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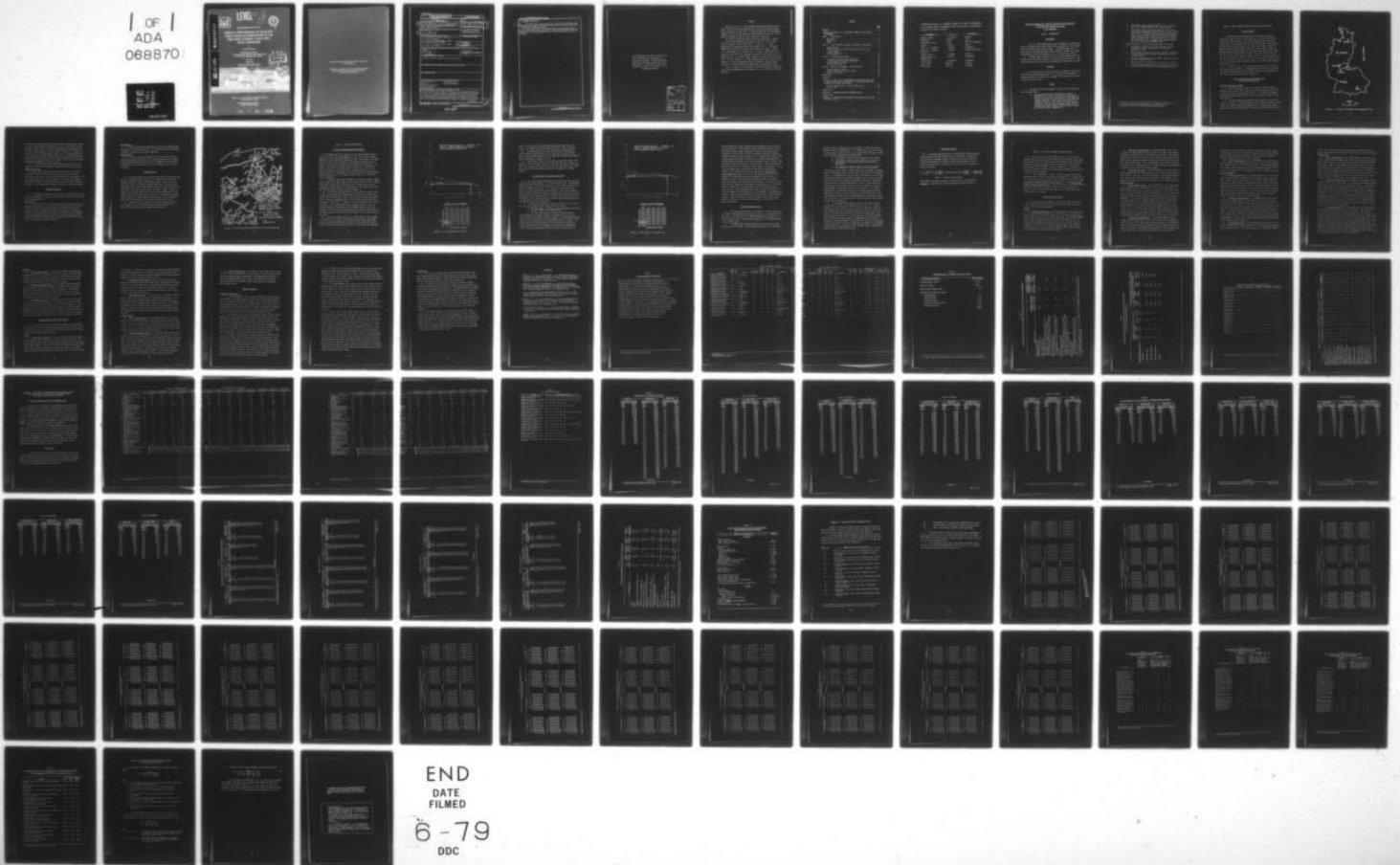
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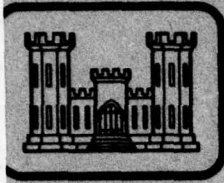
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MISCELLANEOUS PAPER GL-79-10

## MOBILITY PERFORMANCE OF SELECTED TRUCK/TRAILER COMBINATIONS IN THE HIMO WEST GERMANY STUDY AREA (TACV ADDENDUM)

by

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May 1979

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20. ABSTRACT (Continued).

used to establish mobility rating speed for the five tactical mobility levels (on-road, tactical support, tactical standard, tactical high, and high-high) in the HIMO West Germany study area.

The study vehicles were then compared based on their mobility rating speeds for the three surface conditions at each tactical mobility level. The study vehicles were also compared based on their percent NOGO on trails and off-road.

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## PREFACE

Personnel of the U. S. Army Engineer Waterways Experiment Station (WES) conducted the study described herein during the period January 1979 to February 1979 for the U. S. Army Training and Doctrine Command (TRADOC) under Intra-Army Orders for Reimbursable Services Nos. CD 9-79 dated 15 November 1978 and CD 20-79 dated 25 January 1979.

The study was conducted under the general supervision of Messrs. J. P. Sale, Chief, Geotechnical Laboratory (GL); E. S. Rush, Chief, Mobility Systems Division (MSD); and C. J. Nuttall, Jr., Chief, Methodology and Modeling Research Group (MMRG). Mr. D. D. Randolph (MMRG) directed the overall study and prepared this report. Messrs. R. P. Smith (MMRG), R. B. Ahlvin, and B. R. Wright, Computations and Analysis Group (CAG), MSD, prepared the mobility predictions. Mr. R. G. Temple and Ms. E. P. Roberts, MMRG, prepared the vehicle characteristics data. Mr. Dave Logston, U. S. Army Logistic Center (LOGC), and CPT Dan Noonan, U. S. Army Transportation School (USATSCH), supported WES's efforts in collecting vehicle characteristics and performance data.

COL J. L. Cannon, CE, was Director of the WES during the conduct of the study and preparation of this report. Mr. F. R. Brown was Technical Director.

CONTENTS

	<u>Page</u>
PREFACE . . . . .	2
CONVERSION FACTORS, U. S. CUSTOMARY TO METRIC (SI) UNITS OF MEASUREMENT . . . . .	4
PART I: INTRODUCTION . . . . .	5
Background . . . . .	5
Objective . . . . .	5
Scope . . . . .	5
PART II: STUDY VEHICLES, TERRAIN, AND SCENARIO CONDITIONS . . . . .	7
Study Vehicles . . . . .	7
Brief Description of HIMO Road, Areal Terrain, and Linear Data . . . . .	7
Surface Conditions . . . . .	9
Study Scenarios . . . . .	10
PART III: MOBILITY PREDICTIONS . . . . .	12
On- and Off-Road Mobility Predictions . . . . .	12
Linear Feature Performance Predictions . . . . .	14
Tactical Mobility Levels . . . . .	16
Missions Performed . . . . .	18
PART IV: MOBILITY ASSESSMENT OF STUDY VEHICLES . . . . .	19
Tactical Mobility Levels . . . . .	19
Percent NOGO on Trails and Off-Road . . . . .	23
Summary Assessment . . . . .	25
REFERENCES . . . . .	28
TABLES 1-7	
APPENDIX A: DATA USED TO CHARACTERIZE THE STUDY VEHICLES AND A BRIEF DESCRIPTION OF FACTORS USED IN DESCRIBING HIMO WEST GERMANY AND MID-EAST STUDY AREAS . . . . .	A1
Vehicle Characteristics and Performance Data . . . . .	A1
Terrain Data . . . . .	A1
TABLES A1-A7	
APPENDIX B: DETAILED MOBILITY PERFORMANCE DATA . . . . .	B1
TABLES B1-B19	
APPENDIX C: COMPUTATION OF MOBILITY RATING SPEED FOR TACTICAL MOBILITY LEVELS . . . . .	C1

CONVERSION FACTORS, U. S. CUSTOMARY TO METRIC (SI) UNITS OF MEASUREMENT

U. S. customary units of measurement used in this report can be converted to metric (SI) units as follows:

<u>Multiply</u>	<u>By</u>	<u>To obtain</u>
degrees (angle)	0.01745329	radians
horsepower	745.6999	watts
horsepower per ton	82.82	watts per kilonewton
inches	0.0254	metres
miles (U. S. statute)	1.609344	kilometres
miles (U. S. statute) per hour	1.609344	kilometres per hour
pounds (force)	4.448222	newtons
pounds (force) per square inch	6.894757	kilopascals
pounds (mass)	0.45359237	kilograms
tons (force)	8896.444	newtons
tons (mass)	907.185	kilograms

MOBILITY PERFORMANCE OF SELECTED TRUCK/TRAILER COMBINATIONS  
IN THE HIMO WEST GERMANY STUDY AREA  
(TACV ADDENDUM)

PART I: INTRODUCTION

Background

1. The U. S. Army Transportation School (USATSCH) is conducting a study to determine which cargo truck/trailer candidates can best support the Ground Support Rocket System (GSRs). The USATSCH asked the U. S. Army Engineer Waterways Experiment Station (WES) to support their study by developing mobility performance data for selected study vehicles.

2. Fourteen cargo truck/trailer and one tractor/semitrailer combinations were selected by USATSCH as study vehicles (Appendix A). This report deals only with the mobility performance of these study vehicles.

Objective

3. The objective of the WES support of the USATSCH's study was to provide mobility performance data for the selected study vehicles in HIMO West Germany study area<sup>1</sup> and to compare the study vehicles at five tactical mobility levels.<sup>1</sup>

Scope

4. Principal activities necessary to achieve the WES objective were the following:

- a. The Army Mobility Model (AMM) (AMC-74X version, paragraph 18) was used to establish for each study vehicle the on- and off-road mobility performances for dry, wet, and snow surface conditions in the HIMO West Germany study area. The mobility performance was expressed in terms of speed profiles for each surface condition of primary roads, secondary roads, and off-road terrain; and in terms of percent NOGO for trails and off-road terrain (Appendix B).

- b. The SWIMCRIT water-crossing model<sup>2</sup> was used to predict water-crossing performance of the study vehicles.
  - c. The mobility rating speed was computed for each study vehicle at five tactical mobility levels for each of the three surface conditions and for all conditions combined (Part III). The levels of mobility and corresponding mobility rating speeds were those described in the HIMO Study<sup>1</sup> (paragraph 27). Three of these mobility levels (tactical high, tactical standard, and tactical support) were first defined by the WHEELS Study<sup>3</sup>.
5. Some limitations of this mobility study were as follows:
- a. The mobility assessment for this study was limited to comparison of study vehicles based on mobility performance alone.
  - b. Vehicles were assumed to be in prime condition, operating at approximately rated payload, and operated by fully competent drivers.
  - c. Payload was established by the weight of missiles carried on cargo truck and trailer.
  - d. Maximum speed of study vehicles was limited to 55 mph.\*
  - e. Mobility assessment was based on three surface conditions of the HIMO West Germany study area (paragraphs 12-15).

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\* A table of factors for converting U. S. customary units of measurement to metric (SI) units is presented in page 4.

## PART II: STUDY VEHICLES, TERRAIN, AND SCENARIO CONDITIONS

### Study Vehicles

6. Fourteen cargo truck/trailer and one tractor-semitrailer combinations were selected as study vehicles. A list of these study vehicles is given in Table 1. The study vehicles include two 5-ton cargo trucks, a 7-ton cargo truck, and four 10-ton cargo trucks towing the XM835 5-ton flatbed trailer, four 10-ton cargo trucks towing the German Kasbohrer 10-ton flatbed trailer, one 5-ton tractor towing the M871 22-1/2-ton lowbed semitrailer, and three 10-ton cargo trucks towing the XM345 10-ton flatbed trailer. Each 5-ton cargo truck and trailer has as its payload two missiles weighing 10,758 lb. Each 10-ton cargo truck and 10-ton trailer has as its payload four missiles weighing 21,516 lb. The 22-1/2-ton lowbed semitrailer has as its payload eight missiles weighing 43,032 lb.

7. A list of some of the important characteristics of the study vehicles is given in Table 2. The complete list of vehicle characteristics and performance data used by the AMM to make mobility predictions for the study vehicles is given in Appendix A.

### Brief Description of HIMO Road, Areal Terrain, and Linear Data

#### Road and areal terrain data

8. The road and areal terrain data for the HIMO West Germany study area were used in this study. The HIMO West Germany study area is located between Fulda and Giessen (Figure 1). The HIMO West Germany study area contains about 3000 sq km and was selected by TRADOC during the HIMO study.

9. The road and areal terrain data were prepared from maps at a scale of 1:50,000. The resulting maps used to describe the areal terrain units for the HIMO study were considered to be "study-quality" maps. That is, specific values for many terrain factors involved were largely

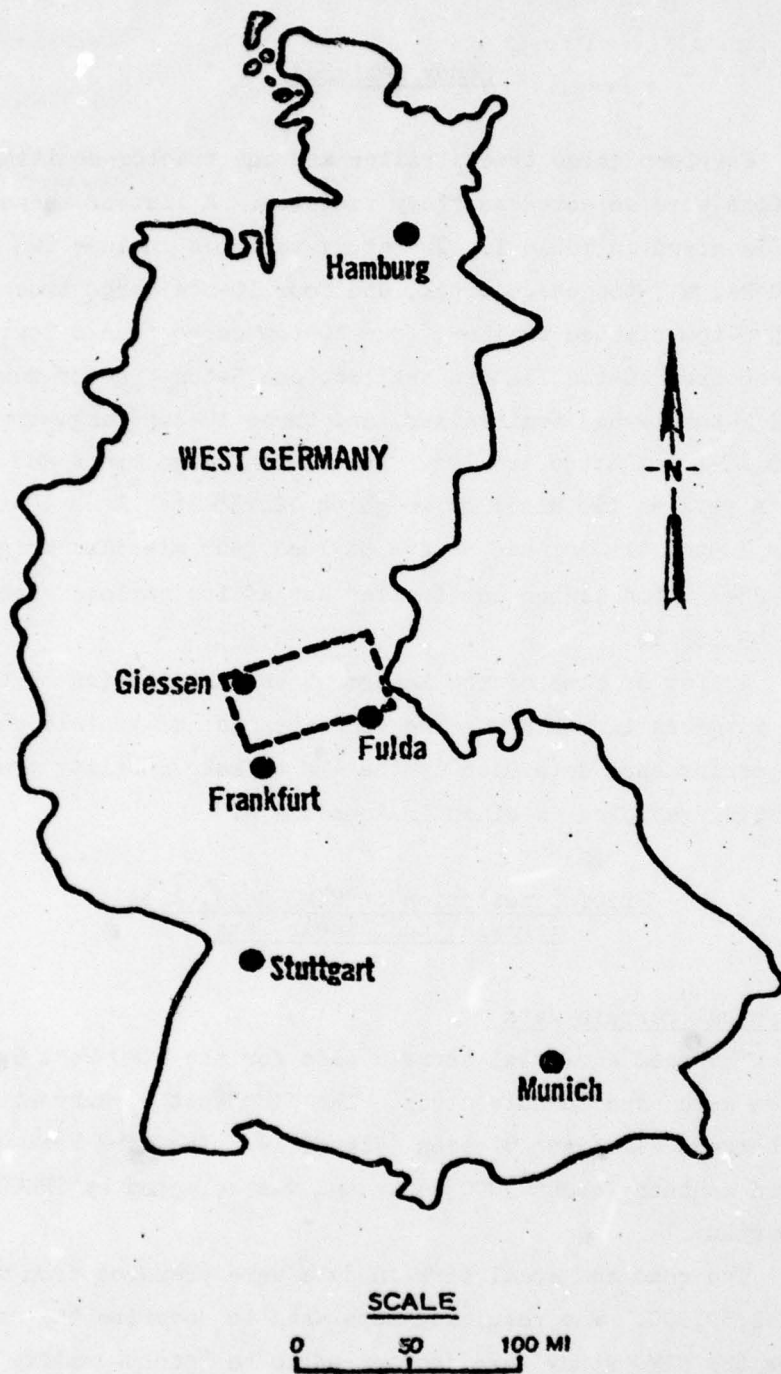


Figure 1. Location of the HIMO West Germany study area

inferred from available qualitative data sources interpreted in context of local climate, cultural practices, etc., but no ground truth data were used. As a result, it cannot be guaranteed that the specific set of factor values assigned to a given point on a map will, in fact, be found at that point on the ground. However, it is considered that the area as mapped is generally representative of the levels, associations, and areal distribution of those factors that influence vehicle mobility performance throughout the area as a whole.

10. It is felt that the HIMO West Germany study map data is acceptable for the vehicle comparisons that are involved in this study.

#### Linear feature data

11. The linear feature data that were developed in the area for the WACROSS<sup>4</sup> study were used to describe potential water-crossing features for this study. These linear feature data are considered to be more representative of the linear features in the HIMO West Germany study area than were the data available at the time the HIMO study was conducted. These WACROSS data, however, are also of study quality only.

#### Surface Conditions

12. The surface conditions of areal terrain and road data for this study were considered to be dry, wet, and covered with snow for the HIMO West Germany study area.

#### Wet condition

13. The wet condition is described as that from an excessively wet period and during rain. The wet condition is generally the worst condition for vehicle cross-country mobility because of the high soil-moisture content and associated reduced soil strengths. The assumption of continuing rain makes the situation still less favorable because of potential slipperiness on soils whose strength would otherwise be adequate for traction and vehicle flotation.

#### Dry condition

14. The dry condition is described as that from a dry period when the surface is mostly dry and firm. It is generally the most favorable condition for vehicle cross-country mobility.

#### Snow condition

15. The snow condition assumes that the terrain and trails are frozen and uniformly covered by 10 in. of dry snow, which is a reasonable maximum average depth for the area. Differences in snow depth or characteristics in forested areas, or due to drifting snow, are not considered.

#### Study Scenarios

16. During the HIMO study, personnel from TRADOC schools and study agencies designated movement routes at 1:50,000 scale for portions of authorized TRADOC scenarios representing defense, attack, and delay operations within the HIMO West Germany study area. They indicated appropriate main supply routes (MSR) and secondary supply roads between each combat unit and concurrent points of supply. Figure 2 shows an example of the supply routes for part of the West Germany study area. Similar routes were designated for a number of typical runs by combat, combat support, and combat service support units. Table 3 summarizes some of the characteristics of the composite network of routes.

17. Because of the high density of secondary roads and trails in West Germany, very little off-road operation was considered to be required except under the local impact of enemy action.

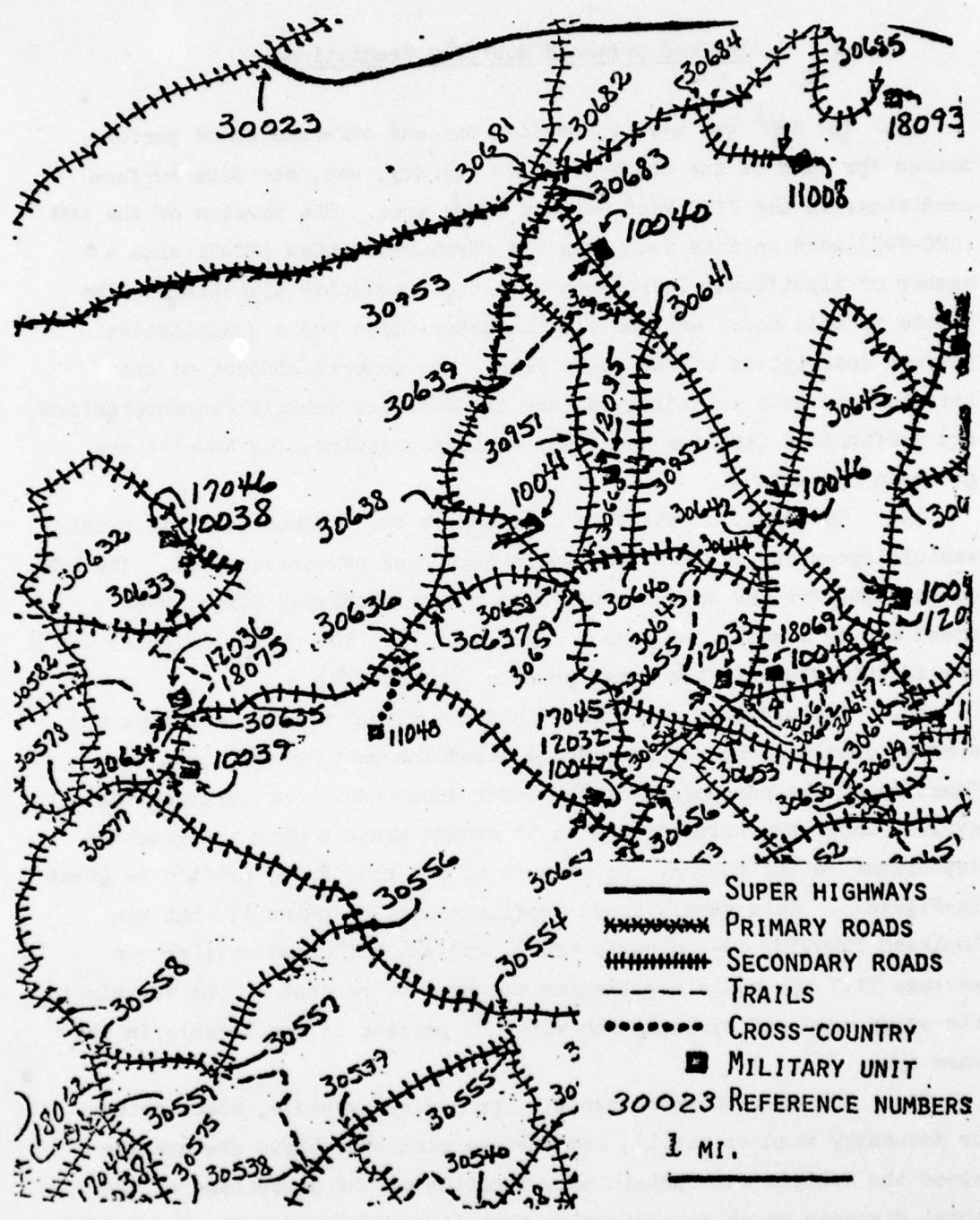


Figure 2, Partial supply route network map for West Germany study area

### PART III: MOBILITY PREDICTIONS

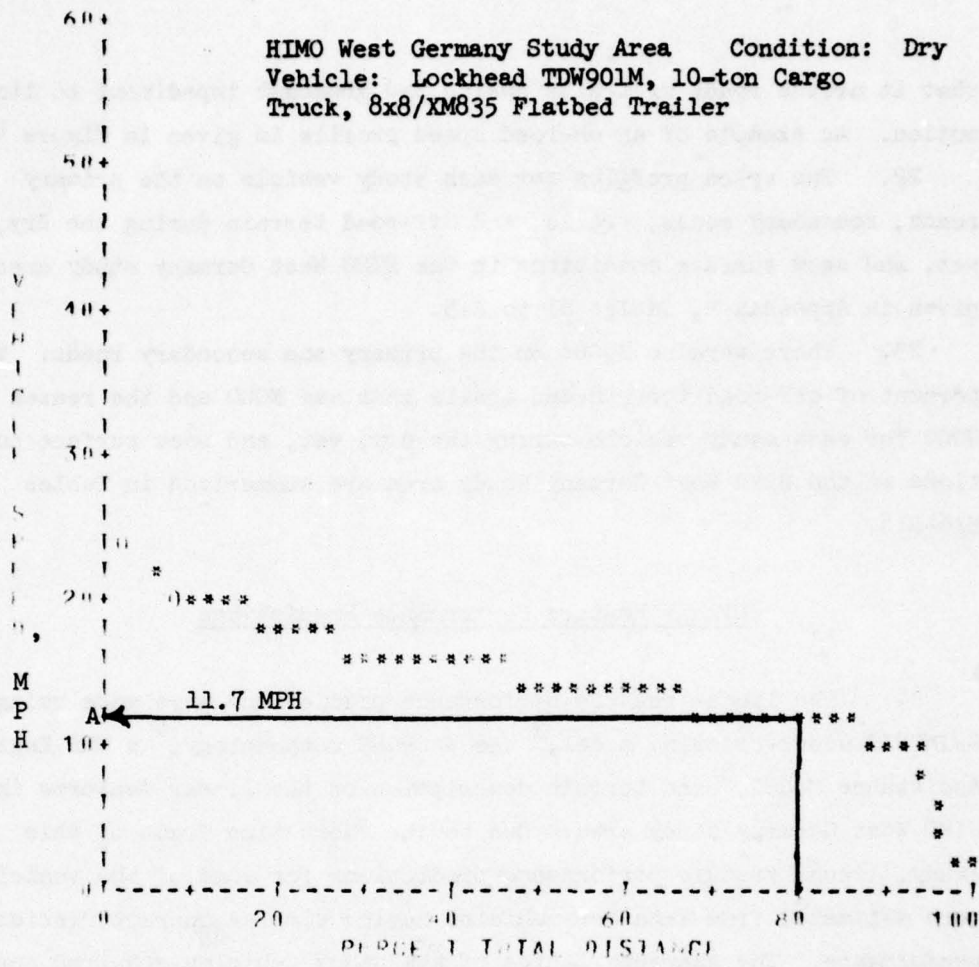
#### On- and Off-Road Mobility Predictions

18. The AMM<sup>1</sup> was used to predict on- and off-road speed performances for each of the study vehicles for dry, wet, and snow surface conditions in the HIMO West Germany study area. The version of the AMM (AMC-74X) used in this study was the first-generation AMC-71 with a number of significant improvements in the predictive algorithms. The inputs to this model are vehicle characteristics and a quantitative terrain description of the study area. The general content of the terrain data base is indicated, and the detailed vehicle characteristics and performance data for the study vehicles required for AMC-74X are given in Appendix A.

19. The basic output data from AMM is the maximum feasible single vehicle speed for a given vehicle in each road or terrain unit. The AMM output data for the entire study area can be displayed directly as a speed map or statistically as a speed profile. The output selected for use in this study is the speed profile (Appendix B).

20. The off-road speed profile for a given vehicle, terrain, and surface condition shows the average speed the vehicle can sustain as a function of the percentage of the total area under consideration that it avoids, under the assumption that it avoids areas posing the greatest impediment to its motion. An example of off-road speed profile is given in Figure 3. This sample speed profile shows, at point A, that the Lockheed TDW901M, 10-ton cargo truck, 8x8/XM835 flatbed trailer can average 11.7 mph while negotiating the best 80 percent of the terrain in the study area and avoiding the worst 20 percent of the terrain in the same area.

