

NATICK - John Kirk  
1995 - MOLT Requirements Doc  
NATICK to Develop for Marine Corps.

**Rationale:** Land Warrior SINGARS compatible communications ranges support greater dispersion, and increase decentralized operations capability. The operational mission, concept of the operation, tactical and environmental conditions, and the threat environment drive distances between units. An operation in complex terrain and vegetation limits movement, and encompass a battlespace, which is approximately 5-7 kilometers. Communications range requirements, based on smooth earth models, reflect the reality of the environmental and terrain effects on communications components.

**4.1.5.5 Mobility:** Mobility for the soldier is the ability to move faster on foot than a threat. It is facilitated by the ability to navigate accurately, the ability to see at night, and the ability to select the quickest route through improved SA. Mobility is most affected by weight of equipment each soldier must carry. It requires reducing the soldier's load, but can be improved slightly through the use of MLS equipment, which allows load tailoring. The Land Warrior system will increase the soldier's mobility by not increasing his load in comparison to a current comparably equipped soldier. Infantry, and by increasing his ability to navigate accurately and see at night. Mobility will be increased with the use of embedded position/location devices, hands-free display, a graphical bearing indicator, and an I2 device for night operations. The Land Warrior System shall optimize weight, space, and balance to improve close quarters battle outcomes.

**Rationale:** Mobility enhancement must be compatible with current requirements for mobility. Land Warrior must provide mobility equal or greater than the current soldier as prescribed by Field Manual (FM) 21-18, Foot Marches. Increases in mobility will be gained at night by the proliferation of the I2 devices, and use of navigation technology for precise location during movement.

**4.1.5.5.1 Load Carrying Equipment.** The Land Warrior requires the integration of an ergonomically designed modular load system. The MLS will be provided as government furnished equipment. The five primary components of the MLS are: fighting load carrier; Patrol Pack (approach march carrier); rucksack (individual basic sustainment items carrier); butt pack, and a series of modular pouches/pockets to be mounted on the fighting load carrier and/or rucksack or patrol pack to carry items of mission essential equipment. An on-the-move-hydration capability is required. This hydration system must resist contamination when the soldier is exposed to a nuclear, biological, or chemical threat, and must interface with the M45 Protective Mask. This modular capability will allow the commander to tailor the mission essential load based on METT-TC mission analysis and expected/projected threats. The MLS must functionally integrate with the required MBA system, and must be designed for maximum comfort. The system should utilize materials to increase durability and stability and be designed to allow the soldier to minimize his energy expenditure (as defined by The Technology Demonstration For Lightening The Soldier's Load - 1988) through load tailoring when carrying loads of various weights. The system will not impede the performance of individual movement techniques and should be easily and rapidly donned and doffed. The MLS will be compatible with standard mobility methods used by soldiers in Airborne, Air Assault, Brigade Combat Team, Light, Mechanized, and Ranger Infantry maneuver battalions; and soldiers in direct support of the Infantrymen in the close fight.

1995 - MOLLE Requirements Doc  
NATICK to Develop for Marine Corps.

**Rationale:** Land Warrior SINGARS compatible communications ranges support greater dispersion, and increase decentralized operations capability. The operational mission, concept of the operation, tactical and environmental conditions, and the threat environment drive distances between units. An operation in complex terrain and vegetation limits movement, and encompass a battlespace, which is approximately 5-7 kilometers. Communications range requirements, based on smooth earth models, reflect the reality of the environmental and terrain effects on communications components.

**4.1.5.5 Mobility:** Mobility for the soldier is the ability to move faster on foot than a threat. It is facilitated by the ability to navigate accurately, the ability to see at night, and the ability to select the quickest route through improved SA. Mobility is most affected by weight of equipment each soldier must carry. It requires reducing the soldier's load, but can be improved slightly through the use of MLS equipment, which allows load tailoring. The Land Warrior system will increase the soldier's mobility by not increasing his load in comparison to a current comparably equipped soldier. Infantry, and by increasing his ability to navigate accurately and see at night. Mobility will be increased with the use of embedded position/location devices, hands-free display, a graphical bearing indicator, and an I2 device for night operations. The Land Warrior System shall optimize weight, space, and balance to improve close quarters battle outcomes.

**Rationale:** Mobility enhancement must be compatible with current requirements for mobility. Land Warrior must provide mobility equal or greater than the current soldier as prescribed by Field Manual (FM) 21-18, Foot Marches. Increases in mobility will be gained at night by the proliferation of the I2 devices, and use of navigation technology for precise location during movement.

