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Materiel Test Procedure 2-3-035  
General Equipment Test Activity

26 May 1970

U. S. ARMY TEST AND EVALUATION COMMAND  
COMMODITY SERVICE TEST PROCEDURE

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LANDING VEHICLES, WHEELED AND TRACKED

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1. OBJECTIVE\*

This document provides procedures to determine to what degree wheeled and tracked landing vehicles and their associated tools and equipment perform the mission as described in Qualitative Materiel Requirements (QMR's), and Small Development Requirements (SDR's), and the suitability of these landing vehicles and associated maintenance packages for use by the Army.

2. BACKGROUND

There are Army amphibious landing operations requirements for vehicles capable of disembarking from a landing craft (or other sea craft) and swimming ashore and operating over whatever terrain is necessary to perform the mission. Landing vehicles satisfy the above requirements and are capable of carrying personnel and/or cargo in support of an assault wave. These Landing Vehicles aid in the overall mission of placing as many men and supplies on shore as possible, in as little time as possible. Further, they support the land operations by supplying overland transportation for the ground troops and their supplies.

3. REQUIRED EQUIPMENT

- a. Lubricants.
- b. Repair Parts.
- c. Tools.
- d. Stopwatch.
- e. Loading Vehicles.
- f. Materials Handling Equipment (MHE).
- g. Inclinator.
- h. Cargo Carriers.
- i. Communication Control Equipment.
- j. Maintenance Facility.
- k. Cargo, as required for performance and durability tests.
- l. Still Cameras and Film.
- m. Facilities and Equipment as required by referenced MTP's and

other test documents.

4. REFERENCES

- A. USATECOM Regulation 385-6, Verification of Safety of Materiel During Testing.

\*This MTP is intended to be used as a basic guide in preparing actual test plans for the subject equipment. Specific criteria and test procedures must be determined only after careful appraisal of pertinent QMR's, SDR's TC's and any other applicable documents.

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- B. USAMC Regulation 385-12, Verification of Safety of Army Materiel.
- C. USATECOM Regulation 700-1, Value Engineering.
- D. USATECOM Regulation 705-4, Equipment Performance Report.
- E. AMCP 706-134, Maintenance Guide for Design.
- F. USATECOM Regulation 750-15, Maintenance of Supplies and Equipments.
- G. MIL-STD-209, Slinging Eyes and Attachments for Lifting and Tying Down Military Equipment.
- H. MIL-STD-461, Electromagnetic Interference Characteristics, Requirements for Equipments.
- I. MIL-STD-462, Electromagnetic Interference Characteristics, Measurements of.
- J. USAGETA Document, Human Factors Evaluation Data for General Equipment (HEDGE).
- K. TB MED 251, Noise and Conservation of Hearing.
- L. MTP 2-3-500, Preoperational Inspection and Physical Characteristics.
- M. MTP 2-3-501, Safety Hazards.
- N. MTP 2-3-502, Maintainability.
- O. MTP 2-3-503, Cargo Capacity.
- P. MTP 2-3-504, Cross-Country Mobility.
- Q. MTP 2-3-505, Road Mobility.
- R. MTP 2-3-506, Simulated Tactical Operation.
- S. MTP 2-3-507, Reliability.
- T. MTP 2-3-508, Stowage.
- U. MTP 2-3-509, Fording.
- V. MTP 2-3-510, Inland Waterway Operations.
- W. MTP 2-3-512, Compatibility with Related Equipment.
- X. MTP 2-3-513, Fuel and Oil Consumption.
- Y. MTP 2-3-514, Kit Installation and Evaluation.
- Z. MTP 2-3-516, Human Factors Engineering.
- AA. MTP 2-3-518, Line Haul Operation.
- AB. MTP 2-3-519, Surface Transportability (Vehicles).
- AC. MTP 2-3-520, Logistics-Over-The-Shore (LOTS).
- AD. MTP 2-3-527, Tools and Test Equipment.
- AE. MTP 2-3-528, Technical Manuscripts and Manuals.
- AF. MTP 2-4-002, Arctic Environmental Test of Wheeled and Tracked Vehicles.
- AG. MTP 2-4-003, Tropic Environmental Test of Wheeled and Tracked Vehicles.
- AH. MTP 6-3-521, Operational Intelligibility Test of Voice Communications Equipment.
- AI. MTP 7-3-515, Air Transport, Internal (Suitability of Equipment for).
- AJ. MTP 10-3-501, Operator Training and Familiarization.
- AK. MTP 10-3-511, Quality Assurance.

5. SCOPE

5.1 SUMMARY

This document describes the following tests conducted to evaluate landing vehicles:

- a. Preparation for Test - A determination of the condition and physical characteristics of the test item upon arrival, to ensure that the test item is complete and functionally operational, and to provide operator training and familiarization procedures.
- b. Operational Performance - An evaluation to determine the degree of test item compliance with the required military characteristics and objectives while being operated by service personnel under intended mission conditions.
- c. Transportability - An evaluation to determine the ability of the test item to be prepared for transport by service personnel, to be transported, and whether the test item can withstand the shock and vibration that it may encounter during normal handling and transporting operations.
- d. Maintenance - An evaluation to determine and appraise the test item's maintenance characteristics and requirements, a verification and appraisal of its malfunctions, an evaluation of the test item's associated publications and other common and special support elements (maintenance test package), an appraisal of the test item's design for maintainability (AMCP 706-134: accessibility, ease of maintenance, standardization, and interchangeability), an evaluation of component and system durability and reliability, and the calculation of indicators which express the effects of appropriate preceding aspects.
- e. Safety - An evaluation to determine the test compliance with safety requirements and to confirm the test item's safety characteristics during conduct of all tests, to comply with requirements of the applicable section of USATECOM Regulation 385-6.
- f. Human Factors Evaluation - An evaluation of the man-item relationship during operation, maintenance, and transport of the test item, including the noise level generated, and design deficiencies which affect operability.
- g. Value Analysis - An evaluation to determine whether the test item contains unnecessary, costly, or "nice-to-have" features which could be eliminated without affecting technical performance or safety.
- h. Compatibility - An evaluation to determine the ability of the test item to operate in conjunction with related equipments.
- i. Electromagnetic Compatibility - An evaluation to determine the ability of the test item to operate with other units during periods of mutual interference.
- j. Durability - An evaluation of the ability of the test item to operate for the required mileage through water, and over various terrain.
- k. Communication - An evaluation of the ability of the test item to provide intelligible voice communication between operating personnel, and with other units, while in motion.
- l. Fuel and Oil Consumption - An evaluation to determine the test item operating range for land operation, water-borne operations, and Battlefield day.
- m. Extreme Environmental Tests - An evaluation of the test item's ability to function under actual tropic and arctic conditions.
- n. Quality Assurance - A review to determine and evaluate defects in material and workmanship.

