head Town and State where the equipment may be loaded on Rail Cars.
38	Origin Rail Carrier	The Rail carrier that may be used to transport unit equipment.
39	Origin Motor Ramp	The name of the Ramp location and State which may be used to load unit equipment on trucks and trailers.
40	Origin Motor Carrier	The Motor Carrier's name and State which may be used to transport unit equipment .
41	Remarks	This location on the report can be used to enter remarks that provide explanation or clarification of additional information about the unit.

Continued on next page

Planning vehicle placement

Using Figure 7-1 as a guide, plan the placement of vehicles on a 70-ton, 50-foot flatcar with a 140,000-pound load limit. Remember that any piece of equipment exceeding 15 feet, 1 inch in height or 10 feet, 8 inches in width, may be considered an outsized load. Simplify your loading and unloading operations by combining each vehicle with a tractor. Start by computing possible combinations of equipment:

<table>
<tr><th>Step</th><th>Action</th></tr>
<tr><td>1</td><td>Add the weights and lengths for a tractor and semitrailer:
<table>
<tr><th></th><th>Weight</th><th>Length</th></tr>
<tr><td>Tractor</td><td>24,917</td><td>256</td></tr>
<tr><td>Semitrailer</td><td>17,390</td><td>492</td></tr>
<tr><td>TOTAL</td><td>42,307</td><td>748</td></tr>
</table>
As you can see, the weight is fine since the rated load for a 70-ton flatcar is 140,000 pounds. However, the length of the load is 50 feet or 600 inches once you have subtracted the 4 feet for tiedowns. The load's length for this flatcar cannot exceed 552 inches; therefore, as you can see in Figure 7-2, the load length of 748 inches does not work.</td></tr>
</table>

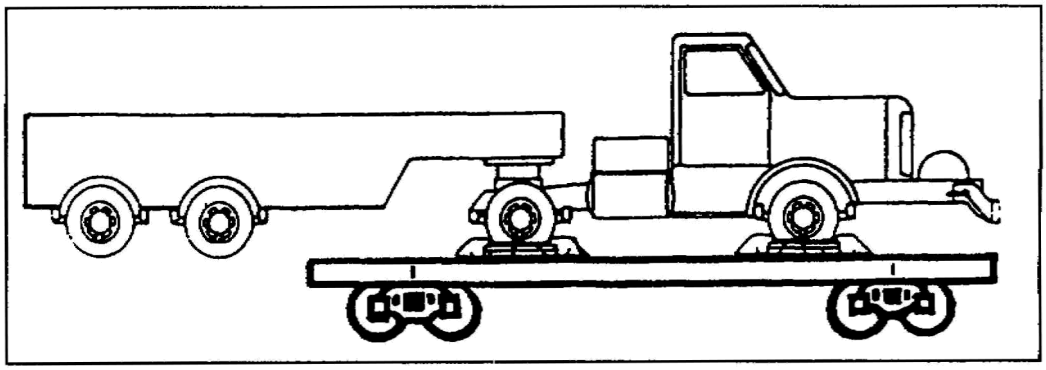


Figure 7-2. Load Length Exceeded.

Continued on next page

Planning vehicle placement, continued

<table>
<tr><th>Step</th><th>Action</th></tr>
<tr><td>2</td><td>Try combining a semitrailer and a power supply vehicle on the same flatcar:
<table>
<tr><th></th><th>Weight</th><th>Length</th></tr>
<tr><td>Semitrailer</td><td>17,390</td><td>492</td></tr>
<tr><td>Power supply vehicle</td><td>1,300</td><td>109</td></tr>
<tr><td>TOTAL</td><td>18,690</td><td>601</td></tr>
</table>
This combination also will not work; a combined length of 601 inches is too long.</td></tr>
<tr><td>3</td><td>Now try loading a semitrailer and a small CONEX:
<table>
<tr><th></th><th>Weight</th><th>Length</th></tr>
<tr><td>Semitrailer</td><td>17,390</td><td>492</td></tr>
<tr><td>CONEX</td><td>4,650</td><td>51</td></tr>
<tr><td>TOTAL</td><td>22,040</td><td>1,035</td></tr>
</table>
This load complies with all load limit constraints; however, it is not the most efficient load this car can carry. Remember, the objective for planning an efficient rail load is to use the fewest railcars possible to transfer your load.</td></tr>
<tr><td>4</td><td>Use the load configuration of Step 3 but this time piggyback the semitrailers:
<table>
<tr><th></th><th>Weight</th><th>Length</th></tr>
<tr><td>Semitrailer, 2 piggyback</td><td>34,780</td><td>492</td></tr>
<tr><td>CONEX</td><td>4,650</td><td>51</td></tr>
<tr><td>TOTAL</td><td>74,210</td><td>543</td></tr>
</table>
This is an efficient load. It maximizes load length limitations. Using this load configuration you will use three flatcars, one of which will contain only one semitrailer.</td></tr>
</table>

7-3. Preparing DA Form 2942-R for Cargo

Introduction

When preparing DA Form 2942-R you will use your units AUEL report. This portion of the lesson will describe each block on this form. We will discuss these blocks according to the three sections:

- Administrative information.
- Actual loading information.
- General information.

Administrative information

The top of DA Form 2942-R requests general administrative information. These are the blocks in this section and instructions for their completion:

Block	Instructions for completion
Organization	Enter the name of the battalion ordering the train. Even though the 142d Med Trk Co is the only company moving in Figure 7-3, the railcars were ordered by the company's battalion, the 7th S&T Bn, who will maintain administrative control over the movement.
Station	Enter the company's station.
Date	Enter the completion date of the form.
TOE	Enter the company's TOE. The battalion movements supervisor will also have a copy of each company's TOE.
Train No.	This is the number assigned once the train is made available by a civilian carrier or military authority.
Main No.	This space contains a routing symbol which must be entered by the routing officer.
Loading time	Enter the approximate time loading will begin.

Actual loading information

The next section of the form contains actual loading information. These are the blocks concerning loading information and instructions for their completion:

Continued on next page

Actual loading information, continued

UNIT TRAIN LOADING PLAN (WORKSHEET)
For use of this form, see TM 55-601 and TM 55-604; the proponent agency is U.S. Continental Army Command.

Organization: 7th S&T Bn		Station: Ft Carson, Colorado	Date: 7 Nov 88
TOE: 55-018	Train No.	Main No.	Loading Time

Type Car	Car No.	Type Car	Car No.	Type Car	Car No.	Type Car	Car No.
65,000 F	1	65,000 F	2	65,000 F	3	65,000 F	4
Unit: 142d MDM TRK CO		Unit: TMTC		Unit: TMTC		Unit: TMTC	
Z021 - 17,390 Z022 - 17,390 Z027 - 4,650 Total 39,430		Z023 - 17,390 Z024 - 17,390 Z030 - 2,750 Total 37,530		Z020 - 17,390 Total 17,390		Z006 - 13,180 Z007 - 13,180 Total 26,360	

Type Car	Car No.	Type Car	Car No.	Type Car	Car No.	Type Car	Car No.
65,000 F	5	65,000 F	6	65,000 F	7	65,000 F	8
Unit: TMTC		Unit: TMTC		Unit: TMTC		Unit: TMTC	
Z001 - 5,275 Z009 - 24,917 Total 30,192		Z002 - 5,275 Z010 - 24,917 Z014 - 1,300 Total 31,492		Z003 - 5,275 Z011 - 24,917 Z015 - 1,300 Total 31,492		Z004 - 5,275 Z012 - 24,917 Z016 - 1,300 Total 31,492	

Remarks:
Train number and loading time will be announced

SAMPLE

Passenger			Freight									Total
	Pullman					Gondola		Flat				
Coach	Std	Tour	Baggage	Kitchen	Box	40'	50'	40'	42'	46'	50'	Special	
								12					12

DA FORM 2942-R, 1 Aug 68 Replaces edition of 1 Jul 67, which may be used. 0960-79

Figure 7-3. DA Form 2942-R.

Continued on next page

Actual loading information, continued

Block	Description
Type car	Enter the load limit of the railcar, in pounds, and the type of railcar to be loaded. In Figure 7-4, "65,000 F" stands for a flatcar with a load limit of 65,000 pounds. You must give the load limit in pounds rather than tons.
Car No.	Enter the car number in the series of railcars being loaded. This page has space for loading information on eight railcars.
Unit	Enter the unit whose cargo is being loaded on this car. Here, the transportation medium truck company is using this car. The unit name is shortened for the remaining cars to "TMTC"; the 142d is omitted for clarity.
Remarks	This block contains special instructions for loading the cars, for filling out the form, or for any other information out of the ordinary.

Instructions for completing actual loading information

Figure 7-4, the Type car and Unit, blocks show that the items Z021, Z022, and Z027, will be loaded onto this car. These items are the piggybacked semitrailers and CONEX container. Along with the item numbers are the weights for each of the items and the total weight of the car's load, 39,430 pounds. Calculate this amount for each car to be certain that the car's load limit is not exceeded. Now, calculate this information for each railcar until all spaces are completed. If the unit requires more than eight cars, use another DA Form 2942-R, as shown in Figure 7-5, beginning with Car 9.

Competing general information

The bottom of the DA Form 2942-R records general information concerning your unit's rail move. Use the final spaces of this form to record the number of railcars of each type that are needed. In this case, the only cars needed are flatcars, and 12 of them are required to load all vehicles and containers of the 142d Med Trk Co. The complete train loading plan requires two sheets.

