



# THE WARRIOR

U.S. Army Soldier Systems Center

Natick, Massachusetts

November-December 2000



## *Urban assault*

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Cover photo: Soldiers from the 10th Mountain Division land at Fort Polk, La., to participate in the Joint Contingency Force, Advanced Warfighter Experiment in September. (Warrior/Underhill)



### **Deputy for Acquisition and Readiness**

*Brig. Gen. Philip M. Mattox*

### **Deputy to the Commander for Installation Management**

*John J. Manning*

### **Command Sergeant Major**

*CSM Warren L. Williams*

### **Chief, Public Affairs**

*Jeremiah A. Whitaker*

### **Editor**

*Curt Biberdorf*

### **Staff Writer**

*Jane Benson*

### **Staff Photographer**

*Sarah E. Underhill*

*The Warrior* is published bimonthly by the U.S. Army Soldier Systems Center Public Affairs Office in Natick, Mass., and is available online at: [www.natick.army.mil/warrior/index.htm](http://www.natick.army.mil/warrior/index.htm)

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U.S. Army Soldier Systems Center  
Public Affairs Office  
ATTN: AMSSB-OPA(N)  
Bldg. 45, Kansas Street  
Natick, MA 01760-5012  
(508) 233-4300/5340  
DSN 256-4300/5340

U.S. Army Soldier Systems Center  
Internet links

<http://www.natick.army.mil>  
<http://www.sbcom.army.mil>

Circulation: 2,200

*Printed by Defense Automated  
Printing Services, Natick, Mass.*

# Natick continues fast pace

Since my arrival in late July as the U.S. Army Soldier and Biological Chemical Command (SBCCOM) deputy for acquisition and readiness and as the installation commander of the U.S. Army Soldier Systems Center in Natick, I have been enthused and excited by the fast pace we keep as well as the importance of what we do for our warfighters and our nation.

Veterans Day is already upon us. This day was established following the “war to end all wars” as a way to recognize the dedication and contributions of our servicemembers who worked so valiantly for peace. Sadly, World War I was not the last war, and our servicemen and women have been called upon many times since then to protect America’s interests, both at home and in foreign lands.

These men and women have given the greatest gift anyone can offer: They have given of themselves. They have ensured our liberty through their toil, sweat, blood and sometimes with their lives. The strength of our nation rests upon them and their sacrifices. The freedoms we enjoy today are the legacy of their selfless sacrifices.

While we give pause on Nov. 11 to remember those servicemen and women, both past and present, who ensure our safety and liberty, it is also time to remark on what a truly unique and meaningful mission we have here at the Soldier Systems Center and the RDA Enterprise.

Throughout the RDA Enterprise, we work to



**Brig. Gen. Philip M. Mattox**

ensure the survivability and sustainability of our servicemembers every day. Whether we are working to improve body armor, chemical agent detectors or new rations, we bear in mind that the unique and important mission we have impacts every single soldier every single day.

I continue to be impressed with the level of dedication and the commitment

of the work force. At no time was this more apparent than during two recent high level visits to the Natick facility: the visit of

Gen. John Keane, the Vice Chief of Staff of the Army, and the visit of Mr. Gregory Dahlberg, the Undersecretary of the Army. Both visitors were extremely impressed with the tours and briefs they received.

In fact, Gen. Keane commented that the Army

needs to move away from being platform-centered to being focused on soldiers. This has always

been one of our maxims, which goes all the way back to when Brig. Gen. Doriot, who our climatic chambers are named af-

ter, conceived the idea of an “Institute of Man.” Brig. Gen. Doriot, who was quartermaster general, said never again should we be caught short in the basic needs of man, the items needed to clothe, feed, shelter and protect our soldiers, as we did in World War II.

Mr. Dahlberg was especially interested in the direct interaction we have with soldiers through our Operational Forces Interface Group, or OFIG as they are commonly called. For those who may not be familiar with this group, OFIG has several important functions, one of which is interaction with our customers, the soldiers, to survey and gather data on our items to ensure that what we are fielding meets the needs of the soldier.

As this will be the last column before the holiday season begins, I would like to pass on a few thoughts.

It is important to count the many blessings we have in our lives. One of the blessings we all enjoy is working together toward the common goal of making life better for our soldiers, many of whom will spend this holiday season far from home and their families.

There is so much we can learn from the selfless giving of these young men and women, whose year-round sacrifices make our nation, and indeed the world, a better place. I personally want to wish you and your families a happy and healthy holiday season. Thank you for all the hard work you do every day in support of our soldiers.

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*It is important to count the many blessings we have in our lives*

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Warrior/Underhill

**A Marine applies camouflage face paint using a compact. The new Advanced Camouflage Face Paint compact will have more paint and include another color. Built-in insect repellent will also be available.**

# Battling bugs

## *Advanced Camouflage Face Paint includes insect repellent*

*By Curt Biberdorf*  
Editor

Camouflage face paint will soon offer more than simple concealment.