## 5.2 LIMITATIONS

This MTP is oriented to landing vehicles. It can be modified as

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appropriate for other types of amphibious vehicle, including LARC's amphibious recovery vehicles, amphibious mine clearing vehicles, and other adaptations of the basic landing vehicle.

6. PROCEDURES

6.1 PREPARATION FOR TEST

6.1.1 Inspection

Perform the following procedures upon arrival of the test item at the test site:

6.1.1.1 Arrival Inspection

a. Subject the test item to the applicable inspection sections of MTP 2-3-500 and record pertinent data including the following:

- 1) Equipment, time and personnel required to remove the test item from the carrier.
- 2) Defects in test item rivets, soldering, welding, hardware, seams, joints and edges.
- 3) Controls indicators, access ports not clearly marked.

b. Photograph any damages noted.

6.1.1.2 Inventory Check

Conduct an inventory against the Basic Issue Item List (BIIL), and record any discrepancies as regards the maintenance literature, spare parts, associated tools, associated equipment and components. Record all shortages. Prepare an Equipment Performance Report (EPR) when applicable.

6.1.1.3 Pre-Operational Inspection

a. Check each test item component and perform preliminary service requirements as indicated in MTP 2-3-500 and in accordance with the draft technical manual or other supplied service instructions, where applicable:

- 1) Check for correct fluid levels:
  - a) Engine oil
  - b) Transmission oil
  - c) Geared steering unit oil
  - d) Radiator coolant
- 2) Check the radiator coolant specific gravity and determine that it is adequate for the testing environment.
- 3) Check the radiator for obstructions to air flow, loose mountings, leaks, and improper or leaking hose connections.

- 4) Check all coolant hoses for leaks.
- 5) Drain engine compartment of accumulated liquids.
- 6) Check the battery electrolyte level. Inspect the terminals and cables for corrosion. Replace or repair loose battery holddown brackets and cable lugs.
- 7) Operate all hatch doors to ensure that they lock securely in open and closed positions. Check hatch seals for damage and deterioration.
- 8) Drain condensate from fuel filter, then immediately fill the tank with fuel. Also check the fuel level in auxiliary gas cans.
- 9) Clean the air filter.
- 10) Inspect the fire extinguisher to be certain the seal is unbroken and is in serviceable condition.
- 11) Clean the vehicle exterior of dirt, mud, grease, and gasoline.
- 12) Inspect tracks, road wheels, idler wheels, sprockets, shock absorbers, idler and drive sprocket guide wheels for damage, excessive wear, and evidence of tampering. Check for lubricant leaks and broken torsion bars.
- 13) Check towing pintle and lifting hooks for proper operation and damage.
- 14) Operate each vehicle light and check for illumination. Check infrared bulbs for heat.
- 15) Lubricate the test item, as required.
- 16) Inflate tires to proper pressure.
- 17) Inspect brake lines for leakage.

b. Record any discrepancies and the following information for each check or action of step a above:

- 1) Specific information as indicated
- 2) Personnel required
- 3) Tools required
- 4) Materials
- 5) Time for perform check
- 6) Difficulties experienced and suggestions for improvement

#### 6.1.1.4 Physical Characteristics.

Determine and record the physical characteristics of the test item as described in the applicable section of MTP 2-3-500, and the following:

NOTE: Do not repeat acceptable data verified during engineering tests.

a. Vehicle type:

- 1) Wheeled:
  - a) Number of wheels
  - b) Size and tread design

2) Tracked

b. Maximum wave amplitude, from crest to trough, through which the test item can travel, as specified in draft technical manuals or in operating instructions.

c. Vehicle accessories such as (fire extinguisher, towing pintles, winch, lifting hooks, other).

d. For electrical system:

- 1) Potential voltage and position of each battery
- 2) Position, name, and replacement type of each bulb
- 3) Position, name, and replacement type of each fuse

e. Capacity:

- 1) Number of personnel with no cargo
- 2) Amount of cargo with no personnel

6.1.2 Operator Training and Familiarization

Orient service test personnel using the criteria of MTP 10-3-501 and the following:

a. Service test personnel shall receive the following familiarization:

1) A review of all safety precautions and hazards associated with operating and landing vehicle. This review shall include, but not be limited to, the following:

- a) Fire hazards, fighting, and prevention.
- b) Mechanical hazards and precautions required.
- c) Electrical shock hazards, prevention, and emergency action required.
- d) Safety precautions in paragraph 6.2.4.

2) Instructions in the capabilities, operation, and limitations of the test item. Operator training shall include operational instructions for the following equipments:

- a) Brakes (air, hydraulic, or mechanical, as applicable)
- b) Monitoring gauges, if applicable
- c) Electrical equipment
- d) Instrument panel and controls

3) Instructions in the operations of the landing vehicle shall include the following:

- a) Starting
- b) Maneuvering
- c) Braking
- d) Rough terrain operation

- e) Water operation
  - f) Entering and leaving the water
- 4) Instructions pertaining to service test objectives and detailed procedures of individual subtests.
- b. Record the following:
- 1) Data collected as described in the applicable sections of MTP 10-3-501.
  - 2) The training procedures and materials used.
  - 3) All personal data for the test personnel selected.

### 6.1.3 Pre-Operational Functional Check

Ensure that the test item is functionably operable by performing applicable checks below. Record the specific information indicated, and for each check, the personnel, tools, materials, and time required, and any difficulties experienced and suggestions for improvement.

a. Upon receipt of a new or newly reconditioned vehicle, perform a hydrostatic lock test, before starting the engine, as follows:

- 1) Apply the parking brake, position the transmission lever to neutral and supply power to the starter but not to the ignition, with the master switch in the "ON" position, and the ignition switch in the "OFF" position.
- 2) Depress the starter for five seconds.
  - a) If the starter turns the engine for five seconds, switch the ignition to the "ON" position and start the engine.
  - b) If the starter does not function as required, discontinue testing, record as appropriate, and notify maintenance personnel.

b. If step a is not required for the test item:

- 1) Start the engine, observe for proper operation, and listen for any strange or unusual noises.
- 2) Record any evidence of improper operation.

c. Check the heaters for proper operation.

d. Inspect the fuel and exhaust leaks.

e. Inspect the instrument panel for normal indications and operation of meters, gauges, and lights.

