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PS

December  
2011

# THE PREVENTIVE MAINTENANCE MONTHLY

TB 43-PS-709

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Unlimited



JOE KUBER  
WILL EISNER

# Changes May Not Happen ...Unless *You* Change



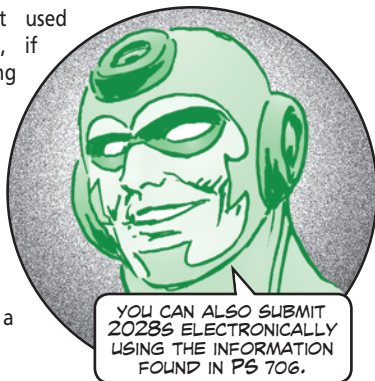
**T**he heart of the matter is, equipment TMs, TBs and LOs tell you how to do PM, but only you can submit a DA Form 2028 when you spot problems.

Now that many TMs have been revised, they look different. Instead of chapter, paragraph and page numbers, you have work package (WP) numbers.

For some, the new TMs are complicated and not very user-friendly. Some of you complain about seeing incorrect NSNs and part numbers. Others don't like that the old numbering system is gone.

Of course, it will take some time to get used to the new style and format. But you can, if you change the way you think. Complaining about problems you want fixed in the manuals doesn't change anything. A TM change will never happen unless you change your mind about submitting DA Form 2028s, *Recommended Changes to Publications and Blank Forms*.

So if you have a problem with incorrect data, or if you want to improve a procedure, go ahead and submit your changes, recommendations, or suggestions. And if you don't know how, pick up a copy of **PS 706, (Sep 11), Pages 58-59**.



# PS

## THE PREVENTIVE MAINTENANCE MONTHLY

ISSUE 709 DECEMBER 2011

TB 43-PS-709, The Preventive Maintenance Monthly, is an official publication of the Department of the Army, providing information for all Soldiers assigned to combat and combat support units and all Soldiers with unit maintenance and supply duties. All information published has been reviewed and approved by the agency responsible for the equipment, publication or policy discussed. Application of the information is optional with the user. Masculine pronouns may refer to both genders. The use of product or company names does not constitute endorsement of those products, services or companies by the U.S. Army. The use of non-DoD hyperlinks, along with their content, does not constitute endorsement by DoD or DA. Neither DoD nor DA exercises any editorial control over, and cannot vouch for, content on non-DoD websites.



### COMBAT VEHICLES

M1-Series Tank MILES Hookup	2
M1A1 Tank Ball Bearing Race Ring Assembly	2-4
Bradley, BFIST, MLRS Brake Shaft Inspection	5
M777A2 Towed Howitzer CSD Screen Protection	6-7
M109A6 Paladin, M992A2 Ammo Carrier Drive Bolts	8-9



### WHEELED VEHICLES

Tactical Trucks Vehicle Passenger Limits	10
HEMTT Transfer Oil Substitute	10-11
HEMTT Vehicle Access Ladder	12
FMTV LTAS Hydraulic Brake Converter	12-13
Tire Assembly Repair Program	14
	16-17



### MRAP/ROUTE CLEARANCE

MRAP Heat Detector NSNs, Light Bar Kit	15
MaxxPro Dash Straight Axle, MRAP Batteries	15
MRAP-ATV A/C System Charge Change	17



### COMBAT ENGINEERING

SEE/HMMH Shutdown Reminder	18
621B Scraper Cab Air Flow	19
MK2 Bridge Boat Battery Maintenance	20
MK2 Bridge Boat Step Cautions	21



### AVIATION

AGSE Maintenance Stand Parts NSNs	22
New AGSE Tug in the System	23
Advanced Composites Repair Info	24-25
AH-64/D IHADSS Helmet Reminders	26
The Dueling Dragons	27-34



### TOOLS

New Joint Aviation Tool Set Now Available	35
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### MISSILES

Avenger Missile System Canopy Care	36-38
Patriot Missile System Trailer Tips	39
MLRS Family of Munitions Handling, Storage	40-42



### SMALL ARMS

M16 Rifle, M4/M4A1 Carbine Storage Solutions	43
M16 Rifle, M4/M4A1 Carbine Authorized Items	44-45
M249 Machine Gun Bipod Feet	44-45
Defense Ammunition Center Online Training	46



### CBRN

CBRN Alerts, Updates Now Available	47
M40/M42-Series Masks Hard-to-Fit Cases	48-49
AN/PDR-77 Radiac Set TM Updates	49



### SOLDIER SUPPORT

Containerized Kitchen Packing Tips	50-51
Petroleum, Oil, Lubricant Spill Kits/Absorbent Info	52-54
Flame-Resistant ACU-Permethrin Wear Reminders	55-56



### LOGISTICS MANAGEMENT

Non-Standard Equipment Reset, Repair Process	57
SPIDERS Provides Logistics Tools	58-59
DLA Sets Up HAZMIN, Green Products Programs	60-61
LOGSA Updates ETM CD-ROM/DVD Labels	61

You are invited to send PS your ideas for improving maintenance procedures, questions on maintenance and supply problems and questions or comments on material published in PS.

Just write to:

**MSG Half-Mast**  
**PS, the Preventive Maintenance Monthly**  
**USAMC LOGSA (AMXLS-GP)**  
**5307 Sparkman Circle**  
**Redstone Arsenal, AL 35898**

Or email to:

**logsa.psmag@conus.army.mil** or  
**half.mast@us.army.mil**

Internet address:

**<https://www.logsa.army.mil/psmag/pshome.cfm>**

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**JOYCE E. MORROW**  
 Administrative Assistant to the Secretary of the Army

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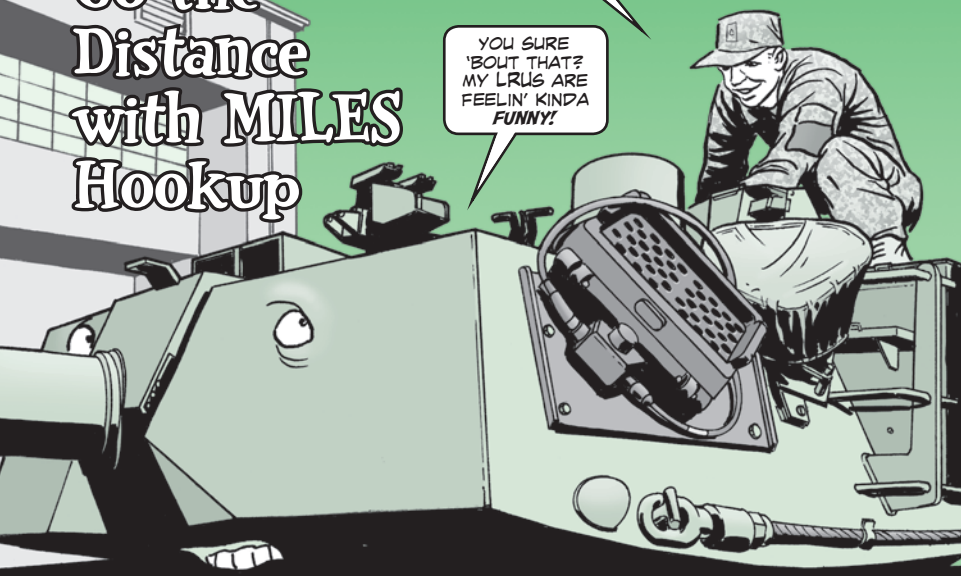
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# Go the Distance with MILES Hookup

OK! YOUR MILES IS ALL HOOKED UP!!