21. The on-road speed profile for a given vehicle, road (primary or secondary road or trail), and surface condition shows the average speed the vehicle can sustain as a function of the percentage of the total distance under consideration that it avoids, under the assumption



PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	27.7	24.4	22.6	21.5	20.8
1X	20.3	19.9	19.4	19.0	18.6
2X	18.2	17.8	17.5	17.3	17.0
3X	16.7	16.5	16.3	16.2	16.0
4X	15.8	15.6	15.4	15.1	14.9
5X	14.7	14.5	14.3	14.1	13.9
6X	13.6	13.4	13.2	13.0	12.8
7X	12.7	12.5	12.3	12.1	11.9
8X	11.7	11.5	11.3	11.1	10.9
9X	10.7	10.2	9.7	3.2	2.0
10X	1.4				

ACCUMULATED SPEED

Figure 3. Off-road speed profile data

that it avoids roads or trails posing the greatest impediment to its motion. An example of an on-road speed profile is given in Figure 4.

22. The speed profiles for each study vehicle on the primary roads, secondary roads, trails, and off-road terrain during the dry, wet, and snow surface conditions in the HIMO West Germany study area are given in Appendix B, Tables B1 to B15.

23. There were no NOGOs on the primary and secondary roads. The percent of off-road terrain and trails that was NOGO and the reason for NOGO for each study vehicle during the dry, wet, and snow surface conditions in the HIMO West Germany study area are summarized in Tables B16-B18.

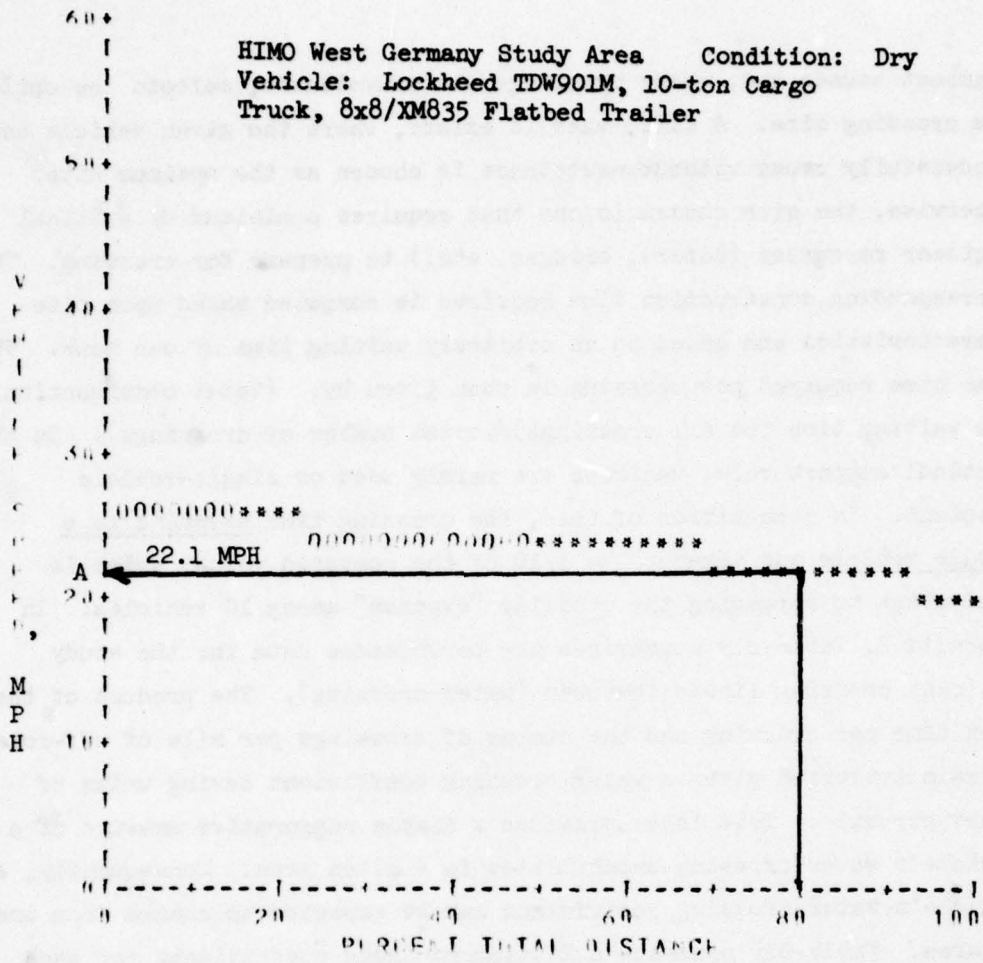
#### Linear Feature Performance Predictions

24. The linear feature performance predictions were made using the SWIMCRIT water-crossing model,<sup>2</sup> the WACROSS methodology,<sup>4</sup> a WES Engineer Assistance Model,<sup>5</sup> and terrain description of the linear features in the HIMO West Germany study area. Due to the short time frame of this study, linear feature performance predictions for some of the vehicles were estimated from data for vehicles having similar characteristics and performance. The characteristics of the study vehicles required for the SWIMCRIT water-crossing model and the linear feature data required for the SWIMCRIT are given in Appendix A.

25. The WACROSS methodology was used to determine (for each vehicle, for three seasonal water stages, and for the area):

- a. The mean number of stream crossings necessarily negotiated per mile during cross-country travel.
- b. The mean time required to effect a single crossing.

The methodology, as applied, examined the WACROSS digitized linear feature data for the areas covered by eighteen 1- by 22-km sample strips across the area depicted on the central HIMO quad sheet (L5322). Nine samples were north-south transects; nine were east-west transects. Moving from one end of each transect to the other, the computerized process avoids crossings where possible without going outside the



PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	25.7	25.7	25.7	25.7	25.7
1X	25.7	25.7	25.6	25.4	25.3
2X	25.2	25.1	25.0	24.9	24.8
3X	24.8	24.7	24.7	24.7	24.6
4X	24.6	24.6	24.6	24.5	24.5
5X	24.4	24.3	24.2	24.1	23.9
6X	23.8	23.6	23.5	23.3	23.1
7X	22.9	22.7	22.6	22.4	22.3
8X	22.1	22.0	21.9	21.7	21.5
9X	21.3	21.1	20.9	20.7	20.3
10X	19.9				

ACCUMULATED SPEED

Figure 4. Speed profile for primary road

transect bounds and, where crossings are unavoidable, selects the optimum crossing site. A site, when it exists, where the given vehicle can successfully cross without assistance is chosen as the optimum site. Otherwise, the site chosen is one that requires a minimum of critical engineer resources (dozers, bridges, etc.) to prepare for crossing. The corresponding construction time required is computed based upon site characteristics and added to an arbitrary waiting time of one hour. The mean time required per crossing is then given by: (total construction and waiting time for all crossings)/(total number of crossings). In the tactical support role, vehicles are rarely used on single-vehicle missions. In recognition of this, the crossing time assessed to a single vehicle was taken to be 1/10 of the computed value, which is equivalent to spreading the crossing "expense" among 10 vehicles. In Appendix B, Table B19 summarizes the performance data for the study vehicles crossing linear features (water-crossing). The product of the mean time per crossing and the number of crossings per mile of off-road terrain traversed gives a water-crossing coefficient having units of hours per mile. This index provides a simple comparative measure of a vehicle's water-crossing capabilities in a given area. Consequently, a vehicle's water-crossing coefficient can be expected to change from area to area. Table B19 presents a listing of these coefficients for each vehicle for each of the three surface conditions for the HIMO West Germany study area.

#### Tactical Mobility Levels

26. The mobility performance of a vehicle is a complex function of the vehicle characteristics, the terrain in which it is operating, and the task it is required to do. Expressing mobility performance in a minimal reduced set of comprehensible numbers to aid in making decisions is a formidable task.

27. The WHEELS study defined three levels of tactical mobility. These are listed in Table 4 along with the definitions for two further

mobility levels (high-high and on-road mobility), which were added to the HIMO study for completeness. In the HIMO study, each of the resulting five levels of mobility were also quantitatively described in terms of the following statistical performance data:

- a. Percentage of off-road travel expected of the vehicle.
- b. The severity of expected off-road travel (in terms of performance of the off-road terrain that should be negotiable).
- c. The severity of expected travel on trails (in terms of the percentage of trails that should be negotiable).

In computing on-road speeds, separate predictions were made for primary roads, for secondary roads, and for trails in accordance with constraint c above. The percentage of on-road travel was subdivided into the same categories according to the relative mileage of each found in the road network for the area developed in the HIMO scenario play. Assignment for each vehicle of proper percentages of total off-road travel, on primary roads, on secondary roads, and on trails (Table 5), along with the appropriate corresponding values for mean speeds in each travel category level, permitted calculation of an average mobility rating speed that the vehicle could be expected to maintain area-wide in the stated weather condition while performing missions requiring a stated level of mobility. Procedures used to calculate mobility rating speeds are described in Appendix C.

28. The mobility rating speeds for each of the study vehicles during the dry, wet, and snow conditions and for the "all" surface condition, for each mobility level are given in Table 6 for the HIMO West Germany study area. The mobility rating speed for a vehicle for the "all" condition was determined by taking the simple mean of the rating speeds for dry, wet, and snow or dry, wet, and sand conditions. This in effect gives equal weight to performance in each condition. Because the three conditions do not prevail for each time period during a normal year, this, in effect, assigns special emphasis to performance in bad conditions (wet and snow or wet and sand), which, subjectively, appears proper in the military context.

### Missions Performed

29. The average one-way mission for the HIMO West Germany scenario established from the HIMO scenario play is 18.8 miles. The number of one-way missions completed during a 10-hour day (no time allowed for loading and unloading) was computed for each study vehicle, at each tactical mobility level, and for dry, wet, snow, and "all" surface conditions as follows:

$$\begin{aligned} \text{No. of missions} &= \left[ 10 \left( \frac{\text{hr}}{\text{day}} \right) \times \text{Mobility Rating Speed} \left( \frac{\text{mi}}{\text{hr}} \right) \right] \div 18.8 \left( \frac{\text{mi}}{\text{mission}} \right) \\ \text{per day} &= 0.532 \times (\text{Mobility Rating Speed}) \end{aligned}$$

(This number is simply truncated to a whole number to give missions completed.) The number of missions completed is given in Table 7.

#### PART IV: MOBILITY ASSESSMENT OF STUDY VEHICLES

30. The study vehicles were compared based on their mobility rating speeds at the five tactical mobility levels and the percent NOGO on trails and off road in the HIMO West Germany study area. The speed profiles and linear performance data are reflected in the mobility rating speeds and the number of missions completed in a 10-hr day is directly related to the mobility rating speeds, therefore, they were not included in this assessment.

31. Since the payloads of some of the seven cargo trucks towing the XM835 flatbed trailer are different (paragraphs 6-7), comparisons of the cargo trucks towing the XM835 flatbed trailer were made based on all cargo trucks towing the XM835 flatbed trailer and on the 10-ton cargo trucks towing the XM835 trailer. Cargo trucks towing the German Kasbohrer and M345 flatbed trailers were all carrying a 10-ton payload and, therefore, only a single comparison based on all cargo trucks towing these trailers was required.

##### Tactical Mobility Levels

32. The mobility rating speeds for the cargo trucks towing the three flatbed trailers at the five mobility levels (Table 6) are discussed in the following paragraphs.

##### On road

33. XM835 flatbed trailer. The TARADCOM HMTT, 10-ton cargo truck had the highest mobility rating speed of all cargo trucks towing the XM835 flatbed trailer for all surface conditions. The Lockheed TDW901M, 10-ton cargo truck had the lowest mobility rating speed of all cargo trucks towing the XM835 flatbed trailer for the dry and wet surface conditions. The M813 PIP, 5-ton cargo truck had the lowest mobility rating speed of all the cargo trucks towing the XM835 flatbed trailer for the snow and the "all" surface conditions.

34. Kasbohrer flatbed trailer. The TARADCOM HMTT, 10-ton cargo truck had the highest mobility rating speed of all cargo trucks towing the Kasbohrer flatbed trailer for all surface conditions. The Lockheed TDW901M, 10-ton cargo truck had the lowest mobility rating speed of all cargo trucks towing the Kasbohrer flatbed trailer for the dry, wet, and "all" surface conditions. The Lockheed TDW902, 10-ton cargo truck had the lowest mobility rating speed of all cargo trucks towing the Kasbohrer flatbed trailer for the snow surface condition.

35. M345 flatbed trailer. The TARADCOM HMTT, 10-ton cargo truck had the highest mobility rating speed of all the cargo trucks towing the M345 flatbed trailer for all surface conditions. The Lockheed TDW901M, 10-ton cargo truck, 8x8, had the lowest mobility rating speed of all cargo trucks towing the M345 flatbed trailer for all surface conditions.

Tactical support

36. XM835 flatbed trailer. The TARADCOM HMTT, 5-ton cargo truck, had the highest mobility rating speed of all cargo trucks towing the XM835 flatbed trailer for all surface conditions. The M813 PIP, 5-ton cargo truck had the lowest mobility rating speed of all the cargo trucks towing the XM835 flatbed trailer for the dry, snow, and "all" surface conditions. The M813 PIP also had the lowest mobility rating speed of the cargo trucks towing the XM835 flatbed trailer for the wet surface condition along with the Lockheed TDW901M, 10-ton cargo truck. The Lockheed TDW902, 10-ton cargo truck had the highest mobility rating speeds of the 10-ton cargo trucks towing the XM835 flatbed trailer for the dry, wet, and "all" surface conditions. The TARADCOM HMTT, 10-ton cargo truck had the highest mobility rating speed of the 10-ton cargo trucks towing the XM835 flatbed trailer for the wet surface condition.

37. Kasbohrer flatbed trailer. The Lockheed TDW902 had the highest mobility rating speed of the cargo trucks towing the Kasbohrer flatbed trailer for the dry and wet surface conditions. The TARADCOM HMTT, 10-ton cargo truck had the highest mobility rating speed of the cargo trucks towing the Kasbohrer flatbed trailer for the snow and "all" surface conditions. The Lockheed TDW901M had the lowest mobility

rating speed of the cargo trucks towing the Kasbohrer flatbed trailer for the dry, wet, and "all" surface conditions, and the Lockheed TDW902 had the lowest mobility rating speed of the cargo trucks towing the Kasbohrer flatbed trailer for the snow condition.

38. M345 flatbed trailer. The TARADCOM HMTT, 10-ton cargo truck had the highest mobility rating speed of all the cargo trucks towing the M345 flatbed trailer for all surface conditions. The Lockheed TDW901M, 10-ton cargo truck, 8x8, had the lowest mobility rating speed of all cargo trucks towing the M345 flatbed trailer for all surface conditions.  
Tactical standard

39. XM835 flatbed trailer. The TARADCOM HMTT, 5-ton cargo truck had the highest mobility rating speed of the cargo trucks towing the XM835 flatbed trailer for the dry, snow, and "all" surface conditions. The Lockheed TDW902 had the highest mobility rating speed of the cargo trucks towing the XM835 trailer for the wet surface condition and had the highest mobility rating speed of the 10-ton cargo trucks towing the XM835 for all surface conditions. The M813 PIP, 5-ton cargo truck had the lowest mobility rating speed of all the cargo trucks towing the XM835 flatbed trailer for all surface conditions.

40. Kasbohrer flatbed trailer. The TARADCOM HMTT, 10-ton cargo truck had the highest mobility rating speed of all the cargo trucks towing the Kasbohrer flatbed trailer for the wet, snow, and "all" surface conditions. The TDW902 had the highest mobility rating speed of all the cargo trucks towing the Kasbohrer flatbed trailer for the dry condition. The TDW901M had the lowest mobility rating speed of all the cargo trucks towing the Kasbohrer flatbed trailer for the dry, wet, and "all" surface conditions. The Lockheed TDW902 had the lowest mobility rating speed of all the cargo trucks towing the Kasbohrer flatbed trailer for the snow surface condition.

41. M345 flatbed trailer. The TARADCOM HMTT, 10-ton cargo truck had the highest mobility rating speed of all the cargo trucks towing the M345 flatbed trailer for all surface conditions. The Lockheed TDW901M,

10-ton cargo truck, 8x8, had the lowest mobility rating speed of all cargo trucks towing the M345 flatbed trailer for all surface conditions.

Tactical high

42. XM835 flatbed trailer. The TARADCOM HMTT, 5-ton cargo truck had the highest mobility rating speed of all the cargo trucks towing the XM835 flatbed trailer for the dry, snow, and "all" surface conditions. The Lockheed TDW902 had the highest mobility rating speed of all the cargo trucks towing the XM835 flatbed trailer for the wet surface condition and had the highest mobility rating speed of the 10-ton cargo trucks towing the XM835 flatbed trailer for all surface conditions. The M813 PIP had the lowest mobility rating speed of all the cargo trucks towing the XM835 flatbed trailer for all surface conditions.

43. Kasbohrer flatbed trailer. The TDW902 had the highest mobility rating speed of all of the cargo trucks towing the Kasbohrer flatbed trailer for the dry, wet, and "all" surface conditions. The TARADCOM HMTT, 10-ton cargo truck and German MAN, 10-ton cargo truck had the highest mobility rating speeds of the cargo trucks towing the Kasbohrer flatbed trailer for the snow condition. The German MAN, 10-ton cargo truck had the lowest mobility rating speed of the cargo trucks towing the Kasbohrer flatbed trailer for the wet and "all" surface conditions. The TARADCOM HMTT, 10-ton cargo truck along with the Lockheed TDW901M had the lowest mobility rating speed when towing the Kasbohrer flatbed trailer for the dry surface condition.

44. M345 flatbed trailer. The German MAN, 10-ton cargo truck had the highest mobility rating speed of all the cargo trucks towing the M345 flatbed trailer for the dry surface condition. The Lockheed TDW901M had the highest mobility rating speed of the cargo trucks towing the M345 flatbed trailer for the wet and "all" surface conditions. The Lockheed TDW901, 10-ton cargo truck, and the TARADCOM HMTT, 10-ton cargo truck, had the highest mobility rating speeds for the snow surface condition. The lowest mobility rating speed for all cargo trucks towing the M345 flatbed trailer were the TARADCOM HMTT, 10-ton cargo truck, during the dry surface condition and the German MAN, 10-ton cargo truck, during the wet, snow, and "all" surface conditions.

### High-high

45. XM835 flatbed trailer. The Lockheed TDW902 and TDW901M had the highest mobility rating speeds of the cargo trucks towing the XM835 flatbed trailer for all surface conditions. The M813 PIP, 5-ton cargo truck had the lowest mobility rating speed of the cargo trucks towing the XM835 flatbed trailer for all surface conditions.

46. Kasbohrer flatbed trailer. The Lockheed TDW902 and TDW901M had the highest mobility rating speeds of the cargo trucks towing the Kasbohrer flatbed trailer for all surface conditions. The TARADCOM HMTT, 10-ton cargo truck and German MAN, 10-ton cargo truck had the lowest mobility rating speeds of the cargo trucks towing the Kasbohrer flatbed trailer for all surface conditions.

47. M345 flatbed trailer. The TDW901M, 10-ton cargo truck, had the highest mobility rating speed of the cargo trucks towing the M345 flatbed trailer for the dry, wet, and "all" surface conditions. All the cargo trucks had the same mobility rating speed when towing the M345 flatbed trailer during the snow surface condition. The German MAN, 10-ton cargo truck, and TARADCOM HMTT, 10-ton cargo truck, had the lowest mobility rating speeds for the dry, wet, and "all" surface conditions.

### Percent NOGO on Trails and Off-Road

48. A NOGO situation is predicted when a vehicle configuration is immobilized under its own power and requires engineering effort, such as winching and towing, to continue. Only the trails and off-road terrain contain NOGO situations (Table B12-B18).

### Trails

49. XM835 flatbed trailer. None of the cargo trucks were immobilized towing the XM835 flatbed trailer during the dry condition. The TARADCOM HMTT, 10-ton cargo truck, Lockheed TDW901M, 10-ton cargo truck, and Lockheed TDW902, 10-ton cargo truck were not immobilized towing the XM835 flatbed trailer during the wet condition. Other cargo trucks towing the XM835 flatbed trailer were immobilized on 1.5 percent or less

of the trails. The M813 PIP, 5-ton cargo truck towing the XM835 flatbed trailer was immobilized on 7.0 percent of the trails during the snow condition. Other cargo trucks towing the XM835 flatbed trailer were not immobilized on trails during the snow condition.

50. Kasbohrer flatbed trailer. None of the cargo trucks were immobilized towing the Kasbohrer flatbed trailer during the dry surface condition. All study vehicles were immobilized on between 1.5 and 2.9 percent of the trails during the wet surface condition. Only the Lockheed TDW902 was immobilized towing the Kasbohrer flatbed trailer during the snow surface condition.

51. M345 flatbed trailer. None of the cargo trucks were immobilized towing the M345 flatbed trailer during the dry condition. All cargo trucks towing the M345 flatbed trailer were immobilized on 1.5 percent of the trails during the wet surface condition. The TARADCOM, 10-ton HMTT, towing the M345 flatbed trailer, was immobilized on 0.5 percent of the trails and the other trucks towing the flatbed trailer were immobilized on 1.5 percent of the trails during the snow surface condition.

#### Off-road terrain

52. XM835 flatbed trailer. The Lockheed TDW901M, 10-ton cargo truck had the lowest percent NOGO of the cargo trucks towing the XM835 flatbed trailer in off-road terrain during the dry, wet, and snow conditions. The M813 PIP, 5-ton cargo truck had the highest percent NOGO of the cargo trucks towing the XM835 flatbed trailer in off-road terrain during the dry, wet, and snow surface conditions.

53. Kasbohrer flatbed trailer. The Lockheed TDW902, 10-ton cargo truck had the lowest percent NOGO of the cargo trucks towing the Kasbohrer flatbed trailer in off-road terrain during the dry surface condition. The Lockheed TDW901M, 10-ton cargo truck had the lowest percent NOGO of the cargo trucks towing the Kasbohrer flatbed trailer in off-road terrain during the wet and snow surface conditions. The other 10-ton cargo trucks had about 2.0 percent more NOGO than the Lockheed TDW901M, 10-ton cargo truck and the TDW902, 10-ton cargo truck when towing the Kasbohrer flatbed trailer at all surface conditions.

54. M345 flatbed trailer. The TDW901M, 10-ton cargo truck, towing the M345 flatbed trailer had the lowest percent of the area NOGO for the dry, wet, and snow surface conditions. The German MAN, 10-ton cargo truck, and TARADCOM HMTT, 10-ton cargo truck had about 2.0 percent more area NOGO than the TDW901, 10-ton cargo truck when towing the M345 flatbed trailer.

#### Summary Assessment

##### Mobility rating speeds

55. The TARADCOM HMTT, 10-ton cargo truck had the highest mobility rating speed of the cargo trucks towing both the XM835 flatbed trailer and the Kasbohrer flatbed trailer for all surface conditions of the on-road tactical mobility level. The TARADCOM HMTT, 5-ton cargo truck had the highest mobility rating speed of the cargo trucks towing the XM835 flatbed trailer during most surface conditions of tactical support, tactical standard, and tactical high tactical mobility levels.

56. The TDW902, 10-ton cargo truck had the highest mobility rating speed of the 10-ton cargo trucks towing the XM835 flatbed trailer for most surface conditions of tactical support, tactical standard, tactical high, and high-high tactical mobility levels. The mobility rating speeds of the Lockheed TDW902, 10-ton cargo truck were significantly higher than the TDW901M, 10-ton cargo truck when towing the XM835 flatbed trailer for most surface conditions at the on-road, tactical support, tactical standard, and tactical high tactical mobility levels.

57. The TDW902, 10-ton cargo truck had the highest mobility rating speed of the cargo trucks towing the Kasbohrer flatbed trailer for the dry and wet surface conditions of tactical support, dry surface condition of tactical standard, and dry, wet, and "all" surface conditions of tactical high tactical mobility levels. The TARADCOM HMTT, 10-ton cargo truck had the highest mobility rating speed of the cargo trucks towing the Kasbohrer flatbed trailer for the snow and "all" surface conditions of tactical support; wet, snow, and "all" surface conditions of tactical standard; and the snow surface condition of tactical high.

58. The M813 PIP, 5-ton cargo truck had the lowest mobility rating speed of the cargo trucks towing the XM835 trailer for most surface conditions of all tactical mobility levels. The mobility rating speed of the German MAN 10-ton cargo truck, towing both the XM835 and Kasbohrer flatbed trailers, was usually somewhere between lowest and highest speed for most tactical mobility levels.

59. The TARADCOM HMTT, 10-ton cargo truck, had the highest mobility rating speed of the cargo trucks towing the M345 flatbed trailer for all surface conditions of the on-road, tactical support, and tactical standard mobility levels. The Lockheed TDW901M had the highest mobility rating speed of the cargo trucks towing the M345 flatbed trailer for most surface conditions of the tactical high and high-high mobility levels. Mobility rating speeds are not available for comparing the TDW902, 10-ton cargo truck, with the TDW901, 10-ton cargo truck, towing the M345 flatbed trailer; however, similar improvement in mobility rating speed of the TDW902 over the TDW901 towing the Kasbohrer would be expected.

60. All the 10-ton cargo trucks towing the M345 trailer during the snow surface condition had lower mobility rating speeds when towing the XM835 and Kasbohrer flatbed trailers. This increase in mobility rating speed for the 10-ton cargo trucks towing the XM835 and Kasbohrer flatbed trailers during the snow surface condition is due to the increased weight on the powered axles caused by installation of a heavy crane on the 10-ton cargo trucks towing the XM835 and Kasbohrer trailers. The M818, 5-ton tractor, towing the M871 lowbed trailer, had a lower mobility rating speed for the dry, wet, and "all" surface conditions of all tactical mobility levels than all the cargo truck/flatbed trailers used in this study; and only the M813, 5-ton cargo truck towing the XM835 flatbed trailer had lower mobility rating speeds during the snow surface condition. All of the 10-ton cargo trucks towing the XM835 flatbed trailers had higher mobility rating speeds for all surface conditions and tactical mobility levels except high-high than when towing the Kasbohrer flatbed trailer.

Percent NOGO

61. All the 10-ton cargo trucks towing the M345 flatbed trailer were immobilized more than 10 percent during the snow condition. However, the additional weight of a heavy crane would likely decrease NOGO for all these trucks during the snow surface condition.