Face paint smeared on the exposed face, neck and hands of soldiers has been used for years to tone down skin highlights and minimize skin shine contrast in various backgrounds to help hide troops from the enemy.

The U.S. Army Soldier Systems Center (Natick) Product Manager-Enhanced Soldier Systems and U.S. Army Medical Research and Materiel Command are working together to produce a better paint, simply known as the Advanced Camouflage Face Paint. The first generation, scheduled for introduction in late 2001, will offer insect repellent and a fifth color. Then the plan is to add thermal signature reduction in a

later version.

"We haven't been able to come up with something like Arnold Schwarzenegger in 'Predator' where you smear mud on your face, and you're invisible," said Joe Jones, combat developer at the U.S. Army Infantry School at Fort Benning, Ga.

Still, efforts are ongoing to produce a paint that not only conceals against visible and near-infrared region of the electromagnetic spectrum, which is detectable with Night Vision Goggles, but also the far-infrared spectrum, which is captured through thermal imagers.

Thermal imaging has become widespread with advances in technology during the last decade, said Anabela Dugas, project officer for the Advanced Camouflage Face Paint. Thermal imagers are inexpensive, shrinking in size, more portable and readily purchased, and other

countries have a version of the technology.

"Your hands and face glow automatically in a thermal imager," Dugas said. "It's a very challenging effort to develop something that defeats thermal imagers. That's an area that has a lot of room to improve."

Individual camouflage is a common soldier task, and certain colors blend well in different environments.

Camouflage combinations are green and loam for woodland areas, green and sand for desert climates, and loam and white for arctic regions. Dugas said each element, such as leaves, has a certain reflectance that is matched with the corresponding paint. Soldiers currently use a hard stick encased in an olive green steel tube with a different color contained on each end, or an olive green compact similar to commer-

cial cosmetics that opens and holds a mirror on top and compartments with four colors on the bottom. The stick protects against the visible region, while the more modern compact adds near-infrared protection.

A base of waxes and oil mixed with talc and pigment compose the face paint. Because the paint is applied on the skin, it is treated as a medical product and is tested by the U.S. Army Medical Materiel Development Activity.

It must meet Environmental Protection Agency regulations, be approved by the Food and Drug Administration and meet cosmetic industry standards. The final clearing agency is the Armed Forces Pest Management Board.

"It's fortunate that (the Army Medical Department) has overseas labs in Peru and Thailand where we can test the paint in the field," said Scott Doughty, lead product manager, Pharmaceutical Systems Division, U.S. Army Medical Materiel Development Activity at Fort Detrick, Md. "It's performed well, and we feel it will be an effective face paint."

The first generation of the ad-

vanced face paint will add black paint and include deet that repels mosquitoes for a minimum of eight hours. A version without deet will be available for soldiers who are sensitive to the chemical or are in a bug-free environment, said Jones.

"We wanted to move up from the individual steps of applying an insect repellent and face paint," Jones said. "When soldiers applied the repellent, it would wash off the paint. Then they would have to wait until it dried and reapply. The new paint allows them to take care of it all at once."

Repellent is especially important to use in areas where mosquito-borne illnesses such as dengue fever or malaria are common, added Doughty. Skin-smacking sounds from chasing away the bugs could also reveal a soldier's position.

Dugas said soldier surveys and feedback revealed that they like black paint, which brings the shadow effect on the skin and is a color on the Battle Dress Uniform. Soldiers have purchased commercial face paint for the black color, but they don't meet the military requirements.

The advanced paint will be offered in a compact container. The

new compact will be redesigned to hold twice the amount of product, with the heavily-used green, loam and sand colors filling the most space. By increasing the size, the goal is to provide 20 applications of green, loam and sand, and 10 applications of white and black. The plan is to phase out the old compacts as the new products arrive.

The advanced face paint complies with all safety criteria and meets soldier acceptability standards set before testing. Design criteria include comfort in application and wear, durability, appearance, resistance to perspiration, ease of application and removal, and compatibility to clothing and other equipment. Face paint, nearly odorless, will not diminish soldiers' senses and is non-toxic on the skin or if ingested.

Yet meeting all of the attributes mean nothing if the face paint can't perform its basic function.

"There's a general conception: If you can see something, you can shoot it. If you can shoot it, you can kill it," Jones said.

The advanced face paint will further assist a soldier's ability to fight unseen and stay alive.



Warrior/Underhill

**A soldier smears on camouflage face paint in stick form. Because the paint is applied on the skin, it is treated as a medical product and is tested by the U.S. Army Medical Materiel Development Activity.**

# Under siege

## Culminating demonstration shows capability of MOUT ACTD kit

By Curt Biberdorf  
Editor

Infantrymen seized the city, forced out enemy troops and returned the city to the proper authorities as part of the culminating demonstration for the Military Operations in Urban Terrain, Advanced Concept Technology Demonstration (MOUT ACTD) Sept 8-20.

