Now, Where Do We Put It?

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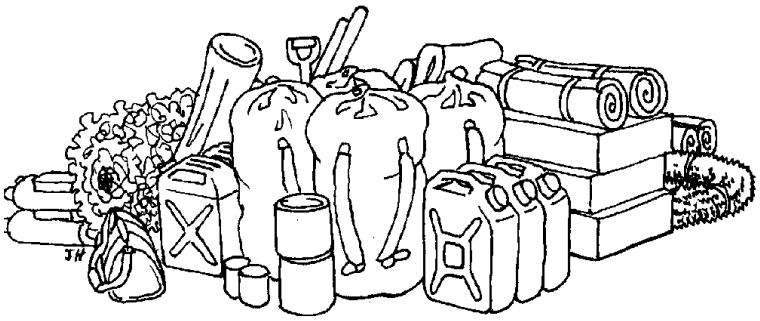


In the beginning, there was the Soldier and his "stuff," and this was good.

Then there was the vehicle, and the vehicle could carry the Soldier and his "stuff," and that too, was good.

When it was found that the vehicle could carry the Soldier and his "stuff," the Engineer quoth, "Give to the Soldier camouflage nets, poles, picks, shovels, mines, stakes, and wire with which to protect himself, and all manner of detectors to find those mines which would do him harm."

The Logistician quoth, "Give to the Soldier oil, grease, hydraulic fluid, track blocks, road wheels, center guides, end connectors, and endless number of tools with which to care for the vehicle, along with food and water with which to sustain himself."

The Chemical Guru quoth, "Give to the Soldier all manner of detectors and accessories to protect him from the harmful vapors and chemicals to be found in the hands of our enemies."

And, yea, verily, it was good to have said equipment to protect life and limb and to provide sustenance for the Soldier.

Finally, the Commander said, "You shall carry all these things and your "stuff" upon your vehicle and you shall do so in a secure and orderly manner, so as to please the Sergeants Major and the First Sergeants by its appearance."

The Soldier looked upon the prodigious pile of things given unto him, his "stuff," and his vehicle, and wailed, "There ain't no !#$^%$ way!!."*

Thus was born the Bustle Rack.

The foregoing is a somewhat humorous and simplistic view of a major problem that has faced the mounted warrior since the beginning of the Armored Force. As technology expands and the capability of the soldier increases, so does the amount of equipment required to accomplish the mission, and this all has to be carried somewhere in order to be available for use when needed.

The problem facing the mounted soldier of today is, where do I put it?

The obvious answer is to carry it somewhere on the tank or BFV. However, almost every vehicle produced over the history of armored warfare has not had built into it the capacity to store everything that is added on the vehicle by and for the crew.

Granted, there is a place for everything associated with the vehicle's Basic Issue Items (BII), and these are integrated into the design of the vehicle. But, those items such as CTA 50-900 and personal gear, as well as the items mentioned in our small parable, are obviously not fully integrated into the system.

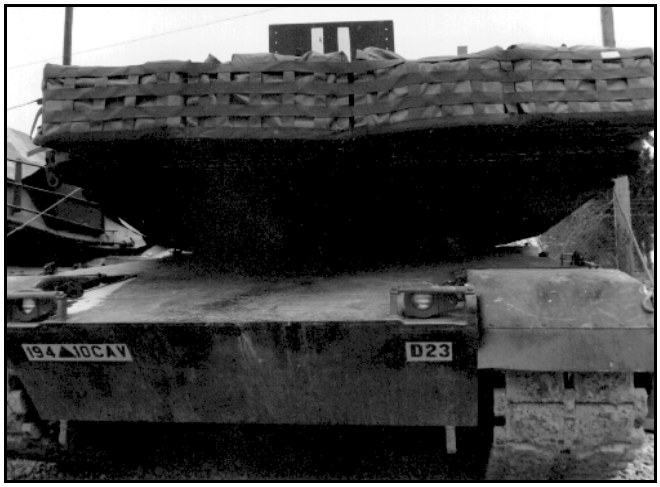
A classic example of this is the M1. When first fielded, the M1 had an angled slope to the rear of the turret. On this slope were numerous "footloop" fastening locations for a net-like covering that was supposed to act like a bustle rack. Gone, too, were the familiar sponson boxes that lined the sides of the M60-series vehicles then in service. However, the amount of equipment wasn't reduced one bit.