62. The M813 PIP, 5-ton cargo truck towing the XM835 flatbed trailer was immobilized in more than 10 percent of the off-road terrain for the wet and snow surface conditions. The TARADCOM HMTT, 5-ton cargo truck towing the XM835 flatbed trailer was immobilized in more than 10 percent of the area in off-road terrain for the wet surface condition. The TARADCOM HMTT, 10-ton cargo truck towing the Kasbohrer and M345 flatbed trailers was immobilized in more than 10 percent of the area in off-road terrain for the wet surface condition. The German MAN, 10-ton cargo truck towing the M345 flatbed trailer was also immobilized in more than 10 percent of the area in off-road terrain for the wet surface condition.

63. The Lockheed TDW901M, 10-ton cargo truck and the Lockheed TDW902, 10-ton cargo truck were generally immobilized about 2 percent less in the off-road terrain than the TARADCOM HMTT, 10-ton cargo truck and the German MAN, 10-ton cargo truck when towing the M835 and Kasbohrer flatbed trailers. The Lockheed TDW901M, 10-ton cargo truck towing the M345 flatbed trailer was immobilized about 2 percent less in off-road terrain than the TARADCOM HMTT, 10-ton cargo truck and the German MAN, 10-ton cargo truck towing this trailer.

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Table 1  
TACV Addendum Study Vehicles

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M813 PIP, 5-ton Cargo Truck, 6x6/XM835 Flatbed Trailer  
TARADCOM HMTT, 5-ton Cargo Truck, 8x8/XM835 Flatbed Trailer\*  
German MAN, 7-ton Cargo Truck, 6x6/XM835 Flatbed Trailer  
TARADCOM HMTT, 10-ton Cargo Truck, 8x8/XM835 Flatbed Trailer\*  
Lockheed TDW901M, 10-ton Cargo Truck, 8x8/XM835 Flatbed Trailer\*  
Lockheed TDW902, 10-ton Cargo Truck, 8x8/XM835 Flatbed Trailer\*  
German MAN, 10-ton Cargo Truck, 8x8/XM835 Flatbed Trailer\*  
TARADCOM HMTT, 10-ton Cargo Truck, 8x8/Kasbohrer Flatbed Trailer\*  
Lockheed TDW901M, 10-ton Cargo Truck, 8x8/Kasbohrer Flatbed Trailer\*  
Lockheed TDW902, 10-ton Cargo Truck, 8x8/Kasbohrer Flatbed Trailer\*  
German MAN, 10-ton Cargo Truck, 8x8/Kasbohrer Flatbed Trailer\*  
Lockheed TDW901M, 10-ton Cargo Truck, 8x8/M345 Flatbed Trailer  
German MAN, 10-ton Cargo Truck, 8x8/M345 Flatbed Trailer  
TARADCOM HMTT, 10-ton Cargo Truck/M345 Flatbed Trailer  
M818, 5-ton Tractor, 6x6/M871 Lowbed Semitrailer

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\* Modified/heavy crane moved to rear.

Table 2  
Important Characteristics of Study Vehicles

Vehicles	Gross Vehicle Weight lb	Wheel Base in.	Engine	Power to Weight Ratio, hp/ton	Minimum Ground Clearance in.	Approach Angle deg	Departure Angle deg	Transmission	Fine-Grained Soil
M813 PIP, 5-ton Cargo Truck, 6x6/XM835 Flatbed Trailer	49,439	178	NHL 250 Cummins	10.1	10.5	46	34	Mt 654CR	40.2
TARADCOM HMTT, 5-ton Cargo Truck, 8x8/XM835 Flatbed Trailer**	47,424	148	6V53T	12.7	15.0	50	73	M550CR Allison	28.0
German MAN, 7-ton Cargo Truck, 6x6/XM835 Flatbed Trailer	57,023	169	F8L413	11.2	16.5	40	40	ZF S-690	44.6
TARADCOM HMTT, 10-ton Cargo Truck, 8x8/XM835 Flatbed Trailer**	71,552	190	Detroit Diesel 8 V92TA	12.3	12.5	45	45	Allison HT740D	35.7
Lockheed TDW901M, 10-ton Cargo Truck, 8x8/XM835 Flatbed Trailer**	69,182	202	Detroit Diesel 6V53T	8.7	13.2	54	58	Allison MT650D	36.0
Lockheed TDW902, 10-ton Cargo Truck, 8x8/XM835 Flatbed Trailer**	72,982	214	8V92T-90	11.8	14.0	54	54	HT750 DR Allison	26.2
German MAN, 10-ton Cargo Truck, 8x8/XM835 Flatbed Trailer**	73,182	210	Kloekner-Humboldt-Deutz 8F8L413	9.6	15.5	46.5	45.3	Zahnrad Fabrik Friedrichshafen AG S6-90	43.5
TARADCOM HMTT, 10-ton Cargo Truck, 8x8/Kasbohrer Flatbed Trailer**	84,318	190	Detroit Diesel 8V92TA	10.3	12.5	45	45	Allison HT740D	38.7
Lockheed TDW901M, 10-ton Cargo Truck, 8x8/Kasbohrer Flatbed Trailer**	81,948	202	Detroit Diesel 6V53T	7.5	13.25	54	58	Allison MT650D	36.2
Lockheed TDW902, 10-ton Cargo Truck, 8x8/XM835 Flatbed Trailer**	85,748	214	8V92T-90	10.0	14.0	54	54	HT750 DR Allison	25.8
German MAN 10-ton Cargo Truck, 8x8/Kasbohrer Flatbed Trailer**	84,246	210	Kloekner-Humboldt-Deutz 8F8L413	8.4	15.5	46.5	45.3	Zahnrad Fabrik Friedrichshafen AG S6-90	42.3
Lockheed TDW901M, 10-ton Cargo Truck, 8x8/M345 Flatbed Trailer	83,460	160	Detroit Diesel 6V53T	7.2	13.25	54	58	Allison MT650D	41.4
German MAN, 10-ton Cargo Truck, 8x8/M345 Flatbed Trailer	87,460	211	KHDBF8L413	8.1	15.5	46.5	45	Zahnrad Fabrik Friedrichshafen AG S6-90	44.7
TARADCOM HMTT, 10-ton Cargo Truck, 8x8/M345 Flatbed Trailer	85,830	190	Detroit Diesel 8V92TA	10.3	12.5	45	45	Allison HT740D	40.9
M818, 5-ton Tractor, 6x6/M871 Lowbed Semitrailer	81,555	167	NHL-250 Cummins	6.1	11.5	35	90	5-Speed Manual†	48.1

\* Estimated speeds.

\*\* Modified/heavy crane moved to rear of truck.

† Specific model number not available.

Table 2  
Important Characteristics of Study Vehicles

Line	Power to Weight Ratio, hp/ton	Minimum Ground Clearance in.	Approach Angle deg	Departure Angle deg	Transmission	VCI		Maximum Speed* mph	Speeds for Obstacle Heights at 2.5-g, mph			Six-watt Speeds for Indicated rms elevations		
						Fine-Grained Soil	Coarse-Grained Soil		4	6	10	1	2	3
Cummins	10.1	10.5	46	34	Mt 654CR	40.2	69.5	55	100.0	30.2	4.4	9.1	8.0	7.7
	12.7	15.0	50	73	M650CR Allison	28.0	48.2	55	100.0	42.0	18.2	18.8	13.0	10.5
	11.2	16.5	40	40	ZF S-690	44.6	73.0	54	100.0	17.0	9.08	14.8	8.2	5.9
Diesel	12.3	12.5	45	45	Allison HT740D	35.7	52.3	55	100.0	20.5	6.0	13.5	5.7	5.7
Diesel	8.7	13.2	54	58	Allison MT650D	36.0	51.8	53.9	100.0	100.0	9.0	16.5	8.0	8.0
	11.8	14.0	54	54	HT750 DR Allison	26.2	36.9	55.0	84.5	48.0	17.1	18.4	15.0	15.0
Humboldt-BL413	9.6	15.5	46.5	45.3	Zahnrad Fabrik Friedrichshafen AG S6-90	43.5	65.0	55	100.0	100.0	9.0	13.0	8.5	8.5
Diesel	10.3	12.5	45	45	Allison HT740D	38.7	42.5	55	100.0	20.5	6.0	13.5	5.7	5.7
Diesel	7.5	13.25	54	58	Allison MT650D	36.2	41.5	55	100.0	100.0	9.0	16.5	8.0	8.0
	10.0	14.0	54	54	HT750 DR Allison	25.8	24.0	55	84.5	48.0	17.1	18.4	15.0	15.0
Humboldt-BL413	8.4	15.5	46.5	45.3	Zahnrad Fabrik Friedrichshafen AG S6-90	42.3	58.5	51.6	100.0	100.0	9.0	13.0	8.5	8.5
Diesel	7.2	13.25	54	58	Allison MT650D	41.4	158.0	50.5	100.0	100.0	9.0	16.5	8.0	8.0
113	8.1	15.5	46.5	45	Zahnrad Fabrik Friedrichshafen AG S6-90	44.7	76.0	55.0	100.0	100.0	9.0	13.0	8.5	8.5
Diesel	10.3	12.5	45	45	Allison HT740D	40.9	63.0	55.0	100.0	20.5	6.0	13.5	5.7	5.7
Cummins	6.1	11.5	35	90	5-Speed Manual*	48.1	98.0	50.0	21.0	13.6	7.3	9.0	7.5	6.5

Table 3  
Characteristics of Composite Route Networks

<u>Study Area Features</u>	<u>West Germany</u>
Total distance, miles	1678
Number of links*	2184
Average link length, miles	0.77
Composition of network, percent	
Superhighways	3.1
Primary roads	21.1
Secondary roads	61.4
Tertiary roads and trails	14.3
Off-road traverse	<u>0.1</u>
	100.0

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\* A link is the route joining two route intersections or route end points.

Table 4

Preliminary Quantification of WHEELS Study Definitions of Tactical Mobility<sup>1</sup>

Mobility Level	Operating Distance		Severity of Operation	
	Off-Road Percent	On-Road Percent	Off-Road* Percent of Terrain Challenged	On-Road Percent of Trails Included
<u>High-high mobility**</u>				
All off-road operation	100	0	100	-
<u>Tactical high mobility</u>				
The highest level of mobility designating the requirement for extensive cross-country maneuverability characteristic of operations in the ground-gaining and fire-support environment	50	50	90	100
<u>Tactical standard mobility</u>				
The second highest level of mobility designating the requirement for occasional cross-country movement	15	85	80	100
<u>Tactical support mobility</u>				
A level of mobility designating the requirement for infrequent off-road operations over selected terrain with the preponderance of movement on primary and secondary roads	5	95	50	50
<u>On-road mobility**</u>				
All on superhighways, primary and secondary roads, and the best tertiary roads and trails	0	100	-	10

\* In terms of percentage of best off-road terrain to be challenged (off-road speed profile).  
 \*\* NOT a WHEELS study definition.

Table 5  
Network Composition and Severity at Tactical Mobility Levels  
For HIMO West Germany Study Area

Tactical Mobility Levels	Composition of Network in Percent				Severity of Operation in Terms of Percent of Terrain and Roads Challenged			
	Primary Roads (P <sub>P</sub> )	Secondary Roads (P <sub>S</sub> )	Trails (P <sub>T</sub> )	Off-road (P)	Primary Roads (V <sub>PP</sub> )	Secondary Roads (V <sub>SP</sub> )	Trails (V <sub>TP</sub> )	Off-road (V <sub>C</sub> )
High-High	0	0	0	100	-	-	-	V <sub>100</sub>
Tactical High	10	30	10	50	V <sub>100</sub>	V <sub>100</sub>	V <sub>100</sub>	V <sub>90</sub>
Tactical Standard	20	50	15	15	V <sub>100</sub>	V <sub>100</sub>	V <sub>100</sub>	V <sub>80</sub>
Tactical Support	30	55	10	5	V <sub>100</sub>	V <sub>100</sub>	V <sub>50</sub>	V <sub>50</sub>
On-Road	35	60	5	0	V <sub>100</sub>	V <sub>100</sub>	V <sub>10</sub>	-

Table 6  
Summary of Study Vehicles Mobility Rating Speeds for the Tactical Mobility Levels

Vehicles	On-Road				Tactical Support				Tactical Standard				Tactical High				High-High			
	Dry	Wet	Snow	All	Dry	Wet	Snow	All	Dry	Wet	Snow	All	Dry	Wet	Snow	All	Dry	Wet	Snow	All
MB13 PIP, 5-ton Cargo Truck, 6x6/XM835 Flatbed Trailer	17.6	17.1	1.4	3.6	14.9	14.2	1.5	3.6	11.0	8.4	0.9	2.2	6.7	3.3	0.5	1.1	0.8	0.7	0.3	0.5
TARADCOM HMTT, 5-ton Cargo Truck, 6x6/XM835 Flatbed Trailer*	21.3	20.6	17.8	19.8	18.7	17.6	15.8	17.3	14.6	12.2	12.5	13.0	9.4	6.8	8.0	7.9	1.1	0.8	1.0	1.0
German MAN, 7-ton Cargo Truck, 6x6/XM835 Flatbed Trailer	20.6	19.8	15.7	18.4	17.4	16.4	13.8	15.7	12.8	9.3	10.7	10.8	8.0	6.4	7.0	7.1	1.1	0.9	1.0	1.0
TARADCOM HMTT, 10-ton Cargo Truck, 6x6/XM835 Flatbed Trailer*	22.7	21.6	18.0	20.6	17.7	16.6	14.7	16.2	12.2	11.4	10.8	11.4	7.3	6.6	6.7	6.9	1.0	0.9	0.9	0.9
Lockheed TDW901M, 10-ton Cargo Truck, 6x6/XM835 Flatbed Trailer*	17.3	16.7	13.7	15.7	15.0	14.2	12.2	13.7	11.7	10.6	9.8	10.7	7.6	6.6	6.6	6.9	1.2	1.1	1.2	1.2
Lockheed TDW902, 10-ton Cargo Truck, 6x6/XM835 Flatbed Trailer*	21.1	20.3	15.0	18.4	18.5	17.4	13.7	16.3	14.3	13.1	11.2	12.7	8.8	7.6	7.3	7.8	1.3	1.1	1.2	1.2
German MAN, 10-ton Cargo Truck, 6x6/XM835 Flatbed Trailer*	18.9	18.2	15.0	17.2	16.1	15.2	13.2	14.8	12.2	9.0	10.5	10.4	7.7	6.2	6.9	6.9	1.0	0.8	1.0	0.9
TARADCOM HMTT, 10-ton Cargo Truck, 6x6/Kasbohrer Flatbed Trailer*	20.5	19.6	16.3	18.6	16.3	15.2	13.5	14.9	11.6	8.5	10.0	9.9	7.1	4.8	6.2	5.9	1.0	0.7	0.9	0.9
Lockheed TDW901M, 10-ton Cargo Truck, 6x6/Kasbohrer Flatbed Trailer*	15.2	14.6	11.8	13.7	13.4	12.5	10.6	12.1	10.7	7.8	8.7	8.9	7.1	5.4	5.9	6.0	1.3	0.9	1.2	1.1
Lockheed TDW902, 10-ton Cargo Truck, 6x6/Kasbohrer Flatbed Trailer*	19.6	18.9	10.4	15.0	17.3	16.2	9.9	13.6	13.5	8.0	8.1	9.3	8.4	5.6	6.0	6.5	1.5	0.9	1.1	1.1
German MAN 10-ton Cargo Truck, 6x6/Kasbohrer Flatbed Trailer*	17.3	16.7	12.8	15.3	14.9	14.0	11.6	13.3	11.5	8.4	9.4	9.6	7.4	4.1	6.2	5.5	1.0	0.7	0.9	0.9
Lockheed TDW901M, 10-ton Cargo Truck, 6x6/M345 Flatbed Trailer	15.0	14.4	5.4	9.3	13.3	12.3	5.3	8.7	10.6	7.8	4.5	6.8	7.1	5.3	2.6	4.2	1.2	0.9	0.7	0.9
German MAN, 10-ton Cargo Truck, 6x6/M345 Flatbed Trailer	17.0	16.4	5.9	10.4	14.7	13.7	5.8	9.6	11.4	8.3	4.8	7.2	7.3	4.6	2.2	3.7	1.0	0.7	0.7	0.8
TARADCOM HMTT, 10-ton Cargo Truck/M345 Flatbed Trailer	20.3	19.4	9.7	14.7	16.2	15.1	8.9	12.5	11.5	8.5	6.9	8.6	7.0	4.8	2.6	4.1	1.0	0.7	0.7	0.8
MB18, 5-ton Tractor, 6x6/MST1 Lowbed Semitrailer	13.1	12.8	2.1	4.8	11.5	10.8	2.2	4.7	9.0	5.1	1.4	2.9	4.7	1.3	0.6	1.1	0.7	0.5	0.3	0.4

\* Modified/heavy crane moved to rear of truck.

Table 7

## Summary of Missions Completed in a 10-Hour Day by Study Vehicles at the Tactical Mobility Levels

Vehicles	On-Road			Tactical Support			Tactical Standard			Tactical High			High-High							
	DRY	Wet	Snow	DRY	Wet	All	DRY	Wet	All	DRY	Wet	All	DRY	Wet	All					
	All	All	All	All	All	All	All	All	All	All	All	All	All	All	All					
M813 FIP, 5-ton Cargo Truck, 6x6/ XM835 Flatbed Trailer	9.4	9.1	0.7	1.9	7.9	7.6	0.8	1.9	5.8	4.4	0.5	1.1	3.6	1.8	0.3	0.6	0.4	0.4	0.2	0.3
TARADCOM HMTT, 5-ton Cargo Truck, 8x8/XM835 Flatbed Trailer*	11.3	11.0	9.5	10.5	10.0	9.4	8.4	9.2	7.8	6.5	6.6	6.9	5.0	3.6	4.3	4.2	0.6	0.4	0.5	0.5
German MAN, 7-ton Cargo Truck, 8x8/ XM835 Flatbed Trailer	11.0	10.5	8.4	9.8	9.3	8.7	7.3	8.4	6.8	5.0	5.7	5.8	4.3	3.4	3.7	3.8	0.6	0.5	0.5	0.5
TARADCOM HMTT, 10-ton Cargo Truck, 8x8/XM835 Flatbed Trailer*	12.1	11.5	9.6	11.0	9.4	8.8	7.8	8.6	6.5	6.1	5.8	6.1	3.9	3.5	3.6	3.7	0.5	0.5	0.5	0.5
Lockheed TDW901M, 10-ton Cargo Truck, 8x8/XM835 Flatbed Trailer*	9.2	8.9	7.3	8.4	8.0	7.6	6.5	7.3	6.6	5.6	5.2	5.7	4.0	3.5	3.5	3.7	0.6	0.6	0.6	0.6
Lockheed TDW902, 10-ton Cargo Truck, 8x8/XM835 Flatbed Trailer*	11.2	10.8	8.0	9.8	9.8	9.3	7.3	8.7	7.6	7.0	6.0	6.8	4.7	4.0	3.9	4.2	0.7	0.6	0.6	0.6
German MAN, 10-ton Cargo Truck, 8x8/XM835 Flatbed Trailer*	10.1	9.7	8.0	9.2	8.6	8.1	7.0	7.9	6.5	4.8	5.6	5.5	4.1	3.3	3.7	3.7	0.5	0.4	0.5	0.5
TARADCOM HMTT, 10-ton Cargo Truck, 8x8/Kasbohrer Flatbed Trailer*	10.9	10.4	8.7	9.9	8.7	8.1	7.2	7.9	6.2	4.5	5.3	5.3	3.8	2.6	3.3	3.1	0.5	0.4	0.5	0.5
Lockheed TDW901M, 10-ton Cargo Truck, 8x8/Kasbohrer Flatbed Trailer*	8.1	7.8	6.3	7.3	7.1	6.6	5.6	6.4	5.7	4.2	4.6	4.7	3.8	2.9	3.1	3.1	0.7	0.5	0.6	0.6
Lockheed TDW902, 10-ton Cargo Truck, 8x8/Kasbohrer Flatbed Trailer*	10.4	10.1	5.5	8.0	9.2	8.6	5.3	7.2	7.2	4.3	4.3	5.0	4.5	3.0	3.2	3.5	0.8	0.5	0.6	0.6
German MAN, 10-ton Cargo Truck, 8x8/Kasbohrer Flatbed Trailer*	9.2	8.9	6.8	8.1	7.9	7.4	6.2	7.1	6.1	4.5	5.0	5.1	3.9	2.2	3.3	2.9	0.5	0.4	0.5	0.5
Lockheed TDW901M, 10-ton Cargo Truck, 8x8/M345 Flatbed Trailer	8.0	7.7	2.9	5.0	7.1	6.5	2.8	4.6	5.5	4.2	2.4	3.6	3.8	2.8	1.4	2.2	0.6	0.5	0.4	0.5
German MAN, 10-ton Cargo Truck, 8x8/M345 Flatbed Trailer	9.0	8.7	3.1	5.5	7.8	7.3	3.1	5.1	6.1	4.4	2.6	3.8	3.9	2.4	1.2	2.0	0.5	0.4	0.4	0.4
TARADCOM HMTT, 10-ton Cargo Truck, 8x8/M345 Flatbed Trailer	10.8	10.3	5.2	7.8	8.6	8.0	4.7	6.6	6.1	4.5	3.7	4.6	3.7	2.6	1.4	2.2	0.5	0.4	0.4	0.4
M818, 5-ton Tractor, 6x6/M871 Lowbed Semitrailer	7.0	6.8	1.1	2.6	6.1	5.8	1.2	2.5	4.8	2.7	0.7	1.5	2.5	0.7	0.3	0.6	0.4	0.3	0.2	0.2

\* Modified/heavy crane moved to rear of truck.

APPENDIX A: DATA USED TO CHARACTERIZE THE STUDY VEHICLES AND  
A BRIEF DESCRIPTION OF FACTORS USED IN DESCRIBING HIMO  
WEST GERMANY AND MID-EAST STUDY AREAS

Vehicle Characteristics and Performance Data

1. Extensive data are required to characterize a vehicle to predict its performance with the AMM and SWIMCRIT/WACROSS water-crossing models. These data for the study vehicles are given in Tables A1-A6.
2. Tractive force-speed relations determined from test data conducted at Aberdeen Proving Ground (APG) were used for most of the study vehicles. The tractive force-speed relations for the TARADCOM HMTT, 5-ton cargo truck were obtained from TARADCOM and those for the Lockheed TDW902, 10-ton cargo truck were obtained from Lockheed.
3. Ride dynamics data for the TARADCOM HMTT, 10-ton cargo truck German MAN, 10-ton cargo truck, and Lockheed TDW901M, 10-ton cargo truck were obtained from WES test data. Ride dynamics data for the Lockheed TDW902 were obtained by WES using suspension data and the AMM Dynamic Submodel.<sup>6</sup> Ride dynamics data for the TARADCOM HMTT, 5-ton cargo truck were obtained by TARADCOM. The M813 PIP, 5-ton cargo truck has a suspension system similar to that of the M813A1 and, therefore, was assigned the measured ride dynamics data of the M813A1.

Terrain Data

4. A detailed description of the procedures used to describe the HIMO West Germany study area for use with the AMM is given in the HIMO study. The terrain and road factors required for the (AMC-74X) SWIMCRIT/WACROSS water-crossing prediction models are given in Table A7 to show the content of the data required for these models.

Table A1  
Vehicle Characteristics Used in Army Mobility Model (AMM)

No.	Identification	Dimen- sions	M813 PIP	TARADCOM HMTT	German MAN	TARADCOM HMTT	Lockheed TD
			5-ton Cargo Truck, 6x6/ XM835 Flatbed Trailer	5-ton Cargo Truck, 8x8/ XM835 Flatbed Trailer*	7-ton Cargo Truck, 6x6/ XM835 Flatbed Trailer	10-ton Cargo Truck, 8x8/ XM835 Flatbed Trailer*	10-ton Cargo Tr XM835 Flatbed
1	Vehicle type (NVEH = 0 for tracked and 1 for wheeled)	--	1	1	1	1	1
2	Gross vehicle weight	lb	49,439	47,424	57,023	71,552	69,183
3	Track type (NFL = 0 for flexible and 1 for girderized)	NA	NA	NA	NA	NA	NA
4	Grouser height for tracks	NA	NA	NA	NA	NA	NA
5	Tire ply rating	--	12	10	18	16	16
6	Gross rated horsepower	hbp	250	300	320	440	300
7	Number of tracks or tires	--	10	8	6	8	8
8	Number of axles	--	3	4	3	4	4
9	Vehicle width	in.	96	98	97.8	94.5	96
10	Vehicle length	in.	525.8	503	556.4	565.5	593
11	Track width or nominal tire width	in.	11.0	16.7	13	16.7	16.7
12	Wheel rim diameter on road wheel radius	in.	20	20	21.5	20.0	20.0
13	Recommended tire pressure (cross-country)	psi	55	15	51	30.0	20
14	Area of one-track shoe (tracked) or number of wheels (wheeled) (duals as one)	sq in. or #	6	8	6	8	8
15	Number of bogies (tracked) or chain indicator wheeled (0 = no chains; 1 = chains)	--	0	0	0	0	0
16	Vehicle ground clearance at the center of greatest wheel span	in.	19.5	24	23	22.5	30.0
17	Minimum vehicle ground clearance	in.	10.5	15	16.5	12.5	13.4
18	Rear end clearance (vertical clearance of vehicle's trailing edge)	in.	28	35	33	35.5	36.0
19	Vehicle departure angle	deg	34	73	40	45.0	58.0
20	Vehicle approach angle	deg	46	50	40	45.0	54.0
21	Length of track on ground or wheel diameter	in.	42	51.8	49	52.0	52.0
22	Height of vehicle pushbar, bumper or leading edge	in.	46	35	46	42.5	34.0
23	Distance between first and last wheel center lines	in.	205	206	202.8	248	260.0
24	Horizontal distance from the center of gravity to the front wheel center lines	in.	118.2	123.1	116.7	133.2	144.0
25	Vertical distance from the center of gravity to the road wheel center lines	in.	30.6	34	43.3	34.2	34
26	Maximum span between adjacent wheel center lines	in.	151.5	90	147.6	132	144
27	Vertical distance from the ground to the center of the rear wheel (idler or sprocket for tracked vehicle)	in.	20.0	22.8	23.7	23	22.0
28	Track thickness plus the radius of the rear idler or sprocket	in.	NA	NA	NA	NA	NA
29	Road wheel radius plus track thickness	in.	NA	NA	NA	NA	NA
30	Loaded rolling radius of tire (cross-country tire pressure) or sprocket pitch radius (sprocket pitch dia/2)	in.	20	22.8	23.7	23	22.0
31	Height of rigid point used to determine approach angle	in.	34.2	35	36	38.0	34.0
32	Maximum braking force the vehicle develops	lb	26,378	25,246	32,925	44,550	42,653
33	Loaded wheel deflection (at sand tire pressure)	%	25	25	25	25	25
34	Distance vehicle spans before significant motion begins	in.	20	26	24.5	26	26.0
35	Maximum force the pushbar can withstand	kips	33	31.6	41.1	56	53
36	Maximum axle load/gross vehicle weight	--	0.34	0.32	0.33	0.28	0.28
37	Vehicle rated horsepower per ton	hp/ton	10.1	12.7	11.2	12.3	8.7
38	Transmission type (0 = automatic, 1 = manual)	--	0	0	1	0	0
39	Final drive gear ratio	--	6.44	6.40	6.73	5.57	6.9
40	Final drive gear efficiency	--	0.9	0.9	0.92	0.90	0.9
41	Number of gear ratios	--	10	10	6	8	5
42	Transmission efficiency	--	0.9	0.9	0.92	0.90	0.9
43	Gear ratios for study vehicles (descending order)	--	←	←	←	←	←
44	Tractive force (lbs) - vehicle speed (mph) relations	--	←	←	←	←	←
45	Vehicle speed at 2.5 g acceleration (mph) - obstacle height (in.) relations	--	←	←	←	←	←
46	Rise dynamic vehicle speed (mph) - surface roughness relations (rms, elev, in.)	--	←	←	←	←	←
47	Additional characteristics required for trailers	--	←	←	←	←	←

(Continued)

\* Modified/heavy crane moved to rear of truck.