The demonstration was part of the Joint Contingency Force, Advanced Warfighter Experiment at the Joint Readiness Training Center, Fort Polk, La. It was the high point of an initiative started in 1997 to improve our military's capability in the type of urban warfighting soldiers experienced in Grenada, Panama, Somalia, and Haiti, said Maj. Joseph G. Krebs Jr., MOUT officer-in-charge, JRTC.

"It's predicted that 50 percent of today's combat will be fought in urban areas," Krebs said. "By the year 2025, it will be approximately 75 percent."

Urban combat is particularly dan-

gerous to U.S. military troops for several reasons, Krebs said. History has shown that a hometown advantage is enough to complicate lines of communication and limit conventional warfighting effectiveness. And he said the presence of non-combatants also can restrict lethal firepower. The MOUT program was undertaken as a direct response to those circumstances, he said, and aims to solve them with new equipment and tactics, techniques and procedures.

Soldiers from 10th Mountain Division's 2nd Battalion, 22nd Infantry in Fort Drum, N.Y., and Marines from 2nd Marines Division's Company K, 3rd Battalion, 6th Marines, from Camp Lejeune, N.C., took the entire kit of about 25 products to help them with the fight as part of a combined arms team, according to Maj. Rick Stockton, Dismounted Battlespace Battle Lab Division III chief.

An overnight demonstration consisted of force-on-force fire using MILES "laser tag" between Fort

Polk's Opposing Force and the U.S. Blue Force at the simulated war-torn town of Shughart-Gordon.

The products were successfully used by troops in clearing three adjacent buildings in the complex after their air assault and initial breach into Shughart-Gordon, according to Carol Fitzgerald, MOUT ACTD technology program manager.

Mapping and mission rehearsal tools were used throughout the mission preparation phase. The Pointer Unmanned Aerial Vehicle was seen as a good option to use to gather intelligence in the absence of helicopters.

Companies B and C had man-portable ladders capable of reaching three story rooftops but no opportunity to use them. Still, Company C used the Quickstep—a ladder small enough to fit in a rucksack—to climb on top of a one-story building and enter from the roof.



Warrior/Underhill

A 10th Mountain Division soldier scans the terrain after clearing a building at the Shughart-Gordon training facility.



Warrior/Underhill

A soldier walks down a street at Shughart-Gordon after finishing the force-on-force mission.

Explosive Cutting Tape was used several times to blow holes through walls to enable surprise breaching and entry into buildings. Rafael Rifle Launched Door Breaching Round Simulators were used to remotely breach doors. During the exercise, the troops wore SPEAR/Ranger body armor, and knee and elbow pads for individual protection.

“The culminating demonstration validated that the MOUT kit gives new capabilities in the fight and proves the value of the ACTD in getting useful equipment quickly into the field,” said Pete Wallace, acting deputy technology program manager for the MOUT ACTD at the U.S. Army Soldier Systems Center (Natick). Since experimentation began in January 1998 with approximately 128 technologies, the list of products was cut to about 25 through extensive testing and training with the soldiers and Marines.

MOUT requirements were established and prioritized based on the feedback of servicemembers and subject matter experts. The requirements filled the design criteria for some 32 targeted areas of improvement in urban combat, Krebs said. Technologies in the realms of rapid mapping, personal protection, powered optics and forced entry equipment were among the highlights of the list.

“MOUT ACTD changes the face



Warrior/Underhill

**A squad of soldiers moves into position to clear a building during the culminating demonstration of the MOUT ACTD at Fort Polk, La. During the force-on-force training event, a combined arms team took over a city. The demonstration was part of the Joint Contingency Force, Advanced Warfighter Experiment in September.**

of the battle at the squad level,” Wallace said. “These technologies provide new capabilities. The enemy is less able to respond, and that’s where these products are handy.”

With anticipated approval of battalion and company commanders, the entire group of technologies will comprise the residual package and will be provided to the Army and Marine operational forces for a two-year extended user evaluation until

Sept. 30, 2002.

“They will have a chance to determine what they like and would want in the inventory,” Wallace said. “The evaluation will provide an interim operational capability and allow them to further refine the tactics, techniques and procedures.”

*Editor’s Note: Pvt. James Strine, a member of the 27th Public Affairs Detachment from Fort Drum, N.Y., contributed to this story.*

## Products elevate ability to fight in unpredictable terrain

Of the many products that have become part of the MOUT ACTD kit, the items that meet the following requirements stand out as offering the most dramatic improvements in urban combat.

### Mapping

Troops will know where they’re going with the Battlespace Mapper, a tool that produces and updates maps in the theater of operation.