**4.1.5.5.1 Load Carrying Equipment.** The Land Warrior requires the integration of an ergonomically designed modular load system. The MLS will be provided as government furnished equipment. The five primary components of the MLS are: fighting load carrier; Patrol Pack (approach march carrier); rucksack (individual basic sustainment items carrier); butt pack, and a series of modular pouches/pockets to be mounted on the fighting load carrier and/or rucksack or patrol pack to carry items of mission essential equipment. An on-the-move-hydration capability is required. This hydration system must resist contamination when the soldier is exposed to a nuclear, biological, or chemical threat, and must interface with the M45 Protective Mask. This modular capability will allow the commander to tailor the mission essential load based on METT-TC mission analysis and expected/projected threats. The MLS must functionally integrate with the required MBA system, and must be designed for maximum comfort. The system should utilize materials to increase durability and stability and be designed to allow the soldier to minimize his energy expenditure (as defined by The Technology Demonstration For Lightening The Soldier's Load - 1988) through load tailoring when carrying loads of various weights. The system will not impede the performance of individual movement techniques and should be easily and rapidly donned and doffed. The MLS will be compatible with standard mobility methods used by soldiers in Airborne, Air Assault, Brigade Combat Team, Light, Mechanized, and Ranger Infantry maneuver battalions; and soldiers in direct support of the Infantrymen in the close fight.

*Molle I*  
*what about?*  
*Molle II*

*NATICK*  
*JOHN*  
*KIRK*

*P-6*  
*3.3.6*  
*" on the move "*  
*P. 23*  
*3.13.5*

NOTE: This DRAFT dated 5 December 1996, prepared by the U.S. Army Natick Research, Development and Engineering Center (GL), Natick, MA 01760-5019 has not been approved and is subject to modification. IT IS INTENDED TO BE USED AS A BASELINE FOR R&D CONTRACT WITH LIMITED PRODUCTION ONLY. IT IS NOT INTENDED FOR FUTURE FULL SCALE PRODUCTION CONTRACTS (Project 8465- )

INCH POUNDS

## PERFORMANCE REQUIREMENTS MARINE CORPS LOAD-CARRYING SYSTEM

This document is approved for use by the Department of the Army Soldier Systems Command, Natick Research, Development, and Engineering Center, and is available for use by all Departments and Agencies of the Department of Defense (DoD).

### 1. SCOPE

1.1 Scope. This specification covers Marine Corps Load-Carrying System (MCLCS). The system is needed to increase the mobility of the fighting force by providing an ergonomically designed individual load-carrying system that will minimize the burdens of weight, improve overall system compatibility, and minimize physiological threats to the marine such as fatigue and heat stress.

### 2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in Sections 3 and 4 of this specification. This section does not include documents cited in other sections of the specification or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements documents cited in section 3 and 4 of this specification, whether or not they are listed.

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be used in improving this document should be addressed to: U.S. Army Natick Research, Development, and Engineering Center, Attn: SSCNC-IC, Natick, MA 01760-5019 by using the Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

AMSC N/A

FSC 8465

DISTRIBUTION STATEMENT A. Approved for public release; Distribution is unlimited.

96  
John  
Kink

that are compatible with attachment straps on the patrol pack, rucksack and sleep system carrier so that integration can be accomplished.

3.13.2 Lightweight frame. The frame shall have a method of attaching the M122 tripod and ancillary equipment, light anti-tank weapons, and bulk items (e.g., 5 gallon cans, cases of items, etc.) to the frame in a manner to hold items securely in place. This attachment method is not included in the guide sample or patterns, but may be simple straps and or shelf that are capable of securing items to the frame. The frame shall conform to Down East Inc., Bridgton ME 04009, (207)647-5443, part no 1601, or equal. THIS PART IS GOVERNMENT PROPRIETARY INFORMATION. ALL POTENTIAL CONTRACTORS WILL BE REQUIRED TO SIGN A GOVERNMENT PROPRIETARY INFORMATION AGREEMENT BEFORE THIS INFORMATION IS RELEASED.

3.13.3 Patrol pack. The patrol pack shall be made from fabric and thread specified in 3.7.3 and 3.7.2 and be capable of carrying at least a 40 pound load to include the current family of field radios including SINCGARS. The patrol pack shall be quickly and easily donned and doffed over the LBV. The exterior sides and outermost surface of the patrol pack shall contain a means to accomplish secure attachment/detachment of the modular pouches/pockets and other individual equipment items/carriers i.e., mattax, entrenching tool, two quart canteen, NBC mask, etc. The patrol pack should be accessible through the top and have a flap covering the opening and providing water resistance. There shall be a non-reflective camouflage slide in name holder for marine identification on the exterior of the pack. The patrol pack shall have drain holes.

3.13.4 Rucksack. The rucksack shall be made from fabric and thread specified in 3.7.3 and 3.7.2 and be capable of carrying a 120 pound load. The rucksack shall be quickly and easily attached/detached to/from the frame. The rucksack shall have an internal pouch to the side of the rucksack nearest the back of the wearer to accommodate the current family of field radios including SINCGARS.. The pouch shall have a dual purpose flap and map case covering the opening. The sleep system carrier shall provide storage of readily available mission items, e.g., poncho liner, modular sleeping bag system, rain suit, etc.). Both compartments shall incorporate drain holes. Access to the interior of the rucksack should be through the top, with the flap covering the opening providing water resistance. There shall be at least 2 removable pockets on the exterior of the rucksack capable of carrying small clothing items such as the poncho, improved rain suit, spare batteries, etc. Additionally, the exterior sides and outermost side of the rucksack shall contain a means to accomplish secure attachment/detachment of the modular pouches/pockets and other individual equipment items/carriers. There shall be a permanently sew outside zippered pocket on the front of the rucksack capable of carrying a claymore mine and a removable bandoleer for carrying six 30-round magazines. There shall be a non-reflective camouflage slide-in name holder for Marine identification on the exterior of the rucksack.