Continued on next page

Completing general information, continued

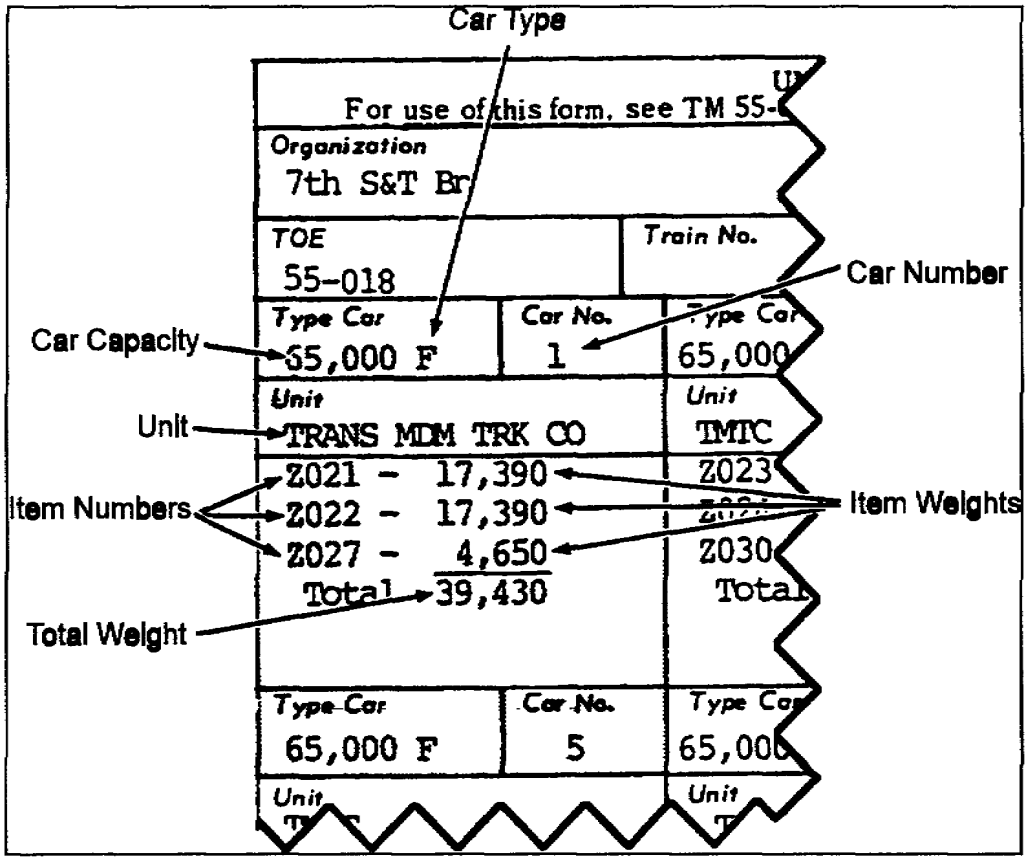


Figure 7-4. Car Number One.

Continued on next page

Completing general information, continued

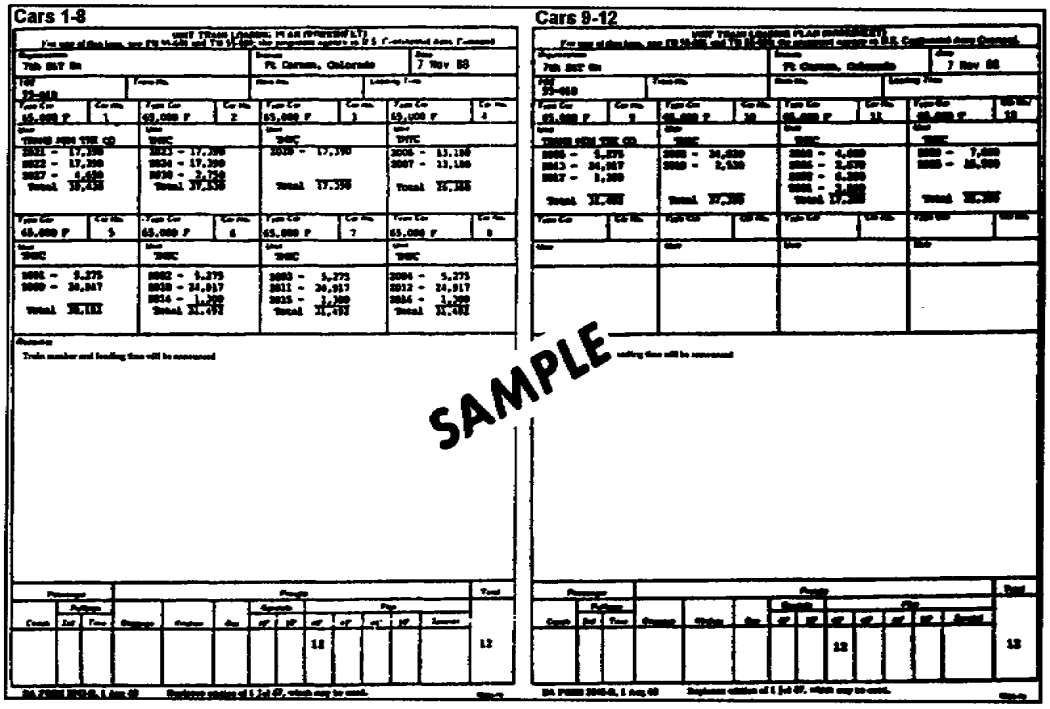


Figure 7-5. DA Form 2942-R Completed for Cargo.

7-4. Preparing DA Form 2942-R for Unit Personnel

Introduction

When transporting unit personnel by rail you must also complete a DA Form 2942-R. This portion of the lesson discusses the types of passenger railcar equipment and instructions for preparing DA Form 2942-R.

Passenger equipment

Passenger equipment is used to transport personnel. These are examples of available personnel cars:

Type of Railcar	Description
Coach car	The standard day coach car has a 60 to 70 person seating capacity, depending upon the types of seats onboard the car. When calculating the number of cars needed, you should leave some seats vacant to accommodate field packs, arms, and other like items. Use coach cars for moves of one day or less. For longer moves, use Pullman cars.
Pullman car	The Pullman car contains sleeping berths. It accommodates between 27 to 80 personnel.
Baggage car	A baggage car transports personnel-- • Baggage. • Unit equipment. • Unit records. One baggage car per 250 men is usually adequate space for unit needs.
Kitchen	If the Army is handling the unit mess during the unit movement and the trip takes 24 hours or longer and includes more than 100 troops, a kitchen car is required. Usually you can use one kitchen car for every 250 persons.

Continued on next page

Passengers

When completing DA Form 2942-R for passengers, use Figure 7-6 as a guide; for completing the form for cargo, use the instructions below which address these exceptions:

- Type car. This entry will identify the type of rail car. When transporting passengers you will list either, baggage, sleeper, or kitchen.

- Car block. Enter the number of personnel in the block's lower right corner. Also, when the information becomes available, enter the railroad company and the last three digits of the number of the car assigned by the railroad. Ensure you record totals at the bottom.

Continued on next page

Passengers, continued

Below is a completed sample of a DA Form 2942-R.

UNIT TRAIN LOADING PLAN (WORKSHEET)
For use of this form, see TM 55-601 and TM 55-604; the proponent agency is U.S. Continental Army Command.

Organization	Station	Date
7th S&T Bn	Ft. Carson, Colorado	7 Nov 88

TOE	Train No.	Main No.	Loading Time
55-018			

Type Car	Car No.	Type Car	Car No.	Type Car	Car No.	Type Car	Car No.
Baggage	1	Sleeper	2	Sleeper	3	Sleeper	4
Unit: 142d MDM TRK CO		Unit: TMTC		Unit: TMTC		Unit: TMTC	
		26		26		26	
Type Car	Car No.	Type Car	Car No.	Type Car	Car No.	Type Car	Car No.
Sleeper	5	Kitchen	6	Sleeper	7	Sleeper	8
Unit: TMTC		Unit: TMTC		Unit: TMTC		Unit: TMTC	
26				26		26	

Remarks:

1. Number of personnel per car appears in lower right corner of car block. In this block enter railroad company and last three digits of number of car assigned by the railroad when the information becomes available.
2. Car No. 1 is loaded with personal baggage.
3. Loading time, main number, and train number will be announced.

SAMPLE

Passenger			Freight										Total
	Pullman					Gondola		Flat					
Coach	Svc	Tour	Baggage	Kitchen	Box	40'	50'	35'	42'	46'	50'	Special	
	6		1	1									8

DA FORM 2942-R

Figure 7-6. Completed DA Form 2942-R for Passengers.

7-5. Preparing the Rail Load Plan

Introduction

Preparation of FORSCOM Form 285-5-R, Rail Load Plan, Figures 7-7 and 7-8, creates a conceptual rail load plan for the unit. This form is a United States Army Transportation School-developed worksheet for personnel loading vehicles and containers on railcars. The Rail Load Plan identifies--

- Cargo loaded on each railcar.
- Cargo loading configuration for each railcar.
- BBT materials for each railcar.

FORSCOM Form 285-R

FORSCOM Form 285-5-R shows how the cargo is loaded and specifies the kind and amount of BBT materials are required for securing the cargo to the railcar. The rail load plan consists of four main sections:

- Top.
- Middle.
- Bottom.
- Back.

Completing the top of the rail load plan

Figure 7-9 shows the top section of the rail load plan. These are the blocks and instructions for their completion:

Block Title	Entry Instructions
Page ____ of ____	Enter the page number of the plan. Notice that Figure 7-9 indicates that this is the seventh page of twelve pages. There is a page for each railcar; therefore, in this example, twelve railcars are to be loaded.
1. Unit	Enter the unit being moved. In our sample the unit is a transportation medium truck company from the 7th Supply and Transport Battalion (7th S&T Bn).
2. UIC	Enter the UIC for the unit. AW51HN is the unit code for a truck company stationed at Fort Carson, Colorado.

Continued on next page

FORSCOM Form 285-R

Below is an example of a FORSCOM Form 285-5-R.

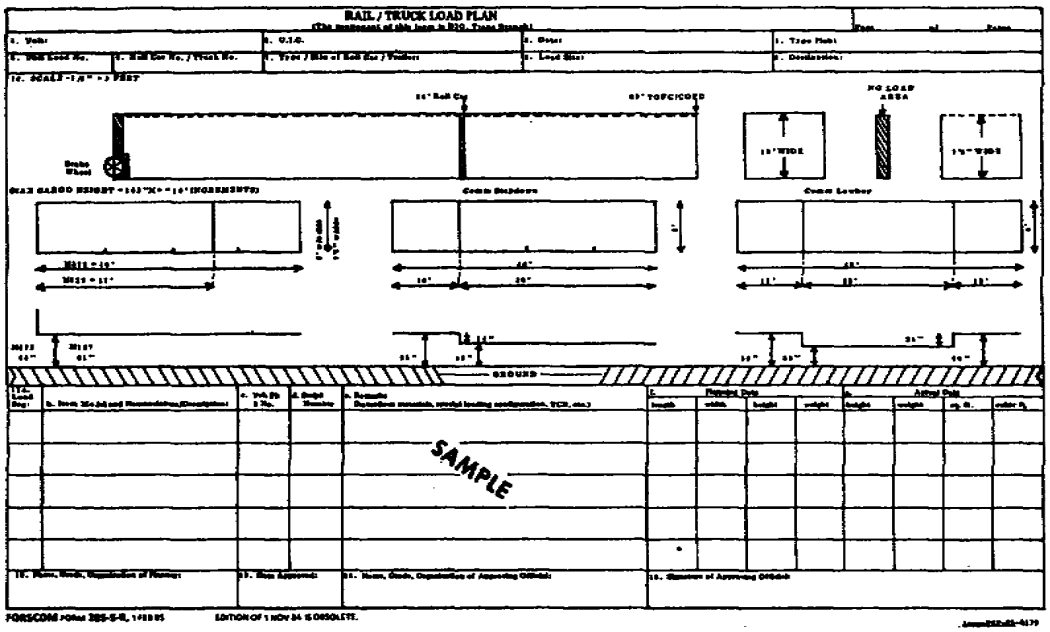


Figure 7-7. FORSCOM Form 285-R (Front)

Continued on next page

16. Dunnage Requirements:

a. Vehicle / Trailer	b. 2" x 6" No/Length	c. 2" x 4" No/Length	d. Chocks No/Pattern	d. Cable No/Length	f. Clamp No/Size	g. Thimble No/Size	h. Nails No/Size
17. TOTALS							

18. Remarks:

a. Loading ramps required to upload?	Y N	e. MHE required?	Y N	Available?	Y N		
b. Loading ramps required to download?	Y N	f. Sensitive cargo?	Y N				
c. Chains and binders required?	Y N	g. Outsized/oversized cargo?	Y N				
d. Tarp required?	Y N	h. Special handling permit required?	Y N				

Figure 7-8 FORSCOM Form 285-R (Back)

Continued on next page

Completing the top of the rail load plan

Below is an example of the top section of the rail load plan completed.