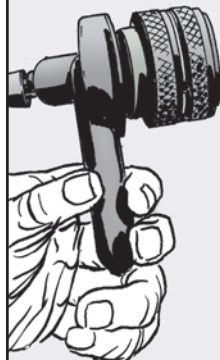
YOU SURE 'BOUT THAT? MY LRUS ARE FEELIN' KINDA FUNNY!



CREWMEN, HOOK UP THE CABLES FOR YOUR MULTIPLE INTEGRATED LASER ENGAGEMENT SYSTEM (MILES) THE RIGHT WAY.

IF YOU DON'T, THE SYSTEM WON'T WORK AND YOU CAN DAMAGE SOME PRETTY EXPENSIVE EQUIPMENT ON YOUR TANK.

THE **BIGGEST PROBLEM** IS INSTALLATION OF THE MILES TRIGGER CABLE.



IF IT'S CONNECTED TO THE **WRONG** LINE REPLACEABLE UNIT (LRU) OR TEST JACK, YOU GET **DAMAGE** TO THE IMPROVED FIRE CONTROL ELECTRONICS UNIT (IFCEU), IMPROVED COMMANDER'S ELECTRONICS UNIT (ICEU), IMPROVED MISSION PROCESSOR UNIT (IMPU), OR OTHER FIRE CONTROL COMPONENTS AND SYSTEMS.

TM 9-1265-373-10-1, OPERATOR'S MANUAL FOR MULTIPLE INTEGRATED LASER ENGAGEMENT SYSTEM (MILES), SIMULATOR SYSTEM, FIRING, LASER, M82, IS BEING UPDATED TO MAKE THE PROCESS CLEARER. UNTIL THEN, FOLLOW THESE INSTRUCTIONS FOR HOOKUP...

## M1A1

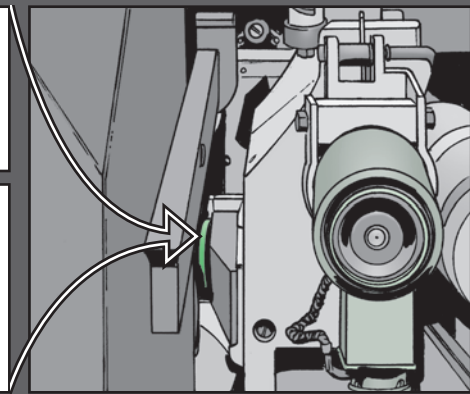
1. Install the MILES tank firing insulator card between the firing contacts on the right side of the main gun breech ring assembly. Without this card, circuit breaker #19 on the turret networks box (TNB) or redesigned turret networks box (RTNB) will trip and disable the firing circuit. Don't forget to remove the card after the tactical exercise is done.  
The insulator card doesn't have an NSN, so you'll need to make a substitute if it's missing from your MILES kit. Just drill a hole through the edge of a flashlight filter and tie a string to it. Then, insert the filter between the contacts.

Insert card or filter between firing contacts on right side of breech ring assembly

Card

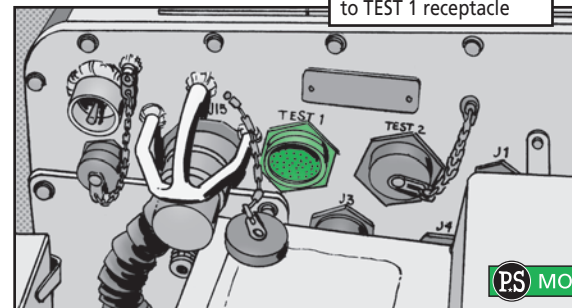
REMOVE BEFORE LIVE FIRE  
MILES M1 TANK  
TRIGGER RELAY INSULATOR  
135970

Filter



2. Connect the MILES trigger cable plug labeled P1 CONTROL CONSOLE J2 to the J2 receptacle on the MILES control console.
3. Route the other end of the cable to the TNB/RTNB.
4. Connect the plug labeled P2-TEST 1 to the TEST 1 receptacle on the TNB or to the TJ1 receptacle on the RTNB.
5. Continue MILES installation from this point following the TM.

Connect P2-TEST 1 plug to TEST 1 receptacle



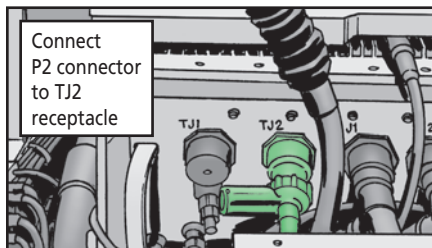
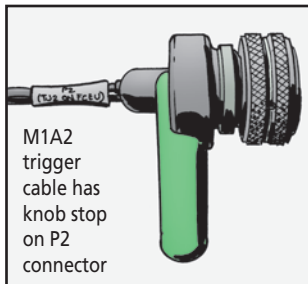


## M1A2

1. Install the MILES tank firing insulator card (or the replacement flashlight filter) between the firing contacts on the right side of the main gun breech ring assembly. If you forget, the firing circuits inside the fire control electronics unit (FCEU) or IFCEU will be destroyed. Remember to remove the card once the simulation exercise is over.
2. Locate the modified MILES trigger cable. It's the one that has a knob stop that extends from the P2 connector end of the cable. The knob stop keeps you from accidentally plugging the P2 connector into the TJ1 receptacle on the FCEU/IFCEU.

In fact, make sure you never connect the MILES trigger cable to the TJ1 receptacle on **any** LRU, including the turret mission processor unit (TMPU), hull mission processing unit (HMPU), improved hull mission processing unit (IHMPU), commander's electronics unit (CEU), ICEU or commander's independent thermal viewer-electronics unit (CITV-EU). If you do, you'll soon be replacing a damaged LRU.