Table A1  
Vehicle Characteristics Used in Army Mobility Model (AMM)

	M813 PIP 5-ton Cargo Truck, 6x6/ XM835 Flatbed Trailer	TARADCOM HMTT 5-ton Cargo Truck, 8x8/ XM835 Flatbed Trailer*	German MAN 7-ton Cargo Truck, 6x6/ XM835 Flatbed Trailer	TARADCOM HMTT 10-ton Cargo Truck, 8x8/ XM835 Flatbed Trailer*	Lockheed TDW901M 10-ton Cargo Truck, 8x8/ XM835 Flatbed Trailer*	Lockheed TDW902 10-ton Cargo Truck, 8x8/ XM835 Flatbed Trailer*	German MAN 10-ton Cargo Truck, 8x8/ XM835 Flatbed Trailer*	TARADCOM HMTT 10-ton Cargo Truck, 8x8/ Kasbohrer Flatbed Trailer*
	1	1	1	1	1	1	1	1
Weight	49,439	47,424	57,023	71,552	69,182	72,982	731,82	84,318
	NA	NA	NA	NA	NA	NA	NA	NA
Height	NA	NA	NA	NA	NA	NA	NA	NA
Wheelbase	12	10	18	16	16	12	18	16
Track	250	300	320	440	300	430	352	440
Ground Clearance	10	8	6	8	8	8	8	8
Approach Angle	3	4	3	4	4	4	4	4
Departure Angle	96	98	97.8	94.5	96	112	97.8	98
Max. Grade	525.8	503	556.4	565.5	593	597	617.0	612
Max. Slew	11.0	16.7	13	16.7	16.7	24	14.5	16.7
Max. Turn	20	20	21.5	20.0	20.0	20.5	20.0	20
Max. Slew	55	15	51	30.0	20.0	15	45.0	30
Max. Turn	6	8	6	8	8	8	8	8
Max. Slew	0	0	0	0	0	0	0	0
Max. Turn	19.5	24	23	22.5	30.0	37	23.2	22.5
Max. Slew	10.5	15	16.5	12.5	13.25	14	15.5	12.5
Max. Turn	28	35	33	35.5	36.0	37.5	32.0	35.5
Max. Slew	34	73	40	45.0	58.0	54	45.3	45
Max. Turn	46	50	40	45.0	54.0	54	46.5	45
Max. Slew	42	51.8	49	52.0	52.0	54	47.5	52
Max. Turn	46	35	46	42.5	34.0	34	29.0	42.5
Max. Slew	205	206	202.8	248	260.0	273	275.0	248
Max. Turn	128.2	123.1	116.7	133.2	144.5	138.3	150.5	144.9
Max. Slew	30.6	34	43.3	34.2	34	34.2	39.6	34.2
Max. Turn	151.5	90	147.6	132	144	155	144.0	132
Max. Slew	20.0	22.8	23.7	23	22.0	24.5	22.0	23
Max. Turn	NA	NA	NA	NA	NA	NA	NA	NA
Max. Slew	NA	NA	NA	NA	NA	NA	NA	NA
Max. Turn	20	22.8	23.7	23	22.0	24.5	22.0	23
Max. Slew	34.2	35	36	38.0	34.0	34	29.0	38
Max. Turn	26,378	25,246	32,925	44,550	42,653	45,700	45,853	44,230
Max. Slew	25	25	25	25	25	25	25	25
Max. Turn	20	26	24.5	26	26.0	59	24.0	26
Max. Slew	33	31.6	41.1	56	53	57.1	57	55.3
Max. Turn	0.34	0.32	0.33	0.28	0.29	0.27	0.270	0.30
Max. Slew	10.1	12.7	11.2	12.3	8.7	11.8	9.6	10.3
Max. Turn	0	0	1	0	0	0	1	0
Max. Slew	6.44	6.40	6.73	5.57	6.90	6.17	6.73	5.57
Max. Turn	0.9	0.9	0.92	0.90	0.90	0.9	0.92	0.90
Max. Slew	10	10	6	8	5	10	6	8
Max. Turn	0.9	0.9	0.92	0.90	0.85	0.85	0.92	0.90
Max. Slew				Table A2				
Max. Turn				Table A3				
Max. Slew				Table A4				
Max. Turn				Table A5				
Max. Slew				Table A6				

(Continued)

Table A1 (Concluded)

No.	Identification	Dimen- sions	Lockheed TDW901M		Lockheed TDW902		German MAN		Lockh
			10-ton Cargo Truck, 8x8/ Kasbohrer Flatbed Trailer*	10-ton Cargo Truck, 8x8/ Kasbohrer Flatbed Trailer*	10-ton Cargo Truck, 8x8/ Kasbohrer Flatbed Trailer*	10-ton Cargo Truck, 8x8 Kasbohrer Flatbed Trailer*	10-ton Ca		
1	Vehicle type (NVEH = 0 for tracked and 1 for wheeled)	--	1	1	1				83
2	Gross vehicle weight	lbs	81,948	85,748	84,246				
3	Track type (NFL = 0 for flexible and 1 for girderized)	NA	NA	NA	NA				
4	Grouser height for tracks	NA	NA	NA	NA				
5	Tire ply rating	--	16	12	18				
6	Gross rated horsepower	bhp	300	430	352				
7	Number of tracks or tires	--	8	8	8				
8	Number of axles	--	4	4	4				
9	Vehicle width	in.	98	112	98				
10	Vehicle length	in.	639.5	643.5	657.5				
11	Track width or nominal tire width	in.	16.7	24	14.5				
12	Wheel rim diameter on road wheel radius	in.	20	26.5	20				
13	Recommended tire pressure (cross-country)	psi	20	15	45				
14	Area of one-track shoe (tracked) or number of wheels (wheeled) (duals as one)	sq in. or #	8	8	8				
15	Number of bogies (tracked) or chain indicator wheeled (0 = no chains; 1 = chains)	--	0	0	0				
16	Vehicle ground clearance at the center of greatest wheel span	in.	30	37	23.2				
17	Minimum vehicle ground clearance	in.	13.2	14	15.5				
18	Rear end clearance (vertical clearance of vehicle's trailing edge)	in.	36	37.5	32				
19	Vehicle departure angle	deg	58	54	45.3				
20	Vehicle approach angle	deg	54	54	46.5				
21	Length of track on ground or wheel diameter	in.	52	54	47.5				
22	Height of vehicle pushbar, bumper or leading edge	in.	34	34	29				
23	Distance between first and last wheel center lines	in.	260	273	275				
24	Horizontal distance from the center of gravity to the front wheel center lines	in.	148.2	138.3	150.4				
25	Vertical distance from the center of gravity to the road wheel center lines	in.	34	34.2	39.6				
26	Maximum span between adjacent wheel center lines	in.	144	155	144				
27	Vertical distance from the ground to the center of the rear wheel (idler or sprocket for tracked vehicle)	in.	22	24.5	22				
28	Track thickness plus the radius of the rear idler or sprocket	in.	NA	NA	NA				
29	Road wheel radius plus track thickness	in.	NA	NA	NA				
30	Loaded rolling radius of tire (cross-country tire pressure) or sprocket pitch radius (sprocket pitch dia/2)	in.	22	24.5	22				
31	Height of rigid point used to determine approach angle	in.	34	34	29				
32	Maximum braking force the vehicle develops	lbs	42,332	45,375	44,170				42
33	Loaded wheel deflection (at sand tire pressure)	%	25	25	25				
34	Distance vehicle spans before significant motion begins	in.	26	59	24				
35	Maximum force the pushbar can withstand	kips	52.9	56.7	55.2				
36	Maximum axle load/gross vehicle weight	--	0.29	0.27	0.25				
37	Vehicle rated horsepower per ton	hp/ton	7.5	10	8.4				
38	Transmission type (0 = automatic, 1 = manual)	--	0	0	1				
39	Final drive gear ratio	--	6.90	6.17	6.73				
40	Final drive gear efficiency	--	6.90	0.90	0.92				
41	Number of gear ratios	--	5	10	6				
42	Transmission efficiency	--	0.85	0.85	0.92				
43	Gear ratios for study vehicles (descending order)	--							Table A2
44	Tractive force (lbs) - vehicle speed (mph) relations	--							Table A3
45	Vehicle speed at 2.5 g acceleration (mph) - obstacle height (in.) relations	--							Table A4
46	Ride dynamic vehicle speed (mph) - surface roughness relations (rms, elev, in.)	--							Table A5
47	Additional characteristics required for trailers	--							Table A6

\* Modified/heavy crane moved to rear of truck.

Table A1 (Concluded)

Dimensions	Lockheed TDW901M		Lockheed TDW902		German MAN		Lockheed TDW901M		German MAN		TARADCOM BMTT		MB18 5-Ton	
	10-ton Cargo Truck, 8x8/ Kasbohrer Flatbed Trailer*	10-ton Cargo Truck, 8x8/ Kasbohrer Flatbed Trailer*	10-ton Cargo Truck, 8x8/ Kasbohrer Flatbed Trailer*	10-ton Cargo Truck, 8x8/ Kasbohrer Flatbed Trailer*	10-ton Cargo Truck, 8x8/ Kasbohrer Flatbed Trailer*	10-ton Cargo Truck, 8x8/ Kasbohrer Flatbed Trailer*	10-ton Cargo Truck, 8x8/ M345 Flatbed Trailer	10-ton Cargo Truck, 8x8/ M345 Flatbed Trailer	10-ton Cargo Truck, 8x8/ M345 Flatbed Trailer	10-ton Cargo Truck, 8x8/ M345 Flatbed Trailer	10-ton Cargo Truck, 8x8/ M345 Flatbed Trailer	10-ton Cargo Truck, 8x8/ M345 Flatbed Trailer	10-ton Cargo Truck, 8x8/ M345 Flatbed Trailer	Tractor, 6x6/MB71 Lowbed Semitrailer
Weight and 1 for	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Weight and 1 for	lbs	81,948	85,748	84,246	83,460	87,460	85,830	81,555	NA	NA	NA	NA	NA	NA
NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Wheel diameter	in.	16	12	18	16	18	16	12	18	16	16	16	12	12
HP	bhp	300	430	352	300	352	440	250	352	440	440	440	250	250
Clearance	in.	8	8	8	8	8	8	10	8	8	8	8	10	10
Wheel diameter	in.	4	4	4	4	4	4	3	4	4	4	4	3	3
Wheel diameter	in.	98	112	98	96	97.8	94.5	151	97.8	97.8	94.5	94.5	151	151
Wheel diameter	in.	639.5	643.5	657.5	702	726	674.5	612	726	726	674.5	674.5	612	612
Wheel diameter	in.	16.7	24	14.5	16.7	14.5	16.7	11	14.5	14.5	16.7	16.7	11	11
Wheel diameter	in.	20	20.5	20	20	20	20	20	20	20	20	20	20	20
Wheel diameter	psi	20	15	45	20	45	30	35	45	45	30	30	35	35
Wheel diameter	sq in.	8	8	8	8	8	8	6	8	8	8	8	6	6
Wheel diameter	or #	0	0	0	0	0	0	0	0	0	0	0	0	0
Wheel diameter	chain	0	0	0	0	0	0	0	0	0	0	0	0	0
Wheel diameter	main;	0	0	0	0	0	0	0	0	0	0	0	0	0
Wheel diameter	in.	30	37	23.2	30	23.2	22.5	23	23.2	23.2	22.5	22.5	23	23
Wheel diameter	in.	13.2	14	15.5	13.25	15.5	12.5	11.5	15.5	15.5	12.5	12.5	11.5	11.5
Wheel diameter	in.	36	37.5	32	36	32	35.5	30	32	32	35.5	35.5	30	30
Wheel diameter	deg	58	54	45.3	58	45	45	90	45	45	45	45	90	90
Wheel diameter	deg	54	54	46.5	54	46.5	45	35	46.5	46.5	45	45	35	35
Wheel diameter	in.	52	54	47.5	52	47.5	52	42	47.5	47.5	52	52	42	42
Wheel diameter	in.	34	34	29	34	29	42.5	32	29	29	42.5	42.5	32	32
Wheel diameter	in.	260	273	275	260	275	248	195	275	275	248	248	195	195
Wheel diameter	in.	148.2	138.3	150.4	139	151.6	131	122	151.6	151.6	131	131	122	122
Wheel diameter	in.	34	34.2	39.6	34	39.6	34.2	18.4	39.6	39.6	34.2	34.2	18.4	18.4
Wheel diameter	in.	144	155	144	102	144	132	140	144	144	132	132	140	140
Wheel diameter	in.	22	24.5	22	22	22	23	18.6	22	22	23	23	18.6	18.6
Wheel diameter	in.	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Wheel diameter	in.	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Wheel diameter	in.	22	24.5	22	22	22	23	18.6	22	22	23	23	18.6	18.6
Wheel diameter	in.	34	34	29	34	29	38	32	34	34	38	38	32	32
Wheel diameter	lbs	42,332	45,375	44,170	42,005	45,205	43,900	32,924	42,005	42,005	43,900	43,900	32,924	32,924
Wheel diameter	%	25	25	25	25	25	25	25	25	25	25	25	25	25
Wheel diameter	in.	26	59	24	26	24	26	21	26	26	24	26	21	21
Wheel diameter	kips	52.9	56.7	55.2	52.5	56.5	54.9	41.1	56.5	56.5	54.9	54.9	41.1	41.1
Wheel diameter	hp/ton	0.29	0.27	0.25	0.29	0.29	0.25	0.37	0.29	0.29	0.25	0.25	0.37	0.37
Wheel diameter	hp/ton	7.5	10	8.4	7.2	8.1	10.3	6.1	8.1	8.1	10.3	10.3	6.1	6.1
Wheel diameter	hp/ton	0	0	1	0	1	0	1	0	0	1	1	0	0
Wheel diameter	hp/ton	6.90	6.17	6.73	6.90	6.73	5.57	6.44	6.90	6.90	6.73	6.73	6.44	6.44
Wheel diameter	hp/ton	6.90	0.90	0.92	0.90	0.92	0.90	0.90	0.90	0.90	0.92	0.92	0.90	0.90
Wheel diameter	hp/ton	5	10	6	5	6	8	10	5	5	6	6	10	10
Wheel diameter	hp/ton	0.85	0.85	0.92	0.85	0.92	0.90	0.90	0.85	0.85	0.92	0.92	0.90	0.90
Wheel diameter	Table A2	Table A2												
Wheel diameter	Table A3	Table A3												
Wheel diameter	Table A4	Table A4												
Wheel diameter	Table A5	Table A5												
Wheel diameter	Table A6	Table A6												

2

Table A2  
Gear Ratios for Study Vehicles

Vehicles	Gear Ratios for Vehicles									
M813 PIP, 5-ton Cargo Truck, 6x6/ XM835 Flatbed Trailer	7.46	4.17	3.96	2.97	2.27	2.21	1.79	1.66	1.27	1.00
TARADCOM HMTT, 5-ton Cargo Truck, 8x8/ XM835 Flatbed Trailer*	9.17	4.86	4.00	3.65	2.79	2.20	2.14	1.59	1.21	0.96
German MAN, 7-ton Cargo Truck, 6x6/ XM835 Flatbed Trailer	6.53	3.77	2.50	1.69	1.29	1.02				
TARADCOM HMTT, 10-ton Cargo Truck, 8x8/ XM835 Flatbed Trailer*	8.02	4.50	3.69	3.04	2.17	2.07	1.46	1.00		
Lockheed TDW901M, 10-ton Cargo Truck, 8x8/XM835 Flatbed Trailer*	8.04	3.58	2.10	1.39	1.00					
Lockheed TDW902, 10-ton Cargo Truck, 8x8/XM835 Flatbed Trailer*	10.24	6.83	4.09	2.73	2.66	1.80	1.77	1.28	1.20	0.86
German MAN, 10-ton Cargo Truck, 8x8/ XM835 Flatbed Trailer*	6.53	3.77	2.50	1.69	1.29	1.02				
TARADCOM HMTT, 10-ton Cargo Truck, 8x8/ Kasbohrer Flatbed Trailer*	8.02	4.50	3.69	3.04	2.17	2.07	1.46	1.00		
Lockheed TDW901M, 10-ton Cargo Truck, 8x8/XM835 Flatbed Trailer*	8.04	3.58	2.10	1.39	1.00					
Lockheed TDW902, 10-ton Cargo Truck, 8x8/XM835 Flatbed Trailer*	10.24	6.83	4.09	2.73	2.66	1.80	1.77	1.28	1.20	0.86
German MAN, 10-ton Cargo Truck, 8x8/ Kasbohrer Flatbed Trailer*	6.53	3.77	2.50	1.69	1.29	1.02				
Lockheed TDW901M, 10-ton Cargo Truck, 8x8/M345 Flatbed Trailer	8.04	3.58	2.10	1.39	1.00					
German MAN, 10-ton Cargo Truck, 8x8/ M345 Flatbed Trailer	6.53	3.77	2.50	1.69	1.29	1.02				
TARADCOM HMTT, 10-ton Cargo Truck, 8x8/ M345 Flatbed Trailer	8.02	4.50	3.69	3.04	2.17	2.07	1.46	1.00		
M818, 5-ton Tractor, 6x6/M871 Lowbed Semitrailer	12.29	6.88	6.07	3.62	3.40	2.02	1.79	1.58	1.00	0.78

\* Modified/heavy crane moved to rear of truck.

Table A3

## Tractive Force - Vehicle Speed Relations

M813 PIP 5-ton Cargo Truck, 6x6/ XM835 Flatbed Trailer		TARADCOM HMTT 5-ton Cargo Truck, 8x8/ XM835 Flatbed Trailer*		German MAN 7-ton Cargo Truck, 6x6/ XM835 Flatbed Trailer	
Vehicle Speed mph	Tractive Force lb	Vehicle Speed mph	Tractive Force lb	Vehicle Speed mph	Tractive Force lb
0	30,785	0	41,913	0	34,842
1.0	26,235	0.5	39,517	0.5	31,686
2.0	21,736	1.0	36,637	1.0	28,476
3.0	17,987	1.5	33,569	1.5	25,519
4.0	14,488	2.0	30,297	2.0	23,535
5.0	11,739	2.5	26,854	2.5	21,617
6.0	9,241	3.0	23,675	3.0	19,256
7.0	7,993	3.5	20,921	3.5	16,212
8.0	7,749	4.0	18,576	4.0	15,709
9.0	7,249	4.5	16,354	4.5	14,585
10.0	6,503	5.0	15,001	4.8	13,600
11.0	5,756	5.5	14,720	6.0	13,553
12.0	5,310	6.0	14,207	6.5	13,389
14.0	4,769	6.5	11,248	7.0	13,091
16.0	4,229	7.0	10,554	7.5	12,665
18.0	3,791	7.5	9,907	8.0	12,240
20.0	3,555	8.0	9,246	8.5	11,550
22.0	3,070	8.5	8,693	9.0	8,000
25.0	2,795	9.0	8,254	11.0	7,767
30.0	2,243	9.5	7,960	11.5	7,713
35.0	2,100	10.0	7,885	12.0	7,599
40.0	1,966	11.0	7,624	13.0	7,314
45.0	1,841	11.5	7,406	14.0	7,008
50.0	1,874	12.0	6,512	15.0	5,776
55.0	1,786	13.0	6,348	15.5	5,197
55.0	0	14.0	6,082	17.0	5,124
		14.5	5,750	18.0	5,047
		15.0	5,667	19.0	4,922
		15.5	5,484	20.0	4,798
		16.0	4,640	21.0	4,670
		17.0	4,557	22.0	4,464
		18.0	4,484	22.5	4,039
		19.0	4,392	23.0	3,518
		20.0	4,295	26.0	3,452
		21.0	3,603	30.0	3,223
		22.0	3,573	32.5	3,021
		24.0	3,469	33.0	2,654
		26.0	3,277	38.5	2,490
		27.0	2,715	42.5	2,310
		29.0	2,603	43.0	2,081
		32.0	2,545	45.0	2,041
		35.5	2,395	54.0	1,937
		36.0	2,055	54.0	0
		38.0	1,980		
		45.0	1,883		
		47.0	1,806		
		47.5	1,569		
		50.0	1,562		
		55.0	1,515		
		55.0	0		

(Continued)

\* Modified/heavy crane moved to rear of truck.

(Sheet 1 of 5)

Table A3 (Continued)

TARADCOM HMTT 10-Ton Cargo Truck, 8x8/ XM835 Flatbed Trailer*		Lockheed TDW901M 10-ton Cargo Truck, 8x8/ XM835 Flatbed Trailer*		Lockheed TDW902 10-ton Cargo Truck, 8x8/ XM835 Flatbed Trailer*	
Vehicle Speed mph	Tractive Force lb	Vehicle Speed mph	Tractive Force lb	Vehicle Speed mph	Tractive Force lb
0	43,460	0	36,350	0	57,740
0.5	41,280	0.5	34,852	0.9	49,490
1.0	38,900	1.0	33,104	1.8	41,240
1.5	36,515	1.5	30,856	2.8	33,980
2.0	34,525	2.0	27,860	4.0	26,390
2.5	32,140	2.5	24,365	4.2	22,200
3.0	29,555	3.0	21,870	5.9	17,600
3.5	27,370	3.5	19,575	6.1	16,280
4.0	25,180	4.0	17,030	6.5	14,000
4.5	22,590	4.5	13,882	7.4	13,200
5.0	20,200	5.0	12,636	8.6	11,600
5.5	18,010	6.0	10,640	9.9	10,600
6.0	15,820	7.0	9,600	10.3	9,600
6.5	15,030	8.0	8,610	10.4	9,200
7.0	14,235	9.0	7,620	11.0	8,800
7.5	12,640	10.0	6,680	13.0	7,800
8.0	12,140	11.0	5,840	14.9	7,050
8.5	11,645	12.0	5,450	16.6	6,760
9.0	11,440	13.0	5,155	18.8	6,270
9.5	11,135	14.0	4,810	19.1	5,280
10.0	10,930	15.0	4,465	22.1	4,920
10.5	10,753	16.0	4,220	24.8	4,620
11.0	10,540	18.0	3,630	27.6	4,290
11.5	10,240	20.0	3,240	28.3	3,630
12.0	9,650	22.0	3,100	33.1	3,300
12.5	8,660	24.0	2,520	38.6	3,130
13.0	7,870	26.0	2,290	42.5	2,420
13.5	7,780	28.0	2,160	49.6	2,200
14.0	7,735	30.0	2,150	55.0	1,925
14.5	7,690	32.5	2,100	55.0	0
15.0	7,595	35.0	2,000		
16.0	7,300	40.0	1,600		
17.0	6,900	48.5	1,400		
18.0	6,300	53.9	1,000		
19.0	5,485	54.0	0		
20.0	5,370				
22.0	5,240				
25.0	5,160				
27.0	4,430				
30.0	3,500				
35.0	3,260				
40.0	2,800				
45.0	2,610				
50.0	2,350				
55.0	2,040				
55.0	0				

(Continued)

(Sheet 2 of 5)

Table A3 (Continued)

German MAN		TARADCOM HMTT		Lockheed TDW901M	
10-ton Cargo Truck, 8x8/ XM835 Flatbed Trailer*		10-ton Cargo Truck, 8x8/ Kasbohrer Flatbed Trailer*		10-ton Cargo Truck, 8x8/ Kasbohrer Flatbed Trailer*	
Vehicle	Tractive	Vehicle	Tractive	Vehicle	Tractive
Speed	Force	Speed	Force	Speed	Force
mph	lb	mph	lb	mph	lb
0	28,960	0	43,460	0	36,350
0.5	27,970	0.5	41,280	0.5	34,852
1.0	26,980	1.0	38,900	1.0	33,104
1.5	25,490	1.5	36,515	1.5	30,856
2.0	24,000	2.0	34,525	2.0	27,860
2.5	22,255	2.5	32,140	2.5	24,365
3.0	20,765	3.0	29,555	3.0	21,870
3.5	19,270	3.5	27,370	3.5	19,575
4.0	17,530	4.0	25,180	4.0	17,030
4.5	16,040	4.5	22,590	4.5	13,882
5.0	14,300	5.0	20,200	5.0	12,636
6.0	13,820	5.5	18,010	6.0	10,640
7.0	13,340	6.0	15,820	7.0	9,600
8.0	12,600	6.5	15,030	8.0	8,610
9.0	8,120	7.0	14,235	9.0	7,620
10.0	8,040	7.5	12,640	10.0	6,680
11.0	7,960	8.0	12,140	11.0	5,840
12.0	7,870	8.5	11,645	12.0	5,450
13.0	7,440	9.0	11,440	13.0	5,155
14.0	5,600	9.5	11,135	14.0	4,810
15.0	5,225	10.0	10,930	15.0	4,465
18.0	5,140	10.5	10,735	16.0	4,220
20.0	4,990	11.0	10,540	18.0	3,630
25.0	3,560	11.5	10,240	20.0	3,240
30.0	3,300	12.0	9,650	22.0	3,100
35.0	2,720	12.5	8,660	24.0	2,520
40.0	2,530	13.0	7,870	26.0	2,290
45.0	2,165	13.5	7,780	28.0	2,160
50.0	1,780	14.0	7,735	30.0	2,150
55.0	1,680	14.5	7,690	32.5	2,100
55.0	0	15.0	7,595	35.0	2,000
		16.0	7,300	40.0	1,600
		17.0	6,900	48.5	1,400
		18.0	6,300	53.9	1,000
		19.0	5,485	54.0	0
		20.0	5,370		
		22.0	5,240		
		25.0	5,160		
		27.0	4,430		
		30.0	3,500		
		35.0	3,260		
		40.0	2,800		
		45.0	2,610		
		50.0	2,350		
		55.0	2,040		
		55.0	0		