Nor is the M1 unique in this regard. A look back shows that the M47 was one of the first vehicles to have a dedicated storage area built on to the rear of the turret. And like the crews of today, crews then solved the problem by improvising storage schemes and load plans. The resultant "gypsy caravan" look of armored columns is one that has persisted throughout the world. The alternative to carrying all this equipment was that items perceived as having limited use usually became "combat losses," sometimes weeks prior to any actual combat!

Vehicles currently in development, such as the AGS and LOSAT, also suffer from this problem. Current configurations of AGS do not have any type of bustle rack, and there appears to be a similar approach to external stowage as was originally placed on the M1.

LOSAT's design precludes any external stowage at all, yet has a three-man crew. The pop-up design of the launcher will not allow the storage of anything on top of the vehicle. As with all Bradley chassis-based designs, anything carried on the front of the vehicle interferes with accessibility to the engine compartment and possibly blocks the driver's vision.

In order to have a feel for the size of the problem, consider the amount of



Above, an M1A1 Abrams with the Abrams Bustle Rack Extension mounted to the fixed bustle rack.

Individual crewman's equipment bags provide greater protection and easier access than does the current duffle bag.

"stuff" a typical M1 crew has to carry. According to the M1A1 Combat Load Plan, ST 17-184-1A1, dated November 1987, each crewmember is allotted for their CTA 50-900 and personal items 1 each, ALICE Pack, duffle bag, and flight helmet bag. In most instances, the flight helmet bag is carried inside the vehicle and doesn't enter into this discussion.

The approximate dimensions of the duffle bag are 14" in diameter and 38" tall for a volume of about 5,850 cubic inches or 3.4 cubic feet. The ALICE Pack is about 14" x 10" x 28", 3,920 cubic inches or 2.3 cubic feet. Therefore, a crew of four needs 4 x 5.7 cubic feet or 22.8 cubic feet of total storage for personal gear. The current bustle rack is about 15" x 14" x 112" for an available volume of 13.6 cubic feet; which translates to a 10.1 cubic foot shortfall! Crews have solved this by standing the duffle bags up inside the bustle rack and attaching the ALICE Packs to the outside.

An alternative is to have the company trains carry the extra duffle bags and to have the first sergeant bring them forward when needed. For a typical company this would require 56 duffle bags or 190 cubic feet of storage volume. A typical 2½ ton (M35 series) has a carrying volume of 444 cubic feet, which would mean one half of the truck would be filled with duffle bags. How many company commanders have this much excess carrying capacity in their company trains?

The loading scenario described above, along with the stacking of items and tying them down to the turret roof, etc., has an added effect of blocking the view of the TC and loader, both in the open hatch and closed hatch configurations. This has obvious implications in safely operating the vehicle and in the operational effectiveness of the crew. Another safety-related problem with this manner of stowage is the obstruction of the ammunition compartment blowout panels and crosswind sensor.

Nor is the storage area of the bustle rack sacrosanct. Presently the External Auxiliary Power Unit (EAPU) is designed to reside in the bustle rack. This unit takes up approximately 11.3 cubic feet (although it extends about 11" above the bustle rack, for an effective loss of 6.25 cubic feet).

Any type of system that is designed to alleviate this storage problem has several key requirements. First, it must be strong enough to carry a significant load, 400 to 500 lbs typically. It also has to be strong enough to withstand additional loads induced by shock while driving over rough terrain. This shock loading can be three to four times as great as the static load, or about 1,500 lbs.

Second, it must be large enough that it significantly increases the amount of storage volume. Ammo cans and locally produced brackets, although cheap, do not increase the storage volume more than 10 percent. Any system must increase the volume at a minimum of 75 percent, preferably 150 percent.

Any type of storage system must itself be able to be stored or removed when not being used for its intended purpose. This feature facilitates the loading of vehicles in confined spaces for deployment, such as ships or aircraft. It also remains out of the way during routine maintenance operations while not in the field or being used.

Finally, any system must be easily installed and not require major modifications to the vehicle. Extensive use must be made of all available hardware and existing features of the vehicle as attachment points. These attachments must also be strong enough to carry the load and secure the device during rough maneuvering.

Although there is little that can be done with regard to lessening the number of items to be carried, there have been several attempts at solving this problem that range from locally produced brackets to specially designed carriers.

The Israeli Defense Force (IDF) has built several different types of vehicle racks. One type hangs off the sides of the M113 and significantly increases the amount of material that can be carried. The MERKAVA's specially designed hammock-type arrangement has a hinged bottom that drops the rucksacks of the infantry once they deploy from the vehicle.