It’s operated in conjunction with the Sextant Virtual Warfighting Tool, used for mission planning and rehearsal.

The mission planner provides 3-D maps of location and allows a “fly-through” view to visualize changes as troops move through the battlefield.

### Breaching

During Operation Just Cause in Panama, troops reportedly used ineffective and dangerous techniques to breach various fences, walls and barred doors with grenades, rifle fire and even anti-tank rounds. MOUT ACTD found three products designed for this purpose.

Explosive Cutting Tape stuck on a concrete or brick wall safely blows a hole large enough so that troops can walk through it. Rifle Launched Entry Munitions fire an explosive round that blows doors off their hinges or breaches windows from a safe, stand-off distance.

DEMTEK, a kit of heavy hand tools capable of knocking through doors and windows, also works when explosive power is unnecessary.

### Entering

Sometimes troops don’t want or need to enter a building through a wall, window or door. It’s better to go on top. The Quik Step Ladder and Light Modular Ladder give troops that option.

### Training

The more realism in training, the better prepared the troops will be in real combat. Instead of using blank rounds connected to MILES “laser tag” type gear, Simunitions non-lethal blunt training rounds fire soap and dye-filled rounds which leave a sting without causing carnage. Soldiers can train force-on-force while trying to avoid getting hit with a bullet they can feel. Simunitions significantly improves close quarters marksmanship.

# 'Smart' suit lightens SEALs

By Jane Benson  
Staff Writer

Navy SEALs in a few years will be able to operate more safely and comfortably with a new amphibious "smart" suit.

SEALs take on some of the military's toughest missions and must perform their jobs in and out of water. Currently, they must wear one suit for their sea missions and another for land missions. When traveling from sea to land, they must change into a mission suit and hide their wet suit.

Besides the extra weight and bulk of carrying another suit in their backpack, changing their outfit when they reach land is dangerous because it exposes SEALs to enemy detection and attack.

To solve these problems, a team of scientists has been brought together to research and develop a lightweight suit that can be worn in water and on land. The team is working on providing the SEALs a low-cost, lightweight single garment that can be used during all phases of a typical operation, including insertion, infiltration, actions at the objective, exfiltration and extraction.

"The suit protects users in a wide variety of envi-

ronments," said Quoc Truong, a physical scientist who is a research, development, test and evaluation program manager at the Natick Soldier Center at the U.S. Army Soldier Systems Center (Natick). He is the principle investigator for the amphibious suit. "The suit contains a shape memory polymer membrane along with special insulation material that is designed to keep users warm in the sea water, but not hinder the perspiration process."

He said the membrane adapts to the change in the water or air temperature, opening or closing its molecular pores to cool or slow down the heat loss of the user.

Tony Ramey, branch chief of the Diving and Life Support Systems at the Coastal Systems Station in Panama City, Fla., is the project's co-principle investigator who works with Truong to secure future funding and to coordinate technical work with the Navy. Other team members include Lew Nuckols, a U.S. Naval Academy professor, and Joe Giblo, a U.S. Navy Clothing and Textile Research Facility (NCTRF) biomedical engineer.

Truong said the fabric system is waterproof, in-

sulated and has a low-drag outer-shell fabric for more efficient movement in the water. Those who need to transition from water to land or land to water can easily adapt to different environments with the same suit.

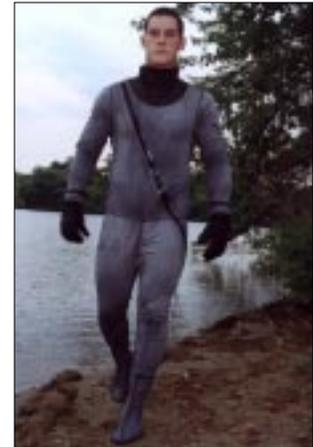
The new amphibious suit is lighter and leaner than a conventional diving suit, he added. Waterproof gloves and socks are integrated into the material to keep hands and feet warm in water. For delicate operations on land, the gloves are removable.

The fabric system has been tested by the U.S. Army Research Institute of Environmental Medicine on the thermal manikin, which replicates human response, and on the guarded hot plate, which measures heat escaping through the material. The suit has been proven to protect against heat loss in water and heat stress on land.

Chris Shaffer, a materials engineer at the Natick Soldier Center, is assisting Truong in developing and testing a fabric system.

"The amphibious prototype suit is an improvement over a wet suit since the amphibious suit can also be worn on land without experiencing heat stress, and it can be used with a liner to provide more or less insulation depending on the water and land temperatures," said Shaffer. "With a wet suit you would have to buy different thickness suits to coincide with the water temperature. If needed, SEALs using wet suits or dry suits can use gloves and boots."