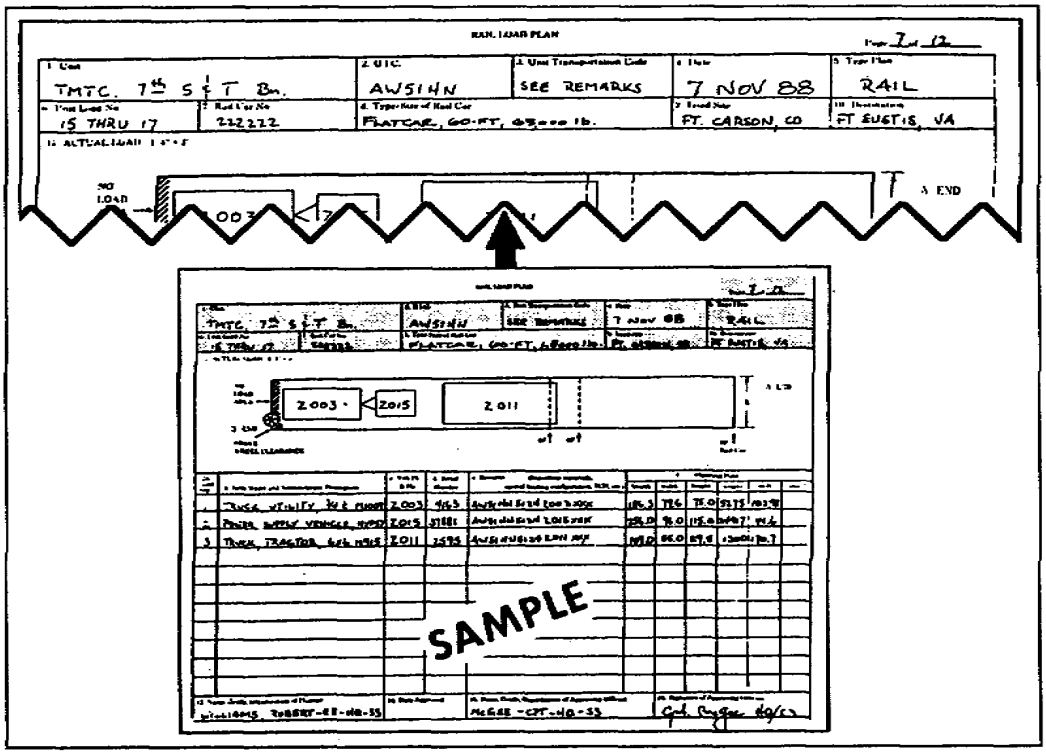


Figure 7-9. Top Section of the Rail Load Plan.

Continued on next page

Completing the top of the rail load plan, continued

Block Title	Entry Instructions
3. Unit Transportation Code	Enter the assigned unit code for the vehicle/vehicles being loaded. Notice in our example that the unit transportation codes are listed in the **Remarks** section of the form.
4. Date	Enter the preparation date of the load plan.
5. Type Plan	Enter the type of transportation this plan is intended for--in this case, rail.
6. Unit Load No.	Enter the loading sequence number of the equipment. In our sample form, three vehicles are being loaded--the 15th, 16th, and 17th unit vehicles.
7. Rail Car No.	Enter the number of the railcar on which the equipment will be loaded.
8. Type/Size of Railcar	Specify the railcar-- • Type (such as, flatcar, gondola, box, and so forth). • Length. • Load limit. Our example shows a 60-foot flatcar with a 65,000-pound load limit.
9. Load Site	Enter the area designation. If there is more than one site on the installation, the ITO will designate the specific loading site.
10. Destination	Enter the final point of shipment.

Completing the middle of the rail load plan

The middle area of the rail load plan is the conceptual part of the document. Figure 7-10 provides a sample of the middle of the rail load plan. Using a template, Figure 7-11, sketch the load configuration you developed in Block 11, Actual Load. The dotted lines on the railcars in Block 11 indicate a 54-foot, 60-foot, and an 89-foot railcar. When the plan is completed, each page corresponds to a specific railcar. Also each Block 11 will show loaders the type equipment to place on a specific railcar and in what configuration the loader should place the equipment.

Continued on next page

Completing the middle of the rail load plan

Below is an example of the completed middle section of the rail load plan.

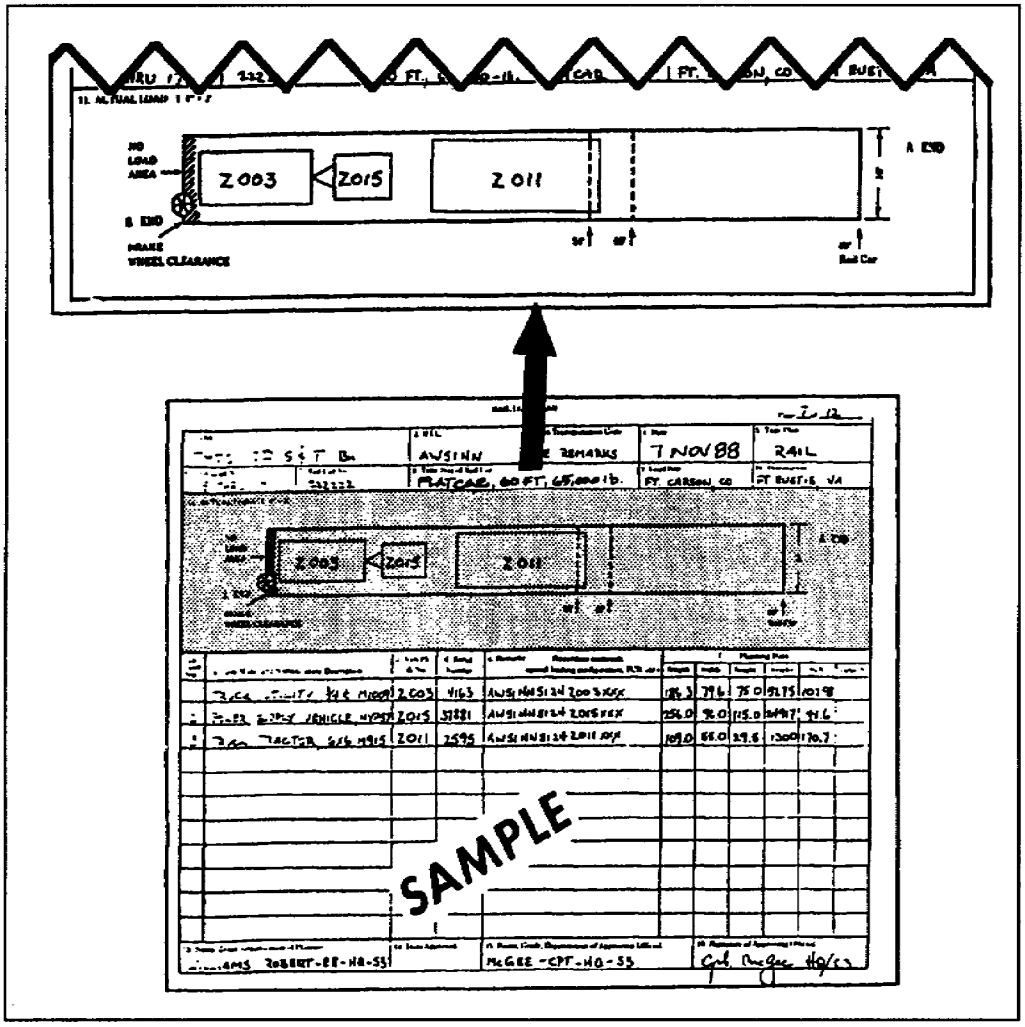


Figure 7-10. Middle Section of the Rail Load Plan.