These designs are tailored to the requirements of the IDF in that they extend beyond the sides of the vehicles and are constructed of metal. For areas in which the IDF operates — desert, sparse vegetation, and urban terrains — this is acceptable. However, the U.S. Army requires that we also operate in close vegetation, such as forests and thick brush.

In this environment, a rigid system, or one that extends beyond the sides of the vehicle, are prone to being

snagged and damaged, especially when the driver of the vehicle is unsure of the location of his fenders and the TC/BC is occupied in navigating and directing the vehicle. A prime example of what can happen is evidenced by the large number of reports of survey and statements of charges for lost tanker's rolls and rucksacks snatched from bustle racks while moving along tree lines during exercises such as past REFORGERs.

One system specifically designed for the M1, and in development, is the Abrams Bustle Rack Extension (ABRE). This is a system made of durable webbing, capable of supporting 3,000 lbs/web and attaches directly to the top rail of the existing bustle rack. It also attaches to the bottom and sides for stability during maneuvering.

The device includes four 27" x 14" x 14" individual equipment storage bags. A piece of ⅜"-thick fabric-reinforced rubber forms the bottom of the compartment, gives shape to the device, and prevents it from sagging below the bottom of the bustle rack and interfering with the operation of the turret.

Being made of rubber and fabric, the device is designed to resist damage when caught on trees or brush, or through contact with more solid objects. If damaged, repairs are much simpler than they would be for an all-metal device.

For the protection of the individual crewmember's personal items, a waterproof/NBC protective bag is available. This bag is made of butyl-coated nylon, the same material found in camouflage covers, and is designed to be removed from the device for individual packing and storage. Two straps secure each bag to the device. Rucksacks can be attached to the exterior of the device, as is currently done in most unit load plans.

Placing mostly personal gear in the stowage device frees up space in the bustle rack for heavier items. These heavier items then would not have to be stored on top of the blowout panels, increasing the safety of the crew. This would also lower the profile of stored items and allow the crew better all-around observation.

The entire device weighs only about 40 lbs and can be attached in about five minutes by a single crewman. The primary means of attachment is by hooks that go over the top rail and secure with a ring.

The device is laterally secured by means of adjustable side straps and hook straps on the bottom that attach to existing eyes welded to the bottom of the bustle rack to prevent the device from bouncing off. These bottom straps are loosened when the device is folded flat against the bustle rack for storage.

Velcro along the entire bottom of the device facilitates the mounting of the rear turret belt for MILES. Also, mounting points can be added for vehicle identification signs, gunnery lights, etc. This basic design can be adapted to any number of vehicles. A prototype was developed for the LAV-25, while concepts for the Bradley and AGS are currently being developed.

The system is an inexpensive solution to an age-old problem. Any number of load plans cannot escape the simple fact that there is just too much "stuff" and nowhere to put it. Future systems **have** to be designed with the simple fact in mind that the soldier and his noncombat equipment must be carried by the vehicle because it is his home. The logistics system is stretched to its limits just providing fuel, ammo, and food for the soldier, let alone dragging his clothes around.

The ABRE, as designed and developed by Oceaneering Space Systems of Houston, Texas, could be procured as early as 1995, if funds were available.

Captain William K. Weldon was commissioned in 1985 from the U.S. Military Academy at West Point, N.Y. He has served in a number of Armor positions, including tank platoon leader, support platoon leader, and company executive officer while at Fort Polk, La. He was then assigned to Camp Casy, Korea where he served as battalion supply officer and later commander of C Company, 1-72 Armor. He recently served as the Materiel Branch Chief of the Directorate of Combat Developments at the Armor Center, Ft. Knox, Ky. He is currently an advisor for the 3-116 Cavalry (ARNG) in La Grande, Oregon.

Major Michael E. Mergens was commissioned through ROTC at Texas A&M University with a degree in Mechanical Engineering. He has served in a number of Armor positions including platoon leader, scout platoon leader, headquarters company commander, tank company commander, asst. brigade S3, and S3 air, and brigade S1. He is currently a member of the Texas Army National Guard serving as the operations chief, G-2 Section, 49th AD. In his civilian capacity, he works for Oceaneering Space Systems (OSS) as a design and project engineer on the International Space Station Alpha refrigerator/freezer project. He is also the senior project engineer for Armored Vehicle Habitability Upgrades for OSS.

The focal point for the identification of all support items for the Mounted Combat Soldier is:

Materiel Branch, Soldier Support Division
Director of Combat Developments
U.S. Army Armor Center
Fort Knox, KY 40121

For further information and technical details about the ABRE, other similar stowage systems, or soldier-related support items, please contact the branch chief at (502) 624-1750, DSN 464-1750.