NOTE: Warning lamps are normally off. Tachometers and speedometers should operate without excessive fluctuations or unusual noises.

f. Operate the vehicle on a level, hard surface, and check the follow-

ing for binding, excessive play, unusual noises, and unacceptable operation:

- 1) Brakes, including foot brake and parking brake
- 2) Transmission shift lever
- 3) Accelerator
- 4) Steering gear
- 5) Doors and/or hatches
- 6) Other functional parts

g. Move tracked vehicle on a hard, level surface, and allow it to coast to a stop without applying brakes. Measure and adjust track tension as required using applicable technical manual or other instructions. Record all measurements and adjustments.

h. Check wheeled vehicle tires for proper inflation.

i. During halts and after vehicle operation, cautiously inspect wheel hubs for noticeable variation of temperature between like components.

j. Operate all lights on the vehicle and record any failures.

k. Operate windshield wipers and record any failures.

l. Check other functional parts of the vehicle as required to ensure proper operation.

m. Ensure that the vehicle has been operated for the number of miles, as specified by applicable technical manual or other instructions, prior to evaluation.

## 6.2 TEST CONDUCT

NOTE: All equipment failures occurring shall be reported in accordance with USATECOM 705-4.

### 6.2.1 Operational Performance

Determine the operational performance of the test item while observing the following general procedures:

a. Place the test item in extended service in actual mission-type assignment under TOE environments. If unable to perform the above operations, subject the test item to simulated tactical operations in accordance with the applicable portions of MTP 2-3-506.

b. Authorized MOS-qualified personnel shall operate and maintain the test item using appropriate products, tools and equipment.

c. The length of the operational period shall be planned using the designated unit mission time and shall include sustained mission operations and provisions for scheduled maintenance and allowable downtime.

d. Where mobility is a requirement, moves and relocations shall be accomplished with the use of TOE transportation.

e. The suitability of the test item for task operations and verification of its conformance with specified QMR and SDR requirements shall be determined by conducting various mission tasks, different test item applications, and usage under the required environmental conditions.

f. Concurrent with the conduct of the operational performance tests

the following related evaluations will be made where applicable:

- 1) Early in the service test period initiate fuel and oil consumption tests as described in paragraph 6.2.11 below.
- 2) Where kits are provided for use on the test item, they will be evaluated in accordance with the requirements of MTP 2-3-514 and problems concerned with the test item recorded.
- 3) All related equipment which is not considered part of the test item but which is used to support or aid in landing vehicle operations will be evaluated for compatibility with the test item as described in paragraph 6.2.7. Equipment which was found to be ineffective when used as described for a particular operation shall be recorded.

g. Determine the ability of the test item to perform the tests of paragraph 6.2.1.1 through 6.2.1.11 below, with the test item at rated load as applicable, and for each test record the following:

- 1) Environmental conditions
- 2) Description of load (cargo, personnel, towed vehicle)

#### 6.2.1.1 Camouflage Operations

Determine how readily effectively the test item can be concealed or disguised, while providing transportation support to tactical units, by performing the following:

- a. Conceal or disguise the test item so that it appears to blend with natural surroundings or appears not to be a military vehicle.
- b. Record the following:
  - 1) Distance at which the test item is detected.
  - 2) Clock-hours and man-hours required to conceal or disguise the test item.
  - 3) Comments of test and supervisory personnel, regarding:
    - a) Test item parts or features which were difficult to camouflage, due to shape, size, and/or color.
    - b) Ease or difficulty of camouflage operations.
    - c) Techniques to improve the camouflage.
  - 4) Overall suitability and effectiveness of test item for camouflage.
- c. Photograph the test item as appropriate.

#### 6.2.1.2 Accessories Evaluation

Determine the suitability of essential, built-in test item features and nominally non-essential, attachable/detachable accessories or associated equipment for operation for service use as follows:

- a. Electrical Equipment - Determine and record the suitability of:
  - 1) All lights, as required for adequate visibility for safe

operations with other vehicles at night and during low visibility conditions.

- 2) Alternator system, to provide sufficient but not damaging amounts of power.
- 3) Radio to perform mission and its compatibility both mechanical and electrical with the vehicle.
- 4) Other electrical equipment.

b. Load protection accessories - Determine and record the degree to which these accessories afford protection to cargo from weather or pilferage.

c. Storage areas - Determine and record the adequacy of spaces provided to store tools, check blocks, and other applicable equipment.

#### 6.2.1.3 Night Operations

Evaluate the characteristics of the test item concerning its capabilities for night operations, by performing the following:

a. With test personnel performing various work tasks, evaluate the capability of the external lighting system (e.g. headlights) to provide the necessary light for these tasks. Record any evidence of ineffective lighting, and the approximate area covered.

b. With the exterior of the test vehicle brought to blackout conditions, raise the interior illumination of the test vehicle to operating levels. Viewing from the exterior of the vehicle, record the amount and locations of any light leakage, particularly:

- 1) Through the body and windshield
- 2) Through openings while personnel enter, and leave the vehicle

c. Determine and record effectiveness of night vision devices.

#### 6.2.1.4 Vehicle Control, Stability and Gradeability

a. Operate the test vehicle in a straight path at varying speeds over a level, smooth and hard-surface improved road. Observe the vehicle and record the following:

- 1) Evidence of yaw, crabwise travel, or inability to travel in a straight line.
- 2) Excessive swerving from side to side.
- 3) Any other deviations from specified characteristics.

b. Maneuver the test vehicle into right and left turns that are within its turning radius capabilities. Observe the vehicle and record the following:

- 1) Excessive roll (leaning)
- 2) Loss of traction
- 3) Any other deviations from the specified characteristics

c. Maneuver the vehicle over the following grades, ranging from 10% to the vehicle maximum, as specified in draft technical manuals:

- 1) Longitudinal Inclines - Record any evidences of difficulty, especially controllability.
- 2) Side Slopes - Record any evidences of difficulty, including slippage, upsetting, or other controllability problem.

#### 6.2.1.5 Fording

Perform the fording operations of the applicable procedures of MTP 2-3-509 and the following:

- a. Maneuver the vehicle through salt or fresh water at a depth which raises the vehicle carriage, but does not allow the vehicle to float. The crossing shall be hard bottomed. Continue the fording for 30 minutes.
- b. Examine the vehicle for and record any evidence of damage or water leakage.
- c. Record evidence of adverse effects on land operations attributed to fording.

NOTE: If there is any evidence of water damage or leakage, stop the test and ascertain the difficulty. If possible, remedy the problem (e.g. secure drain plugs); otherwise notify maintenance personnel. Do not perform the Water Operational Characteristics test until the above fording test has been satisfactorily completed.