3. Connect the plug labeled P1 CONTROL CONSOLE J2 to the J2 connector on the MILES control console.
4. Route the other end of the cable to the FCEU/IFCEU. The cable should go around the outside of the ammo/ration box. Make sure it's clear of the ready ammo box, too.
5. Remove the FCEU/IFCEU access cover.
6. Connect the P2 connector to the TJ2 receptacle on the FCEU/IFCEU. You may need to disconnect some other cables to make room. Just be sure you reconnect all of these cables afterward.
7. Reinstall the FCEU/IFCEU cover and continue MILES installation from this point according to the TM.

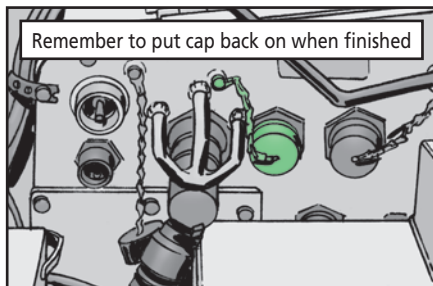


## When You're Done

When you're finished using MILES, don't forget to reattach the connector cover on the TNB/RTNB. Leaving the connector uncovered lets in dirt and moisture that causes corrosion. The next time you hook up your MILES gear, it won't work.

Replace a missing cover with NSN 5935-00-196-6835 for the TNB and NSN 5935-01-092-3042 for the RTNB. These NSNs also bring the cover's metal lanyard.

Questions? Contact TACOM-Rock Island's Michael Fiamé, DSN 793-6745, (309) 782-6745, or by email: [michael.a.fiamé.civ@mail.mil](mailto:michael.a.fiamé.civ@mail.mil)



# Ball Bearing Race Ring Changes

HEY, **GOOD NEWS!** I JUST GOT A COPY OF THE NEW PARTS TM FOR YOUR TURRET!

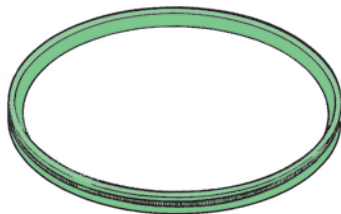
YEAH, BUT THERE ARE A FEW CHANGES YOU NEED TO KNOW ABOUT **FIRST!**

**T**he new revision to TM 9-2350-264-24P-2 (May 11) was published with some missing artwork and parts list info for the ball bearing race ring assembly on your M1A1 tank.

Until the TM is revised, make the following changes:

1. Make a copy of the NBC seal listed as Item 7 of Fig 29 in TM 9-2350-264-24P-2 (Apr 03 w/Ch 6). This is the old, superseded TM.
2. Tape or paste the NBC seal to one side of the artwork in Fig 28 (WP 0029-1) of the May 11 TM.
3. On the parts list page of the new TM's Fig 28 (WP 0029-3), change the first letter of the SMR code for Item 7 from a **P** to an **X**. Then strike a line through the NSN, ~~1015-01-198-2039~~.
4. At the bottom of the parts list page for Fig 28 (WP 0029-3), add the following info for columns 2-7:

Add this seal to artwork in Fig 28 of new TM



(2)	(3)	(4)	(5)	(6)	(7)
PAFZZ	5330-01-230-1689	19200	12344522	Seal Assembly	1
PAFDD	1015-01-580-4674	19200	13023852	Race and Seal Assy	1

The race and seal assembly, NSN 1015-01-580-4674, is a new item of supply which includes the seal assembly, NSN 5330-01-230-1689, and ball bearing race assembly, NSN 1015-01-198-2039. Although the ball bearing race assembly has an NSN, it can no longer be ordered. Its SMR code has changed to XAFDD (see Step 3), which means you must order the next higher assembly.

M2A2/M3A2, M2A2/M3A2 ODS,  
M2A2 ODS-E, M2A3/M3A3,  
M7/M7A3 BFIST,  
M270/M270A1 MLRS...

# BRAKE SHAFT NEEDS INSPECTION

OH,  
MAN!

THAT'S THE  
LAST THING I  
NEED OUT HERE.  
I'D BETTER GET  
BACK TO POST!

CHUGGA-CHUG-CHUG



BACK  
AT THE  
POST...

WHAT'RE YOU  
DOING BACK,  
HERNANDEZ?

I JUST SAW  
THIS ARTICLE IN  
PS. CAN YOU DO  
A QUICK BRAKE  
INSPECTION ON  
MY BRADLEY?

Drivers, losing your brakes is the last thing you need while tooling around in your Bradley, BFIST or MLRS. That's why you need to have your mechanic do a quick inspection of the brake equalizer shaft, NSN 3040-01-378-7674.

It seems that the manufacturer didn't apply thread locking compound to some of the 3-piece shafts. While a failure is unlikely, it is possible that these shafts could separate during operation, leaving you with no brakes.

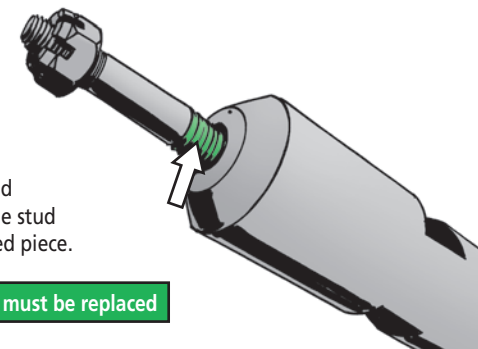
MECHANICS, THE BRAKE  
EQUALIZER SHAFT IS  
LOCATED IN THE ENGINE  
COMPARTMENT IN FRONT  
OF THE DRIVER'S STATION.  
HERE'S HOW TO PERFORM  
THE INSPECTION...

1. Take a look at the vendor ID code on the shaft. If it has a code of 000405 or 002166, it's a 1-piece shaft and is good to go. If you see no vendor ID code or the number is other than the two above, go to Step 2.

Check vendor ID code



2. The older style 3-piece shafts have a wire-laced bolt that secures the linkage rod in place. If the shaft you're inspecting has this bolt and the lacing wire has been applied, the vehicle is good for operation. Otherwise, go to Step 3.
3. Remove the cotter pin from the end of the shaft that has the castle nut.
4. Unscrew the castle nut and slide the rod bearing off the shaft.
5. Look closely at where the threaded stud is attached to the equalizer shaft body. If the stud is a separate part that has been screwed into the body, it's a 3-piece shaft and should be replaced. On a 1-piece shaft, the stud and body will be a single, machined piece.



If stud screws into body, shaft must be replaced

To get a replacement shaft, send an email that includes the number of shafts requested, your shipping address, DODAAC, unit identification code, vehicle serial numbers, and POC with phone number to:

[gregory.m.mendell@us.army.mil](mailto:gregory.m.mendell@us.army.mil)

You'll find the complete scoop in TACOM GPA 11-019:

[https://tulsa.tacom.army.mil/safety/gpm/tacom\\_wn/gpa11-019.html](https://tulsa.tacom.army.mil/safety/gpm/tacom_wn/gpa11-019.html)



# Guard Against CSD Screen Cracks

**NUTS!**

SOMETHING CRACKED  
THE CSD SCREEN! THAT'S  
GONNA BE A **HEFTY** BILL!