Continued on next page

Completing the middle of the rail load plan

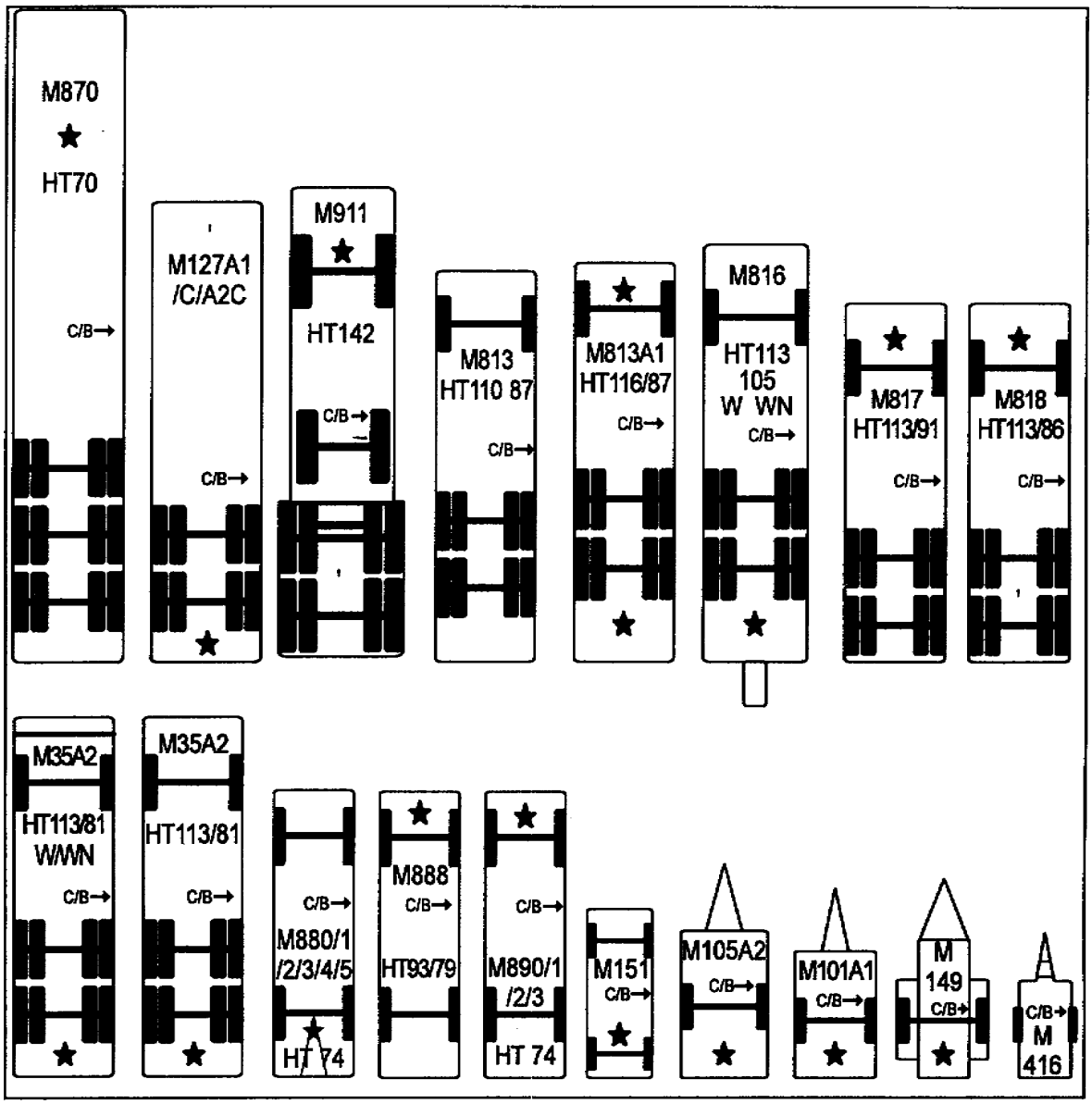


Figure 7-11. Template for 7th Trans Motor Trans Equipment.

Continued on next page

Completing Block 11

When completing Block 11, Actual Load enter the--

- Layout of the railcar, showing A and B ends.
- No-load area near the brake wheel.
- Railcar's dimensions--10-feet wide, and 54-, 60-, or 89-feet long.

Since the same rail load plan is used for loading all lengths of railcars, only the maximum length is shown; you must draw the other lengths as required. As you can see, using this plan, you can draw the railcar's load exactly as it should be loaded--including how much space each vehicle or container requires. Our example shows the middle section with three cargo load drawn in--

- Center load, Z015, with the tongue extending forward.
- Type of configuration used for a trailer, Z011.
- Another vehicle, Z003.

The numbers in the center of the equipment--Z003, Z011, and Z015-are taken directly from the AUEL.

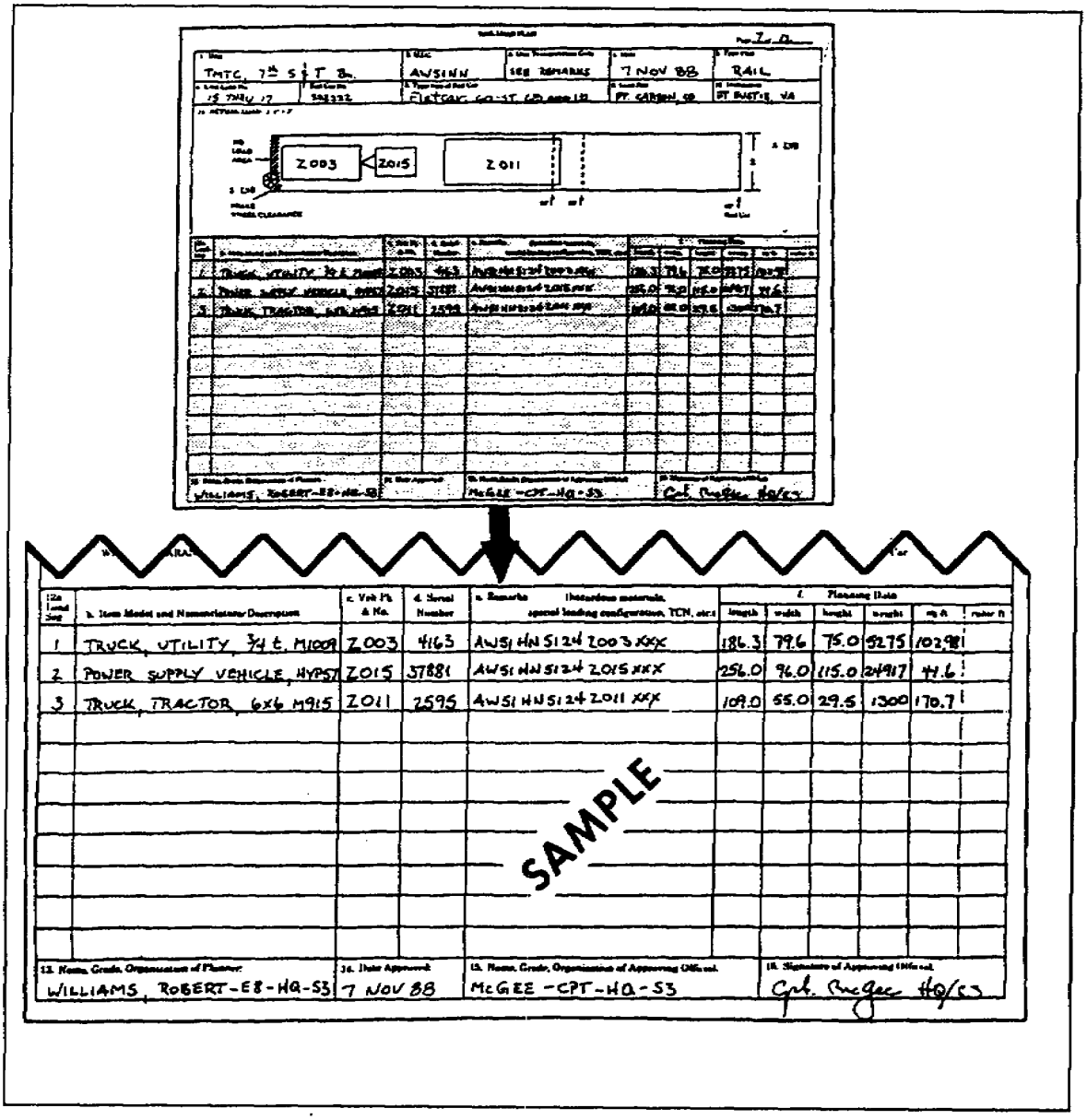
Completing the bottom of the rail load plan

The bottom section of the rail load plan's front page lists details about the cargo and loading operations. Figure 7-12 shows the bottom section of the rail load plan. These are the blocks in this section and instructions for their completion:

Block Title	Entry Instructions
12a. Load Sequence	Enter the equipment loading sequence onto the railcar.
12b. Item Model and Nomenclature/ Description	Enter a description of each load and its TOE line number. For example, in our sample railcar number ZZZZZ will carry a 3/4-ton utility truck, a power supply vehicle, and a tractor.
12c. Veh Pk & No.	Enter the vehicle's unit inventory number. These numbers are listed on the AUEL.

Continued on next page

Completing the bottom of the rail load plan, continued



	Item Model and Nomenclature/Description	Veh Pt & No.	Serial Number	Remarks (Hazardous materials, special loading configurations, TCN, etc.)	Planning Data: length	width	height	weight	sq ft	meter ft
1	TRUCK, UTILITY, ¾ t, M1009	Z003	4163	AWSI HN 5124 Z003 XXX	186.3	79.6	75.0	9275	102.98	
2	POWER SUPPLY VEHICLE, HYPST	Z015	37881	AWSI HN 5124 Z015 XXX	256.0	96.0	115.0	24917	44.6	
3	TRUCK, TRACTOR, 6x6 M915	Z011	2595	AWSI HN 5124 Z011 XXX	109.0	55.0	29.5	1300	170.7	

12. Name, Grade, Organization of Planner	14. Date Approved	15. Name, Grade, Organization of Approving Official	16. Signature of Approving Official
WILLIAMS, ROBERT-E8-HQ-S3	7 NOV 88	McGEE-CPT-HQ-S3	Cpt. McGee HQ/S3

Figure 7-12. Bottom Section of the Rail Load Plan

Continued on next page

Completing the bottom of the rail load plan, continued

Block Title	Entry Instructions
12d. Serial Number	Enter the vehicle's serial number. This number is stamped on the vehicle's data plate by the manufacturer, and differentiates and identifies different vehicles of the same type.
12e. Remarks	Use this block to specify information for loading the items. For example, Figure 7-12 uses this block to list the TCN of the items. This block may also be used to identify hazardous cargo or cargo requiring special handling or loading.
12f. Planning Data.	Enter the dimensions of the cargo including: • Length. • Width. • Height. • Weight. • Square feet. This entry shows how much railcar space each cargo piece requires and the total space requirements for loading all vehicles. In our example, notice that the **cubic ft** column is blank. Cubic feet requirements are only required when loading equipment into a boxcar.
13. Name, Grade, Organization of Planner	Enter the name, grade, and organization of the soldier completing the rail load plan.
14. Date Approved	Enter the approval date of the plan.
15. Name, Grade, Organization of Approving Official	Enter the name, grade, and organization of the soldier reviewing and approving the load plan.
16. Signature of approving official.	The soldier listed in block 15 must sign here upon receiving approval of the plan by higher headquarters.

Continued on next page

Completing the bottom of the rail load plan, continued

NOTE: The information in Blocks 13 through 16 may either be filled out on each separate page of the plan, or they can be filled out on one page for the entire plan.

Completing the back of the rail load plan

Figure 7-13 shows the back of the rail load plan. This side lists the BBT materials requirement for each vehicle loaded on a railcar. The back of the load plan is divided into columns--blocks 17a. through h. Block 17a. provides space for a list of vehicles being loaded. Columns 17b. through h. list the various sizes of--

- Dunnage.
- Cable.
- Clamp.
- Thimble information.
- Nails.

Line 18 records the BBT materials for securing all vehicles on the railcar.

NOTE: Nails are ordered by the pound, Figure 7-14.