#### 6.2.1.6 Swimming

Operate the test vehicle in salt and fresh water at a depth sufficient to allow the test vehicle to swim, and perform the following:

- a. Operate the test vehicle in a straight path at varying speeds. Record any unusual attitude of the test item (angles of yaw, pitch, or roll).
- b. Maneuver the test item into right and left turns that are within its turning radius capabilities. Record any excessive leaning (angle of roll) during each turn, and the direction of the turn.
- c. Operate the vehicle in various sea states, as prescribed by the intended mission. Record any evidence of difficulty pertinent to test item controllability.
- d. At the completion of step a perform the following:
  - 1) Record the total test time.
  - 2) Visually inspect the test item and record location and extent of water damage, if any.
  - 3) Record evidence of adverse effects on land operation attributed to swimming.

#### 6.2.1.7 Mobility

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Perform the following tests under weather conditions typical of mission operation:

6.2.1.7.1 Highway Mobility - Subject the test item to the applicable procedures of MTP 2-3-505 and the following:

a. Operate the loaded vehicle over a highway which consists of turns, curves, longitudinal and side slopes, and straight sections, over a sufficiently long distance to determine the following:

- 1) Stability and tracking performance where road characteristics are constant and also where they are changing.
- 2) Any unusual noises emanating from the vehicle.
- 3) Performance of the brakes and stability of the vehicle while braking, and during slow-down operations, at different speeds and at points in the road where conditions vary.

b. At the completion of each test visually inspect the test item for damage, or shifting of cargo.

c. Record the following:

- 1) Data collected as described in MTP 2-3-505
- 2) Length of test and description of test route
- 3) Performance characteristics of the vehicle
- 4) Location and types of noises emanating from the vehicle
- 5) Any adverse reactions demonstrated during braking operations
- 6) Difficulties in controlling and maneuvering the vehicle
- 7) Evidence of cargo shifting or damages to cargo or vehicle
- 8) Evidences of traction loss

6.2.1.7.2 Cross-Country Mobility - Subject the test item to the applicable procedures of MTP 2-3-504, and in particular, the following:

a. Operate the vehicle over unimproved roads, trails, open fields, rolling hills and other cross-country terrain at speeds up to maximum, for a distance typical in the intended mission to determine the following:

- 1) Stability and tracking performance of the test vehicle.
- 2) Any unusual noises emanating from the test vehicle.
- 3) Performance of the brakes and stability of the test vehicle during braking and slow down operations at different speeds.
- 4) Difficulties, especially traction difficulties, in controlling and maneuvering the test vehicle.

b. At the completion of each test visually examine the test item for evidence of any damage or cargo shifting.

c. Record the following:

- 1) Data collected as described in the applicable procedures of MTP 2-3-504.

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- 2) Distance travelled and test course description.
- 3) Performance characteristics of the vehicle.
- 4) Location and types of noises emanating from the test item.
- 5) Any adverse reactions demonstrated during the braking operations.
- 6) Difficulties in controlling maneuvering the vehicles and obtaining necessary traction.
- 7) Any cargo or vehicle damages, or evidence of cargo shifting.

6.2.1.7.3 Water Mobility - Perform the following:

a. Operate the test vehicle over inland waters, beaches and other mission-specified waterway and perform or simulate the intended mission to determine the following:

- 1) Stability and tracking performance of the test vehicle
- 2) Performance and stability of the test vehicle during slow down operations at different speeds.
- 3) Any unusual noises emanating from the test vehicle.
- 4) Difficulties in controlling and maneuvering the test vehicle.

b. At the completion of step a visually examine the test item and cargo for damage due to cargo shifting or water.

c. Record the following:

- 1) Equipment used in this mission (e.g. landing craft).
- 2) Distance travelled and test course description.
- 3) Performance characteristics.
- 4) Locations and types of noises emanating from test item.
- 5) Any adverse reactions demonstrated when slowing the test item.
- 6) Any difficulties encountered in controlling and maneuvering the test item.
- 7) Any evidence of the following:
  - a) Damage to test item and cargo
  - b) Shifting of cargo

6.2.1.7.4 Adverse Conditions

a. Perform the highway, cross-country and water mobility tests of paragraphs 6.2.1.7.1, 6.2.1.7.2 and 6.2.1.7.3 under varying degrees of non-ideal road/water weather conditions as follows:

- 1) Low temperatures and snow covered terrain/water
- 2) Steady rain and wet roads, or muddy terrain or sand, or water
- 3) High temperature and humidity
- 4) High winds as specified in the intended mission

b. Record any failures or damage to the landing vehicle due to adverse weather conditions.

#### 6.2.1.8 Vulnerability

Determine the vulnerability of the test vehicle by performing missions or simulated mission and recording the following:

- a. Description of the operating site.
- b. Degree of protection afforded personnel or cargo from hazardous items (e.g., projectiles).
- c. Hazards encountered or simulated.
- d. Ability of the test item to be moved quickly into or out of hazardous location (include starting and completion times).
- e. Recommendations for changes to evaluation procedures to reduce operation time.

#### 6.2.1.9 Cargo Loading Adaptability

Determine the types of cargo the test vehicle can carry and the ease with which they can be loaded by performing the procedures of MTP 2-3-503.

#### 6.2.1.10 Stowage

Determine the stowage capability of the test vehicle by performing the applicable procedures of MTP 2-3-508 and record all pertinent data including the following:

- a. Accessibility and adequacy of stowage positions
- b. Interference of stowed items with the operation of the test vehicle.

#### 6.2.1.11 Line Haul Operation

Determine the ability of the test item, when being utilized by service personnel of the user organization and/or units to fulfill its mission in a line haul operation by performing the procedures of MTP 2-3-518 and the following:

- a. Assure that the course to be traversed consists of improved roads, unimproved roads, cross-country terrain, sand, beaches, and inland waterways.
- b. Schedule a continuous (24 hour) test which will consist of (2) ten hour operating shifts with the remainder of the test time to be utilized for cargo transfer, maintenance change of operating teams, etc.
- c. Arrange for cargo to be available at the terminal points of the course. Cargo shall be of all types the test vehicle will need to carry to perform its intended mission.
- d. The test should simulate or perform mission requirements, in particular as follows:

- 1) Accumulation of mileage
- 2) Total time

- e. Begin the test with a loading operation at the starting point and

following each one way traverse of the test course, perform procedures of un-load/load, preventive maintenance, shift changes, etc.

f. Record the following:

- 1) Tonnage hauled.
- 2) Total mileage.
- 3) Elapsed time for each traverse of the test course, elapsed times for operations performed at the test course terminal points and total time of test.
- 4) Fuel, oil, and grease consumption.
- 5) Damage to or problems with the test vehicle.
- 6) All maintenance procedures, scheduled and unscheduled, including time, tools, materiel and personnel.