Dear Editor,

The M777A2 howitzer's Chief of Section Display (CSD) panel, NSN 6625-01-533-8823, is a very expensive piece of equipment. If you accidentally drop something on it, the screen could crack. A new CSD panel will set your unit back more than \$43,000!

I've come up with a simple, inexpensive way to protect the CSD screen while still allowing easy access to the buttons on the panel. Here's how:

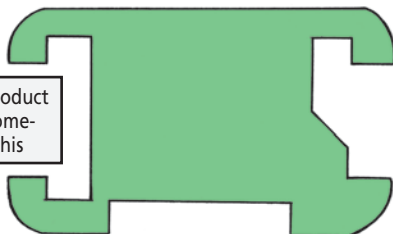
**1.** Cut a thin piece of plexiglass to fit the CSD panel. I used a piece of scrap plexiglass, but you can usually find it at your local home improvement store for about \$10.

**2.** Lay the plexiglass on the panel and use the black rubber rim to secure it in place.

**3.** Outline the areas where the panel's buttons are located with a thin-tipped marker.

**4.** Remove the plexiglass and cut out the marked areas.

Finished product  
will look some-  
thing like this



**5.** Place the finished plexiglass guard back over the panel and secure it with the rubber rim.

Completed guard  
protects panel screen

SFC Ian Conley  
606th FSC, 1-377th FAR  
Ft Lewis, WA

*Editor's note: An inexpensive solution to a very expensive problem! While this fix won't appear in the howitzer's TMs, it has been approved for field use.*

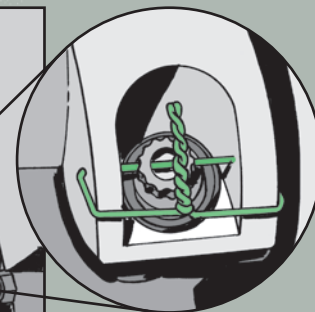
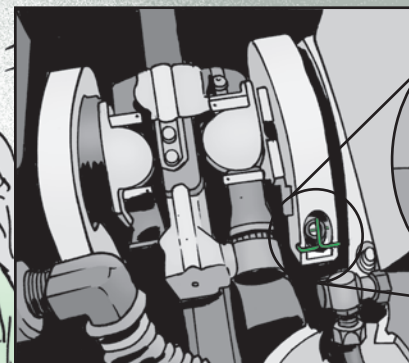
## FINAL DRIVE BOLTS NEED SAFETY WIRE

MECHANICS, AFTER  
INSTALLING THE FINAL  
DRIVE U-JOINT BOLTS  
ON THE M109A6 PALADIN  
OR M992A2 AMMO  
CARRIER, THERE'S ONE  
MORE STEP!

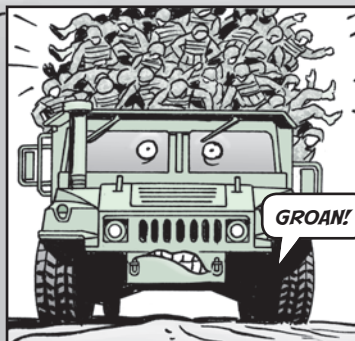
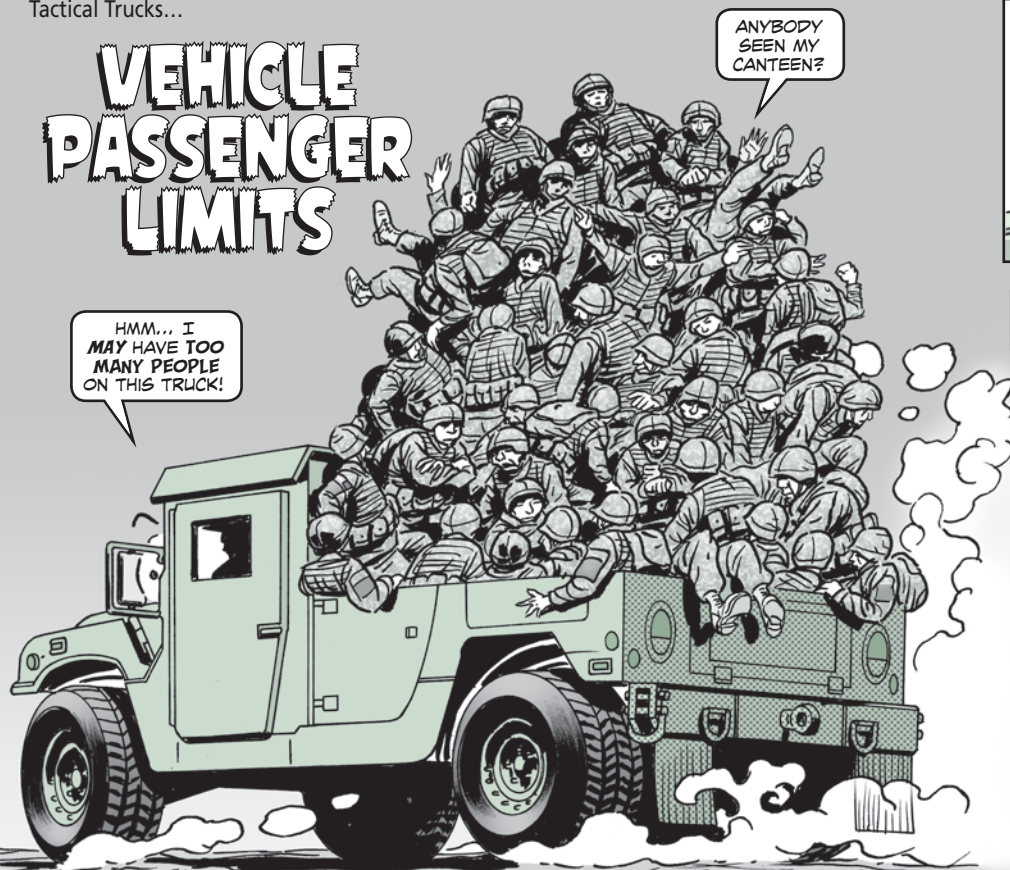
**YOU MUST  
REMEMBER  
TO SAFETY-  
WIRE THE  
BOLTS!**

UNLESS THEY'RE SAFETY-  
WIRED, THE BOLTS WILL  
LOOSEN AND BACK OUT.  
WHEN THAT HAPPENS, THE  
U-JOINTS COME APART AND  
TEAR UP THE TRANSFER OR  
TRANSMISSION.