(Continued)

(Sheet 3 of 5)

Table A3 (Continued)

Lockheed TDW902, 10-ton Cargo Truck, 8x8/ Kasbohrer Flatbed Trailer*		German MAN 10-ton Cargo Truck, 8x8/ Kasbohrer Flatbed Trailer*		Lockheed TDW901M, 10-ton Cargo Truck, 8x8/ M345 Flatbed Trailer	
Vehicle Speed mph	Tractive Force lb	Vehicle Speed mph	Tractive Force lb	Vehicle Speed mph	Tractive Force lb
0	57,740	0	28,960	0	36,350
0.9	49,490	0.5	27,970	0.5	34,852
1.8	41,240	1.0	26,980	1.0	33,104
2.8	33,980	1.5	25,490	1.5	30,856
4.0	26,390	2.0	24,000	2.0	27,860
4.2	22,200	2.5	22,255	2.5	24,635
5.9	17,600	3.0	20,765	3.0	21,870
6.1	16,280	3.5	19,270	3.5	19,575
6.5	14,000	4.0	17,530	4.0	17,030
7.4	13,200	4.5	16,040	4.5	13,882
8.6	11,600	5.0	14,300	5.0	12,636
9.9	10,600	6.0	13,280	6.0	10,640
10.3	9,600	7.0	13,340	7.0	9,600
10.4	9,200	8.0	12,600	8.0	8,610
11.0	8,800	9.0	8,120	9.0	7,620
13.0	7,800	10.0	8,040	10.0	6,680
14.9	7,050	11.0	7,960	11.0	5,840
16.6	6,760	12.0	7,870	12.0	5,450
18.8	6,270	13.0	7,440	13.0	5,155
19.1	5,280	14.0	5,600	14.0	4,810
22.1	4,920	15.0	5,225	15.0	4,465
24.8	4,620	18.0	5,140	16.0	4,220
27.6	4,290	20.0	4,990	18.0	3,630
28.3	3,630	25.0	3,560	20.0	3,240
33.1	3,300	30.0	3,300	22.0	3,100
38.6	3,130	35.0	2,720	24.0	2,520
42.5	2,420	40.0	2,530	26.0	2,290
49.6	2,200	45.0	2,165	28.0	2,160
55.0	1,925	50.0	1,780	30.0	2,150
55.0	0	55.0	1,680	32.5	2,100
		55.0	0	35.0	2,000
				40.0	1,600
				48.5	1,400
				53.9	1,000
				54.0	0

(Continued)

(Sheet 4 of 5)

Table A3 (Concluded)

German MAN 10-ton Cargo Truck, 8x8/ M345 Flatbed Trailer		TARADCOM HMTT, 10-ton Cargo Truck, 8x8/ M345 Flatbed Trailer		M818, 5-ton Tractor, 6x6/ M871 Lowbed Semitrailer	
Vehicle Speed mph	Tractive Force lb	Vehicle Speed mph	Tractive Force lb	Vehicle Speed mph	Tractive Force lb
0	28,960	0	43,460	0	25,732
0.5	27,970	0.5	41,280	2.0	25,632
1.0	26,980	1.0	38,900	2.4	25,380
1.5	25,490	1.5	36,515	2.6	24,624
2.0	24,000	2.0	34,525	3.1	21,602
2.5	22,255	2.5	32,140	3.2	14,700
3.0	20,765	3.0	29,555	4.0	14,650
3.5	19,270	3.5	27,370	4.9	13,642
4.0	17,530	4.0	25,180	5.5	12,846
4.5	16,040	4.5	22,590	5.6	11,839
5.0	14,300	5.0	20,200	6.3	10,942
6.0	13,820	5.5	18,010	6.4	7,919
7.0	13,340	6.0	15,820	7.6	7,889
8.0	12,600	6.5	15,030	9.0	7,557
9.0	8,120	7.0	14,235	11.0	6,781
10.0	8,040	7.5	12,640	11.1	6,680
11.0	7,960	8.0	12,140	11.6	6,388
12.0	7,870	8.5	11,645	11.7	4,725
13.0	7,440	9.0	11,440	13.7	4,705
14.0	5,600	9.5	11,135	16.0	4,594
15.0	5,225	10.0	10,930	19.7	4,091
18.0	5,140	10.5	10,735	19.8	3,990
20.0	4,990	11.0	10,540	22.5	3,627
25.0	3,560	11.5	10,240	22.6	3,526
30.0	3,300	12.0	9,650	25.4	3,244
35.0	2,720	12.5	8,660	25.5	2,438
40.0	2,530	13.0	7,870	28.6	2,428
45.0	2,165	13.5	7,780	35.4	2,227
50.0	1,780	14.0	7,735	40.3	2,025
55.0	1,680	14.5	7,690	40.4	1,874
55.0	0	15.0	7,595	45.4	1,743
		16.0	7,300	50.0	1,622
		17.0	6,900	50.0	0
		18.0	6,300		
		19.0	5,485		
		20.0	5,370		
		22.0	5,240		
		25.0	5,160		
		27.0	4,430		
		30.0	3,500		
		35.0	3,260		
		40.0	2,800		
		45.0	2,610		
		50.0	2,350		
		55.0	2,040		
		55.0	0		

Table A4

Vehicle Speed at 2.5 g Acceleration - Obstacle Height Relations

M813 PIP		TARADCOM HMTT		German MAN	
5-ton Cargo Truck, 6x6/ XM835 Flatbed Trailer		5-ton Cargo Truck, 8x8/ XM835 Flatbed Trailer*		7-ton Cargo Truck, 6x6/ XM835 Flatbed Trailer	
Obstacle Height in.	Vehicle Speed mph	Obstacle Height in.	Vehicle Speed mph	Obstacle Height in.	Vehicle Speed mph
0	100.0	0	100.0	0	100.0
1.0	100.0	1.0	100.0	4.9	100.0
2.0	100.0	2.0	100.0	5.0	50.0
3.0	100.0	3.0	100.0	5.2	30.0
4.0	100.0	4.0	100.0	5.5	20.0
5.0	100.0	5.0	63.0	6.0	17.0
6.0	30.2	6.0	42.0	7.5	12.8
7.0	14.0	7.0	32.2	9.2	10.0
8.0	5.0	8.0	25.6	11.0	7.9
9.0	4.8	9.0	21.6	15.0	5.5
10.0	4.4	10.0	18.2	20.0	4.0
11.0	4.3	11.0	16.5	25.0	3.0
12.0	4.2	12.0	15.2	50.0	2.0
13.0	4.1	13.0	14.0		
14.0	4.0	14.0	12.8		
15.0	3.9	15.0	11.6		
16.0	3.8	16.0	10.0		
60.0	2.0	60.0	2.0		

(Continued)

\* Modified/heavy crane moved to rear of truck.

Table A4 (Continued)

TARADCOM HMTT 10-ton Cargo Truck, 8x8/ XM835 Flatbed Trailer*		Lockheed TDW901M 10-ton Cargo Truck, 8x8/ XM835 Flatbed Trailer*		Lockheed TDW902, 10-ton Cargo Truck, 8x8/ XM835 Flatbed Trailer*	
Obstacle Height in.	Vehicle Speed mph	Obstacle Height in.	Vehicle Speed mph	Obstacle Height in.	Vehicle Speed mph
0	100.0	0	100.0	0	100.0
4.0	100.0	4.0	100.0	3.0	100.0
4.3	55.0	5.0	100.0	5.9	55.0
4.6	40.0	6.0	100.0	6.0	48.0
5.0	33.0	6.3	55.0	7.0	33.0
5.6	24.5	7.0	20.0	7.5	30.0
6.0	20.5	7.4	15.0	8.0	26.0
7.0	14.5	8.0	11.4	9.0	21.0
8.0	9.4	9.0	10.0	10.0	17.1
9.0	7.5	10.0	9.0	11.0	14.0
10.0	6.0	12.0	7.9	12.0	11.8
12.0	4.0	14.0	7.0	13.0	9.8
14.0	3.9	16.0	6.0	14.0	8.4
16.0	3.8	23.0	3.0	15.0	7.4
22.0	3.0	50.0	2.0	16.0	6.8
50.0	2.0			50.0	2.0

(Continued)

\* Modified/heavy crane moved to rear of truck.

(Sheet 2 of 5)

Table A4 (Continued)

German MAN		TARADCOM HMTT		Lockheed TDW901M	
10-ton Cargo Truck, 8x8/ XM835 Flatbed Trailer*		10-ton Cargo Truck, 8x8/ Kasbohrer Flatbed Trailer*		10-ton Cargo Truck, 8x8/ Kasbohrer Flatbed Trailer*	
Obstacle Height in.	Vehicle Speed mph	Obstacle Height in.	Vehicle Speed mph	Obstacle Height in.	Vehicle Speed mph
0	100.0	0	100.0	0	100.0
4.0	100.0	4.0	100.0	4.0	100.0
5.0	100.0	4.3	55.0	5.0	100.0
6.0	100.0	4.6	40.0	6.0	100.0
6.3	55.0	5.0	33.0	6.3	55.0
7.0	20.0	5.6	24.5	7.0	20.0
7.4	15.0	6.0	20.5	7.4	15.0
8.0	11.4	7.0	14.5	8.0	11.4
9.0	10.0	8.0	9.4	9.0	10.0
10.0	9.0	9.0	7.5	10.0	9.0
12.0	7.9	10.0	6.0	12.0	7.9
14.0	7.0	12.0	4.0	14.0	7.0
16.0	6.0	14.0	3.9	16.0	6.0
23.0	3.0	16.0	3.8	23.0	3.0
50.0	2.0	22.0	3.0	50.0	2.0
		50.0	2.0		
		60.0	2.0		

(Continued)

\* Modified/heavy crane moved to rear of truck.

(Sheet 3 of 5)

Table A4 (Continued)

Lockheed TDW902, 10-ton Cargo Truck, 8x8/ Kasbohrer Flatbed Trailer*		German MAN, 10-ton Cargo Truck, 8x8/ Kasbohrer Flatbed Trailer*		Lockheed TDW901M, 10-ton Cargo Truck, 8x8/ M345 Flatbed Trailer	
Obstacle Height in.	Vehicle Speed mph	Obstacle Height in.	Vehicle Speed mph	Obstacle Height in.	Vehicle Speed mph
0	100.0	0	100.0	0	100.0
3.0	100.0	4.0	100.0	4.0	100.0
5.9	55.0	5.0	100.0	5.0	100.0
6.0	48.0	6.0	100.0	6.0	100.0
7.0	33.0	6.3	55.0	6.3	55.0
7.5	30.0	7.0	20.0	7.0	20.0
8.0	26.0	7.4	15.0	7.4	15.0
9.0	21.0	8.0	11.4	8.0	11.4
10.0	17.1	9.0	10.0	9.0	10.0
11.0	14.0	10.0	9.0	10.0	9.0
12.0	11.8	12.0	7.9	12.0	7.9
13.0	9.8	14.0	7.0	14.0	7.0
14.0	8.4	16.0	6.0	16.0	6.0
15.0	7.4	23.0	3.0	23.0	3.0
16.0	6.8	50.0	2.0	60.0	2.0
50.0	2.0				

(Continued)

\* Modified/heavy crane moved to rear of truck.

(Sheet 4 of 5)

Table A4 (Concluded)

German MAN 10-ton Cargo Truck, 8x8/ M345 Flatbed Trailer		TARADCOM HMTT, 10-ton Cargo Truck, 8x8/ M345 Flatbed Trailer		M818, 5-ton Tractor, 6x6/ M871 Lowbed Semitrailer	
Obstacle Height in.	Vehicle Speed mph	Obstacle Height in.	Vehicle Speed mph	Obstacle Height in.	Vehicle Speed mph
0	100.0	0	100.0	0	100.0
4.0	100.0	4.0	100.0	1.0	100.0
5.0	100.0	4.3	55.0	1.0	80.0
6.0	100.0	4.6	40.0	1.5	56.0
6.3	55.0	5.0	33.0	2.0	44.0
7.0	20.0	5.6	24.5	3.0	30.0
7.4	15.0	6.0	20.5	4.0	21.0
8.0	11.4	7.0	14.5	5.0	16.0
9.0	10.0	8.0	9.4	7.5	10.0
10.0	9.0	9.0	7.5	9.0	8.0
12.0	7.9	10.0	6.0	12.0	6.0
14.0	7.0	12.0	4.0	18.0	4.0
16.0	6.0	14.0	3.9	30.0	3.0
23.0	3.0	16.0	3.8	50.0	2.0
60.0	2.0	22.0	3.0	60.0	2.0
		50.0	2.0		
		60.0	2.0		

(Continued)

\* Modified/heavy crane moved to rear of truck.

Table A5  
Ride Dynamic Vehicle Speed - Surface Roughness Relations

M813 PIP				TARADCOM HMTT				German MAN				TARADCOM HMTT			
5-ton Cargo Truck, 6x6/ XM835 Flatbed Trailer		5-ton Cargo Truck, 8x8/ XM835 Flatbed Trailer*		7-ton Cargo Truck, 6x6/ XM835 Flatbed Trailer		10-ton Cargo Truck, 8x8/ XM835 Flatbed Trailer*		5-ton Cargo Truck, 6x6/ XM835 Flatbed Trailer		7-ton Cargo Truck, 8x8/ XM835 Flatbed Trailer*		10-ton Cargo Truck, 8x8/ XM835 Flatbed Trailer*			
Elevation	Vehicle	Speed	Vehicle	Elevation	Vehicle	Speed	Vehicle	Elevation	Vehicle	Speed	Vehicle	Elevation	Vehicle		
rms		mph		rms		mph		rms		rms		rms			
in.				in.				in.		in.		in.			
0		100.0		0		100.0		0		100.0		0			
0.1		100.0		0.1		59.2		0.1		100.0		0.1			
0.2		100.0		0.2		41.0		0.2		100.0		0.2			
0.3		100.0		0.3		31.9		0.4		50.0		0.3			
0.4		100.0		0.4		28.1		0.6		30.0		0.4			
0.5		19.8		0.5		25.9		1.0		20.0		0.5			
0.6		14.1		0.6		24.0		1.4		14.8		0.6			
0.8		10.6		0.8		21.0		2.0		11.3		0.7			
1.0		9.1		1.0		18.8		2.4		8.2		0.8			
1.2		8.4		1.2		16.5		3.0		7.0		1.0			
1.4		8.0		1.4		15.5		4.0		5.9		1.2			
1.6		8.0		1.6		14.5		6.0		5.0		1.4			
1.8		8.0		1.8		13.5		8.0		4.9		1.4			
2.0		8.0		2.0		13.0				4.8		2.0			
2.2		7.9		2.2		12.2						3.0			
2.4		7.9		2.4		11.6						4.0			
2.6		7.8		2.6		11.1						4.0			
2.8		7.8		2.8		10.8						4.0			
3.0		7.7		3.0		10.5						5.0			
3.5		7.6		3.5		9.6						5.0			
4.0		7.5		4.0		9.4						5.0			
4.5		7.3		4.5		9.1						5.0			
5.0		7.2		5.0		9.0						5.0			

\* Modified/heavy crane moved to rear.

(Continued)

(Sheet 1 of 4)

Table A5 (Continued)

Lockheed TDW901M		Lockheed TDW902		German MAN		TARADCOM HMTT	
10-ton Cargo Truck, 8x8/ XM835 Flatbed Trailer*		10-ton Cargo Truck, 8x8/ XM835 Flatbed Trailer*		10-ton Cargo Truck, 8x8/ XM835 Flatbed Trailer*		10-ton Cargo Truck, 8x8/ Kasbohrer Flatbed Trailer*	
Elevation	Vehicle	Elevation	Vehicle	Elevation	Vehicle	Elevation	Vehicle
rms	Speed	rms	Speed	rms	Speed	rms	Speed
in.	mph	in.	mph	in.	mph	in.	mph
0	100.0	0	100.0	0	100.0	0	100.0
0.1	100.0	0.1	80.0	0.1	100.0	0.1	100.0
0.2	60.0	0.2	62.0	0.2	100.0	0.2	60.0
0.3	49.0	0.2	54.0	0.3	60.0	0.3	46.0
0.4	43.5	0.2	50.0	0.4	35.0	0.4	41.0
0.5	38.0	0.3	40.0	0.5	22.5	0.5	36.0
0.6	33.0	0.4	33.0	0.6	20.0	0.6	31.5
0.7	27.7	0.5	28.0	0.7	17.8	0.7	26.5
0.8	23.5 *	0.6	25.0	0.8	16.0	0.8	22.0
1.0	16.5	0.7	24.0	1.0	13.0	1.0	13.5
1.2	12.2	0.8	22.0	1.2	11.0	1.2	7.5
1.4	10.0	0.9	20.0	1.4	9.9	1.4	5.7
1.6	8.4	1.0	18.4	1.6	9.0	2.0	5.7
1.8	8.3	1.2	17.0	1.8	8.8	3.0	5.7
2.0	8.0	1.4	16.2	2.0	8.5	4.0	5.7
3.0	8.0	1.6	15.7	2.6	8.5	5.0	5.0
4.0	8.0	1.8	15.1	3.0	8.5		
5.0	7.8	2.0	15.0	4.0	8.5		
		3.0	15.0	5.0	8.0		
		5.0	15.0				

(Continued)

\* Modified/heavy crane moved to rear.

Table A5 (Continued)

Lockheed TDW901M		Lockheed TDW902		German MAN	
10-ton Cargo Truck, 8x8/ Kasbohrer Flatbed Trailer*		10-ton Cargo Truck, 8x8/ Kasbohrer Flatbed Trailer*		10-ton Cargo Truck, 8x8/ Kasbohrer Flatbed Trailer*	
Elevation	Vehicle	Elevation	Vehicle	Elevation	Vehicle
rms	Speed	rms	Speed	rms	Speed
in.	mph	in.	mph	in.	mph
0	100.0	0	100.0	0	100.0
0.1	100.0	0.1	80.0	0.1	100.0
0.2	60.0	0.2	62.0	0.2	100.0
0.3	49.0	0.2	54.0	0.3	60.0
0.4	43.5	0.2	50.0	0.4	35.0
0.5	38.0	0.3	40.0	0.5	22.5
0.6	33.0	0.4	33.0	0.6	20.0
0.7	27.7	0.5	28.0	0.7	17.8
0.8	23.5	0.6	25.0	0.8	16.0
1.0	16.5	0.7	24.0	1.0	13.0
1.2	12.2	0.8	22.0	1.2	11.0
1.4	10.0	0.9	20.0	1.4	9.9
1.6	8.4	1.0	18.4	1.6	9.0
1.8	8.3	1.2	17.0	1.8	8.8
2.0	8.0	1.4	16.2	2.0	8.5
3.0	8.0	1.6	15.7	2.6	8.5
4.0	8.0	1.8	15.1	3.0	8.5
5.0	7.8	2.0	15.0	4.0	8.5
		3.0	15.0	5.0	8.0
		5.0	15.0		

(Continued)

\* Modified/heavy crane moved to rear.

(Sheet 3 of 4)

Table A5 (Concluded)

Lockheed TDW901M, 10-ton Cargo Truck, 8x8/ M345 Flatbed Trailer		German MAN, 10-ton Cargo Truck, 8x8/ M345 Flatbed Trailer		TARADCOM HMTT, 10-ton Cargo Truck, 8x8/ M345 Flatbed Trailer		M818, 5-ton Tractor, 6x6/ M871 Lowbed Semitrailer	
Elevation rms in.	Speed mph	Elevation rms in.	Speed mph	Elevation rms in.	Speed mph	Elevation rms in.	Speed mph
0	100.0	0	100.0	0	100.0	0	100.0
0.1	100.0	0.1	100.0	0.1	100.0	0.1	100.0
0.2	60.0	0.2	100.0	0.2	60.0	0.2	70.0
0.3	49.0	0.3	60.0	0.3	46.0	0.20	50.0
0.4	43.5	0.4	35.0	0.4	41.0	0.2	40.0
0.5	38.0	0.5	22.5	0.5	36.0	0.3	23.0
0.6	33.0	0.6	20.0	0.6	31.5	0.5	14.0
0.7	27.7	0.7	17.8	0.7	26.5	0.7	10.0
0.8	23.5	0.8	16.0	0.8	22.0	1.0	9.0
1.0	16.5	1.0	13.0	1.0	13.5	1.5	7.5
1.2	12.2	1.2	11.0	1.2	7.5	2.0	7.5
1.4	10.0	1.4	9.9	1.4	5.7	3.0	6.5
1.6	8.4	1.6	9.0	2.0	5.7	5.0	6.0
1.8	8.3	1.8	8.8	3.0	5.7		
2.0	8.0	2.0	8.5	4.0	5.7		
3.0	8.0	2.6	8.5	5.0	5.0		
4.0	8.0	3.0	8.5				
5.0	7.8	4.0	8.5				
		5.0	8.0				

Table A6  
Additional Characteristics Required for Trailers

Characteristics	Dimen- sions	XM835		Kasbohrer		M345		M871	
		Flatbed Trailer	Flatbed Trailer	Flatbed Trailer	Flatbed Trailer	Flatbed Trailer	Flatbed Trailer	Lowbed Semitrailer	
Length	in.	221	268	330	332				
Width	in.	96	98	76	151				
Horizontal distance between pintle and axle 1	in.	31	98	175	272				
Horizontal distance between axles	in.	48	133	58	50				
Vertical clearance at pintle	in.	31	33	29	53.5				
Minimum ground clearance between pintle and axle 1	in.	17.5	22	29	36.0				
Minimum ground clearance under axle	in.	17.5	22	15.0	17.0				
Vertical height at point on hull used to determine departure angle	in.	40	32	34	36				
Departure angle	deg	28	50	45	40				
Tire size	--	11.00x20	16.5-20*	11.00x20	10.00x20				
Tire ply rating	--	12	16	12	12				
Vertical distance loaded CG to axle 1	in.	55	50	52.5	55.0				
Horizontal distance from pintle to loaded CG	in.	130	164	192	217				
Trailer weight empty	lb	5,700	7,700	11,260	17,400				
Trailer payload	lb	10,758	21,500	21,600	43,200				

\* 14x20-18 ply used on trailer with 10-ton German MAN.

Table A7

Terrain Data Required for AMC-74X and SWIMCRIT  
Water-crossing Prediction Models

Terrain or Road Factor	Range
<u>Off-Road</u>	
Surface material	
Type, USCS or other	NA
Mass strength, CI or RCI	0 ->280
Slope, percent	0 ->70
Obstacle	
Approach angle, deg	90 - 270
Vertical magnitude, cm	0 ->85
Length, m	0 ->150
Width, cm	0 ->1200
Spacing, m	0 ->60
Spacing, type	NA
Surface roughness, rms elevations	0 - 10
Stem diameter, cm	0 ->25
Stem spacing, m	0 ->100
Visibility distance, m	0 ->50
Water depth, m	0 ->5
Water velocity, mps	0 ->3.5
Water width, m	0 ->70
Linear feature top width, m	0 ->70
Left approach angle, deg	90 - 270
Right approach angle, deg	90 - 270
Differential bank height or differential	
vertical magnitude, m	0 ->4
Low bank height or least vertical magnitude, m	0 ->6
<u>On-Road</u>	
Road type	
Surface material	
Type, USCS or other	NA
Surface strength	
Trails, CI or RCI	0 ->280
Other, traction coefficients	0.01 ->0.80
Slope, percent	0 ->70
Surface roughness, rms elevation	0 ->7.6
Curvature, deg	0 - 90
Roadside visibility distance (trails only), m	0 ->50

APPENDIX B: DETAILED MOBILITY PERFORMANCE DATA

1. Appendix B contains the speed profiles, the percent NOGO and reasons for NOGO on trails and off-road, and the performance data crossing linear features (water-crossings) for the study vehicles.

2. The speed profile data (paragraphs 20-22, main text) for the study vehicles over primary roads, secondary roads, trails, and off-road terrain for the dry, wet, and snow surface conditions for the HIMO West Germany study area are given in Tables B11-B15.

Table No.	Speed Profile for Study Vehicle
B1	M813 PIP, 5-ton Cargo Truck, 6x6/XM835 Flatbed Trailer
B2	TARADCOM HMTT, 5-ton Cargo Truck, 8x8/XM835 Flatbed Trailer*
B3	German MAN, 7-ton Cargo Truck, 6x6/XM835 Flatbed Trailer
B4	TARADCOM HMTT, 10-ton Cargo Truck, 8x8/XM835 Flatbed Trailer*
B5	Lockheed TDW901M, 10-ton Cargo Truck, 8x8/XM835 Flatbed Trailer*
B6	Lockheed TDW902, 10-ton Cargo Truck, 8x8/XM835 Flatbed Trailer*
B7	German MAN, 10-ton Cargo Truck, 8x8/XM835 Flatbed Trailer*
B8	TARADCOM HMTT, 10-ton Cargo Truck, 8x8/Kasbohrer Flatbed Trailer*
B9	Lockheed TDW901M, 10-ton Cargo Truck, 8x8/Kasbohrer Flatbed Trailer*
B10	Lockheed TDW902, 10-ton Cargo Truck, 8x8/Kasbohrer Flatbed Trailer*
B11	German MAN, 10-ton Cargo Truck, 8x8/Kasbohrer Flatbed Trailer*
B12	Lockheed TDW901M, 10-ton Cargo Truck, 8x8/M345 Flatbed Trailer

\* Truck modified by adding a heavy crane at the rear of truck.