#### 6.2.2 Transportability

Examine the transportability characteristics of the test item as revealed during the preparation for and the actual conduct of the following transporting operations:

a. Surface Transportability as described in the applicable sections of MTP 2-3-519.

b. Logistics-Over-The-Shore (LOTS) as described in the applicable sections of MTP 2-3-520.

c. Air Transportability as described in the applicable sections of MTP 7-3-515.

d. At the completion of each transportation test of steps a through c above perform the following:

- 1) Record recommendations for changes to decrease the disassembly time, if applicable.
- 2) Record test personnel comments on the adequacy of, and recommendations for changes to, the tie down devices and lifting attachments.
- 3) Number of personnel, material handling equipment (MHE), materials and time required for loading, securing and unloading test vehicle for each mode of transportation.
- 4) Determine the effects of transportation on the test vehicle by subjecting it to the preoperational checks of paragraph 6.1.3.

#### 6.2.3 Maintenance

Evaluate the maintenance-related factors of the test item as described in MTP 2-3-502, MTP 2-3-507, MTP 2-3-527 and MTP 2-3-528 with emphasis on the following:

- a. Organizational (O), Direct Support (F), and General Support (H) Maintenance requirements.
- b. Operator through General Support Maintenance Literature.
- c. Repair parts.

- d. Tools.
- e. Test and handling equipment.
- f. Calibration and maintenance facilities.
- g. Personnel skill requirements.
- h. Maintainability.
- i. Reliability.
- j. Availability.

#### 6.2.4 Safety

Throughout the safety test, personnel shall examine and note the safety characteristics of the test item while at all times adhering to the applicable operating instructions found in the draft manual and perform the following:

- a. Perform the appropriate sections of MTP 2-3-501.
- b. Examine the test item for the inclusion of suitable guards, shields, interlocks, and warning plates.
- c. Verify the operation of all safety and overload devices provided on the test item.
- d. Throughout all tests observe hazards to personnel and other equipment and record the following:

- 1) Non-operable safety features.
- 2) Inadequate warning signs.
- 3) Recommendations for additions to the safety program and test item's safety features.

NOTE: Hazards will be reported to the testing officers where a decision will be made as to the continuation of testing.

- e. The following safety precautions will be observed when preparing for water operations:

- 1) Be sure all drain plugs are in place and securely fastened.
- 2) Check that hydrovanes are properly positioned.
- 3) Close and latch all doors as necessary for amphibious operations.

- f. The following safety precautions will be observed when operating the landing vehicle in the water.

- 1) Keep crew compartment doors and emergency escape doors open or ready to open at all times.
- 2) When crossing water at new or untried points make the first crossing without passengers.
- 3) Keep all personnel deployed and ready for immediate evacuation in case of emergency.
- 4) Do not place obstacles or cargo in areas which obstruct doors, especially emergency escape doors.

- 5) When entering or leaving the water, select the most gently sloping bank area. When leaving a river or flowing stream, head the vehicle at an angle downstream to avoid tipping and turning the landing vehicle.

NOTE: Use extreme caution at all times when entering or leaving the water.

- 6) When driving in the water, maintain a lookout for debris.
- 7) Avoid sand bars, rocks, rapids, and whirlpools.

g. The following safety precautions will be observed when operating the landing vehicle on land:

- 1) When driving on hard pavement, avoid oversteering or excessive speeds that might result in loss of vehicle control.
- 2) Drive the vehicle in the correct gear for the terrain (e.g. a low gear for descending grades).
- 3) Decelerate as vehicle approaches obstacles, such as hills and trenches.
- 4) Approach obstacles and grades as squarely as possible and with caution.
- 5) Close and latch all hatches; secure all components.

#### 6.2.5 Human Factors Evaluation

Throughout the test, evaluate the effectiveness of the man-item interaction as related to human factors by performing the applicable procedures of MTP 2-3-516 and the following:

a. Prepare check lists to evaluate the human factor characteristics using Human Factors Evaluation Data for General Equipment, (HEDGE), for Class 1A equipment, including the following:

- 1) Operability:
  - a) Gain access/egress:
    - (1) Climb up/down
    - (2) Open/close
  - b) Prepare for operations:
    - (1) Check out
    - (2) Take/leave position
  - c) Operate:
    - (1) Start/monitor/stop
    - (2) Control direction/speed
- 2) Maintainability:

- a) Perform preventive maintenance:
  - (1) Inspect and checkout
  - (2) Perform routine preventive maintenance
- b) Perform unscheduled maintenance:
  - (1) Detect malfunction(s)
  - (2) Isolate and identify causes
- c) Remove and replace:
  - (1) Remove malfunctioning element
  - (2) Replace or repair on item

3) Transportability:

- a) Prepare for transport:
  - (1) Place in transit configuration
  - (2) Package
- b) Load/unload:
  - (1) Drive or tow into carrier
  - (2) Lift in/out of carrier
- c) Secure/fasten:
  - (1) Immobilize items
  - (2) Prepare for use

b. Evaluation of the tasks of step a shall include, but not be limited to the following:

- 1) Title of task conducted
- 2) Adequacy of instructions and tools to perform the task
- 3) Ease of performing task
- 4) Design of the test item as it affects the task
- 5) Time and personnel required for task

c. Record the effects of vehicle noise during normal operation on test personnel.

6.2.6 Value Analysis

During the conduct of all tests, service personnel shall rate the test item from a value standpoint and shall record comments concerning any features of the test item which can be eliminated and/or cost reduced without degrading the test item in performance and safety. The applicable portions

of USATECOM Regulation 700-1 shall be used as a basis for this evaluation.

Record the following for each feature or components of the test item being examined:

- a. Description of feature
- b. Recommended change to be made
- c. Reason(s) for recommendation

#### 6.2.7 Compatibility

Determine the compatibility of the test item with related vehicles and equipment by performing the applicable procedures of MTP 2-3-512.

#### 6.2.8 Electromagnetic Compatibility

Determine the electromagnetic compatibility of the test item with related vehicles and equipment by performing the applicable electromagnetic interference procedures of MIL-STD-462, using the equipment described in MIL-STD-461 (Reference 4H and I).

NOTE: Do not repeat if verified data is available from Engineering test.