SO  
REMEMBER,  
AFTER YOU  
TIGHTEN 'EM  
**DOWN,**  
LACE 'EM  
**UP!**



# VEHICLE PASSENGER LIMITS

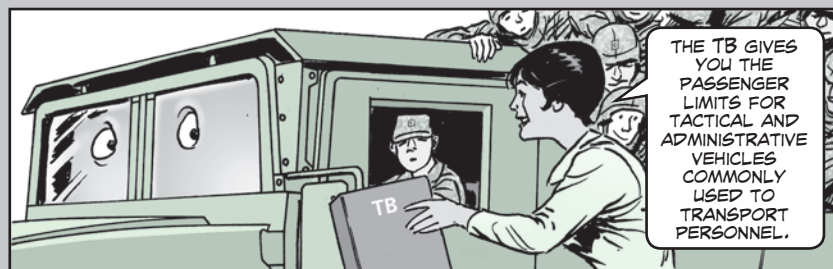


NEED TO KNOW HOW MANY PASSENGERS YOU CAN SAFELY CARRY IN YOUR TACTICAL TRUCK?

TB 9-639, PASSENGER-CARRYING CAPACITY OF TACTICAL AND ADMINISTRATIVE VEHICLES COMMONLY USED TO TRANSPORT PERSONNEL, CAN HELP YOU WITH THAT.

ANYBODY SEEN MY CANTEEN?

HMM... I MAY HAVE TOO MANY PEOPLE ON THIS TRUCK!



HERE ARE A FEW THINGS YOU'LL LEARN FROM THIS TB...

1. The limits provided apply only to vehicles that are properly equipped with permanent or temporary seats. It doesn't include the operating crew.
2. Don't crowd passengers on bench-type seats in cargo beds.
3. Passengers may be transported on post without fixed seats for distances under 10 miles, if each passenger remains seated wholly within the body and the body is equipped with stakes or sideboards. When cargo space is used for passengers, canvas tops will be in place with sides rolled down.
4. Drivers **must** refuse to move a vehicle if anyone is in an unsafe position or the vehicle has too many passengers.

Vehicle	Passenger Capacity
2 1/2-Ton Cargo Truck	14
2 1/2-Ton Extended Cargo Body Trucks	18
2 1/2-Ton Dump Trucks	10
5-Ton Cargo Trucks	16
5-Ton Extended Cargo Body Trucks	20
5-Ton Dump Trucks	12
1 1/4-Ton HMMWV Troop Carrier	8
1 1/4-Ton HMMWV Cargo/Troop Carrier	4
1 1/4-Ton M880, M881, M882	8
Semitrailer Personnel Van	80

NOTE THESE LIMITS...



YOU'LL HAVE TO CHECK THE OPERATOR'S MANUAL AND AR 385-55, PREVENTION OF MOTOR VEHICLE ACCIDENTS, TO GET PASSENGER LIMITS FOR VEHICLES NOT LISTED.

FIND MORE GUIDANCE ON SAFELY TRANSPORTING PERSONNEL IN FM 21-305, MANUAL FOR THE WHEELED VEHICLE DRIVER.

EIGHT PEOPLE! NOW THAT'S MORE LIKE IT!





# SUBSTITUTE OIL IN THE TRANSFER

HERE'S A GOOD  
QUESTION THAT  
YOU MAY HAVE  
SEEN BEFORE...



Dear Half-Mast,

Our maintenance shop says they cannot get OE/HDO 40W oil and wants to know if they can use OE/HDO 15/40W oil in the HEMTT's transfer. Card 3 of 35 in LO 9-2320-279-12 only specifies OE/HDO 40W oil.

Is OE/HDO 15/40W oil an acceptable substitute?

Mr. G.P.

Dear Mr. G.P.,

*This is an issue that has come up in the past. The quick answer is "yes," but there are some stipulations.*

*The NSN shown in the HEMTT IETM for OE/HDO 40W oil has been discontinued. However, you can get re-refined OE/HDO 40W oil to use instead. NSN 9150-01-433-7970 brings a 55-gal drum.*

*If OE/HDO 402 isn't available, you can substitute OE/HDO 15W40... but only if your vehicle's warranty has expired.*

*Half-Mast*



WHOA, NELLY!  
WHAT'S WITH  
THE ATTITUDE?  
DIDN'T YOU GET  
YOUR MORNING  
GRINDS?

THE ONLY  
GRINDING  
I'M GONNA  
DO IS ON  
YOUR HAND  
IF YOU  
DON'T FIX  
MY BROKEN  
HINGE  
POINTS!

**NIP  
LADDER  
BITE  
IN BUD**

**S**oldiers, some of you climb up and down M978, M978A, and M978A4 HEMTT tanker ladders many times a year to tackle tasks like fueling vehicles or aircraft.

Most of the time, you probably don't give a second look or thought to those vehicle access ladders. They're just a means to get from Point A to Point B. So while the ladders are there, you may not really "see" them anymore.

Well, turns out that ladders need PMCS, too. Injuries have been caused by damaged HEMTT ladders—some serious enough that workers have lost fingers.

Even on a ladder that is not damaged, the hinge between the bottom and top halves of the ladder is a pinch point. Follow the warnings in the TM and keep hands clear of the ladder hinge.

Ladder hinge is a pinch point. Keep hands clear

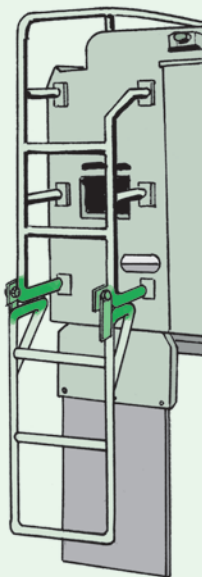
When doing weekly PMCS on your HEMTT, don't forget to check that the safety pins are in place to secure the ladder properly. Repair or replace any damaged components you find. If necessary, replace the whole ladder.

A ladder can get damaged when it's accidentally left in the down position. Remember to stow your HEMTT's ladder when it's not in use or before you move the truck. Follow the guidance in your specific HEMTT model's operator's manual.