B13 German MAN, 10-ton Cargo Truck, 8x8/M345 Flatbed Trailer  
B14 TARADCOM HMTT, 10-ton Cargo Truck/M345 Flatbed Trailer  
B15 M818, 5-ton Tractor, 6x6/M871 Lowbed Semitrailer

3. The percent NOGO on trails and off-road terrain (paragraph 23, main text) for the dry, wet, and snow surface conditions of the HIMO West Germany study area is given in Tables B16-B18. The reason for NOGO is also given in Tables B16-B18.

4. The performance data for the study vehicles crossing linear features (water-crossings), (paragraphs 24-25, main text), for the HIMO West Germany study area are given in Table B19.

Table B1  
 Speed Profile for M313 PIP, 5-ton Cargo Truck, 6x6/DM835 Flatbed Trailer  
 For HIMO West Germany Study Area

Primary Roads					Secondary Roads					Trails					Off Road																													
Dry Condition					Wet Condition					Snow Condition					Dry Condition					Wet Condition					Snow Condition																			
PERCENT TOTAL DISTANCE					PERCENT TOTAL DISTANCE					PERCENT TOTAL DISTANCE					PERCENT TOTAL DISTANCE					PERCENT TOTAL DISTANCE					PERCENT TOTAL DISTANCE					PERCENT TOTAL DISTANCE														
X	2	4	6	H	X	2	4	6	H	X	2	4	6	H	X	2	4	6	H	X	2	4	6	H	X	2	4	6	H	X	2	4	6	H										
44.5	44.5	44.5	44.5	44.5	32.0	32.0	32.0	32.0	32.0	12.5	12.5	12.5	12.5	12.5	30.6	30.6	30.6	30.6	30.6	18.1	18.1	18.1	18.1	18.1	16.2	16.2	16.2	16.2	16.2	24.1	24.1	24.1	24.1	24.1	17.5	17.5	17.5	17.5	17.5	16.2	16.2	16.2	16.2	16.2
44.5	44.5	44.5	44.5	44.5	32.0	32.0	32.0	32.0	32.0	12.5	12.5	12.5	12.5	12.5	30.6	30.6	30.6	30.6	30.6	18.1	18.1	18.1	18.1	18.1	16.2	16.2	16.2	16.2	16.2	24.1	24.1	24.1	24.1	24.1	17.5	17.5	17.5	17.5	17.5	16.2	16.2	16.2	16.2	16.2
44.5	44.5	44.5	44.5	44.5	32.0	32.0	32.0	32.0	32.0	12.5	12.5	12.5	12.5	12.5	30.6	30.6	30.6	30.6	30.6	18.1	18.1	18.1	18.1	18.1	16.2	16.2	16.2	16.2	16.2	24.1	24.1	24.1	24.1	24.1	17.5	17.5	17.5	17.5	17.5	16.2	16.2	16.2	16.2	16.2
44.5	44.5	44.5	44.5	44.5	32.0	32.0	32.0	32.0	32.0	12.5	12.5	12.5	12.5	12.5	30.6	30.6	30.6	30.6	30.6	18.1	18.1	18.1	18.1	18.1	16.2	16.2	16.2	16.2	16.2	24.1	24.1	24.1	24.1	24.1	17.5	17.5	17.5	17.5	17.5	16.2	16.2	16.2	16.2	16.2
44.5	44.5	44.5	44.5	44.5	32.0	32.0	32.0	32.0	32.0	12.5	12.5	12.5	12.5	12.5	30.6	30.6	30.6	30.6	30.6	18.1	18.1	18.1	18.1	18.1	16.2	16.2	16.2	16.2	16.2	24.1	24.1	24.1	24.1	24.1	17.5	17.5	17.5	17.5	17.5	16.2	16.2	16.2	16.2	16.2

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Table B3  
 Speed Profile for German MAN, T-Lon Cargo Truck, 6x6/XM635 Flatbed Trailer  
 for HMO West Germany Study Area

Primary Roads		Secondary Roads		Trails		Off Road	
PERCENT TOTAL DISTANCE		PERCENT TOTAL DISTANCE		PERCENT TOTAL DISTANCE		PERCENT TOTAL DISTANCE	
X=0	H	X=0	H	X=0	H	X=0	H
X 42.9	42.9	X 36.0	35.6	X 17.4	17.4	X 30.5	25.3
1X 42.8	42.6	1X 35.2	34.4	1X 16.6	16.3	1X 21.2	20.7
2X 42.0	41.8	2X 32.1	31.2	2X 15.6	15.6	2X 19.2	18.9
3X 41.3	41.2	3X 28.6	28.0	3X 14.8	14.5	3X 17.9	17.7
4X 40.7	40.5	4X 26.0	25.6	4X 13.6	13.3	4X 17.0	16.8
5X 39.2	38.9	5X 24.5	24.3	5X 12.1	11.9	5X 16.0	15.8
6X 37.0	36.6	6X 23.3	23.1	6X 11.2	11.1	6X 15.0	14.8
7X 35.0	34.6	7X 22.3	22.1	7X 10.6	10.6	7X 14.0	13.7
8X 33.0	32.5	8X 21.4	21.1	8X 10.0	9.8	8X 12.8	12.6
9X 29.9	29.3	9X 20.2	20.0	9X 9.4	9.3	9X 11.6	11.0
10X 26.3	26.1	10X 18.6	18.5	10X 8.8	8.7	10X 1.2	1.5
X 42.9	42.9	X 36.0	35.6	X 17.4	17.4	X 30.5	25.3
1X 42.8	42.6	1X 35.1	34.4	1X 16.6	16.3	1X 21.2	20.7
2X 42.0	41.8	2X 31.9	31.2	2X 15.6	15.6	2X 19.2	18.9
3X 41.3	41.2	3X 28.3	27.8	3X 14.8	14.5	3X 17.9	17.7
4X 40.6	40.3	4X 25.8	25.4	4X 13.6	13.3	4X 17.0	16.8
5X 39.0	38.6	5X 24.3	24.1	5X 12.1	11.9	5X 16.0	15.8
6X 36.6	36.2	6X 23.1	22.9	6X 11.2	11.1	6X 15.0	14.8
7X 34.6	34.2	7X 22.1	21.8	7X 10.2	10.2	7X 14.0	13.7
8X 32.3	31.7	8X 21.1	20.9	8X 9.5	9.4	8X 12.8	12.6
9X 28.8	28.1	9X 19.9	19.6	9X 9.0	8.9	9X 11.6	11.0
10X 24.9	24.7	10X 18.1	18.0	10X 8.7	8.6	10X 1.0	1.2
X 42.9	42.9	X 36.0	35.6	X 17.4	17.4	X 30.5	25.3
1X 42.8	42.6	1X 35.1	34.4	1X 16.6	16.3	1X 21.2	20.7
2X 42.0	41.8	2X 31.9	31.2	2X 15.6	15.6	2X 19.2	18.9
3X 41.3	41.2	3X 28.3	27.8	3X 14.8	14.5	3X 17.9	17.7
4X 40.6	40.3	4X 25.8	25.4	4X 13.6	13.3	4X 17.0	16.8
5X 39.0	38.6	5X 24.3	24.1	5X 12.1	11.9	5X 16.0	15.8
6X 36.6	36.2	6X 23.1	22.9	6X 11.2	11.1	6X 15.0	14.8
7X 34.6	34.2	7X 22.1	21.8	7X 10.2	10.2	7X 14.0	13.7
8X 32.3	31.7	8X 21.1	20.9	8X 9.5	9.4	8X 12.8	12.6
9X 28.8	28.1	9X 19.9	19.6	9X 9.0	8.9	9X 11.6	11.0
10X 24.9	24.7	10X 18.1	18.0	10X 8.7	8.6	10X 1.0	1.2
X 42.9	42.9	X 36.0	35.6	X 17.4	17.4	X 30.5	25.3
1X 42.8	42.6	1X 35.1	34.4	1X 16.6	16.3	1X 21.2	20.7
2X 42.0	41.8	2X 31.9	31.2	2X 15.6	15.6	2X 19.2	18.9
3X 41.3	41.2	3X 28.3	27.8	3X 14.8	14.5	3X 17.9	17.7
4X 40.6	40.3	4X 25.8	25.4	4X 13.6	13.3	4X 17.0	16.8
5X 39.0	38.6	5X 24.3	24.1	5X 12.1	11.9	5X 16.0	15.8
6X 36.6	36.2	6X 23.1	22.9	6X 11.2	11.1	6X 15.0	14.8
7X 34.6	34.2	7X 22.1	21.8	7X 10.2	10.2	7X 14.0	13.7
8X 32.3	31.7	8X 21.1	20.9	8X 9.5	9.4	8X 12.8	12.6
9X 28.8	28.1	9X 19.9	19.6	9X 9.0	8.9	9X 11.6	11.0
10X 24.9	24.7	10X 18.1	18.0	10X 8.7	8.6	10X 1.0	1.2
X 42.9	42.9	X 36.0	35.6	X 17.4	17.4	X 30.5	25.3
1X 42.8	42.6	1X 35.1	34.4	1X 16.6	16.3	1X 21.2	20.7
2X 42.0	41.8	2X 31.9	31.2	2X 15.6	15.6	2X 19.2	18.9
3X 41.3	41.2	3X 28.3	27.8	3X 14.8	14.5	3X 17.9	17.7
4X 40.6	40.3	4X 25.8	25.4	4X 13.6	13.3	4X 17.0	16.8
5X 39.0	38.6	5X 24.3	24.1	5X 12.1	11.9	5X 16.0	15.8
6X 36.6	36.2	6X 23.1	22.9	6X 11.2	11.1	6X 15.0	14.8
7X 34.6	34.2	7X 22.1	21.8	7X 10.2	10.2	7X 14.0	13.7
8X 32.3	31.7	8X 21.1	20.9	8X 9.5	9.4	8X 12.8	12.6
9X 28.8	28.1	9X 19.9	19.6	9X 9.0	8.9	9X 11.6	11.0
10X 24.9	24.7	10X 18.1	18.0	10X 8.7	8.6	10X 1.0	1.2

Table B4  
 Speed Profile for TARADCOM HMTT, 10-ton Cargo Truck, 6x8/XM635 Flatbed Trailer\*  
 for HIMO West Germany Study Area

Primary Roads					Secondary Roads					Trails					Off Road				
PERCENT TOTAL DISTANCE					PERCENT TOTAL DISTANCE					PERCENT TOTAL DISTANCE					PERCENT TOTAL DISTANCE				
X=0	2	4	6	H	X=0	2	4	6	H	X=0	2	4	6	H	X=0	2	4	6	H
45.2	45.2	45.2	45.2	45.2	36.5	36.5	36.1	36.0	36.0	22.0	22.0	21.9	21.4	20.8	34.8	30.5	28.7	27.4	26.5
45.2	45.2	45.2	45.2	45.2	35.0	35.6	35.2	34.7	34.2	17.9	17.9	17.1	16.5	16.1	25.1	24.4	23.7	23.0	23.0
45.2	45.2	45.2	45.2	45.2	33.5	33.5	33.3	33.0	32.7	15.6	15.6	15.4	15.2	14.8	21.9	21.5	21.0	20.7	20.7
44.9	44.9	44.8	44.6	44.4	32.5	32.2	32.0	31.7	31.3	14.2	14.2	14.1	13.9	13.4	20.1	19.9	19.6	19.3	19.3
43.0	43.0	43.0	43.0	42.5	30.6	30.6	30.2	29.9	29.5	12.7	12.7	12.5	12.4	11.9	18.6	18.2	17.8	17.3	17.3
41.5	41.5	41.0	40.4	39.9	29.2	29.0	28.7	28.4	28.1	10.9	10.9	10.7	10.5	10.4	16.4	15.9	15.4	15.0	15.0
39.4	39.4	38.9	38.4	37.6	27.6	27.6	27.3	27.1	26.8	9.7	9.7	9.4	9.1	8.9	14.5	13.6	13.2	12.7	12.7
37.2	37.2	36.9	36.5	36.1	26.6	26.4	26.1	25.8	25.5	7.8	7.8	7.8	7.7	7.6	12.9	11.6	11.3	11.0	11.0
34.9	34.9	34.3	33.7	33.0	25.2	24.8	24.5	24.1	23.7	7.6	7.6	7.5	7.4	7.3	11.9	11.6	11.3	11.0	11.0
31.4	31.4	30.6	30.0	29.3	23.5	23.0	22.6	22.1	21.5	7.2	7.2	7.2	7.1	7.1	10.4	10.1	9.8	9.5	9.5
27.3					21.0					7.1	7.0	7.0	6.9	6.9	9.2	6.6	6.8	1.8	1.3
										6.8					1.1				
PERCENT TOTAL DISTANCE					PERCENT TOTAL DISTANCE					PERCENT TOTAL DISTANCE					PERCENT TOTAL DISTANCE				
X=0	2	4	6	H	X=0	2	4	6	H	X=0	2	4	6	H	X=0	2	4	6	H
45.2	45.2	45.2	45.2	45.2	36.5	36.5	36.1	36.0	36.0	22.0	22.0	21.9	21.4	20.8	34.8	30.5	28.7	27.4	26.5
45.2	45.2	45.2	45.2	45.2	35.0	35.6	35.2	34.7	34.2	17.9	17.9	17.1	16.5	16.1	25.1	24.4	23.7	23.0	23.0
45.2	45.2	45.2	45.2	45.1	33.5	33.5	33.2	32.9	32.7	15.6	15.6	15.4	15.2	14.8	21.9	21.5	21.0	20.7	20.7
44.8	44.8	44.6	44.4	44.2	32.5	32.2	32.0	31.7	31.3	14.2	14.2	14.1	13.9	13.4	20.1	19.9	19.6	19.3	19.3
42.7	42.7	42.7	42.2	42.2	30.6	30.6	30.2	29.9	29.5	12.7	12.7	12.5	12.4	11.9	18.6	18.2	17.8	17.3	17.3
41.2	41.2	40.6	40.1	39.5	29.2	29.0	28.7	28.4	28.1	10.9	10.9	10.7	10.5	10.4	16.4	15.9	15.4	15.0	15.0
38.6	38.6	38.1	37.7	37.3	27.6	27.6	27.3	27.1	26.8	9.7	9.7	9.4	9.1	8.9	14.5	13.6	13.2	12.7	12.7
36.5	36.5	36.1	35.5	34.9	26.6	26.4	26.1	25.8	25.5	7.8	7.8	7.8	7.7	7.6	12.9	11.6	11.3	11.0	11.0
34.2	34.2	33.4	32.7	31.9	25.2	24.8	24.5	24.1	23.7	7.6	7.6	7.5	7.4	7.3	11.9	11.6	11.3	11.0	11.0
30.1	30.1	29.3	28.6	27.8	23.5	23.0	22.6	22.1	21.5	7.2	7.2	7.2	7.1	7.1	10.4	10.1	9.8	9.5	9.5
25.7					21.0					7.1	7.0	7.0	6.9	6.9	9.2	6.6	6.8	1.8	1.3
										6.8					1.1				
PERCENT TOTAL DISTANCE					PERCENT TOTAL DISTANCE					PERCENT TOTAL DISTANCE					PERCENT TOTAL DISTANCE				
X=0	2	4	6	H	X=0	2	4	6	H	X=0	2	4	6	H	X=0	2	4	6	H
45.2	45.2	45.2	45.2	45.2	36.5	36.5	36.1	36.0	36.0	22.0	22.0	21.9	21.4	20.8	34.8	30.5	28.7	27.4	26.5
45.2	45.2	45.2	45.2	45.2	35.0	35.6	35.2	34.7	34.2	17.9	17.9	17.1	16.5	16.1	25.1	24.4	23.7	23.0	23.0
45.2	45.2	45.2	45.2	45.1	33.5	33.5	33.2	32.9	32.7	15.6	15.6	15.4	15.2	14.8	21.9	21.5	21.0	20.7	20.7
44.8	44.8	44.6	44.4	44.2	32.5	32.2	32.0	31.7	31.3	14.2	14.2	14.1	13.9	13.4	20.1	19.9	19.6	19.3	19.3
42.7	42.7	42.7	42.2	42.2	30.6	30.6	30.2	29.9	29.5	12.7	12.7	12.5	12.4	11.9	18.6	18.2	17.8	17.3	17.3
41.2	41.2	40.6	40.1	39.5	29.2	29.0	28.7	28.4	28.1	10.9	10.9	10.7	10.5	10.4	16.4	15.9	15.4	15.0	15.0
38.6	38.6	38.1	37.7	37.3	27.6	27.6	27.3	27.1	26.8	9.7	9.7	9.4	9.1	8.9	14.5	13.6	13.2	12.7	12.7
36.5	36.5	36.1	35.5	34.9	26.6	26.4	26.1	25.8	25.5	7.8	7.8	7.8	7.7	7.6	12.9	11.6	11.3	11.0	11.0
34.2	34.2	33.4	32.7	31.9	25.2	24.8	24.5	24.1	23.7	7.6	7.6	7.5	7.4	7.3	11.9	11.6	11.3	11.0	11.0
30.1	30.1	29.3	28.6	27.8	23.5	23.0	22.6	22.1	21.5	7.2	7.2	7.2	7.1	7.1	10.4	10.1	9.8	9.5	9.5
25.7					21.0					7.1	7.0	7.0	6.9	6.9	9.2	6.6	6.8	1.8	1.3
										6.8					1.1				
PERCENT TOTAL DISTANCE					PERCENT TOTAL DISTANCE					PERCENT TOTAL DISTANCE					PERCENT TOTAL DISTANCE				
X=0	2	4	6	H	X=0	2	4	6	H	X=0	2	4	6	H	X=0	2	4	6	H
29.1	29.1	29.1	29.1	29.1	20.1	20.1	20.1	20.1	20.1	17.1	17.1	17.1	17.1	17.1	18.1	18.1	18.1	18.1	18.1
28.9	28.9	28.9	28.9	28.9	18.3	18.3	18.3	18.3	18.3	15.2	15.2	15.2	15.2	15.2	16.7	16.7	16.7	16.7	16.7
28.7	28.7	28.7	28.7	28.7	17.7	17.7	17.7	17.7	17.7	14.8	14.8	14.8	14.8	14.8	15.8	15.8	15.8	15.8	15.8
28.6	28.6	28.6	28.6	28.6	16.9	16.9	16.9	16.9	16.9	14.2	14.2	14.2	14.2	14.2	15.0	15.0	15.0	15.0	15.0
28.5	28.5	28.5	28.5	28.5	16.3	16.3	16.3	16.3	16.3	13.7	13.7	13.7	13.7	13.7	14.5	14.5	14.5	14.5	14.5
28.2	28.2	28.2	28.2	28.2	15.8	15.8	15.8	15.8	15.8	13.2	13.2	13.2	13.2	13.2	14.1	14.1	14.1	14.1	14.1
27.9	27.9	27.9	27.9	27.9	15.2	15.2	15.2	15.2	15.2	12.7	12.7	12.7	12.7	12.7	13.6	13.6	13.6	13.6	13.6
27.8	27.8	27.8	27.8	27.8	14.7	14.7	14.7	14.7	14.7	12.2	12.2	12.2	12.2	12.2	13.1	13.1	13.1	13.1	13.1
26.9	26.9	26.9	26.9	26.9	14.2	14.2	14.2	14.2	14.2	11.7	11.7	11.7	11.7	11.7	12.6	12.6	12.6	12.6	12.6
26.6	26.6	26.6	26.6	26.6	13.7	13.7	13.7	13.7	13.7	11.2	11.2	11.2	11.2	11.2	12.1	12.1	12.1	12.1	12.1
25.9	25.9	25.9	25.9	25.9	13.2	13.2	13.2	13.2	13.2	10.7	10.7	10.7	10.7	10.7	11.6	11.6	11.6	11.6	11.6
25.7	25.7	25.7	25.7	25.7	12.7	12.7	12.7	12.7	12.7	10.2	10.2	10.2	10.2	10.2	11.1	11.1	11.1	11.1	11.1
24.7	24.7	24.7	24.7	24.7	12.2	12.2	12.2	12.2	12.2	9.7	9.7	9.7	9.7	9.7	10.6	10.6	10.6	10.6	10.6
24.4	24.4	24.4	24.4	24.4	11.7	11.7	11.7	11.7	11.7	9.2	9.2	9.2	9.2	9.2	10.1	10.1	10.1	10.1	10.1
22.8	22.8	22.8	22.8	22.8	11.2	11.2	11.2	11.2	11.2	8.7	8.7	8.7	8.7	8.7	9.6	9.6	9.6	9.6	9.6
22.4	22.4	22.4	22.4	22.4	10.7	10.7	10.7	10.7	10.7	8.2	8.2	8.2	8.2	8.2	9.1	9.1	9.1	9.1	9.1
22.4	22.4	22.4	22.4	22.4	10.2	10.2	10.2	10.2	10.2	7.7	7.7	7.7	7.7	7.7	8.6	8.6	8.6	8.6	8.6
16.8					6.8					6.8					8.1				

\* Modified/heavy crane moved to rear of truck.



Table B6

Speed Profile for Lockheed TH402, 10-ton Cargo Truck, B&G/YMS35 Flatbed Trailer\*  
for HMO West Germany Study Area

Primary Roads		Secondary Roads		Trails		Off Road	
Dry Condition		Dry Condition		Dry Condition		Dry Condition	
PERCENT TOTAL DISTANCE		PERCENT TOTAL DISTANCE		PERCENT TOTAL DISTANCE		PERCENT TOTAL DISTANCE	
X=0	2 4 6 8	X=0	2 4 6 8	X=0	2 4 6 8	X=0	2 4 6 8
X 40.8	40.8 40.8 40.8 40.8	X 33.6	33.6 33.3 33.2 33.2	X 22.0	22.0 21.9 21.2 20.4	X 32.3	26.8 25.6 24.6 23.9
1X 40.8	40.6 40.5 40.5 40.4	1X 33.1	32.7 32.0 31.4 31.0	1X 20.0	19.7 19.5 19.3 19.1	1X 23.3	22.9 22.5 22.2 21.9
2X 40.4	40.3 40.3 40.3 40.3	2X 30.5	30.1 29.7 29.4 29.2	2X 18.9	18.6 18.4 17.4 17.0	2X 21.5	21.2 20.9 20.6 20.2
3X 40.2	40.2 40.1 40.1 39.9	3X 28.9	28.7 28.4 28.1 27.8	3X 17.9	17.7 17.6 17.4 17.3	3X 20.0	19.7 19.5 19.2 19.0
4X 39.7	39.5 39.1 38.7 38.3	4X 27.5	27.2 26.9 26.6 26.3	4X 17.1	17.0 16.9 16.8 16.7	4X 18.8	18.6 18.4 18.2 18.1
5X 38.0	37.7 37.3 36.8 36.3	5X 26.0	25.7 25.4 25.2 24.9	5X 16.7	16.6 16.5 16.5 16.4	5X 17.9	17.8 17.6 17.5 17.3
6X 35.8	35.3 34.9 34.5 34.0	6X 24.7	24.5 24.2 24.0 23.8	6X 16.4	16.3 16.3 16.2 16.2	6X 17.1	17.0 16.8 16.6 16.4
7X 33.6	33.2 32.8 32.5 32.1	7X 23.6	23.3 23.1 22.9 22.7	7X 16.2	16.1 16.0 16.0 15.9	7X 16.2	15.9 15.7 15.5 15.3
8X 31.6	31.2 30.7 30.2 29.5	8X 22.4	22.2 21.9 21.6 21.3	8X 15.9	15.8 15.8 15.7 15.6	8X 15.0	14.8 14.6 14.4 14.1
9X 28.9	28.3 27.8 27.2 26.4	9X 21.1	20.8 20.5 20.2 19.7	9X 15.5	15.3 15.1 14.7 14.1	9X 13.8	13.3 13.0 12.7 12.4
10X 25.6		10X 19.2		10X 13.6		10X 1.5	
Met Condition		Met Condition		Met Condition		Met Condition	
PERCENT TOTAL DISTANCE		PERCENT TOTAL DISTANCE		PERCENT TOTAL DISTANCE		PERCENT TOTAL DISTANCE	
X=0	2 4 6 8	X=0	2 4 6 8	X=0	2 4 6 8	X=0	2 4 6 8
X 40.8	40.8 40.8 40.8 40.8	X 33.6	33.5 33.3 33.2 33.2	X 22.0	21.4 20.5 19.7 19.3	X 22.0	19.1 17.9 17.2 16.7
1X 40.8	40.6 40.5 40.5 40.4	1X 33.0	32.6 31.8 31.3 30.9	1X 19.8	18.6 18.2 17.9 17.7	1X 16.3	16.0 15.7 15.5 15.3
2X 40.4	40.3 40.3 40.3 40.3	2X 30.4	30.0 29.6 29.3 29.1	2X 17.5	17.3 17.1 16.9 16.7	2X 15.0	14.8 14.6 14.4 14.3
3X 40.2	40.2 40.1 40.0 39.8	3X 28.8	28.6 28.3 28.0 27.7	3X 16.6	16.5 16.4 16.3 16.2	3X 14.1	13.9 13.7 13.6 13.5
4X 39.6	39.3 38.9 38.5 38.1	4X 27.4	27.1 26.7 26.4 26.1	4X 16.2	16.1 16.0 15.9 15.9	4X 13.3	13.2 13.1 13.0 12.9
5X 37.8	37.4 36.9 36.4 35.9	5X 25.8	25.5 25.2 25.0 24.7	5X 15.8	15.7 15.6 15.6 15.5	5X 12.8	12.7 12.6 12.5 12.4
6X 35.3	34.9 34.5 34.0 33.6	6X 24.5	24.3 24.0 23.8 23.6	6X 15.4	15.4 15.3 15.2 15.2	6X 12.3	12.2 12.1 12.0 11.9
7X 33.2	32.8 32.5 32.0 31.6	7X 23.3	23.1 22.9 22.6 22.4	7X 15.1	15.0 14.9 14.9 14.8	7X 11.7	11.6 11.5 11.3 11.2
8X 31.0	30.4 29.9 29.3 28.5	8X 22.1	21.8 21.5 21.2 20.9	8X 14.7	14.7 14.6 14.5 14.3	8X 11.0	10.8 10.7 10.5 10.3
9X 27.8	27.2 26.6 26.0 25.1	9X 20.6	20.3 20.0 19.6 19.1	9X 14.2	14.0 13.8 13.4 13.0	9X 10.0	9.6 3.8 2.1 1.5
10X 24.2		10X 18.7		10X 12.6		10X 1.2	
Snow Condition		Snow Condition		Snow Condition		Snow Condition	
PERCENT TOTAL DISTANCE		PERCENT TOTAL DISTANCE		PERCENT TOTAL DISTANCE		PERCENT TOTAL DISTANCE	
X=0	2 4 6 8	X=0	2 4 6 8	X=0	2 4 6 8	X=0	2 4 6 8
X 19.8	19.8 19.8 19.8 19.8	X 18.3	18.0 18.0 18.0 18.0	X 18.3	18.0 17.5 16.8 16.5	X 18.5	16.5 15.7 15.3 15.0
1X 19.8	19.8 19.8 19.7 19.6	1X 19.8	19.8 19.8 19.8 19.8	1X 16.3	16.2 16.1 15.9 15.8	1X 14.9	14.7 14.5 14.4 14.3
2X 19.6	19.5 19.5 19.4 19.4	2X 19.7	19.6 19.6 19.5 19.4	2X 15.7	15.6 15.5 15.5 15.4	2X 14.1	14.0 13.9 13.8 13.6
3X 19.4	19.3 19.3 19.3 19.3	3X 19.4	19.3 19.2 19.0 18.9	3X 15.3	15.2 15.1 15.0 14.9	3X 13.5	13.4 13.2 13.1 13.0
4X 19.3	19.3 19.3 19.2 19.2	4X 18.8	18.7 18.6 18.4 18.3	4X 14.9	14.8 14.7 14.6 14.5	4X 12.9	12.7 12.6 12.5 12.4
5X 19.2	19.2 19.1 19.1 19.0	5X 18.2	18.1 17.9 17.8 17.7	5X 14.4	14.3 14.3 14.2 14.1	5X 12.3	12.2 12.1 12.0 11.9
6X 19.8	18.9 18.6 18.4 18.2	6X 17.6	17.5 17.4 17.3 17.2	6X 14.1	14.0 13.9 13.9 13.8	6X 11.8	11.7 11.6 11.6 11.4
7X 18.6	18.5 18.4 18.4 18.4	7X 17.1	16.9 16.8 16.7 16.5	7X 13.9	13.7 13.6 13.6 13.5	7X 11.3	11.2 11.1 11.0 10.8
8X 18.3	18.3 18.2 18.1 17.9	8X 16.4	16.2 16.0 15.9 15.6	8X 13.4	13.4 13.3 13.2 13.1	8X 10.7	10.6 10.5 10.3 10.2
9X 17.7	17.6 17.4 17.3 17.0	9X 15.4	15.2 15.0 14.8 14.4	9X 13.0	12.9 12.7 12.4 12.1	9X 10.0	9.8 7.7 3.0 1.9
10X 16.6		10X 14.1		10X 11.7		10X 1.4	

\* Modified/heavy crane moved to rear of truck.