#### 6.2.9 Durability

Determine the durability of the test item and its accessories, as regards number of miles and/or hours they can be operated as follows:

a. Perform scheduled maintenance as required in the test item's Maintenance Allocation Chart (MAC).

b. Operate the test item as required for mission assignments and record the following:

- 1) Description of each type road, terrain and sea condition encountered during the various weather conditions.
- 2) Mileage traversed on each type road or terrain.
- 3) Hours spent in marine operation.

c. Include all mileage travelled over the various roads, and terrains and hours spent in water environments prior to and subsequent to the mission operations of step b and record the following for each test vehicle:

- 1) Total vehicle mileage traversed
- 2) Percentage of miles travelled on various roads and terrains
- 3) Total time performing waterborne operations
- 4) Engine total running time
- 5) Engine total idling time
- 6) Vehicle fuel consumption
- 7) Engine oil used

- 8) Gear lubricant used
- 9) Coolant used, if applicable
- 10) Component failures and their operating hours
- 11) Vehicle performance deficiencies
- 12) Parts mortality including corrosion
- 13) Required component adjustments
- 14) Conditions (road, weather) affecting vehicle performance

d. Record the following for each vehicle accessory or kit tested:

- 1) Accessory/kit under test
- 2) Vehicle mileage
- 3) Hours of operation
- 4) Component failures
- 5) Lubricant used, if applicable
- 6) Parts mortality
- 7) Required component adjustments, if applicable
- 8) Performance deficiency
- 9) Weather conditions affecting performance

NOTE: Appendices A and B, taken from Engineering Test requirements give an indication of the expected life, in miles and hours, of the various test vehicles.

#### 6.2.10 Communication

Determine the ability of the test item to provide intelligible voice communication between operating personnel, and with other vehicles, while the test item is in motion, by performing the applicable procedures of MTP 6-3-521.

#### 6.2.11 Fuel and Oil Consumption

Determine the fuel and oil consumption, cruising range, and Battle-field day capability of the test item by performing the applicable procedures of MTP 2-3-513, and the following:

a. Initiate the cruising range test early in the service test period, and incorporate appropriate water-borne operations in the test.

b. Establish appropriate conditions for water-borne operations, such as:

- 1) Load to be carried by test item.
- 2) Description of water course (length, depth of water, slope and type of beach).
- 3) Conditions of weather, surf, and current.
- 4) Requirements for engine speed versus speed over the ground, and hours of operation in water.

c. Determine test item operating range for the following, as applicable:

- 1) Land operations
- 2) Water-borne operations
- 3) Battlefield day

d. Record all pertinent data.

6.2.12 Extreme Environmental Tests

Determine the effects of tropic and arctic conditions on the test item by performing the applicable procedures of MTP 2-4-002 and MTP 2-4-003.

6.2.13 Quality Assurance

Determine the quality of the test item as described in the applicable sections of MTP 10-3-511.

6.3 TEST DATA

6.3.1 Preparation for Test

6.3.1.1 Inspection

6.3.1.1.1 Arrival Inspection -

a. Record data collected as described in the applicable section of MTP 2-3-500 and the following:

1) For unloading from carrier:

- a) Material handling equipment (MHE) used
- b) Time required in minutes
- c) Number of personnel required

- 2) Test item defects, if any, in rivets, welds, soldering seams, joints, edges.
- 3) Controls, indicators and access ports not clearly marked.

b. Retain all photographs.

6.3.1.1.2 Inventory Check -

Record any deficiencies or shortages in the materiel listed in the Basic Issue Item List (BIIL).

6.3.1.1.3 Pre-Operational Inspection -

Record the following for each check or action required:

- a. Operation performed (inspection of brake linings, cleaning vehicle exterior, etc.).
- b. Discrepancies noted or difficulties encountered.

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- c. Personnel required.
- d. Tools required.
- e. Materials.
- f. Time to perform check.
- g. Difficulties experienced and suggestions for improvement.

6.3.1.1.4 Physical Characteristics -

Record data collected as described in the applicable sections of MTP 2-3-500 and the following:

- a. Vehicle type (wheeled or tracked) as applicable:
  - 1) Number of wheels
  - 2) Size
  - 3) Tread design
- b. Maximum wave amplitude, as specified, from crest to trough, through which the test item can travel.
- c. Vehicle accessories.
- d. For Electrical System:
  - 1) For each battery:
    - a) Potential, in volts
    - b) Position (as appropriate)
  - 2) For each bulb:
    - a) Position
    - b) Name
    - c) Replacement type
  - 3) For each fuse:
    - a) Position
    - b) Name
    - c) Replacement type
- e. Capacity:
  - 1) Number of personnel with no cargo
  - 2) Amount of cargo with no personnel

6.3.1.2 Operator Training and Familiarization

Record data collected as described in the applicable section of MTP 10-3-501 and the following:

- a. The training procedures and materials used

- b. All personal data for the test personnel selected

### 6.3.1.3 Pre-Operational Functional Check

Record the following, if applicable:

- a. For starting:

- 1) Non-functioning during hydrostatic lock test
- 2) Evidence of improper starting operation

- b. For tracked vehicles:

- 1) Track tension
- 2) Adjustments required

- c. Failure of:

- 1) Lights
- 2) Windshield wipers
- 3) Other functional parts

- d. For each check performed:

- 1) Personnel required
- 2) Tools required
- 3) Material
- 4) Time to perform check
- 5) Difficulties experienced and suggestions for improvement

### 6.3.2 Test Conduct

#### 6.3.2.1 Operational Performance

Record the following:

- a. Data collected as described in the applicable sections of the following (where required):

- 1) MTP 2-3-506
- 2) MTP 2-3-514

- b. For each kit provided any problems concerned with its usage, and whether or not it was effective when used on the test item.

- c. Related equipment which was found to be ineffective when used as prescribed for the particular operations.

- d. For each test of paragraphs 6.2.1.1 through 6.2.1.11, as applicable.

- 1) Environmental conditions
- 2) Description of load carried (cargo, personnel)

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6.3.2.1.1 Camouflage Operations -

a. Record the following:

- 1) Distance at which the test item is detected, in yards.
- 2) Clock-hours and man-hours required to conceal or disguise the test item.
- 3) Comments of test and supervisory personnel, particularly:
  - a) Parts or features difficult to camouflage, and cause
  - b) Ease or difficulty of camouflage operations
  - c) Techniques to improve the camouflage

b. Other evidence of overall suitability and effectiveness of test item for camouflage.

c. Retain all photographs.