Continued on next page

17. Dunnage Requirements:

a. Vehicle Trailer	b. 2" x 6" No/Length	c. 2" x 4" No/Length	d. Chocks No/Pattern	e. Cable No/Length	f. Clamp No/Size	g. Thimble No/Size	h. Nails No/Size
M 1009 - 3/4 TON			8-PAT.16 4-PAT.89	3/8" 40 FT.	3/8" 24	3/8" 4	20 - 12 ¿ 60 - 20 ¿ 40-40 ¿
HYP -57		40 FT.	4-PAT.16 2-PA. 89	3/8" 20 FT.	3/8" 28	3/8" 4	10 - 20 ¿ 16-40 ¿
M915 - 6X6			12-PAT. 16 4-PAT.89	1/2" 40 FT.	1/2" 30	1/2" 4	30 - 12 ¿ 90 - 20¿ 60-40 ¿
18. TOTALS		40 FT.	24-PAT.16 10-PAT.89	3/8"-60FT. 1/2"- 40FT	3/8"-52 1/2"-20	3/8" - 8 1/2" - 4	42 - 12¿ 160 - 20¿ 116-40¿

Figure 7-13. Back of the Rail Load Plan

Continued on next page

Completing the back of the rail load plan, continued

Size of nail	Approximate Number per pound		
	Common	Cement coated	Ring-shanked
Fourpenny (4D)	294		
Sixpenny (6D)	167		
Sevenpenny (7D)			118
Eightpenny (8D)	101	101	
Tenpenny (10D)	66	66	
Twelvepenny (12D)	61	61	
Sixteenpenny (16D)	47	47	
Twentypenny (20D)	30	30	(Screwnail) 35
Thirtypenny (30D)	23	23	
Fortypenny (40D)	17	17	
Fiftypenny (50D)	14	14	
Sixtypenny (60D)	11	11	

Figure 7-14. Number of Nails Per Pound.

Ordering nails

Reading across the first line of our example; **NOTE:** a 3/4-ton utility truck is listed. These are the BBM requirements for securing this vehicle:

- Eight pattern, 16 chocks.
- Four pattern, 89 chocks.
- 40 feet of 3/8-inch cable.
- Twenty-four 3/8 inch clamps for that cable.
- Four 3/8 inch thimbles to guard the cable from the railcar pockets.
- 40-feet of 3/8 inch cable.
- 120 nails:
  - 20, 12D nails.
  - 60, 20D nails.
  - 40, 40D nails.

Continued on next page

Tools for rail loading

The following is a list of tools for conducting a rail outload in CONUS:

Quantity	Items	Remarks
1 pair	Pliers	Side cutting or slip-joint, (8-inch)
2	Puller, hoist	Cumalong, left-hand (cable-grip), 7,000-pound capacity
2	Ratchet	1/2 inch square drive, reversible
1	Removable turnbuckle handle	To rapidly tighten turnbuckles with turnbuckle gear
1	Screwdriver	Common, 8 inch square shank
2	Socket	1/2 inch square drive, 3/4 inch (12 point)
2	Socket	1/2 inch square drive, 7/8 inch (12 point)
2	Socket	1/2 inch square drive, 1/2 inch (12 point)
2	Tape measure	Steel, 12 foot, recoil type
1	Torque wrench	1/2 inch square drive, for wire rope clips
1	Wire rope cutter	Hydraulic, 3/4 inch cable capacity
1	Brace and bit or electric drill	To predrill chock blocks for spikes
1	Drill set, twist	Sizes 1/16 to 1/2 inch by 16ths increments
4	Cable grip	5/16 inch capacity 5/8 inch capacity
1	Chain saw	Gasoline-engine-driven, 10 inch bar
2	Claw or pin punch	1/8 inch point, 3 1/2 to 5 inch length
1	Flex handle breaker bar	3/4 inch square drive, 20 inch length
10 pair	Gloves	Leather or leather palm
3	Hammers	1 pound 2 pound 3 pound
2	Marker crayon	Black Yellow
2	Monkey wrench	Lightweight, 11 inches long, 3 inch capacity
1	Nailpuller	If pliers not available.

Continued on next page

Tips and common mistakes

Appendix D contains an extract from MTMCTEA Pam 55-19 which outlines tips and common mistakes when preparing vehicles and railcars for loading. This extract also includes advice for loading and securing vehicles; and a load and tiedown checklist for vehicles covering chain tiedowns for flatcars.

7-6. Reviewing the Rail Load Plan

Introduction

Once your rail load plan is prepared you must perform a review to ensure the data is correct.

Reviewing the rail load plan

These are the procedures for reviewing and approving the unit rail movement plan:

Step	Action
1	Check TOE against TOE list and ensure all equipment has been accounted and planned for, Figure 7-15.
2	Check the accuracy of dimensions and weights of vehicles as extracted from TB 55-46-1.
3	Ensure that vehicles placed on railcars have sufficient room between vehicles and from the one end of the car to the next car.
4	Ensure that any special requirements are annotated, such as oversized loads, hazardous material, or commander's guidance.
5	Check the BBT materials listed on the back of each plan, Figure 7-16, as well as the number of each type against the TM 55-220-001-12 BBM listing for each type of unit equipment.

NOTE: Ensure that all measurements are "reduced" configurations and that the weight of any equipment loaded on vehicles is added to the vehicle weight for planning.

Reviewing BBM requirements

On the job, you must check each sheet of the unit rail loading plan. However, for the purposes of this lesson, we will review the BBM requirements for a truck, cargo, 2 1/2-ton (M35A2W/WN). These are the steps for reviewing BBM requirements for this cargo truck:

Step	Action
1	Consult TM 55-2200-001-12, Figure 7-17. Because this vehicle is a six-wheeled vehicle with dual wheels in the rear, be sure to follow the procedures for "Four or Six Wheel Trucks (single or dual wheels) - Flatcars with Wooden Floors."

Continued on next page

LIN	NO. EA.	TYPE EQUIPMENT
C76335	7	Cavalry Fighting Vehicle M3
D10741	6	Carrier 107MM mortar, M106A1
D11538	6	Carrier Command Post FTRAC M577A1
D12087	23	A Carrier personnel FTRAC M113A1
J81750	33	Infantry fighting vehicle M2 (XM3)
L28351	6	Kitchen field Trl (MHU 110 Trk)
R50681	7	Recover vehicle FTRAC M88A1
W95400	16	Trailer cargo 1/4 ton M416
W95811	46	Trailer cargo 1 1/2 ton M105A2
W98825	6	Trailer tank Water M149A1
X39432	1	Truck cargo 1 1/4 ton 4 x 4 M880
X39940	6	Truck cargo 1 1/4 ton M561 WWN
X40009	6	Truck cargo 2 1/2 ton M35A2
X40146	25	Truck cargo 2 1/2 ton M35A2 WWN
X40794	24	Truck cargo 5 ton D/S 5 ton LWB 813A1
X40831	7	Truck cargo 5 ton LWB813
X40968	1	Truck cargo 5 ton LWB M813 A1 WWN
X60833	18	Truck utility 1/4 ton M151A2
X62299	2	Truck wrecker 5 ton M816 WWN
Y48323	1	Welding shop Tlr MTD LED 300
D11668	13	Carrier GM equip SP M730
X39432	10	Truck cargo 1 1/4-ton 4 x 4 880

Figure 7-15. TOE Unit Equipment List.

Continued on next page

17. Dunnage Requirements:

a. Vehicle Trailer	b. 2" x 6" No/Length	c. 2" x 4" No/Length	d. Chocks No/Pattern	e. Cable No/Length	f. Clamp No/Size	g. Thimble No/Size	h. Nails No/Size
M 88A1	REF. TM	55-2200-001-12,		PAGES	E105, 106, 107		
M 35A2 W/WN			12EA. P.16 6 EA. P.89	40 FT. ½ "	20 EA. ½ "	4 EA. ½ "	60-40d 24 - 30 d 120 - 16 d
18. TOTALS 5 Ea. M35A2 W/WN			60 EA. P.16 36 EA. P.89	220 FT. ½ "	110 EA. ½ "	20EA. ½ "	12LB - 40d 6LB - 30d 14LB - 16d

Figure 7-16. Blocking, Bracing, and Tie-down Materials List

Continued on next page

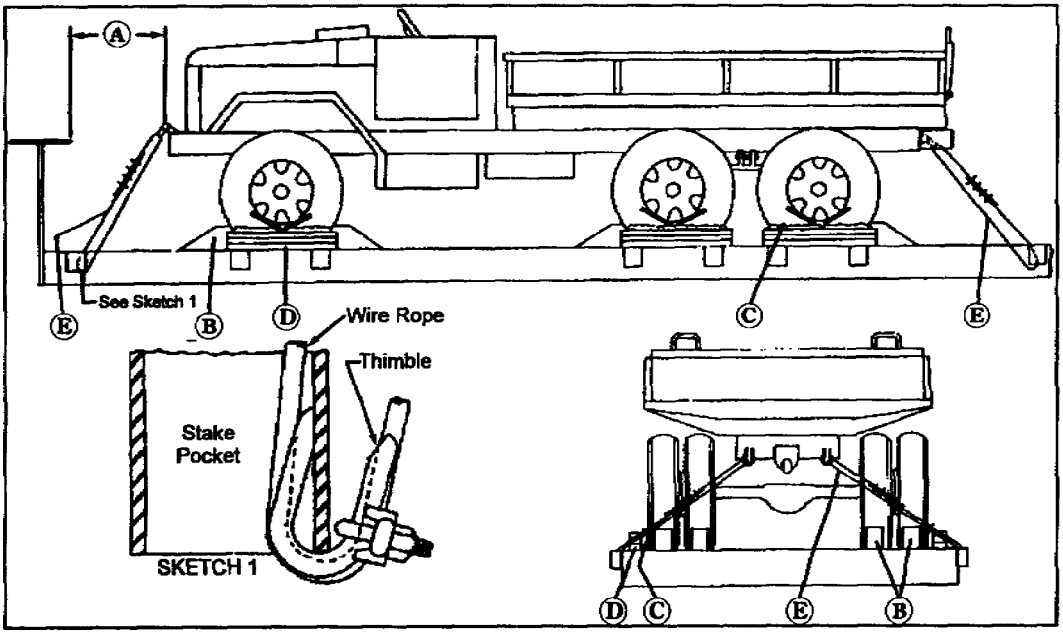


Figure 7-17. BBM Requirements for Four- or Six-Wheel Trucks.

Continued on next page

Reviewing BBM requirements, continued

Step	Action
2	Using Figure 7-17 look under **Item D.** This item provides the requirements for side block. Note that it reads, "May be omitted for the intermediate dual wheels on six-wheel vehicles weight 16,000 pounds or less." This guidance tells you to check the weight for the 2 1/2-ton cargo truck (M35 W/WN).
3	Locate the line item number for the 2 1/2-ton cargo truck, M35 W/WN figure 7-16. It is X40146. Go to Appendix A of this lesson which contains an extract of TB 55-46-1-- • Find LIN X40146 on the table. • Read across to the **Weight** column. • This truck weighs 13,200 pounds. Therefore, blocking for the intermediate dual wheels is unnecessary.
4	Look at **Item B.** Since you have a six-wheel vehicle, you will need 12 blocks per truck.
5	Next check **Item D.** It states that the 2 1/2-ton cargo truck uses six blocks to secure the rear dual wheels.
6	**Item E** tells you to use four pieces of 1/2-inch wire rope, doubled, complete loop since the cargo truck weighs less than 16,000 pounds. Wire rope comes in 10-foot lengths, so four pieces equip 40-feet. Therefore, Block 17e. on the Rail Load Plan, **Cable No/Length**, is also correct.
7	At the end of **Item E** you are told to reference Sketch 1 and General Rules 15(d) and 15(n) for information regarding clamps and ;thimbles. Checking this guidance, you find that 20 clamps and four thimbles of applicable size are required. That means Blocks 17(f) and 17(g) on the plan are correct.
8	Now, check **Item B** and **Item D** for guidance concerning blocking requirements. You must use Patterns 16 and 18, Figure 7-18. **NOTE:** nail sizes, Figure 7-19. You will need five 40D nails per block; however, you must compute two blocks per wheel.