3.13.5 On-the-Move-Drinking-System (OMDS) shall be a .014 mil thick urethane bladder construction with a 41 +/- 1 inch FDA approved vinyl water tube extending from one end. The volume shall be 82 +/- .5 fluid ounces. The opposite end shall have a 1.25" fill valve with a positive closure. The bladder shall have an internal central baffle to minimize slosh of contents. The tube shall have an outside diameter of 3/8" and an inside diameter of 1/4" with a push pull bite valve on the distal end. The bladder shall have 3/4" welded seams reinforced with double stitched 3/4" black binding tape. A 4 inch loop



NATICK  
JOHN  
KIRK



DEVELOPMENTAL EVALUATION OF THE  
MARINE CORPS LIGHTWEIGHT LOAD CARRYING EQUIPMENT  
AND FAMILY OF BODY ARMOR

Conducted with:  
3rd Battalion, 5th Marines,  
Camp Pendleton, CA

20 February 1998

Chuck Greene

Army  
↓  
Land Warrior  
↓  
Battelle - SATILLITES  
Specialty Plastics  
MIKE SYSTEMS  
NATICK - (mole)  
Marine Corps  
Marine Cell

Customer Feedback Team  
Science and Technology Directorate  
U.S. Army Soldier Systems Command  
Natick, MA 01760

Dr. C. Bernal  
84 H. Fatigue  
- Detective Force  
Marine Adv Hydration  
System - Bladder w/  
DARPA medical  
AD Little injection  
module

97

Natick  
John  
Kirk

### Background

In November 1997 the Camp Pendleton test platoon was issued approximately 30 sets of a new version of MOLLE that had been improved based on the feedback obtained during phase I of the test. Significant changes included a redesign of the frame socket to improve durability and ease of use, elimination of the velcro sizing adjustment on the waist belt in favor of a sized belt, and a modified quick release system. Other changes included improved adjustment webbing that would resist slippage, a new valve for the "on the move" drinking system, and strengthening of the stitching and materials used in the sleeping bag compartment. The Marines were issued the modified MOLLE and were briefed on the new features. After a test window of approximately 90 days, a total of thirteen questionnaires that emphasized the performance and acceptability of the revisions to the system were obtained and nearly all of the test participants were interviewed. A summary of the data obtained from the questionnaire responses is presented in the following sections.

### Data Handling and Analysis

All of the Marines completed their questionnaires fully enough to remain in the data set for the final analysis. Only descriptive statistics are presented (i.e. means, percentages, etc.) since the size of the survey group and the nature of the test design precludes the use of more elaborate procedures.

### Survey Sample

As noted previously, the platoon is made up of relatively young Marines who have an average age of nineteen and have been in the service about one year. Most are Privates First Class (n=9) and are in the Infantry career field, specifically Riflemen. The weapons assigned to these troops are the M-16A2 Rifle (n=7), M-16A2 with the M-203 Grenade Launcher (n=3), and the M-249 Squad Automatic Weapon (SAW) (n=3).

All reported using MOLLE in local training scenarios at Camp Pendleton which involved road marches, security duty, patrols, and training in Military Operations in Urban Terrain (MOUT). In addition, the troops also used the system for Operation STEEL KNIGHT, a desert

NATICK  
John  
Kirk

- \* Only three Marines used the six-foot lashing straps. One reported that he used them to secure his sleeping mat and one reported that he used them to replace other straps that were damaged. These respondents felt that they worked well. Slightly more than half of the survey group (60%, n=12) felt that the pack should continue to be issued with this feature.
- \* Only two Marines used the top-flap map case and both reported that the plastic was clear enough to see through.
- \* The majority of Marines felt that the dedicated pocket was easy to use for the body armor plates (88%, n=7 out of 8) and for the water bladder (63%, n=10 out of 16). However, many Marines found another place to store the water bladder (n=13), primarily one of the side pockets on the back pack.
- \* Seven Marines reported that they used the repair kit but almost all (95%, n=19) felt that the pack should continue to be issued with this item.
- \* Three-fourths of the respondents (75%, n=15) felt that the water bladder should continue to be issued with the load carrying system. However, as noted earlier, nearly all of the Marines (85%, n=17) reported that the valve on this item leaked even when fully closed.
- \* Many MOLLE components are removable, and it appears that test participants generally took advantage of this feature. The most common items removed from the system were the armor plate pocket (55%, n=11), sleeping bag compartment (40%, n=8), vest utility pouch (35%, n=7), and the pack side pockets (25%, n=5).
- \* The only system component that the majority of the respondents felt did not need to be removable was the top flap map case (53%, n=10 out of 19). Preference for all of the other components was clearly in favor of them being removable by at least a two-thirds majority.

#### Overall Opinions and Preference