Use these NSNs to order new retention pin hardware for ladders

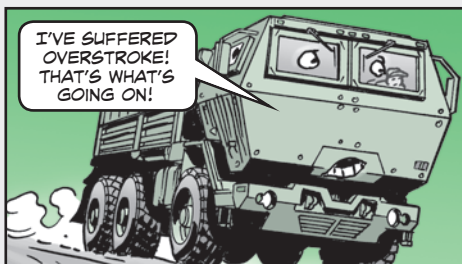
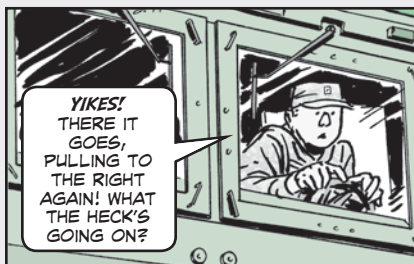
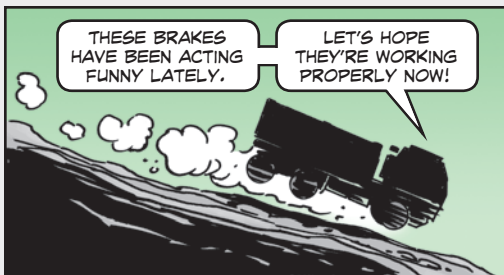
Item	NSN
Wire rope	4010-01-162-9825
Clevis pin	5315-01-197-0608
Ladder clip	5340-01-155-3590

Remember, taking the time to fix a broken ladder now sure beats trying to fix a busted finger down the road.



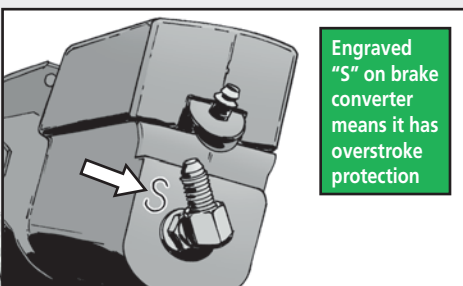
FMTV...

# LTAS HYDRAULIC BRAKE CONVERTER CONFLICT



**L**isten up, FMTV users! IETM versions dated earlier than Sep 2010, new equipment training and TACOM SOUM 11-005 incorrectly tell maintainers to pump the brake pedal to bleed air from the brake hydraulic system. That mistake has resulted in damaged brake converters due to overstroke on LTAS FMTV trucks with a serial number before 707,449.

Overstroke occurs when the brake pedal is pumped when there is air or a leak in the hydraulic brake system. The resulting damage to the brake converter causes poor brake performance or sharp pulling of the FMTV left or right during heavy braking.



Units must inspect both brake converters on LTAS trucks with serial numbers lower than 707,449. See TACOM SOUM 11-013 for inspection and repair details. The instructions are pretty long, but there are detailed pictures to help you out. You can get to the guidance you need online: [https://tulsa.tacom.army.mil/safety/soum/tacom\\_wn/sou11-013.html](https://tulsa.tacom.army.mil/safety/soum/tacom_wn/sou11-013.html)



## MRAP Heat Detector NSNs

Use NSN 6350-01-575-4494 to get a front heat detector for the CAIMAN Plus, RG33 CAT II, RG33 SOCOM, RG33 HAGA, RG33 CAT II Plus, and RG33 HAGA Plus MRAP vehicles. NSN 6350-01-575-4487 gets the rear heat detector for the same vehicles. By the way, these new heat detectors replace the old-style detectors shown in Fig 46 of TM 9-2355-108-24P and Fig 50 of TM 9-2355-319-24P.

## MaxxPro Dash Straight Axle

Tell your buddies in support that NSN 2530-01-570-2511 gets the front straight axle assembly for the MaxxPro Dash straight axle MRAP vehicle. This NSN replaces the parts info shown as Item 005 on Page 2-3 in TM 9-2355-324-24P.

## MaxxPro MRAP Batteries

Do not mix different types of batteries in MaxxPro MRAP vehicles. Mixing batteries burns out the vehicle's voltage regulator. Only use all Exide batteries, NSN 6140-01-446-9506, or only all AGM Hawker Armasafe Plus batteries, NSN 6140-01-485-1472. Remember, all batteries installed in the vehicle need to be the same type, and the Exide and Hawker are considered different types.

## MRAP Light Bar Kit

To get a light bar kit for the MRAP RG33L CAT II Plus, NSN 2355-01-562-6675, or the M1237A1 RG33L HAGA Plus, NSN 2355-01-564-4340, use NSN 6220-01-586-3096. This new kit provides 360-degree illumination and night-vision enhanced capabilities. The kit includes 4 light bars, 2 search lights, control panel, vehicle interface box, electrical harnesses, brackets and attaching hardware. Installation instructions come with the kit. If your RG33 MRAP vehicle has the Rhino IED defeat equipment installed, you will need to order the Rhino adapter kit that comes with NSN 6220-01-588-7845.



# TIRE ASSEMBLY REPAIR PROGRAM

DID YOU KNOW THAT TIRE ASSEMBLY REPAIR SITES EXIST IN CONUS AND OCONUS?

THEY'RE PART OF THE NATIONAL MAINTENANCE MANAGEMENT PROGRAM.



## TARPs in SWA

There is a fixed-site Tire Assembly Repair Program (TARP) in Camp Arifjan, Kuwait. The Kuwait TARP currently repairs 61 different wheel assemblies. The TARP also gets unserviceable wheel assemblies from the Retrograde yard at Camp Arifjan. These are turn-ins from various supply support activities (SSAs) in Iraq and Kuwait.

The Kuwait TARP repairs the unserviceable wheel assemblies and returns them to co-located SSAs for reissue. The TARP also repairs a few wheel assemblies for drive-thru customers who can't remove or replace their own tires.

When ordering replacement wheel assemblies, turn in the unserviceable ones. If the wheels are not damaged, unserviceable wheel assemblies can be recovered, repaired and returned to the supply system.

## Other Repair Sites

Outside of SWA, repair programs exist in the following places: West Virginia ANGB (Red House, WV); Ft Lewis, WA; Ft Hood, TX; Ft Sill, OK; MAK Germany (Kaiserslautern); and MSC Korea (Camp Carroll).

These sites were opened to conform with the two-level maintenance concept and the DA G-4 policy to have units order wheel assemblies instead of tires. Note that not all wheel assemblies are repaired and some sites may repair only one type of wheel assembly.

Finally, there are five mobile tire service centers that do repairs in Afghanistan. They're at Bagram, Kandahar, Sharana, Jalalabad, and Camp Leatherneck.

## POCs for Assistance

Email your technical wheel assembly questions to A.J. Gianfermi, TACOM LCMC's Tire Assembly Team equipment specialist:

[anthony.j.gianfermi.civ@mail.mil](mailto:anthony.j.gianfermi.civ@mail.mil)

He can help you get a current list of wheel assembly NSNs.



## MRAP-ATV...

# A/C System Charge Change

TM 9-2355-335-23-1

**M**echanics, the CAUTION and NOTE from WP 0022-5 in TM 9-2355-335-23-1 say it takes 5 pounds of refrigerant to fully charge the MRAP all terrain vehicle's air conditioner system. That's **wrong!**

Instead, 3½ pounds (1.59 kg) of refrigerant is the full charge—no more! Overcharging the system causes blown seals and hose leaks.