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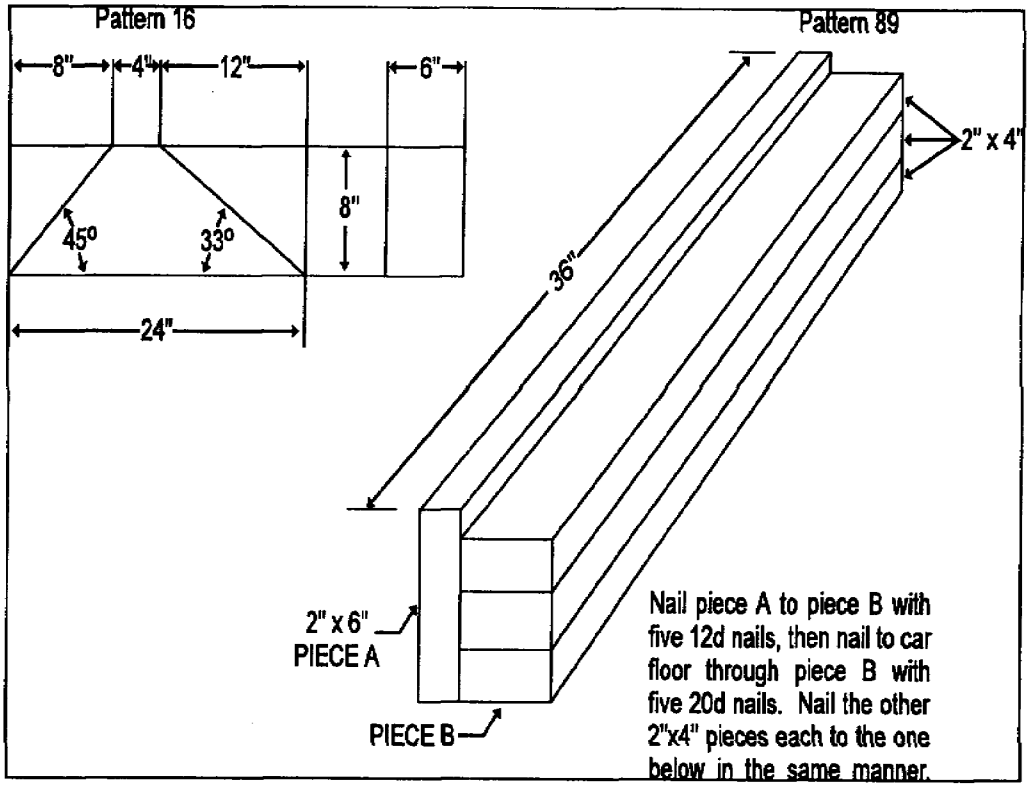

Figure 7-18. Patterns 16 and 89.

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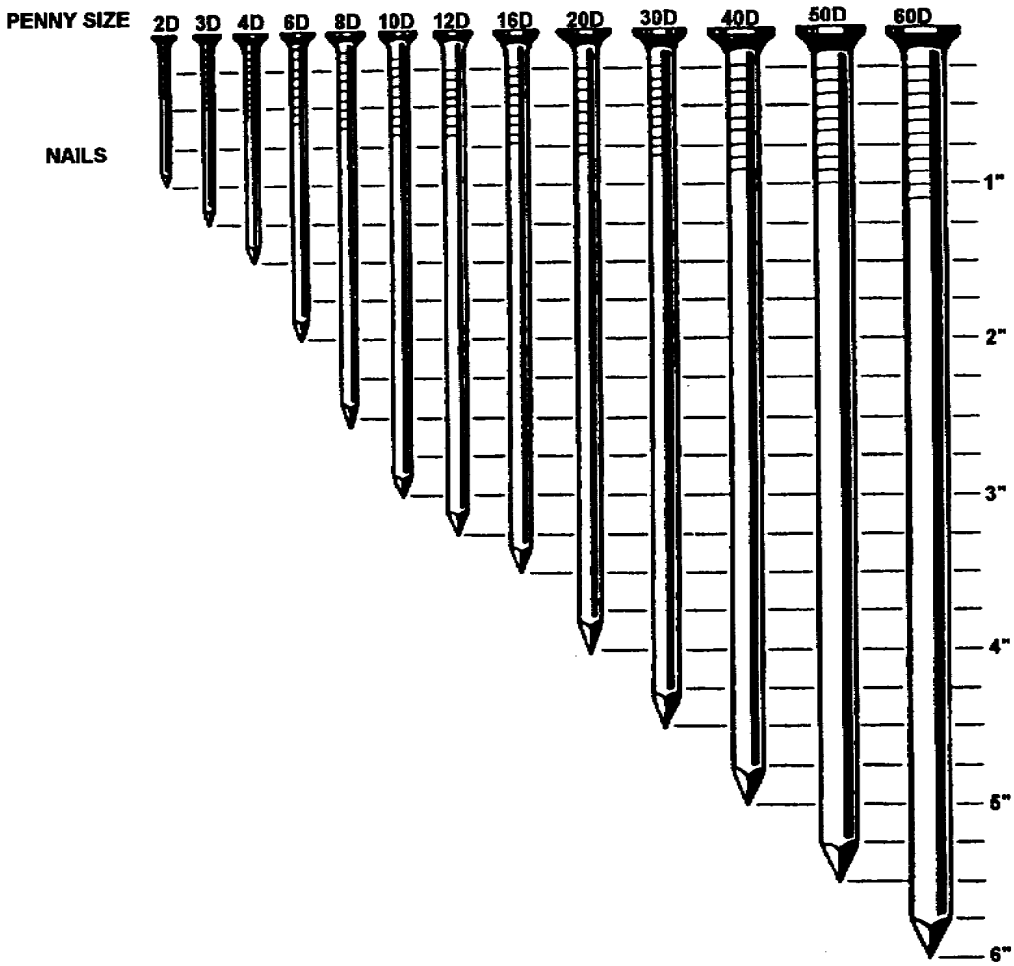

Figure 7-19. Nail Sizes.

Continued on next page

Reviewing BBM requirements, continued

Step	Action
9	These are the computations for determining the number of nails you require: Two blocks per wheel x six wheels = 12 blocks required. 12 blocks x five 40D nails for each block = 60, 40D nails are required. Remember, you also need nails to toenail the blocks in place. This requires two 40D nails for each block. 12 blocks x two 40D nails = 24, 40D to toenail the blocks in place. You also require nails for securing the equipment's sides using pattern 89. Pattern 89 indicates that you need five 12D nails per block and fifteen 20D nails per block. These are your requirements-- 12 blocks x five 12D nails = 60, 12D nails. 12 blocks x 15 20D nails = 90, 20D nails per block. That means that Block 17h, **Nails No/Size**, on the rail load plan is also correct.

Reviewing the front of the rail load plan

You must also review the front of the rail load plan for accuracy. Use this checklist as a guide for ensuring your rail load plan is complete and accurate:

Did you check....	YES	NO
All block entries on each plan and ensure each contains the same data? For example, block 1 should read the same on each page of the plan.		

Continued on next page

Reviewing the front of the rail load plan, continued

Did you check....	YES	NO
All blocks and ensure they are complete and contain the correct data?		
Block 11, the middle section, and ensure it is templated correctly and shows the correct unit equipment loading configurations drawn on the railcar?		
Blocks 12a through 12f and ensure accurate completion? These blocks must show proper-- • Nomenclature. • Serial number. • Applicable remarks. • Planning data dimensions.		
Blocks 13 through 15 for completeness and accuracy?		

Sample

Figure 7-20 shows a sample of the first page of a Rail Load Plan developed for the anticipated rail loadout of the 1029th Infantry Battalion (Mech). Using the above checklist review this figure.

Did you check....	YES	NO
All block entries on each plan and ensure each contains the same data? For example, block 1 should read the same on each page of the plan. **NOTE:** A quick glance assures us that Blocks 1 through 15 are complete.	X	
All blocks and ensure they are complete and contain the correct data?	X	

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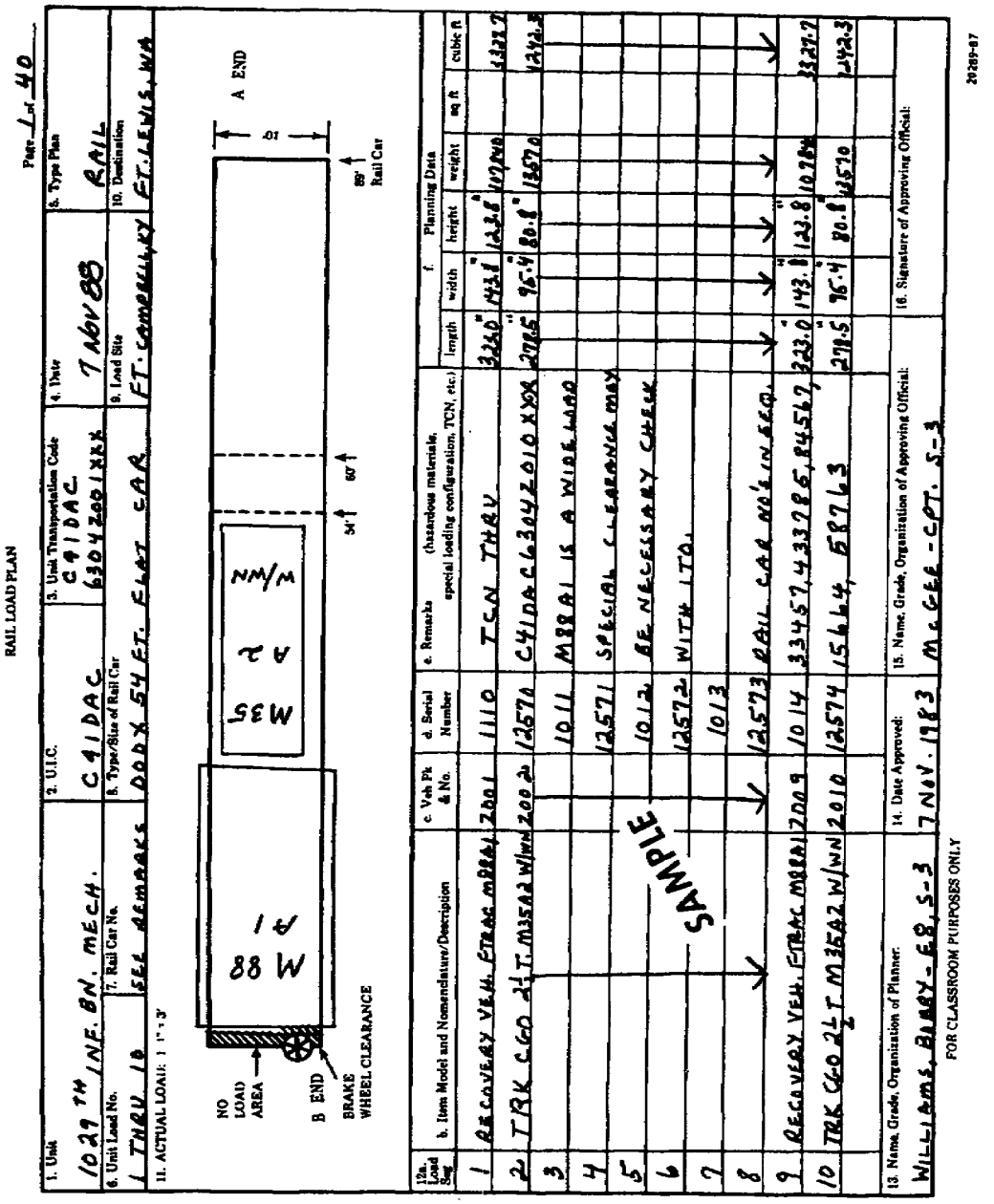