6.3.2.1.2 Accessories Evaluation -

Record the following for each accessory tested:

- a. Identity of accessory
- b. Evidence of any deficiencies

6.3.2.1.3 Night Operations -

Record the following:

- a. Any evidence of ineffective lighting
- b. Approximate area covered
- c. The amount and location of interior light leakage:
  - 1) Through the body and windshield
  - 2) Through openings for entering and exiting the vehicle, during blackout operations.
- d. Effectiveness of night vision devices.

6.3.2.1.4 Vehicle Control, Stability and Gradeability -

Record the following:

a. For straight path operation:

- 1) Evidence of yaw, crabwise travel, or inability to travel in a straight line.
- 2) Excessive side to side motion.
- 3) Any other deviations from specified characteristics, such as wheel noise.

b. For turns:

- 1) Excessive roll (leaning).
- 2) Loss of traction.
- 3) Any other deviations from specified characteristics, such as failure to maneuver through right and left turns.

c. For longitudinal inclines, any excessive motion of the vehicle which affects controllability.

d. For side slopes, any undesirable motion which the vehicle exhibits.

6.3.2.1.5 Fording -

Record the following:

- 2-3-509.
- a. Data collected as described in the applicable sections of MTP
  - b. Description of fording location, and type of water (salt/fresh).
  - c. Length of time, in minutes of exposure to water.
  - d. Location and extent of water leakage.
  - e. Any evidence of adverse effects on land operation attributed to fording.

6.3.2.1.6 Swimming -

Record the following:

- a. Description of swimming location and type of water (salt, fresh)
- b. For straight path operations:
  - 1) Speed of vehicle
  - 2) Unusual attitude of vehicle in patch, roll or yaw angle
- c. For excessive leaning on turns:
  - 1) Direction of turn (left, right)
  - 2) Approximate angle of roll
- d. For each sea state:
  - 1) Sea state (1, 3 etc)
  - 2) Controllability of test vehicle
- e. Length of time for test in minutes
- f. Location and extent of water leakage
- g. Evidence of adverse effects on land operation attributed to fording

6.3.2.1.7 Mobility -

Record the following:

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a. For highway mobility:

- 1) Data collected as described by applicable sections of MTP 2-3-505.
- 2) Length of test and description of test route.
- 3) Stability and tracking performance characteristics where road characteristics are:
  - a) Constant
  - b) Changing
- 4) Location and types of noises emanating from the vehicle
- 5) During braking/slow down operations:
  - a) Vehicle speed in mph
  - b) Road conditions
  - c) Performance of brakes
  - d) Stability of vehicle
- 6) Difficulties in controlling and maneuvering the vehicle.
- 7) Evidences of traction loss.
- 8) Any evidence of the following:
  - a) Cargo shifting
  - b) Damage to test item, or cargo

b. For Cross-Country Mobility:

- 1) Data collected as described by applicable procedures of MTP 2-3-504.
- 2) Distance travelled and test course description.
- 3) Stability and tracking performance characteristics
- 4) Location and types of noises emanating from the test item.
- 5) During braking/slow down operations:
  - a) Terrain conditions
  - b) Performance of brakes
  - c) Stability of vehicle
- 6) Any difficulties in controlling and maneuvering the vehicle:
  - a) Obtaining necessary traction
  - b) Other
- 7) Any evidence of the following:
  - a) Cargo shifting
  - b) Damage to test item

c. For Water Mobility:

- 1) Equipment used in this mission.
- 2) Distance travelled and test course description.
- 3) Swimming performance characteristics, collected as described in paragraph 6.2.1.6.
- 4) Location and types of noises emanating from test item.
- 5) Any adverse reactions demonstrated when slowing the test item.
- 6) Difficulties encountered in controlling and maneuvering the vehicle.
- 7) Any evidence of the following:
  - a) Damage to test item and cargo
  - b) Shifting of cargo

6.3.2.1.8 Vulnerability -

Record the following for each test:

- a. Description of the operating site.
- b. Hazards encountered and protection afforded to personnel and/or cargo from hazards.
- c. Starting and completion times, in hours, minutes, and seconds for moving test vehicle out of hazardous area.
- d. Other data indicating ability of test item to be moved quickly into or out of a hazardous location.
- e. Recommendations for changes to reduce the time required for the operations.

6.3.2.1.9 Cargo Loading Adaptability -

Record the data collected as described in MTP 2-3-503.

6.3.2.1.10 Stowage -

Record the following:

- a. Data collected as described by the applicable procedures of MTP 2-3-508.
- b. Any difficulty encountered in loading, operating, and unloading the test item.
- c. Interference of stowed items with vehicle operation.

6.3.2.1.11 Line Haul Operation -

Record the data collected as described in MTP 2-3-518 and the following:

- a. Tonnage hauled in pounds
- b. Total mileage travelled
- c. Time, in minutes, for:
  - 1) Each traverse of test course

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- 2) Operations performed at test course terminal points
  - 3) Total time of test
- d. Fuel, oil and grease consumption
  - e. Damage to or problems with the test vehicle
  - f. For each maintenance procedure utilized:
    - 1) Type (scheduled/unscheduled)
    - 2) Time, in hours and minutes to perform maintenance
    - 3) Material used
    - 4) Personnel required

#### 6.3.2.2 Transportability

Record the following:

- a. Surface transportability test data collected as described in the applicable sections of MTP 2-3-519.
- b. Logistics-Over-The-Shore test data collected as described in the applicable sections of MTP 2-3-520.
- c. Air transportability test data collected as described in the applicable sections of MTP 7-3-515.
- d. At the completion of each mode of transportation:
  - 1) Mode of transportation (rail, marine, LOTS, etc).
  - 2) Recommendations for changes to decrease disassembly time, if applicable.
  - 3) Test personnel comments on:
    - a) Adequacy of tie down devices and lifting attachments.
    - b) Recommended changes to tie down devices and lifting attachments.
  - 4) Pre-operational check data collected as described in paragraph 6.1.3.

#### 6.3.2.3 Maintenance

Record data collected as described in the applicable sections of the following:

- a. MTP 2-3-502 for maintainability data
- b. MTP 2-3-507 for reliability data
- c. MTP 2-3-527 for tools and test equipment data
- d. MTP 2-3-528 for technical manuscripts and manual data

#### 6.3.2.4 Safety

Record the following:

- 2-3-501.
- a. Data collected as described in the applicable sections of MTP
  - b. Any missing guards, shields, interlocks, or warning plates.
  - c. Any possible hazards to personnel and equipment, including:
    - 1) Inoperable safety devices.
    - 2) Inadequate warning signs.
    - 3) Any difficulties in complying with precautions.
    - 4) Recommendations for additions to the safety program and test item features.