Truong tested the suit



Warrior/Underhill

**The amphibious suit will allow Navy SEALs to use one garment for land and water.**

for waterproofness and human factors such as warmth and comfort in the Hydro-Environmental Simulator with human volunteers. Future testing of the fabric system will be done on the submersible thermal manikin in the NCTRF's Hydro-Environmental Simulator.

The submersible thermal manikin is fully instrumented, permitting the accurate measurement of body heat transfer while the manikin is submerged in the simulator and subjected to varying water temperatures and hydrostatic pressures as well as varying wave heights and speeds.

A limited test with SEALs is planned for next year. Truong estimates that the suit will be available to them in two to three years.

In the future, Truong, Ramey and the team hope to include other capabilities to the suit, such as protection from industrial chemicals and chemical-biological warfare agents, deadly toxins, dangerous bacteria and viruses.



Warrior/Underhill

**For delicate operations, the gloves on the amphibious suit are removable.**

# Versatile nylon

## Universal Static Line fills need for C-17, C-130 airborne troops

By Curt Biberdorf  
Editor

Another 5 feet was what they needed, and now they'll have it.

During a mass tactical airdrop, a static line is the piece of heavy-duty nylon fabric that connects the paratrooper to the aircraft and deploys the parachute after he or she jumps out of it. The standard 15-foot length is too short to use with the new Air Force C-17, which led to the development of the Universal Static Line.

"Jumpers were contacting the (deployment) bag from the person ahead of them," said Chief Warrant Officer 5 Martin Neises, project officer at Product Manager-Soldier Support, U.S. Army Soldier Systems Center (Natick). "Instead of splitting the supplies of parachutes into two different static line lengths, we developed the Universal Static Line that can be configured in 15 or 20-foot lengths."

The 15-foot static line is a World

War II-era design that has been successfully used on the Air Force C-130 and C-141. Troops line up and one by one exit the aircraft with a safety monitoring each person. The static line is stowed on the parachute pack tray and unravels until the parachute is opened, allowing the paratrooper enough space to clear the aircraft and give adequate room for the parachute to open.

The rushing air pushes the soldiers almost vertically until the parachute is fully opened. Static lines with deployment bags accumulate next to the airplane to be retrieved later.

Neises said the C-17 is replacing the C-141. The Universal Static Line is 15-feet long for use on the C-130, but a 5-foot extra piece of line can be attached in girth-like fashion to meet the needs of the C-17.

The girth hitch fastens the two pieces without sewing the loop, which eliminates organization maintenance for parachute riggers.

The current static line has a lifespan of six to eight jumps, according to Neises, but the Universal Static Line is anticipated to be more durable and last longer. A tube edge design increases the strength and longevity of the nylon to reduce the nick and cut potential as the line rubs against the aircraft.

Another advantage is that paratroopers can easily attach or remove the 5-foot extension planeside if the mission requires the use of a different aircraft. Otherwise, the paratroopers would have to remove the entire parachute.

Along with the static line, a new snap hook will be introduced. The snap hook incorporates a double safety gate with single-hand operation. Neises said that removes the need for a safety wire and lanyard that are on the current snap hook.

Fielding of the Universal Static Line begins in March 2001, with a total of 85,000 being supplied within a year to all Army airborne units.



Courtesy photo

**Airborne soldiers jump out of an Air Force C-17 in full combat load during a training mission. The Universal Static Line will solve the problem of producing two separate lengths for the Air Force C-17 and C-130.**

# Bullet stopper

*MICH helmet brings new level of user comfort and protection*

By Curt Biberdorf  
Editor

A new helmet providing improved protection, utility and comfort will be issued to the Special Operations Forces next year.

The Modular Integrated Communications Helmet (MICH) began development in 1997 as part of the Special Operations Forces Personal Equipment Advanced Requirements program at the U.S. Special Operations Command. The MICH provides the Special Operations Forces the flexibility to tailor the communications capability of the helmet to the mission using one modular system.

“Preliminary users across the range have been more than happy with the helmet,” said Richard Elder, equipment specialist with the Special Operations Forces Special Projects Team at the U.S. Army Soldier Systems Center (Natick).

Although molded like the current, standard-issue Personnel Armor System, Ground Troops (PASGT) helmet in use since the early 1980s, the MICH trims away the edge for improved visibility, unobstructed hearing, reduced weight (less than 3 pounds without communication equipment) and easier integration with body armor.



Warrior/Biberdorf

**Suspension pads consist of a comfort foam and “slow memory” foam to absorb shock. The cloth covering wicks away moisture to keep users cooler.**

“The fact that the edge of the helmet rides higher allows it not to impede with the combat mission. You can use it with all types of body armor without feeling clumsy by bumping into it,” Elder said. “You can shoot much easier in the prone position without the helmet slumping and blocking your vision. We can take away the soldier’s attention from equipment concerns so he can focus on the mission.”