Table E7  
 Speed Profile for German MAN, 10-ton Cargo Truck, 8x8/AM835 Flatbed Trailer\*  
 for HIMO West Germany Study Area

Primary Roads					Secondary Roads					Trails					Off Road																								
Dry Condition					Wet Condition					Snow Condition					Dry Condition					Wet Condition					Snow Condition														
PERCENT TOTAL DISTANCE					PERCENT TOTAL DISTANCE					PERCENT TOTAL DISTANCE					PERCENT TOTAL DISTANCE					PERCENT TOTAL DISTANCE					PERCENT TOTAL DISTANCE					PERCENT TOTAL DISTANCE									
X=0	2	4	6	H	X=0	2	4	6	H	X=0	2	4	6	H	X=0	2	4	6	H	X=0	2	4	6	H	X=0	2	4	6	H	X=0	2	4	6	H					
36.5	36.5	36.5	36.5	36.5	30.9	30.8	30.5	30.4	30.4	16.0	16.0	16.0	16.0	15.7	30.2	24.0	22.5	21.4	20.4	36.5	36.5	36.5	36.5	36.5	30.9	30.8	30.5	30.4	30.4	16.0	16.0	16.0	16.0	15.7	30.2	24.0	22.5	21.4	20.4
1X	1X	1X	1X	1X	1X	1X	1X	1X	1X	1X	1X	1X	1X	1X	1X	1X	1X	1X	1X	1X	1X	1X	1X	1X	1X	1X	1X	1X	1X	1X	1X	1X	1X	1X	1X	1X	1X	1X	1X
2X	2X	2X	2X	2X	2X	2X	2X	2X	2X	2X	2X	2X	2X	2X	2X	2X	2X	2X	2X	2X	2X	2X	2X	2X	2X	2X	2X	2X	2X	2X	2X	2X	2X	2X	2X	2X	2X	2X	2X
3X	3X	3X	3X	3X	3X	3X	3X	3X	3X	3X	3X	3X	3X	3X	3X	3X	3X	3X	3X	3X	3X	3X	3X	3X	3X	3X	3X	3X	3X	3X	3X	3X	3X	3X	3X	3X	3X	3X	3X
4X	4X	4X	4X	4X	4X	4X	4X	4X	4X	4X	4X	4X	4X	4X	4X	4X	4X	4X	4X	4X	4X	4X	4X	4X	4X	4X	4X	4X	4X	4X	4X	4X	4X	4X	4X	4X	4X	4X	4X
5X	5X	5X	5X	5X	5X	5X	5X	5X	5X	5X	5X	5X	5X	5X	5X	5X	5X	5X	5X	5X	5X	5X	5X	5X	5X	5X	5X	5X	5X	5X	5X	5X	5X	5X	5X	5X	5X	5X	5X
6X	6X	6X	6X	6X	6X	6X	6X	6X	6X	6X	6X	6X	6X	6X	6X	6X	6X	6X	6X	6X	6X	6X	6X	6X	6X	6X	6X	6X	6X	6X	6X	6X	6X	6X	6X	6X	6X	6X	6X
7X	7X	7X	7X	7X	7X	7X	7X	7X	7X	7X	7X	7X	7X	7X	7X	7X	7X	7X	7X	7X	7X	7X	7X	7X	7X	7X	7X	7X	7X	7X	7X	7X	7X	7X	7X	7X	7X	7X	7X
8X	8X	8X	8X	8X	8X	8X	8X	8X	8X	8X	8X	8X	8X	8X	8X	8X	8X	8X	8X	8X	8X	8X	8X	8X	8X	8X	8X	8X	8X	8X	8X	8X	8X	8X	8X	8X	8X	8X	8X
9X	9X	9X	9X	9X	9X	9X	9X	9X	9X	9X	9X	9X	9X	9X	9X	9X	9X	9X	9X	9X	9X	9X	9X	9X	9X	9X	9X	9X	9X	9X	9X	9X	9X	9X	9X	9X	9X	9X	9X
10X	10X	10X	10X	10X	10X	10X	10X	10X	10X	10X	10X	10X	10X	10X	10X	10X	10X	10X	10X	10X	10X	10X	10X	10X	10X	10X	10X	10X	10X	10X	10X	10X	10X	10X	10X	10X	10X	10X	10X

\* Modified/heavy crane moved to rear of truck.



Table B9  
 Speed Profile for Lockheed TP901V, 10-ton Cargo Truck, S&B/Kaschaber Flatted Trailer\*  
 for HIMO West Germany Study Area

Primary Roads		Secondary Roads		Trails		Off Road	
Dry Condition		Dry Condition		Dry Condition		Dry Condition	
Wet Condition		Wet Condition		Wet Condition		Wet Condition	
Snow Condition		Snow Condition		Snow Condition		Snow Condition	
PERCENT TOTAL DISTANCE		PERCENT TOTAL DISTANCE		PERCENT TOTAL DISTANCE		PERCENT TOTAL DISTANCE	
X=0	2 4 6 R	X=0	2 4 6 R	X=0	2 4 6 R	X=0	2 4 6 R
1X	22.1 22.1 22.1 22.1	1X	18.5 18.4 18.2 18.1	1X	21.5 22.1 20.3 18.8 19.2	1X	21.7 22.1 19.9 18.9 19.2
2X	22.1 22.1 22.1 22.1	1X	18.0 18.0 18.0 18.0	1X	17.8 17.3 16.9 16.4 15.9	1X	17.8 17.4 17.1 16.8 16.4
3X	22.1 22.1 22.1 22.1	2X	18.0 18.0 18.0 18.0	2X	15.5 15.1 14.8 14.5 14.0	2X	16.1 15.8 15.5 15.2 15.0
4X	21.9 21.9 21.9 21.8	3X	17.9 17.9 17.9 17.8	3X	13.7 13.4 13.1 12.9 12.6	3X	14.8 14.6 14.5 14.3 14.2
5X	21.9 21.9 21.4 21.3	4X	17.6 17.5 17.4 17.3	4X	12.3 12.0 11.7 11.5 11.3	4X	14.0 13.8 13.6 13.4 13.3
6X	21.1 21.0 20.8 20.7	5X	17.0 16.8 16.7 16.6	5X	11.1 10.9 10.8 10.6 10.5	5X	13.1 12.9 12.7 12.6 12.4
7X	20.3 20.1 20.0 19.9	6X	16.5 16.4 16.3 16.2	6X	10.4 10.3 10.2 10.1 10.1	6X	12.2 12.0 11.9 11.7 11.5
8X	19.6 19.4 19.3 19.2	7X	16.0 15.8 15.7 15.6	7X	10.0 9.9 9.9 9.8 9.7	7X	11.4 11.2 11.1 10.9 10.8
9X	18.9 18.8 18.6 18.3	8X	15.4 15.2 15.1 15.0	8X	9.7 9.6 9.6 9.5 9.5	8X	10.6 10.4 10.2 10.1 9.9
10X	18.0	9X	14.7 14.5 14.4 14.2	9X	9.4 9.3 9.2 9.1 9.0	9X	9.7 9.4 9.0 3.9 2.2
		10X	13.6	10X	8.8	10X	1.5
PERCENT TOTAL DISTANCE		PERCENT TOTAL DISTANCE		PERCENT TOTAL DISTANCE		PERCENT TOTAL DISTANCE	
X=0	2 4 6 R	X=0	2 4 6 R	X=0	2 4 6 R	X=0	2 4 6 R
1X	22.1 22.1 22.1 22.1	1X	18.0 18.0 18.0 18.0	1X	14.0 13.8 13.6 13.5 13.4	1X	14.8 11.8 11.0 10.5 10.2
2X	22.1 22.1 22.1 22.1	2X	17.9 17.9 17.9 17.9	2X	11.4 11.3 11.2 11.0 10.9	2X	9.0 9.7 9.6 9.5 9.3
3X	22.1 22.1 22.0 21.9	3X	17.9 17.8 17.7 17.6	3X	10.7 10.6 10.5 10.4 10.2	3X	8.8 8.7 8.6 8.5 8.5
4X	21.9 21.9 21.8 21.7	4X	17.5 17.4 17.3 17.2	4X	10.1 9.9 9.8 9.7 9.6	4X	8.4 8.3 8.3 8.2 8.2
5X	21.6 21.5 21.4 21.3	5X	17.0 16.9 16.7 16.6	5X	9.6 9.5 9.4 9.4 9.3	5X	8.1 8.1 8.0 8.0 7.9
6X	21.0 20.7 20.5 20.4	6X	16.3 16.2 16.1 15.9	6X	9.2 9.2 9.1 9.1 9.0	6X	7.9 7.8 7.8 7.7 7.7
7X	20.2 20.0 19.9 19.7	7X	15.7 15.6 15.5 15.4 15.2	7X	8.9 8.9 8.8 8.8 8.7	7X	7.6 7.5 7.5 7.4 7.3
8X	19.5 19.3 19.2 19.0	8X	15.1 15.0 14.9 14.8 14.6	8X	8.6 8.6 8.5 8.5 8.4	8X	7.3 7.2 7.1 7.0 6.9
9X	18.7 18.5 18.4 18.1	9X	14.5 14.3 14.1 14.0 13.8	9X	8.3 8.3 8.2 8.1 7.9	9X	6.7 5.9 5.9 5.6 5.3
10X	17.4	10X	13.5	10X	3.6	10X	1.0
PERCENT TOTAL DISTANCE		PERCENT TOTAL DISTANCE		PERCENT TOTAL DISTANCE		PERCENT TOTAL DISTANCE	
X=0	2 4 6 R	X=0	2 4 6 R	X=0	2 4 6 R	X=0	2 4 6 R
1X	16.9 16.9 16.9 16.1	1X	14.2 14.2 14.2 14.2	1X	13.7 13.5 13.4 13.4 13.0	1X	13.0 12.4 11.6 11.2 10.8
2X	15.3 15.1 15.0 14.9	2X	14.1 14.1 14.1 14.1	2X	12.7 12.4 12.0 11.7 11.5	2X	10.6 10.4 10.3 10.1 10.0
3X	14.7 14.6 14.6 14.6	3X	14.0 14.0 14.0 14.0	3X	10.5 10.4 10.3 10.1 10.0	3X	9.3 9.2 9.1 9.1 9.0
4X	14.5 14.5 14.5 14.5	4X	14.0 14.0 14.0 14.0	4X	9.9 9.8 9.7 9.6 9.5	4X	8.9 8.9 8.8 8.8 8.7
5X	14.4 14.4 14.4 14.4	5X	13.9 13.9 13.8 13.8	5X	9.4 9.4 9.4 9.2 9.2	5X	8.6 8.6 8.5 8.4 8.4
6X	14.3 14.3 14.3 14.2	6X	13.7 13.6 13.5 13.4	6X	9.1 9.0 9.0 8.9 8.9	6X	8.3 8.3 8.2 8.1 8.1
7X	14.1 14.1 14.0 13.9	7X	13.6 13.5 13.4 13.4	7X	8.8 8.7 8.7 8.6 8.6	7X	8.0 7.9 7.8 7.7 7.7
8X	13.8 13.8 13.7 13.6	8X	13.3 13.2 13.1 12.9	8X	8.5 8.4 8.4 8.3 8.3	8X	7.6 7.5 7.4 7.2 7.1
9X	13.5 13.5 13.4 13.3	9X	13.2 13.1 12.9 12.9	9X	8.2 8.1 8.1 8.0 8.0	9X	6.9 6.7 6.7 6.3 3.1
10X	13.0	10X	11.1	10X	7.7	10X	1.4

\* Modified/heavy crane moved to rear of truck.

Table B10

Speed Profile for Lockheed TH900, 10-ton Cargo Truck, 8x8/Kasbohrer Flatbed Trailers\*  
for HIMO West Germany Study Area

Primary Roads		Secondary Roads		Trails		Off Road	
		Dry Condition		Wet Condition			
PERCENT TOTAL DISTANCE		PERCENT TOTAL DISTANCE		PERCENT TOTAL DISTANCE		PERCENT TOTAL DISTANCE	
X=0	X=6	X=0	X=6	X=0	X=6	X=0	X=6
X 35.8	35.8	X 29.2	29.2	X 22.0	22.0	X 27.5	27.5
1X 35.8	35.8	1X 29.2	29.2	1X 19.7	19.7	1X 21.1	21.1
2X 35.8	35.8	2X 27.4	27.4	2X 18.1	18.1	2X 19.5	19.5
3X 35.8	35.8	3X 26.4	26.4	3X 17.3	17.3	3X 18.2	18.2
4X 35.4	35.4	4X 25.1	25.1	4X 16.6	16.6	4X 17.2	17.2
5X 34.3	33.9	5X 23.6	23.6	5X 16.0	16.0	5X 16.4	16.4
6X 32.3	31.8	6X 22.4	22.4	6X 15.7	15.7	6X 15.7	15.7
7X 30.8	29.6	7X 21.4	21.4	7X 15.4	15.4	7X 14.8	14.8
8X 28.2	27.9	8X 20.4	20.4	8X 15.4	15.4	8X 13.9	13.9
9X 26.2	25.8	9X 19.3	19.3	9X 14.9	14.9	9X 12.7	12.7
10X 23.6	23.6	10X 17.3	17.3	10X 13.2	13.2	10X 11.0	11.0
X 35.8	35.8	X 29.2	29.2	X 22.0	22.0	X 27.5	27.5
1X 35.8	35.8	1X 29.2	29.2	1X 19.7	19.7	1X 21.1	21.1
2X 35.8	35.8	2X 27.3	27.3	2X 18.1	18.1	2X 19.5	19.5
3X 35.7	35.7	3X 26.3	26.3	3X 16.6	16.6	3X 18.2	18.2
4X 35.4	35.2	4X 24.9	24.9	4X 15.7	15.7	4X 17.2	17.2
5X 34.0	33.3	5X 23.5	23.5	5X 15.4	15.4	5X 16.4	16.4
6X 31.8	30.2	6X 22.2	22.2	6X 14.7	14.7	6X 15.7	15.7
7X 29.6	28.9	7X 21.2	21.2	7X 14.4	14.4	7X 14.8	14.8
8X 27.7	27.4	8X 20.2	20.2	8X 14.0	14.0	8X 13.9	13.9
9X 25.4	24.9	9X 18.9	18.9	9X 13.4	13.4	9X 12.7	12.7
10X 22.5	22.5	10X 17.3	17.3	10X 12.7	12.7	10X 11.0	11.0
X 35.8	35.8	X 29.2	29.2	X 22.0	22.0	X 27.5	27.5
1X 35.8	35.8	1X 28.9	28.9	1X 19.1	19.1	1X 21.1	21.1
2X 35.8	35.8	2X 27.3	27.3	2X 16.8	16.8	2X 19.5	19.5
3X 35.7	35.7	3X 26.3	26.3	3X 16.1	16.1	3X 18.2	18.2
4X 35.4	35.2	4X 24.9	24.9	4X 15.7	15.7	4X 17.2	17.2
5X 34.0	33.3	5X 23.5	23.5	5X 15.4	15.4	5X 16.4	16.4
6X 31.8	30.2	6X 22.2	22.2	6X 14.7	14.7	6X 15.7	15.7
7X 29.6	28.9	7X 21.2	21.2	7X 14.4	14.4	7X 14.8	14.8
8X 27.7	27.4	8X 20.2	20.2	8X 14.0	14.0	8X 13.9	13.9
9X 25.4	24.9	9X 18.9	18.9	9X 13.4	13.4	9X 12.7	12.7
10X 22.5	22.5	10X 17.3	17.3	10X 12.7	12.7	10X 11.0	11.0
X 17.3	17.3	X 17.3	17.3	X 16.5	16.5	X 15.2	15.2
1X 17.3	17.3	1X 16.7	16.7	1X 14.7	14.7	1X 12.6	12.6
2X 17.3	17.3	2X 16.5	16.5	2X 14.3	14.3	2X 11.9	11.9
3X 17.3	17.3	3X 16.4	16.4	3X 13.9	13.9	3X 11.3	11.3
4X 17.2	17.1	4X 16.2	16.2	4X 13.5	13.5	4X 10.6	10.6
5X 17.0	17.0	5X 15.8	15.8	5X 13.1	13.1	5X 10.4	10.4
6X 16.9	16.8	6X 15.3	15.3	6X 12.8	12.8	6X 10.1	10.1
7X 16.6	16.5	7X 14.8	14.8	7X 12.4	12.4	7X 9.7	9.7
8X 16.2	16.1	8X 14.4	14.4	8X 12.0	12.0	8X 9.1	9.1
9X 15.8	15.7	9X 13.7	13.7	9X 11.6	11.6	9X 8.3	8.3
10X 15.6	15.5	10X 13.2	13.2	10X 11.1	11.1	10X 7.5	7.5

\* Modified/heavy crane moved to rear of truck.



Table B12  
 Speed Profile for Lockheed T11901M, 10-ton Cargo Truck, 8x6/M315 Flatbed Trailer  
 for HMO West Germany Study Area

Primary Roads					Secondary Roads					Trails					Off Road						
PERCENT TOTAL DISTANCE					PERCENT TOTAL DISTANCE					PERCENT TOTAL DISTANCE					PERCENT TOTAL DISTANCE						
X	Y	Z	A	M	X	Y	Z	A	M	X	Y	Z	A	M	X	Y	Z	A	M		
1	21.6	21.6	21.6	21.6	1	18.5	14.4	14.0	17.9	17.9	1	24.5	21.0	20.0	1	24.5	21.0	20.0	18.0	18.0	
1X	17.8	17.8	17.8	17.8	1X	17.8	17.8	17.8	17.8	1X	17.7	17.2	16.7	16.2	1X	17.7	17.2	16.7	16.2	15.8	
2	21.6	21.6	21.6	21.6	2	17.8	17.8	17.8	17.8	2X	15.4	15.0	14.6	14.3	2X	15.4	15.0	14.6	14.3	13.9	
3	21.6	21.6	21.6	21.6	3	17.7	17.7	17.7	17.7	3X	13.5	13.5	13.0	12.8	3X	14.6	14.4	14.3	14.1	14.0	
4	21.4	21.4	21.4	21.3	4	17.4	17.3	17.2	17.0	4X	12.2	11.9	11.6	11.4	4X	13.8	13.6	13.4	13.3	13.1	
5	21.4	21.4	21.4	21.3	5	16.9	16.8	16.6	16.5	5X	11.0	10.9	10.7	10.6	5X	12.9	12.8	12.6	12.4	12.2	
6	20.8	20.7	20.6	20.5	6	16.3	16.2	16.1	16.0	6X	10.4	10.3	10.2	10.1	6X	12.0	11.9	11.7	11.5	11.4	
7	20.8	20.7	20.6	20.5	7	15.8	15.6	15.5	15.4	7X	10.0	9.9	9.8	9.8	7X	11.2	11.1	10.9	10.8	10.6	
8	19.2	19.2	19.1	19.0	8	15.2	15.0	14.9	14.8	8X	9.7	9.6	9.5	9.5	8X	10.5	10.3	10.1	9.9	9.8	
9	18.7	18.6	18.5	18.4	9	14.5	14.3	14.2	14.0	9X	9.4	9.3	9.2	9.1	9X	9.6	9.2	8.8	8.3	1.9	
10	17.8				10X	13.6				10X	8.8				10X	1.4					
PERCENT TOTAL DISTANCE					PERCENT TOTAL DISTANCE					PERCENT TOTAL DISTANCE					PERCENT TOTAL DISTANCE						
X	Y	Z	A	M	X	Y	Z	A	M	X	Y	Z	A	M	X	Y	Z	A	M		
1	21.6	21.6	21.6	21.6	1	17.7	17.7	17.7	17.7	1	12.6	12.5	12.4	12.2	1	13.5	11.2	10.3	9.9	9.5	
1X	17.8	17.8	17.8	17.8	1X	17.7	17.7	17.7	17.7	1X	12.0	11.7	11.4	11.2	1X	9.3	9.1	9.0	8.9	8.7	
2	21.6	21.6	21.6	21.6	2	17.7	17.7	17.7	17.7	2X	10.8	10.7	10.6	10.4	2X	8.6	8.5	8.4	8.4	8.3	
3	21.6	21.6	21.6	21.6	3	17.6	17.6	17.5	17.4	3X	10.2	10.1	9.9	9.8	3X	8.2	8.1	8.1	8.0	7.9	
4	21.4	21.4	21.4	21.3	4	17.3	17.2	17.1	16.9	4X	9.6	9.5	9.4	9.4	4X	7.9	7.8	7.8	7.7	7.7	
5	21.2	21.1	21.0	20.9	5	16.8	16.6	16.5	16.4	5X	9.2	9.2	9.1	9.1	5X	7.6	7.6	7.5	7.5	7.4	
6	20.6	20.5	20.5	20.0	6	16.1	16.0	15.8	15.7	6X	8.9	8.9	8.8	8.8	6X	7.4	7.3	7.3	7.2	7.2	
7	19.8	19.7	19.5	19.4	7	15.5	15.4	15.3	15.2	7X	8.7	8.6	8.6	8.5	7X	7.1	7.1	7.0	7.0	7.0	
8	19.2	19.0	18.7	18.5	8	14.9	14.8	14.7	14.6	8X	8.4	8.3	8.3	8.2	8X	7.1	7.1	7.0	6.9	6.9	
9	18.4	18.2	18.1	17.9	9	14.3	14.1	14.0	13.8	9X	8.1	8.0	7.9	7.8	9X	6.8	6.8	6.7	6.7	6.6	
10	17.2				10X	13.4				10X	3.6				10X	6.4	5.3	2.5	1.7	1.3	
PERCENT TOTAL DISTANCE					PERCENT TOTAL DISTANCE					PERCENT TOTAL DISTANCE					PERCENT TOTAL DISTANCE						
X	Y	Z	A	M	X	Y	Z	A	M	X	Y	Z	A	M	X	Y	Z	A	M		
1	16.9	16.0	16.0	15.6	14.8	1	13.1	12.7	11.5	11.1	1	9.9	9.9	9.9	1	9.7	9.4	9.0	8.8	8.7	
1X	14.3	14.0	13.6	13.1	12.7	1X	10.9	10.8	10.8	10.7	1X	9.8	9.7	9.6	9.5	1X	8.5	8.5	8.4	8.3	8.2
2	12.5	12.2	11.5	11.4	11.3	2	10.6	10.6	10.6	10.5	2	9.3	9.2	9.1	9.0	2	8.1	8.1	8.0	7.9	7.9
3	11.7	11.6	11.5	11.4	11.3	3	10.5	10.5	10.5	10.5	3	9.0	8.9	8.8	8.7	3	7.8	7.7	7.7	7.6	7.6
4	11.3	11.2	11.1	11.1	11.1	4	10.5	10.5	10.4	10.4	4	8.6	8.5	8.5	8.4	4	7.5	7.5	7.4	7.4	7.4
5	11.1	11.0	11.0	11.0	11.0	5	10.4	10.3	10.3	10.3	5	8.3	8.3	8.2	8.1	5	7.3	7.3	7.3	7.2	7.2
6	10.9	10.9	10.9	10.9	10.9	6	10.3	10.2	10.2	10.1	6	8.1	8.0	8.0	7.9	6	7.1	7.1	7.0	7.0	7.0
7	10.8	10.8	10.8	10.8	10.7	7	10.1	10.1	10.0	10.0	7	7.8	7.8	7.7	7.7	7	6.9	6.9	6.8	6.7	6.7
8	10.7	10.6	10.6	10.6	10.6	8	9.9	9.8	9.8	9.7	8	7.6	7.6	7.5	7.4	8	6.6	6.6	6.6	6.6	6.6
9	10.5	10.5	10.4	10.4	10.4	9	9.7	9.6	9.5	9.4	9	7.3	7.3	7.2	7.1	9	6.4	6.4	6.4	6.4	6.4
10	10.3					10X	4.1				10X	3.4				10X	2.4	1.6	1.2	1.0	0.8