If you have questions, contact your local TACOM logistics assistance representative.



(6) to service ports (3 and 4).

## CAUTION

- Do not overcharge system. The system is fully charged with 5.0 lbs. (2.27 kg) of refrigerant. Failure to comply may result in damage to equipment.
- Do not operate vehicle system with the panel high-side valve in open position. Failure to comply may result in damage to equipment.

## NOTE

- System must be in a 15 inHg vacuum status before charging.
- Use Table 1 to monitor pressure.
- A slow charge condition may occur due to pressure equalization between service station and vehicle system.
- Any change in pressure indicates a leak in A/C system.
- Total system charge is 5 lbs. (2.27 kg).

3. Charge system with R134a refrigerant in accordance with Table 1.

MAKE A NOTE OF THESE CHANGES UNTIL THEY'RE ADDED TO THE TECHNICAL MANUAL.

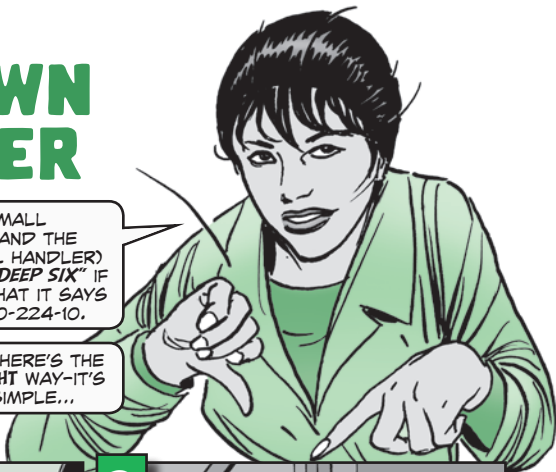


# SHUTDOWN REMINDER

OPERATORS, THE SEE (SMALL EMPLACEMENT EXCAVATOR) AND THE HMMH (HIGH MOBILITY MATERIAL HANDLER) GENERATORS WILL EACH DO A "DEEP SIX" IF YOU DON'T FOLLOW **EXACTLY** WHAT IT SAYS ON PAGE 2-85 OF TM 5-2420-224-10.

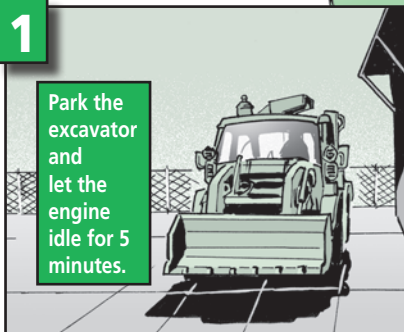
THAT CAN COST YOUR UNIT ABOUT \$300 BUCKS—THE COST OF A NEW GENERATOR.

SO HERE'S THE RIGHT WAY—IT'S SIMPLE...



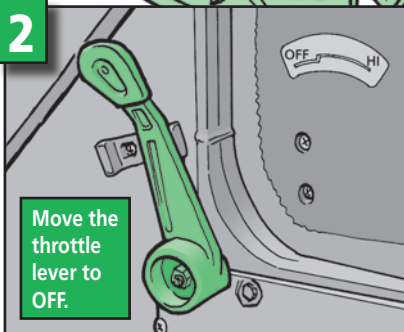
1

Park the excavator and let the engine idle for 5 minutes.



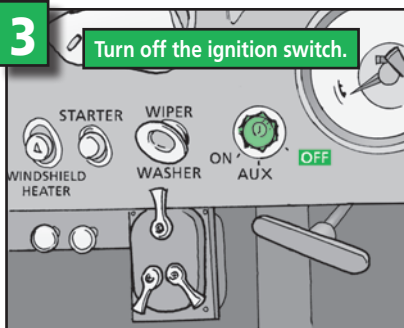
2

Move the throttle lever to OFF.



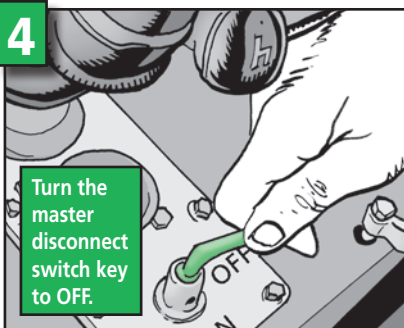
3

Turn off the ignition switch.



4

Turn the master disconnect switch key to OFF.



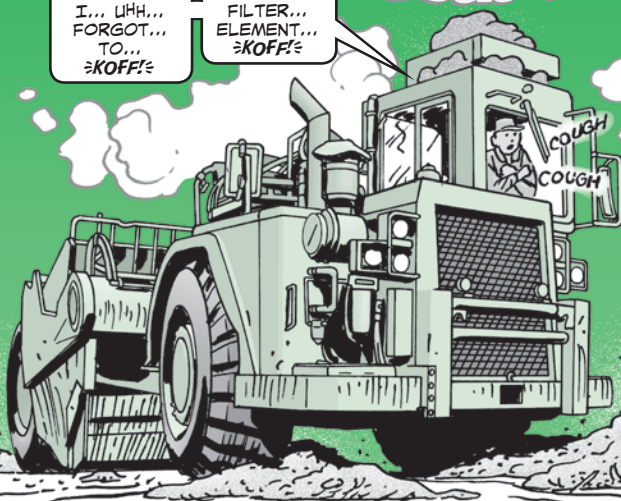
**Never** turn off the master disconnect switch key or the ignition switch before setting the throttle to OFF.

If you don't shut off the fuel first, the generator will build up a load beyond its capacity and burn out.

# Cab Air Flow

≡KOFF!≡  
AHHEEH-UH...  
I... UHH...  
FORGOT...  
TO...  
≡KOFF!≡

CLEAN...  
THE... AIR...  
FILTER...  
ELEMENT...  
≡KOFF!≡



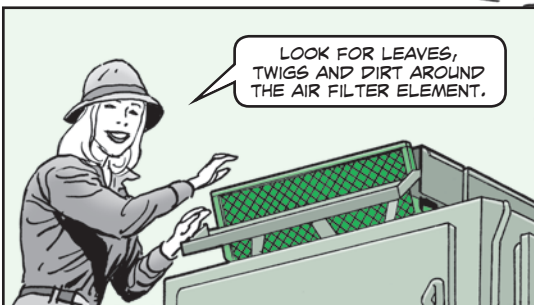
**B**ecause filter elements for the Scraper cab's air system are located on the roof, sometimes they don't get regular cleaning.