He showed a MICH that had

been shot several times during ballistics testing. Besides a half-inch indent, the helmet showed little damage.

Until now, there’s never been a helmet designed to stop bullets, said Elder. The MICH uses a different version of Kevlar combined with different bonding techniques to form a shell capable of halting a submachine gun’s 9 mm round in addition to protecting against fragmentation.

The current Kevlar helmet only protects against fragmentation and at most can deflect bullets.

“A direct shot to the head is a dead man,” Elder said. “That’s not the case with the MICH. The soldier could probably get back into the fight.”

What would allow the wearer to stay conscious is the innovative seven-pad suspension system. The current helmet uses a bolted-on nylon suspension with a leather headband that is fastened onto the inside headband. Many users would buy a circular pad to ease the weight stress on top of their heads.

The MICH suspension pads are composed partly of comfort foam where the pads touch the head and mostly of “slow-memory” impact foam with the resilience of a wres-



Warrior/Biberdorf

**The MICH helmet (left) trims away the edge for improved visibility, unobstructed hearing and reduced weight when compared to the current PASGT helmet.**

ting mat. The foam is like a shock absorber against a striking bullet.

A black CoolMax cloth covering wicks moisture away and helps the user stay cooler. Lining the inside is a glued-on strip of Velcro fastener. Users can unhook and adjust the pads to create a custom fit.

Also remarkably different from the current helmet is the four-point instead of two-point chinstrap. The two-strap "pocket" at the chin remains the same, but instead of anchoring to the helmet over the ear, one strap in front and behind the ear on each side securely clamp down the MICH.

"You lose less helmets while jumping, and it's more stable for everything we put on it, such as night vision goggles," Elder said. "In all of the testing, no helmets have fallen off."

Airborne operations are easier because the MICH requires no shock pad to prevent whiplash while descending or retention strap.

Two features of the MICH reduce logistics. It's made in medium and large with different sized pads used to account for the vast majority of sizes in between, and the hel-

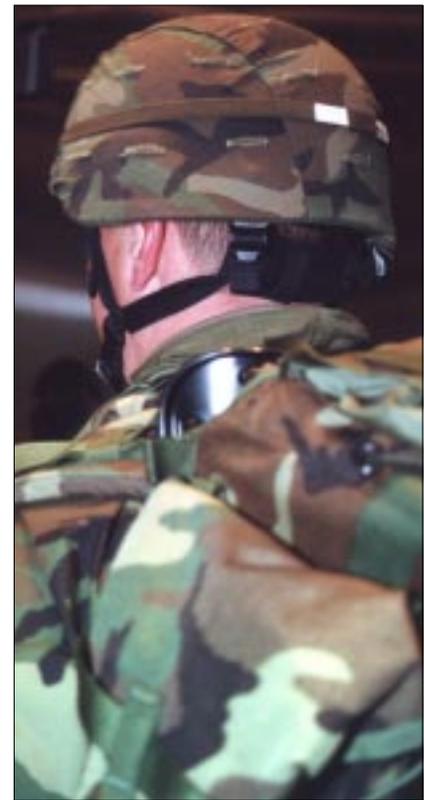
met cover is reversible for woodland and desert camouflage. The PASGT helmet uses separate covers and is issued in five sizes.

A communications subsystem designed to be included with the helmet is in the final stages of testing, and because of its modularity, the MICH can be configured to each specific group with or without the added equipment.

The subsystem is intended to provide aural protection and dual-channel communications capability. It offers features such as a low-profile microphone, microphone adapter for mask microphone, multiple radio and intercom adapters, and push-to-talk access. The headset may be worn alone or with the helmet.

"We're representing the Special Operation Forces, but who knows where it could go from here," Elder said.

The Marine Corps and FBI have ordered helmets for operational use and evaluation, and the MICH is being considered as the helmet platform for Land Warrior, the Army's effort to create a revolutionary weapons system for the 21st century soldier.



Warrior/Biberdorf

**An improved strap attaches at four points on the helmet while retaining the chin pocket for a more secure fit.**



Warrior/Biberdorf

**The MICH helmet on the left proves its ability to stop 9 mm rounds. A seven-pad suspension system allows the user to adjust the cushions for the best fit.**

# Boxed kitchen

**Self-heated meals fuel troops in remote areas without cooks**

By Curt Biberdorf  
Editor

Pull the tab, wait about 20 minutes and then unpack the box containing separate heated entrée, vegetable, starch and dessert trays complete with plates, cups, utensils and even Tabasco sauce.

Self-Heated Meals for Remote Site Feeding, informally known as "Kitchen in a Carton," could make serving a hot meal to troops far away from a base camp that simple. As the military seeks ways of becoming lighter and faster, the self-heated meals look to meet the challenge.