6.3.2.5 Human Factors Evaluation

- a. Record the following:
  - 1) Data collected as described in the applicable sections of MTP 2-3-516.
  - 2) Effects of test vehicle noise on personnel.
- b. Retain completed check lists

6.3.2.6 Value Analysis

Record the following:

- a. Description of feature of test item
- b. Recommended change
- c. Reason(s) for recommended change

6.3.2.7 Compatibility

Record the data collected as required by MTP 2-3-512.

6.3.2.8 Electromagnetic Compatibility

Record the following:

Interference data collected as described by the applicable procedures of MIL-STD-461.

6.3.2.9 Durability

- a. Record the following for each test vehicle:
  - 1) Total mileage travelled, in miles
  - 2) Percentage of total miles on:
    - a) Highways
    - b) Secondary roads
    - c) Cross-country

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- 3) Total time performing water borne operations in hours
  - 4) Total engine running time, in hours
  - 5) Total engine idling time, in hours
  - 6) Vehicle fuel consumption collected as described in MTP 2-3-513
  - 7) Engine oil used, in quarts
  - 8) Gear lubricant used, in pints
  - 9) Coolant used, in pints
  - 10) For each component failure:
    - a) Component nomenclature
    - b) Total operating hours or miles travelled as applicable
  - 11) Vehicle performance deficiencies
  - 12) Parts mortality
  - 13) For component adjustments:
    - a) Component nomenclature
    - b) Total operating hours or miles travelled as applicable
  - 14) Road and/or weather conditions affecting vehicle performance
- b. Record the following for each vehicle accessory or kit tested:
- 1) Test item nomenclature
  - 2) Vehicle mileage
  - 3) Hours of operation
  - 4) Component failures
  - 5) Lubricant used, if applicable
  - 6) Parts mortality
  - 7) For component adjustments, when applicable:
    - a) Component nomenclature
    - b) Total operating hours of miles travelled as applicable
  - 8) Performance deficiency
  - 9) Weather conditions affecting test item performance

#### 6.3.2.10 Communication

Record the data collected as described in the applicable procedures of MTP 6-3-521.

#### 6.3.2.11 Fuel and Oil Consumption

Record the following:

- a. Data collected as described in the applicable procedures of MTP 2-3-513.
- b. Data collected as required for each water borne operation, such as:

- 1) Load weight, in pounds.
- 2) Description of water course:
  - a) Length, in miles
  - b) Depth of water, in feet
  - c) Slope, in percent, or:
    - (1) Drop, in feet
    - (2) Length (horizontal), in feet
  - d) Type of beach (sand, rocky, etc)
- 3) Weather condition(s).
- 4) Surf condition(s).
- 5) Current (relative to course):
  - a) Direction
  - b) Velocity
- 6) Engine speed.
- 7) Hours of operation.
- 8) Fuel and oil consumption data for water borne operations, based on applicable procedures of MTP 2-3-513.

#### 6.3.2.12 Extreme Environmental Tests

Record data collected as described in the applicable sections of the following:

- a. MTP 2-4-002 for Arctic Environmental Tests
- b. MTP 2-4-003 for Tropic Environmental Tests

#### 6.3.2.13 Quality Assurance

Record data collected as described in the applicable procedures of MTP 10-3-511.

### 6.4 DATA REDUCTION AND PRESENTATION

#### 6.4.1 General

All data will be summarized using tabulations and/or charts as appropriate. The data will be analyzed to determine the extent the test item and maintenance package meet the requirements of the QMR's, SDR's, and detail specifications of the test item.

#### 6.4.2 Safety

A Safety Confirmation, based on the data required by paragraph 6.2.4, shall be presented in accordance with USATECOM Regulation 385-6.

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APPENDIX A

WHEELED AMPHIBIOUS VEHICLES

Unless otherwise specified, the mileage cycle in Table I below may be applied to special-purpose wheeled vehicles, either self-propelled, or towed, as intended primarily for amphibious operations. These vehicles may incorporate hull and marine components applied to a standard chassis, or may have hull and chassis of special design stressing marine characteristics.

Table I. Mileage Cycle For Wheeled Amphibious Vehicles

Highway	Secondary Road			Cross-Country <sup>a</sup>				Miles per Cycle	No. of Cycles	Total Miles
	Munson (Gravel)	Perryman (Crushed Stone)	Belgian Block	Level	Hilly	Sand	Water			
c,d 1650	d 300	d 650	d 100	500	500	e 500	f 175	4200	b 2	8,400

(hours)

<sup>a</sup> Run 25 percent of all cross-country mileage under muddy conditions.

<sup>b</sup> Run last-cycle without payload.

<sup>c</sup> May be reduced when highway operation is considered impractical.

<sup>d</sup> Run a loop of paved, gravel, and Belgian Block with 15 minutes in water for each loop until 125 hours of water operation are accumulated. The titles under Secondary Roads refer to courses at Aberdeen Proving Ground.

<sup>e</sup> Ocean beach sand with 50 hours' operation in salt water.

<sup>f</sup> Hours total.

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## APPENDIX B

## TRACKED AMPHIBIOUS VEHICLES

Unless otherwise specified, the mileage cycles in Table II below may be applied to the following groups of vehicles:

- A. Group II includes vehicles having limited amphibious capability, either armored or unarmored, designed primarily for transporting troops and supplies. Also included are armored personnel carriers (APC), cargo carriers, missile support vehicles, wreckers, recovery vehicles, and cargo tractors (with towed load).
- B. Group V includes amphibious vehicles (LVT type). This group consists of track-laying amphibians which may be propelled in water by any of several means. These vehicles are designed as amphibians rather than as modified land vehicles, as in Group II.

Table II. Mileage Cycle for Tracked Amphibious Vehicles

Group	Cycles	Miles per Cycle				Total	
		Roads		Cross-Country			
		Paved	Secondary	Level	Hilly	Miles	Hours
II	4	350	350	400	400	<sup>a</sup> 6000	<sup>b</sup> 10 (Water) <sup>c</sup> 50
V	4	225	225	400	400	5000	100 (Water)

<sup>a</sup>One-half of mileage is run with applicable towed load (except for cargo tractors that have towed load 100 percent of operation), but towed load operation may be omitted if basic vehicle has proved satisfactory.

<sup>b</sup>Approximately 2 hours of water operation per cycle to total 10 hours.

<sup>c</sup>Time includes all functions of wrecker equipment. Care will have to be used to avoid excessive temperatures in hydraulic systems. Operation should be temporarily stopped for cooldown if fluid temperatures exceed specified limits of output of motor, usually 215° F.

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