Figure 7-20. 1029th Infantry Battalion (Mech) Rail Load Plan.

Continued on next page

Sample,
continued

Did you check...	YES	NO
Block 11, the middle section to ensure it is templated correctly and shows the correct unit equipment loading configurations drawn on the railcar? **NOTE:** The available rail equipment is 54 and 60 foot flatcars. Ensure this block shows the correct type load for a 54 foot flatcar. Also check the template which should be attached to the plan, Figure 7-20.	X	
Blocks 12a through 12f to ensure accuracy and completeness? These blocks must show proper-- • Nomenclature. • Serial number. • Applicable remarks. • Planning data dimensions. **NOTE:** Note that the **Remarks** block does reference the recovery vehicle FTRAC M88A1 as a high and wide load possibly requiring a special clearance.	X	
Blocks 13 through 16 for completeness and accuracy? **NOTE:** Block 16, **Signature of Approving Official,** has not been signed. After your review of the plan, forward it to the appropriate higher headquarters for approval.	X	

7-7. Lesson 7 Practice Exercise

Introduction

The following items will test your grasp of the material covered in this lesson. There is only one correct answer for each item. When you complete the exercise, check your answers with the answer key that follows. If you answer any item incorrectly, study again that part of the lesson.

Item 1

The first step in determining which unit equipment should be placed on railcars is analyzing which of the following sources of information?

A. AUEL
B. WWMCCS
C. TC ACCIS
D. DTS.

Item 2

A piece of equipment which exceeds which of the following dimension may be considered an outsized load?

A. 6 feet, 6 inches in height.
B. 1 foot, 15 inches in width.
C. 10 feet, 8 inches in width.
D. 8 feet, 10 inches in width.

Item 3

An efficient load is one which minimizes load limitations.

A. True.
B. False.

Item 4

Which of the following forms is used for unit train load planning?

A. DA Form 314.
B. FORSCOM Form 285-5-R.
C. DA Form 2942-R.
D. FORSCOM Form 2942-R.

Continued on next page

Item 5 Which of the following is not one of the three sections of the form used for unit training loading planning?

A. APOE/APOD information.
B. Administrative information.
C. Actual loading information.
D. General information.

Item 6 The car number is considered too detailed an element of loading information; consequently, it is not a data requirement for unit training loading planning.

A. True
B. False.

Item 7 Which of the following types of railroad cars is not considered in unit train loading planning?

A. Coal tender.
B. Coach car.
C. Baggage car.
D. Kitchen

Item 8 Which of the following is not a section of the four sections of the FORSCOM Form 285-5-R?

A. Front
B. Back
C. Middle
D. None of the above.

Item 9 Which part of the FORSCOM Form 285-5-R list details about cargo and loading operations?

A. Top of front.
B. Middle of back.
C. Bottom of front.
D. Middle of front.

7-8. Lesson 7 Practice Exercise Answer Key and Feedback

Item	Correct Answer and Feedback
1.	A. The first step is analyzing the automated unit equipment listing (AUEL) to determine which unit equipment to place on the railcars. Page 7-3.
2.	C. Any piece of equipment exceeding 15-feet 1-inch in height or 10-feet 8-inches in width maybe considered an outsized load. Page 7-3.
3.	B. False. This is an efficient load. It maximizes load length limitations. Page 7-6.
4.	C. The DA form 2942-R records the number and type of cars for accommodating your unit's equipment. Page 7-3 and pages following.
5.	A. When preparing DA Form 2942-R you will use your unit's AUEL report. This portion of the lesson will describe each block on this form. We will discuss these blocks according to the three sections: • Administrative information. • Actual loading information. • General information. Page 7-7.
6.	B. False. Car No. — Enter the car number in the series of railcars being loaded. This page has space for loading information on eight railcars. Table, page 7-9.
7.	A. Coal tender. All the others are used. Table, page 7-12.
8.	A. The rail load plan consists of four main sections are top, middle, bottom, and back. Page 7-15.
9.	C. The bottom section of the rail load plan's front page lists details about the cargo and loading operations. Page 7-22.

LESSON 8

CONDUCTING A RAIL MOVEMENT WITHIN A THEATER OF OPERATIONS

8-1. Lesson 8 Overview

Lesson description

The mode of transportation available to the Army within an area of operations (AO) is dependent upon the geography and existing developmental infrastructure. Within the transportation system in theater, rail is primarily used during the strategic and operational levels of war. Strategic rail transportation occurs within CONUS and is the responsibility of the US Transportation Command. At the operational level of war the Army uses either--

- Host nation (HN) support
- Contracted resources.
- A field rail operating unit.

Enabling learning objective

This is the ELO for this lesson:

Action: Identify the rail operational procedures within a theater of operations to include the phases of rail operations within a theater, the types of transportation railway service organization, and rail operations at the operational and tactical levels of war.

Condition: Given a self-study environment and the material provided in this subcourse text.

Standard: In accordance with the subcourse material provided and/or the references cited below.

References

These are the references used in developing this lesson:

- FM 55-1, *Transportation Operations*, October 1995.
- FM 55-2, *Division Transportation Operations*, 31 January 1985.
- FM 55-20, *Army Rail Transport Units and Operations* with Change 1, dated October 1988.

Continued on next page

Lesson content

These are the topics included in this lesson:

8-2. Operating Military Railways

Introduction

The operation of military railways is accomplished in the three phases which are described in detail below. Normally these phases progress in sequence; however, this is not always the case. A phase II or phase III operation may be initiated without progression through the preceding phases, and regression of phases is also possible. The ultimate aim is the reduction of requirements for military units and personnel for railway operations. Therefore, a prime consideration in the initiation of phases II and III is the availability of skilled local labor obtained through HN agreements or other arrangements.

Key element of phase operations

The key element in each of the three phases of rail operations is the employment of civilian personnel. In this context, HN support and the employment of civilians is not synonymous.

Phase I operations

Phase I operations are conducted entirely by military personnel. Phase I occurs during the early stages of a military operation when the employment of civilian personnel is not practicable in or near the combat zone. When operations are close to a combat zone the employment of civilians may be restricted due to military or security reasons.

Phase II operations

In Phase II operations the railway lines are operated and maintained by local civilian railway personnel under direct military supervision.

Phase III operations

During Phase III operations military railway personnel are replaced by civilian railway personnel. This phase is instituted as soon as practical in rear areas of a secure and stable communications zone. In this phase the highest military railway echelon in the theater directs and supervises the civilian railway personnel.

Continued on next page

8-3. Using Rail Operations During War

Introduction

The decision to use rail operations during war depends upon the mission, railway capabilities, and limitations. The most efficient use of rail operations occurs when a requirement exists for the primary inland mode to sustain the flow of large quantities of traffic over long distances

Railway operations capabilities

These are the capabilities of railway operations in theater:

- No weather restrictions.
- Transports all commodities.
- Most economical continuous line haul operation.
- Greatest sustained ton-mile capability.
- Variety of specialized equipment and services.

Railway operations limitations

These are the limitations of railway operations in theater:

- Fixed routes limit flexibility.
- Rail-line clearances restrict outsize movements.
- Capability limited by the availability of tractive power.
- Rail line highly vulnerable to enemy action.

Railway operations during the operational level of war

When railways are available within the AO, the Army Service Command Component (ASCC) and the transportation staff and command elements should plan to use this capability. Usually the rail capacity for large tonnages relieves pressures on other modes and facilities required to support of the force. The Army force structure for rail operations is designed to supplement existing HN rail systems. When used, rail may extend into a tactical area of responsibility. In these cases the responsibility for operating the rail, including the terminals, remains with the operational level ASCC. When planning for the use of a rail operation within the AO, transportation staff officers and operations should consider these factors:

- The availability of an existing capability.
- The available manpower resources (such Army force structure, contracted resources, and HN support).

Continued on next page

Railway operations during the operational level of war, continued

- The state of repair of the rights of way.
- The engineering capability to effect repairs.
- The vulnerability of the rail line.

A cost-benefit analysis will determine if the costs of using the rail frees other modes of transportation sufficiently to provide the necessary flexibility to best support the commander's concept of the operation.

Rail transportation during tactical operations

When using rail transportation during tactical operations, the Movement Control Center (MCC) coordinates the flow of these assets through the AO. These coordination procedures include the Corps G3 and other maneuver and fire support units to assure noninterference with on-going military operations.

8-4. Identifying Transportation Railway Service Organizations

Introduction

The transportation railway service is the overall organization of railway units assigned or attached to the senior transportation organization (usually a transportation command). Figure 8-1 shows a typical transportation railway service organization, which may include brigades, groups, battalions, companies, and various transportation teams.

Rail maintenance categories

These are the rail maintenance categories:

- General support:
  - Diesel-electrical locomotive repair company.
  - Transportation electric power transmission company.
  - Transportation railway car repair company general support.

- Direct support:
  - Transportation railway equipment maintenance company.
  - Transportation rail service teams.