"The military wants to get long on the tooth and short on tail," said Don Pickard, team leader of Equipment and Energy Technologies for the Department of Defense Combat Feeding Program at the U.S. Army Soldier Systems Center (Natick). "For remote units that may not be issued kitchen capabilities, heat and serve meals, like this 'Kitchen in a Carton,' will go a long way toward reducing the logistical tail associated with military field feeding."



Warrior/Biberdorf

**After the top parts are folded away, an eight-step instruction sheet shows the user how to prepare the meal.**

A rectangular box houses the self-heated meals contents, which could be pre-positioned, air dropped or carried by the units to the field. In one version of the product, a tab sticking out of the top cardboard fold when pulled releases water to activate the chemical heaters in each tray. The correct amount of heat is provided to the type of food in each tray stacked in the carton. Another version uses a collapsible water bottle inserted into a nozzle at the

top to fill the heating trays.

Plates, cups, utensils, condiments and complementary foods, such as hamburger buns, are stored in a compartment on each side. After the meal, waste products can be returned to the original container for easy, compact disposal. A single carton can feed 12 to 16 soldiers or be adjusted to meet field needs.

More than just a logistics problem, serving quality food is a morale issue as well.



Courtesy photo

**Soldiers rest while an activated container of self-heated meals sends steam into the air. The cartons are ready in about 20 minutes.**

Soldiers are now served Unitized Group Rations that are prepared by cooks in a support area and delivered to them, or they are served hot meals using two cooks attached to a unit, which requires a Humvee to carry portable kitchen equipment. Group rations are offered in five breakfast and 10 lunch or dinner selections, and are served as an alternative to Meals, Ready-to-Eat.

Feeding soldiers will become harder as advancements in command, control and communications result in many Army units covering more terrain and being more widely dispersed than ever. Many teams or squads will likely operate remotely from their main unit for an extended time, and supporting these units with food service will be difficult or even dangerous during combat, according to Pickard.

Self-heated meals are particularly important to the Signal Corps, which can't be regularly sustained because it would give away the unit's location on the battlefield.

These meals allow isolated units to serve themselves a hot meal that is compact, lightweight, simple and affordable.

"It eliminates a lot of the logistics," Pickard said. "You can get rid of the cost and weight, and replace it with one box."

The idea is that by heating the right amount of high-quality food at the right time and place with a virtually on-demand food service, wasted



Warrior/Biberdorf

**After the trays are heated, the cardboard cover is removed and the trays are taken out for serving.**

food will be reduced to fraction of present levels, costs will be drastically reduced, and food acceptance and consumption will increase.

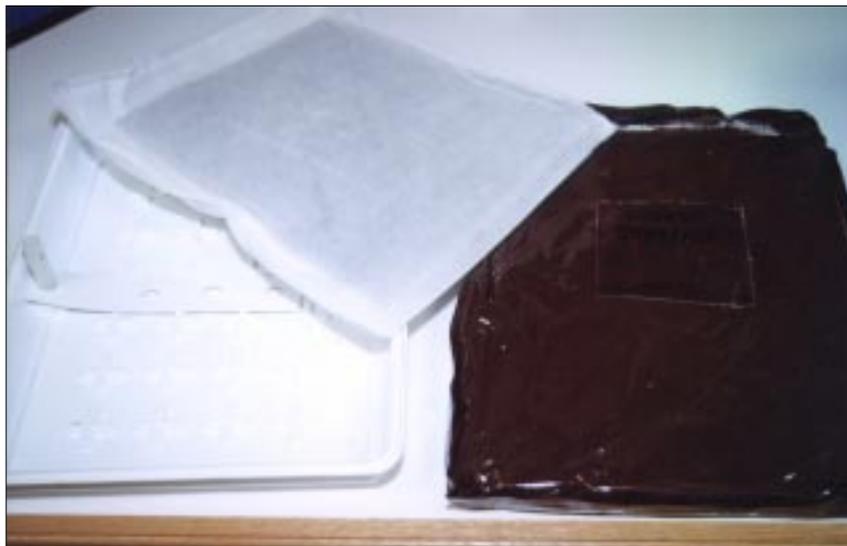
By 2003, the goal is to complete the design of a self-heated ration and demonstrate field feeding that provides hot food that, for remote sites, cuts food service costs, weight and labor each by 90 percent, and increases food acceptance by at least two points on a nine-point rating scale.

Advances in chemical heating, food processing and polymeric tray packaging have merged to allow the self-heated meals to become possible, said Pickard. Quality will still be a key issue. However, Pickard's office is closely linked with research into food processing to ensure opti-

mum quality.

The product is currently targeted for military users, but Pickard said the meals could be used for civil emergency or disaster relief, or for camping. Ontro Inc. in Poway, Calif., an innovative developer of self-heated packages, was awarded a research and development contract to develop prototypes of the Natick concepts.