Table B13  
 Speed Profile for German MAN, 10-ton Cargo Truck, 8x6/M345 Flatbed Trailer  
 for HMO West Germany Study Area

Primary Roads			Secondary Roads			Trails			Off Road		
Dry Condition			Dry Condition			Dry Condition			Dry Condition		
PERCENT TOTAL DISTANCE	X=0	A	PERCENT TOTAL DISTANCE	X=0	A	PERCENT TOTAL DISTANCE	X=0	A	PERCENT TOTAL DISTANCE	X=0	A
X 30.2	30.2	30.2	X 24.6	24.6	24.6	X 16.0	16.0	16.0	X 23.3	19.6	19.5
1X 30.2	30.2	30.2	1X 24.5	24.1	24.9	1X 14.3	14.0	13.8	1X 17.1	16.6	16.3
2X 30.2	30.2	30.2	2X 23.2	22.9	22.6	2X 13.4	13.1	12.9	2X 15.5	15.3	15.1
3X 30.2	30.1	30.1	3X 22.0	21.9	21.4	3X 12.3	12.1	11.8	3X 14.7	14.5	14.2
4X 30.1	30.1	29.8	4X 20.9	20.7	20.3	4X 11.5	11.3	11.1	4X 13.9	13.4	13.4
5X 29.2	29.0	28.8	5X 19.9	19.6	19.3	5X 10.7	10.6	10.4	5X 13.1	12.9	12.6
6X 27.9	27.5	27.1	6X 19.1	18.6	18.5	6X 10.3	10.2	10.1	6X 12.5	12.2	12.0
7X 26.0	25.7	25.2	7X 18.2	18.0	17.9	7X 10.0	9.9	9.8	7X 11.6	11.5	11.3
8X 24.7	24.5	24.2	8X 17.5	17.4	17.3	8X 9.8	9.7	9.6	8X 10.8	10.6	10.4
9X 23.3	23.0	22.8	9X 16.8	16.6	16.3	9X 9.6	9.5	9.4	9X 9.9	9.8	9.7
10X 21.4			10X 15.4			10X 9.0			10X 1.1		
<b>Wet Condition</b>			<b>Wet Condition</b>			<b>Wet Condition</b>			<b>Wet Condition</b>		
PERCENT TOTAL DISTANCE	X=0	A	PERCENT TOTAL DISTANCE	X=0	A	PERCENT TOTAL DISTANCE	X=0	A	PERCENT TOTAL DISTANCE	X=0	A
X 30.2	30.2	30.2	X 24.6	24.6	24.6	X 13.7	13.6	13.1	X 15.5	12.6	11.7
1X 30.2	30.2	30.2	1X 24.4	24.0	23.7	1X 11.9	11.8	11.7	1X 16.7	16.5	16.3
2X 30.2	30.2	30.2	2X 23.0	22.7	22.4	2X 11.3	11.2	11.1	2X 9.8	9.7	9.5
3X 30.2	30.1	30.1	3X 21.9	21.7	21.4	3X 10.7	10.6	10.5	3X 9.2	9.0	8.9
4X 30.1	29.9	29.6	4X 20.7	20.4	20.1	4X 10.2	10.1	10.0	4X 8.6	8.5	8.4
5X 29.1	28.8	28.6	5X 19.7	19.6	19.3	5X 9.8	9.8	9.7	5X 8.2	8.1	8.0
6X 27.5	27.0	26.6	6X 18.9	18.7	18.3	6X 9.5	9.5	9.4	6X 7.9	7.8	7.7
7X 25.6	25.3	25.0	7X 18.0	17.8	17.7	7X 9.3	9.3	9.2	7X 7.5	7.5	7.4
8X 24.3	24.0	23.8	8X 17.2	17.1	17.0	8X 9.1	9.1	9.0	8X 7.1	7.0	6.9
9X 22.7	22.3	22.0	9X 16.5	16.2	15.9	9X 8.8	8.7	8.6	9X 4.4	4.3	4.2
10X 20.5			10X 15.1			10X 3.7			10X 0.8		
<b>Snow Condition</b>			<b>Snow Condition</b>			<b>Snow Condition</b>			<b>Snow Condition</b>		
PERCENT TOTAL DISTANCE	X=0	A	PERCENT TOTAL DISTANCE	X=0	A	PERCENT TOTAL DISTANCE	X=0	A	PERCENT TOTAL DISTANCE	X=0	A
X 16.9	16.9	16.9	X 13.2	13.1	13.1	X 12.4	11.2	11.1	X 11.7	11.3	11.0
1X 14.6	14.3	14.1	1X 13.0	12.9	12.8	1X 10.8	10.8	10.6	1X 10.3	10.1	9.9
2X 13.8	13.7	13.6	2X 12.7	12.6	12.5	2X 10.2	10.1	10.0	2X 9.5	9.3	9.2
3X 13.6	13.5	13.5	3X 12.4	12.3	12.2	3X 9.7	9.6	9.5	3X 9.0	8.9	8.8
4X 13.4	13.4	13.4	4X 12.2	12.2	12.1	4X 9.5	9.3	9.2	4X 8.7	8.6	8.5
5X 13.3	13.3	13.2	5X 12.1	12.1	12.0	5X 9.3	9.2	9.1	5X 8.3	8.2	8.1
6X 13.2	13.2	13.1	6X 11.0	11.0	11.0	6X 8.9	8.8	8.7	6X 8.0	7.9	7.8
7X 13.0	13.0	12.9	7X 11.6	11.5	11.4	7X 8.7	8.6	8.5	7X 7.6	7.5	7.4
8X 12.9	12.8	12.8	8X 11.3	11.2	11.1	8X 8.4	8.3	8.2	8X 7.1	7.0	6.9
9X 12.7	12.7	12.6	9X 10.9	10.8	10.7	9X 8.1	8.0	7.9	9X 1.7	1.5	1.5
10X 12.4			10X 4.4			10X 3.5			10X 0.7		



Table B15

Speed Profile for M618, 5-ton Cargo Truck, 6x6/M67L Lowbed Semitrailer  
for HIMO West Germany Study Area

Primary Roads				Secondary Roads				Trails				Off Road			
PERCENT TOTAL DISTANCE				PERCENT TOTAL DISTANCE				PERCENT TOTAL DISTANCE				PERCENT TOTAL DISTANCE			
X	Y	Z	H	X	Y	Z	H	X	Y	Z	H	X	Y	Z	H
25.6	25.8	25.8	25.8	22.2	22.0	21.1	20.6	9.7	9.7	9.7	9.7	18.3	14.1	13.1	12.7
25.7	25.7	25.7	25.6	20.6	20.4	20.0	19.6	9.4	9.3	9.3	9.2	11.8	11.5	11.2	11.0
25.6	25.4	25.1	25.0	19.1	18.8	18.5	18.1	9.1	9.0	8.9	8.8	10.5	10.4	10.2	10.1
24.7	24.6	24.5	24.4	17.4	17.1	16.7	16.4	8.6	8.6	8.5	8.4	9.9	9.8	9.7	9.6
24.2	24.1	24.0	23.8	15.6	15.4	15.2	15.0	8.4	8.3	8.3	8.2	9.4	9.3	9.2	9.1
23.7	23.6	23.4	23.3	14.8	14.6	14.5	14.4	8.2	8.1	8.1	8.1	9.0	8.9	8.8	8.7
22.9	22.7	22.5	22.2	14.2	14.1	14.0	13.9	8.0	8.0	8.0	7.9	8.5	8.4	8.3	8.2
21.6	21.3	21.1	20.8	13.8	13.7	13.5	13.2	7.8	7.8	7.8	7.7	7.9	7.8	7.7	7.6
20.3	20.1	19.8	19.5	12.9	12.9	12.7	12.6	7.7	7.7	7.7	7.6	7.3	7.1	6.9	6.6
19.1	18.4	18.4	18.1	12.5	12.4	12.3	12.1	7.6	7.5	7.5	7.4	4.3	2.2	1.5	1.2
17.8				11.7				7.2				0.8			
<b>Wet Condition</b>															
PERCENT TOTAL DISTANCE				PERCENT TOTAL DISTANCE				PERCENT TOTAL DISTANCE				PERCENT TOTAL DISTANCE			
X	Y	Z	H	X	Y	Z	H	X	Y	Z	H	X	Y	Z	H
25.8	25.8	25.8	25.8	22.2	21.9	21.1	20.8	9.7	9.5	9.2	8.8	11.4	9.4	8.8	8.5
25.7	25.7	25.6	25.6	20.6	20.3	19.8	19.4	9.4	9.3	8.7	8.2	8.2	7.9	7.8	7.6
25.6	25.3	25.1	24.9	18.9	18.6	18.3	17.8	8.1	8.0	8.0	7.9	7.4	7.3	7.1	7.0
24.6	24.4	24.4	24.3	16.9	16.6	16.2	15.9	7.9	7.8	7.8	7.7	6.8	6.7	6.6	6.5
24.2	24.1	24.0	23.9	15.2	15.1	14.9	14.8	7.7	7.6	7.6	7.5	6.3	6.2	6.1	6.0
23.6	23.5	23.3	23.0	14.6	14.5	14.4	14.3	7.5	7.5	7.5	7.4	5.9	5.8	5.7	5.6
22.5	22.3	22.1	21.7	14.1	14.0	13.9	13.8	7.4	7.3	7.3	7.3	5.5	5.4	5.4	5.3
21.1	20.8	20.5	20.2	13.6	13.5	13.3	13.2	7.2	7.2	7.2	7.2	5.2	5.1	5.0	4.8
19.7	19.5	19.2	19.0	12.9	12.8	12.7	12.6	7.1	7.1	7.1	7.0	4.3	3.1	1.8	1.3
18.5	18.3	18.1	17.9	12.3	12.2	12.1	11.9	6.9	6.9	6.6	6.4	0.8	0.7	0.6	0.5
17.2				11.6				1.7				0.5			
<b>Snow Condition</b>															
PERCENT TOTAL DISTANCE				PERCENT TOTAL DISTANCE				PERCENT TOTAL DISTANCE				PERCENT TOTAL DISTANCE			
X	Y	Z	H	X	Y	Z	H	X	Y	Z	H	X	Y	Z	H
16.9	16.9	16.9	15.6	13.1	12.7	11.7	11.3	9.7	8.7	8.3	8.1	9.0	8.3	8.0	7.9
14.3	14.0	13.6	13.2	10.8	10.7	10.6	10.5	7.8	7.8	7.7	7.7	7.6	7.5	7.4	7.3
12.6	12.4	12.3	12.2	10.4	10.4	10.4	10.4	7.5	7.5	7.4	7.4	7.2	7.1	7.1	7.0
12.0	11.9	11.8	11.7	10.3	10.3	10.3	10.2	7.3	7.3	7.3	7.2	6.8	6.7	6.6	6.5
11.6	11.6	11.6	11.5	10.2	10.2	10.1	10.1	7.2	7.1	7.1	7.1	6.4	6.3	6.2	6.1
11.4	11.4	11.3	11.2	10.0	9.9	9.9	9.8	7.0	7.0	7.0	6.9	6.0	5.9	5.8	5.7
11.2	11.2	11.1	11.1	9.8	9.8	9.7	9.7	6.9	6.9	6.9	6.8	5.4	5.3	5.1	4.9
11.0	11.0	11.0	10.9	9.6	9.6	9.5	9.5	6.7	6.7	6.7	6.7	4.1	2.2	1.4	1.0
10.9	10.8	10.8	10.7	9.4	9.4	9.3	9.2	6.7	6.6	6.6	6.5	0.7	0.6	0.5	0.5
10.7	10.7	10.6	10.6	9.0	8.9	7.9	3.8	6.4	6.4	6.3	4.7	0.4	0.4	0.4	0.3
10.5				1.4				1.2				0.3			

Table B16  
Percent of Distance NOGO on Trails and Percent of Area NOGO Off-Road  
for Dry Conditions in HDMO West Germany Study Area

Vehicles	Trails			Off-Road				
	Insufficient Soil Strength	Insufficient Traction	Total NOGO	Insufficient Soil Strength	Insufficient Traction	Obstacle Interference and Traction	Combination of Following: Obstacles, Vegetation, Soil & Slope	Total NOGO
M813 PIP, 5-ton Cargo Truck, 6x6/XM835 Flatbed Trailer	0	0	0	0	0	9.4	0	9.4
TARADCOM HMIT, 5-ton Cargo Truck, 8x8/XM835 Flatbed Trailer*	0	0	0	0	0	7.8	0	7.8
German MAN, 7-ton Cargo Truck, 6x6/XM835 Flatbed Trailer	0	0	0	0	0	7.6	0	7.6
TARADCOM HMIT, 10-ton Cargo Truck, 8x8/XM835 Flatbed Trailer*	0	0	0	0	0	8.4	0	8.4
Lockheed TDW901M, 10-ton Cargo Truck, 8x8/XM835 Flatbed Trailer*	0	0	0	0	0	6.0	0	6.0
Lockheed TDW902, 10-ton Cargo Truck, 8x8/XM835 Flatbed Trailer*	0	0	0	0	0	5.9	0.2	6.1
German MAN, 10-ton Cargo Truck, 8x8/XM835 Flatbed Trailer*	0	0	0	0	0	8.4	0	8.4
TARADCOM HMIT, 10-ton Cargo Truck, 8x8/Kasbohrer Flatbed Trailer*	0	0	0	0	0	8.4	0	8.4
Lockheed TDW901M, 10-ton Cargo Truck, 8x8/Kasbohrer Flatbed Trailer*	0	0	0	0	0	5.4	0	5.4
Lockheed TDW902, 10-ton Cargo Truck, 8x8/Kasbohrer Flatbed Trailer*	0	0	0	0	0	4.5	0.2	4.7
German MAN, 10-ton Cargo Truck 8x8/Kasbohrer Flatbed Trailer*	0	0	0	0	0	8.4	0	8.4
Lockheed TDW901M, 10-ton Cargo Truck, 8x8/M345 Flatbed Trailer	0	0	0	0	0	6.0	0	6.0
German MAN, 10-ton Cargo Truck 8x8/M345 Flatbed Trailer	0	0	0	0	0	8.4	0	8.4
TARADCOM HMIT, 10-ton Cargo Truck 8x8/M345 Flatbed Trailer	0	0	0	0	0	8.4	0	8.4
M818, 5-ton Tractor, 6x6/M871 Lowbed Semitrailer	0	0	0	0	0	8.5	2.1	10.6

\* Modified/heavy crane moved to rear of truck.

Table B17  
Percent of Distance NOGO on Trails and Percent of Area NOGO Off-Road  
for Wet Conditions in HIMO West Germany Study Area

Vehicles	Trails			Off-Road					Total NOGO
	Insufficient Soil Strength	Insufficient Traction	Total NOGO	Insufficient Soil Strength	Insufficient Traction	Obstacle Interference and Traction	Combination of Following: Obstacles, Vegetation, Soil & Slope	Total NOGO	
M813 PIP, 5-ton Cargo Truck, 6x6/XM835 Flatbed Trailer	1.5	0	1.5	0.9	1.3	9.2	0.9	12.3	
TARADCOM HMTT, 5-ton Cargo Truck, 8x8/XM835 Flatbed Trailer*	0	0.5	0.5	0	1.8	7.8	0.7	10.3	
German MAN, 7-ton Cargo Truck 6x6/XM835 Flatbed Trailer	1.5	0	1.5	0.9	0.8	7.4	0.2	9.3	
TARADCOM HMTT, 10-ton Cargo Truck, 8x8/XM835 Flatbed Trailer*	0	0	0	0.2	0.2	8.4	0.1	8.9	
Lockheed TDW901M, 10-ton Cargo Truck, 8x8/XM835 Flatbed Trailer*	0	0	0	0.2	0.2	6.0	0.1	6.5	
Lockheed TDW902, 10-ton Cargo Truck, 8x8/XM835 Flatbed Trailer*	0	0	0	0	0.8	5.9	0.8	7.5	
German MAN, 10-ton Cargo Truck, 8x8/XM835 Flatbed Trailer*	1.5	0	1.5	0.9	0.8	8.2	0.1	10.0	
TARADCOM HMTT, 10-ton Cargo Truck, 8x8/Kasbohrer Flatbed Trailer*	1.5	0	1.5	0.9	0.8	8.2	0.7	10.6	
Lockheed TDW901M, 10-ton Cargo Truck, 8x8/Kasbohrer Flatbed Trailer*	1.5	0	1.5	0.3	1.5	5.4	0.9	8.1	
Lockheed TDW902, 10-ton Cargo Truck, 8x8/Kasbohrer Flatbed Trailer*	0	2.9	2.9	0	3.9	4.5	0.8	9.2	
German MAN, 10-ton Cargo Truck, 8x8/Kasbohrer Flatbed Trailer*	1.5	0	1.5	0.9	1.3	8.2	0.8	11.2	
Lockheed TDW901M, 10-ton Cargo Truck, 8x8/M345 Flatbed Trailer	1.5	0	1.5	0.9	1.0	9.8	0.5	8.2	
German MAN, 10-ton Cargo Truck 8x8/M345 Flatbed Trailer	1.5	0	1.5	0.9	1.3	8.2	0.3	10.7	
TARADCOM HMTT, 10-ton Cargo Truck 8x8/M345 Flatbed Trailer	1.5	0	1.5	0.9	0.8	8.2	0.7	10.6	
M818, 5-ton Tractor, 6x6/M871 Lowbed Semitrailer	1.5	2.9	4.4	0.9	4.1	8.3	5.1	18.4	

\* Modified/heavy crane moved to rear of truck.

Table B18  
Percent of Distance NOGO on Trails and Percent of Area NOGO Off-Road  
for Snow Conditions in HIMO West Germany Study Area

Vehicles	Trails			Off-Road				
	Insufficient Soil Strength	Insufficient Traction	Total NOGO	Insufficient Soil Strength	Insufficient Traction	Obstacle Interference and Traction	Combination of Following: Obstacles, Vegetation, Soil & Slope	Total NOGO
M813 PIP, 5-ton Cargo Truck, 6x6/XM835 Flatbed Trailer	0	7.0	7.0	0	17.3	9.4	10.3	37.0
TARADCOM HMTT, 5-ton Cargo Truck, 8x8/XM835 Flatbed Trailer*	0	0	0	0	0	7.8	0.2	8.0
German MAN, 7-ton Cargo Truck, 6x6/XM835 Flatbed Trailer	0	0	0	0	0	7.6	0.1	7.7
TARADCOM HMTT, 10-ton Cargo Truck, 8x8/XM835 Flatbed Trailer*	0	0	0	0	0	8.4	0.1	8.5
Lockheed TDW901M, 10-ton Cargo Truck, 8x8/XM835 Flatbed Trailer*	0	0	0	0	0	6.0	0.1	6.1
Lockheed TDW902, 10-ton Cargo Truck, 8x8/XM835 Flatbed Trailer*	0	0	0	0	0	5.9	0.3	6.2
German MAN, 10-ton Cargo Truck, 8x8/XM835 Flatbed Trailer*	0	0	0	0	0	8.4	0.1	8.5
TARADCOM HMTT, 10-ton Cargo Truck, 8x8/Kasbohrer Flatbed Trailer*	0	0	0	0	0	8.4	0.2	8.6
Lockheed TDW901M, 10-ton Cargo Truck, 8x8/Kasbohrer Flatbed Trailer*	0	0	0	0	0	5.4	0.2	5.6
Lockheed TDW902, 10-ton Cargo Truck, 8x8/Kasbohrer Flatbed Trailer*	0	0.5	0.5	0	2.2	4.5	0.6	7.3
German MAN, 10-ton Cargo Truck, 8x8/Kasbohrer Flatbed Trailer*	0	0	0	0	0	8.4	0.2	8.6
Lockheed TDW901M, 10-ton Cargo Truck, 8x8/M345 Flatbed Trailer	0	1.5	1.5	0	4.7	6.0	1.1	11.8
German MAN, 10-ton Cargo Truck 8x8/M345 Flatbed Trailer	0	1.5	1.5	0	4.7	8.4	0.6	13.7
TARADCOM HMTT, 10-ton Cargo Truck 8x8/M345 Flatbed Trailer	0	0.5	0.5	0	2.2	8.4	2.8	13.4
M818, 5-ton Tractor, 6x6/M871 Lowbed Semitrailer	0	6.5	6.5	0	17.0	8.5	3.9	29.4

\* Modified/heavy crane moved to rear of truck.

Table B19

Performance Data for the Study Vehicles Crossing Linear Features  
(Water-Crossing) in the HIMO West Germany Study Area

Vehicles	Hours per Mile		
	Dry	Wet	Snow
M813 PIP, 5-ton Cargo Truck, 6x6/XM835 Flatbed Trailer	0.101	0.109	0.106
TARADCOM HMTT, 5-ton Cargo Truck, 8x8/XM835 Flatbed Trailer*	0.094	0.107	0.100
German MAN, 7-ton Cargo Truck, 6x6/XM835 Flatbed Trailer	0.101	0.106	0.101
TARADCOM HMTT, 10-ton Cargo Truck, 8x8/XM835 Flatbed Trailer*	0.100	0.107	0.101
Lockheed TDW901M, 10-ton Cargo Truck, 8x8/XM835 Flatbed Trailer*	0.100	0.106	0.101
Lockheed TDW902, 10-ton Cargo Truck, 8x8/XM835 Flatbed Trailer*	0.100	0.106	0.101
German MAN, 10-ton Cargo Truck, 8x8/XM835 Flatbed Trailer*	0.101	0.106	0.101
TARADCOM HMTT, 10-ton Cargo Truck, 8x8/Kasbohrer Flatbed Trailer*	0.099	0.113	0.101
Lockheed TDW901M, 10-ton Cargo Truck, 8x8/Kasbohrer Flatbed Trailer*	0.101	0.112	0.101
Lockheed TDW902, 10-ton Cargo Truck, 8x8/Kasbohrer Flatbed Trailer*	0.101	0.112	0.101
German MAN 10-ton Cargo Truck, 8x8/Kasbohrer Flatbed Trailer	0.102	0.112	0.101
Lockheed TDW901M, 10-ton Cargo Truck, 8x8/M345 Flatbed Trailer	0.101	0.107	0.104
German MAN, 10-ton Cargo Truck, 8x3/M345 Flatbed Trailer	0.103	0.108	0.104
TARADCOM HMTT, 10-ton Cargo Truck, 8x8/M345 Flatbed Trailer	0.102	0.108	0.104
M818, 5-ton Trailer, 6x6/M871 Lowbed Semitrailer	0.104	0.111	0.106

\* Modified/heavy crane moved to rear.

APPENDIX C: COMPUTATION OF MOBILITY RATING SPEED  
FOR TACTICAL MOBILITY LEVELS

1. The equation for computing mobility rating speed is given as follows:

$$V_w = \frac{100}{\frac{P}{V_C} + P T_X + \frac{100 - P}{V_R}} \quad (1)$$

where

$V_w$  = mobility rating speed, mph, for a vehicle performing a mission for a specific area and condition

$P$  = the percentage of expected off-road operating distance

$V_C$  = the speed from the off-road profile, mph, corresponding to  $C$

$C$  = the percentage of the off-road terrain that should be negotiable

$T_X$  = the time spent crossing linear features for each mile of off-road terrain traversed, hr/mi

$V_R$  = the speed from the on-road speed profile, mph, corresponding to  $R$

$R$  = the percentage of the road and trail network that should be negotiable

2. The speed from the on-road profile,  $V_R$ , is not directly available from this study, but can be computed using the speeds from the profiles of the primary and secondary roads and trails as follows:

$$V_R = \frac{100 - P}{\frac{P_P}{V_{PP}} + \frac{P_S}{V_{SP}} + \frac{P_T}{V_{TP}}} \quad (2)$$

where

$P_P$ ,  $P_S$ ,  $P_T$  = percentage of the composite on-road and off-road network that are primary roads, secondary roads, and trails, respectively

$V_{PP}$ ,  $V_{SP}$ ,  $V_{TP}$  = the speeds from the primary road, secondary road, and trail speed profiles, respectively, mph, that correspond to  $R$

3. Equations 1 and 2 can be combined to yield the following:

$$V_W = \frac{100}{\frac{P}{V_C} + P T_X + \frac{P_P}{V_{PP}} + \frac{P_S}{V_{SP}} + \frac{P_T}{V_{TP}}} \quad (3)$$

4. For this report, values for  $P$ ,  $P_P$ ,  $P_S$ , and  $P_T$  in the HIMO West Germany study area can be found for each tactical mobility level in Table 5, main text. Values for  $V_C$ ,  $V_{PP}$ ,  $V_{SP}$ , and  $V_{TP}$  are available from the speed profiles for the study vehicles given in Tables B1-B15. Values for  $T_X$  for each vehicle are available in Table B19.

In accordance with letter from DAEN-RDC, DAEN-ASI dated 22 July 1977, Subject: Facsimile Catalog Cards for Laboratory Technical Publications, a facsimile catalog card in Library of Congress MARC format is reproduced below.

Randolph, Donald D

Mobility performance of selected truck/trailer combinations in the HIMO West Germany study area (TACV addendum) / by Donald D. Randolph. Vicksburg, Miss. : U. S. Waterways Experiment Station ; Springfield, Va. : available from National Technical Information Service, 1979.

28, [50] p. : ill. ; 27 cm. (Miscellaneous paper - U. S. Army Engineer Waterways Experiment Station ; GL-79-10)

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References: p. 28.

1. Military vehicles. 2. Mobility. 3. West Germany study area. 4. Mission performance. 5. On-road mobility. 6. Off-road mobility. 7. Vehicle performance. I. United States. Army Training and Doctrine Command. II. Series: United States. Waterways Experiment Station, Vicksburg, Miss. Miscellaneous paper ; GL-79-10.  
TA7.W34m no.GL-79-10