Transportation railway brigade

The transportation railway brigade is the highest echelon of the transportation railway service with the capability to command and provide operation planning, supervision, coordination, and control of the activities of up to eight transportation railway groups or of railroad facilities for the US and foreign nations. When assigned to the Theater Army this brigade is normally ached to the transportation command. This brigade commands, supervises, and controls the entire military railway system.

Transportation railway group

The transportation railway group commands, controls, coordinates, and supervises the activities of three to eight transportation railway battalions and their attached supporting units in CONUS or OCONUS activities. The railway group assigned to the Theater Army is normally attached to a transportation railway brigade. When the transportation railway group is the highest rail service organization in the theater, it operates directly under the transportation command.

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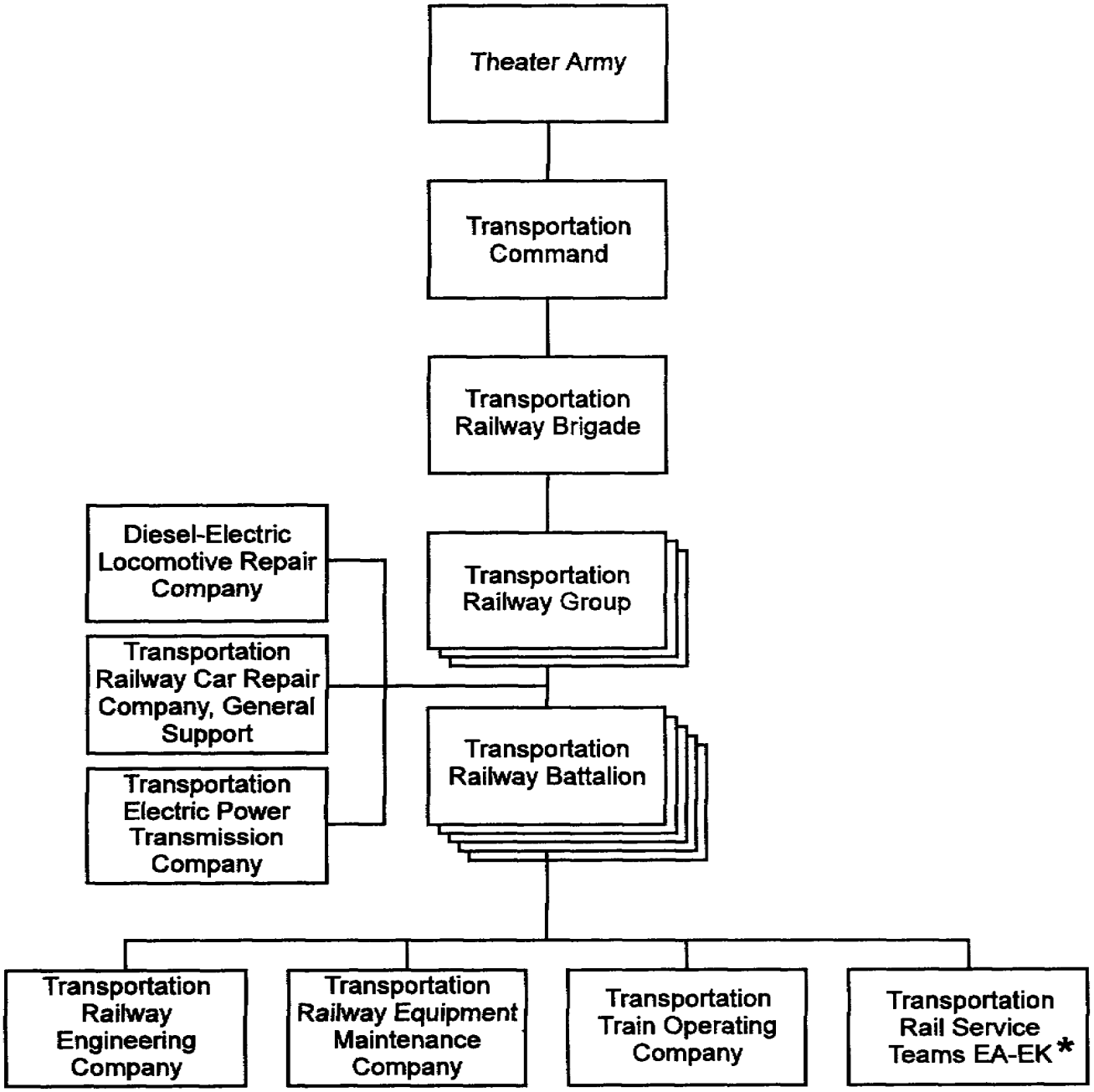

***NOTE.** Team EJ railway workshop - mobile (direct support) may be attached to either a group or a battalion.*

Figure 8-1. Type organization-transportation railway service

Continued on next page

Transportation railway battalion

The transportation railway battalion is the basic unit of the military railway service. This battalion is responsible for the operation and maintenance of a railway division from 90 to 150 miles long. It is assigned to a transportation command and is normally attached to a transportation group. The transportation railway battalion--

- Provides command, staff planning, administration, control, and supervision of operations of all its attached units.
- Dispatches all trains.
- Supervises on-line operations.
- Operates ten railway stations and eight signal towers.
- Maintains and repairs railway signals and communications.

Transportation electric power transmission company

The transportation electric power transmission company maintains and repairs the electric power transmission for electrified railway operations within the railway system. This company is assigned to the transportation command and is normally attached to a transportation railway group. It can maintain and repair electric power transmission facilities for a system of 200 miles of electrified railway and operate a power substation on a 24-hour basis.

Transportation railway engineering company

The transportation railway engineering company is designed to perform maintenance, repair, and limited construction of these railway structures for a railroad division of approximately 90 to 150 miles--

- Track.
- Bridges.
- Buildings.
- Structures.

This unit is assigned to a command or senior transportation element and is usually attached to a transportation railway battalion.

Continued on next page

Transportation railway equipment maintenance company

The transportation railway equipment maintenance company can perform daily and annual running repairs on 40 diesel-electric locomotives and daily running inspections on railway cars, including annual running repairs on approximately 200 railway cars. It also provides limited repairs to railway peculiar tools and equipment within the division in addition to wreck train support. This unit is normally attached to a transportation railway battalion.

Transportation train-operation company

The transportation train-operation company operates trains and locomotives in both yard and road service. This element also provides incidental switching service for a railway division. It performs switching and train buildup in a large terminal including port clearance of up to a 20 mile radius from a large port. This unit can provide 40 train crews daily for road or terminal operations including switching, classifying, and making up trains for the road. Assigned to a transportation command and normally attached to a transportation railway battalion, this unit may operate separately under the supervision of an appropriate transportation element.

Diesel-electric locomotive repair company

The diesel-electric locomotive repair company performs general support maintenance on diesel-electric locomotives and railway cranes. This unit provides--

- Internal class IX supply but does not provide supply to supported unit.
- Technical assistance and maintenance support teams to user units on an exception basis for specific items of equipment.
- General support maintenance for repair and return of diesel-electric locomotives and railway crane peculiar stocks to the supply system.

This organization is assigned to a transportation command and is normally attached to a transportation railway group.

Continued on next page

Transportation railway car repair company, general support

The transportation railway car repair company general support, performs general support maintenance of railway cars. This unit--

- Provides general support maintenance for approximately 2,500 railway cars, including, stripping, fabricating, milling, assembling, erecting, and painting.
- Receives, stores, and issues 8,000 line items of railway supplies and repair parts per month in support of four to six railway battalions.

This unit is assigned to a transportation command attached to a transportation railway group.

Transportation railway service teams

Transportation railway service teams, are used to increase the capabilities of operation and maintenance units when their organic capabilities are exceeded. All railway service teams are attached to a railway battalion for operation and control. These are the railway service teams:

- Team EA, railway station team.
- Team EB, railway terminal detachment.
- Team EC, railway section crew.
- Team ED, diesel-electric locomotive maintenance crew (direct support).
- Team EE, railway car repair crew (direct support).
- Team EF, railway yard operation detachment.
- Team EG, bridge and building maintenance detachment (direct support).
- Team EH, railway train-operating section.
- Team EI, railway workshop mobile detachment (direct support).
- Team EJ, railway maintenance of way crew.
- Team EK, railway train-operating section.

8-5. Lesson 8 Practice Exercise

Introduction

The following items will test your grasp of the material covered in this lesson. There is only one correct answer for each item. When you complete the exercise, check your answers with the answer key that follows. If answer any item incorrectly, study again that part of the lesson.

Item 1

The operation of military railways is accomplished in how many phases?

A. Two
B. Three
C. Four
D. Five

Item 2

Which of the following is the key element in the each of the phases of military rail operations?

A. Meeting time schedules.
B. Maximizing use of available rail cars.
C. Employment of civilian personnel.
D. Computing distances.

Item 3

During which of the phases in the operation of military railways are the operations conducted entirely by military personnel?

A. Phase I
B. Phase II
C. Phase III
D. Phase IV

Item 4

During which of the phases in the operation of military railways are the railways operated and maintained by local civilian railway personnel under direct military supervision?

A. Phase I
B. Phase II
C. Phase III
D. Phase IV

Continued on next page

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Item 5 Which of the following is not considered among the capabilities of railway operations?

A. No weather restrictions.
B. Transports all commodities.
C. Greatest sustained ton-mile capability.
D. A limited amount of specialized equipment and services.

Item 6 Which of the following is a limitation of railway operations in theater?

A. Unlimited flexibility.
B. Invulnerable to enemy attack
C. Unrestricted outsize movements.
D. Capability impacted by availability of tractive power.

Item 7 Which of the following coordinates the flow of railway assets through the area of operations?

A. Division transportation officer.
B. Movement control center.
C. Corps G3.
D. Theater Army DCSLOG.

Item 8 Which of the following rail transportation organizations is responsible for dispatching all trains?

A. Transportation railway brigade.
B. Transportation railway group.
C. Transportation railway battalion.
D. Transportation train-operation company.

8-6. Lesson 8 Practice Exercise Answer Key and Feedback

Item	Correct Answer and Feedback	
1.	B	The operation of military railways is accomplished in the three phases ... Page 8-3.
2.	C	The key element in each of the three phases of rail operations is the employment of civilian personnel. Page 8-3.
3.	A	Phase I operations are conducted entirely by military personnel. Page 8-3.
4.	B	In Phase II operations the railway lines are operated and maintained by local civilian railway personnel under direct military supervision. Page 8-3.
5.	D	Railway operations capabilities include a variety of specialized equipment and services; additionally all the other discriminators accurately answer the question. Page 8-4.
6.	D	The capability of rail operations is limited by the availability of tractive power. Page 8-4.
7.	B	Movement Control Center. Page 8-5.
8.	C.	Transportation railway battalion. Page 8-8.