A technical demonstration is planned for 2002 at Fort Irwin, Calif., and Fort Polk, La.



Warrior/Biberdorf

**Each tray lies in a pan that contains a heating pack. When water reaches the pack, the heating process begins.**



Warrior/Biberdorf

**One version of the self-heated meals uses a water bottle that is attached to a tube at the top.**

# Joint service

## Chemical, biological protective suit ready for issue to units

*By Curt Biberdorf*  
Editor

New chemical and biological agent protective suits will soon be issued to soldiers, replacing the current clothing no longer in production.

Procurement of the Joint Service Lightweight Integrated Suit Technology (JSLIST) overgarment began in 1997 and will be released from the war reserve to Army units as the Battledress Overgarment (BDO) supply is being depleted. Fielding will continue through 2005.

The JSLIST resulted from a joint program led by the Marine Corps to

develop an overgarment to be worn in all environments when under imminent threat of a chemical or biological attack and after these operations have started. It replaces three types of chemical and biological protective suits used by the services.

The project followed as a result of a congressional mandate that all future research and development, and procurement for all chemical items be jointly managed.

“The military wanted to make a joint program for the sake of economy,” said George Costas, project engineer for Product Manager-Soldier Equipment at the U.S. Army Soldier Systems Center (Natick). “Commonality will save money through the economy of scale.”

Some of the features of the JSLIST should also further cut costs. The wear life is 45 days for the



Warrior/Biberdorf

**The Joint Service Lightweight Integrated Suit Technology (JSLIST) is replacing the Battle Dress Overgarment for Army chemical and biological protection.**



Warrior/Biberdorf

**The JSLIST liner consists of a non-woven front laminated to activated carbon spheres and bonded to a knitted back that absorbs chemical agents. Carbon no longer creates a mess for the user.**



Warrior/Biberdorf

**Velcro wrist closures as well as adjustable ankle closures provide a tighter barrier to contaminants.**

JSLIST compared to 22 days for the BDO. Service life extends from 30 days for the BDO to 120 days for the JSLIST. Both provide 24 hours of protection after exposure to a chemical agent, and it's expected that the JSLIST will have at least the same shelf life as the BDO.

Servicemembers will find many reasons to like the JSLIST.

The JSLIST is about one pound lighter and when packaged is 60 percent less bulky than the BDO. JSLIST suits feel cooler and can be washed six times while the BDO cannot be washed.

"You sweat like crazy in these things," Costas said. "It can be a pretty miserable existence to wear it until the end of its wear life."

Another major improvement is the charcoal liner. The BDO liner is a charcoal-impregnated polyurethane foam and nylon tricot laminate. The JSLIST liner consists of a non-woven front laminated to activated carbon spheres and bonded to a knitted back that absorbs chemical agents. The BDO foam deteriorated as the



Warrior/Biberdorf

**The JSLIST jacket has a plastic zipper and Velcro flap. The outer shell of both pieces is a 50 percent cotton and 50 percent nylon poplin ripstop fabric with a durable water-repellent finish.**

wearer rubbed against the foam, and it could become messy.

"Black carbon dust would come out of the foam and get on you and your uniform. The JSLIST carbon is bonded in the liner," Costas said. "No matter how much or hard you rub against it, when you remove the suit, you're nice and clean."

Depending on the temperature and mission, the overgarment may be worn over the standard duty uniform, underwear, or over or under cold weather garments.

The JSLIST consists of a coat and trousers. The pants have expandable pockets, adjustable suspenders and adjustable waistband. They also have a front zipper opening with a protective flap, and a bel-lows pocket with flap located on each thigh. Each leg opening has Velcro ankle adjustment tabs.

The waist-length coat has an integral hood, a zipper covered by a flap that's fastened with Velcro, enclosed extendable elastic drawcord hem with jacket retention cord, full-length sleeves with Velcro wrist closure adjustment tabs, and an outside expandable pocket with flap on the left sleeve. The outer shell of both pieces is a 50 percent cotton and 50

percent nylon poplin ripstop fabric with a durable water-repellent finish. The material is more flexible and can breathe without losing any protection, Costas said. The suits are available in woodland and desert camouflage patterns.

"It's tailored much better. We've done many studies and field tests to make sure it fits well," Costas said.

JSLIST suits are stored in vacuum-sealed packages. They are offered in seven sizes and have the advantage of being split-issue, allowing servicemembers to, for instance, mix a large coat with extra large pants.

"With all the body types, you get a more comfortable fit and better chemical protection because it fits them properly," Costas said.

Although the Department of Defense is in the process of destroying their chemical weapon stockpiles, other countries and terrorists have the potential to use chemical weapons, which is why the chemical protective suit remains an important item in the inventory, Costas said. With an improved pattern established, advances to the suit will focus on making the material lighter, cooler and safer.