The filtering elements keep you supplied with clean air, regardless of how dusty work sites are. But you've got to keep the filter elements clean.

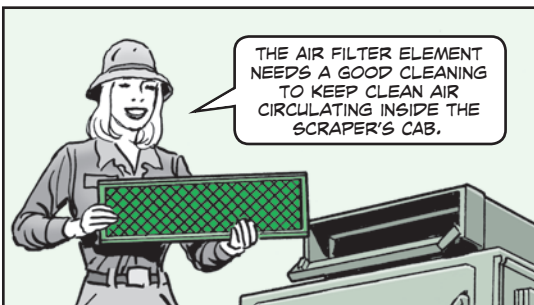
Before you start using low-pressure air (30 psi or less) to clean the elements, make sure that leaves, dirt, ice or snow aren't blocking the air inlets.

To help keep elements clean, start your day's run by removing the elements and tapping them with your hand to loosen and dislodge trapped dirt.

Don't bang elements against the cab or other hard surfaces! That bends sealing edges and crushes the filtering material. Replace a damaged element with NSN 2540-01-062-7166.



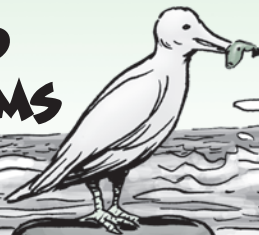
LOOK FOR LEAVES,  
TWIGS AND DIRT AROUND  
THE AIR FILTER ELEMENT.



THE AIR FILTER ELEMENT  
NEEDS A GOOD CLEANING  
TO KEEP CLEAN AIR  
CIRCULATING INSIDE THE  
SCRAPER'S CAB.



# AVOID BATTERY PROBLEMS



**U**se these PM pointers to keep your bridge boat mission-ready.

## Master Power Switch

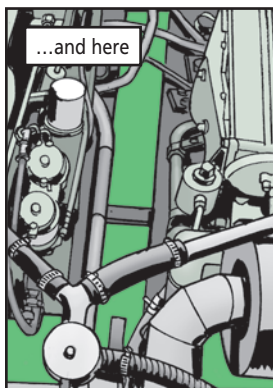
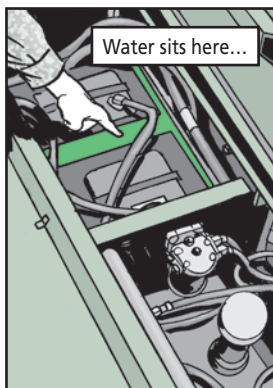
Turn the master power switch to the OFF position after the day's run. That way the dashboard's electrical system won't continue to draw power from the bridge boat's batteries. This is especially important if the boat sits idle for long periods of time.



## Get the Water Out

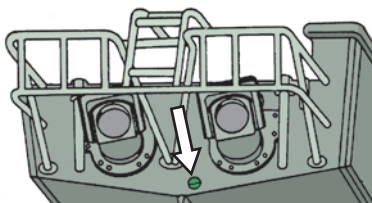
Rainy weather can play havoc with boat batteries. The batteries sit in the hull where water can collect. Enough water causes the batteries to short out.

Regardless of whether your boat is in the water or dry-docked, keep excess water out of the boat's hull.



Open the boat's bilge drain plug when the boat is dry-docked for long periods. The plug is located between the left and right scoops at the back of the boat. You'll find this same info listed in the PMCS tables as Item 36 on Page 2-41 of TM 5-1940-277-10.

Loosen bilge drain plug to let water out



# WATCH YOUR STEP

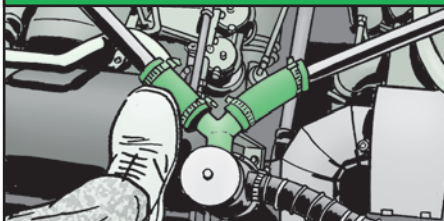


Where you step around the bridge boat's engine can mean the difference between supporting an amphibious bridging operation or being stuck at the dock!

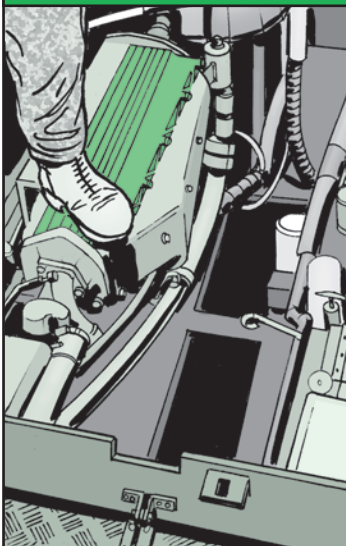
The problem begins when a well-meaning Soldier pulls the floorboards to do checks and services. With the floor boards removed, there are a few places that make a handy step for a Soldier's boot. But stepping in the wrong place causes things to break or come loose—and that's not good!

Here are some areas **not** to put your boots:

The fuel/water separator's vent lines that mount into engine's rocker arm covers



The engine rocker arm cover or the intercooler for the turbocharger



The engine oil dipstick or the engine oil filter

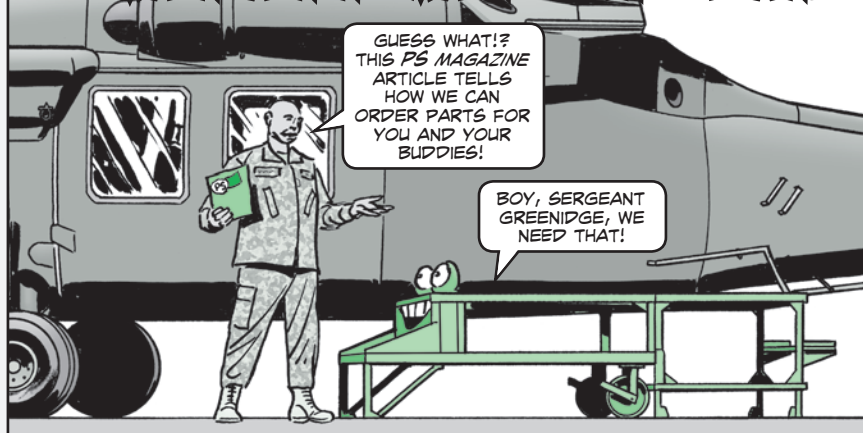


You should also keep your feet off the fuel lines that mount into the fuel injector nozzles and the breather hose that mounts into the fuel/water separator.

So, keep your boots **off** these areas while cleaning, making repairs, doing maintenance or pulling checks or services.

A good area to use as a step is in the bilge (the bottom inside of the boat) or on the frame rails to which the engine is bolted.

# MAINTAINING MAINTENANCE STAND



The low-level maintenance platform, NSN 1730-00-269-8283, is not supported and does not have a TM for maintenance.

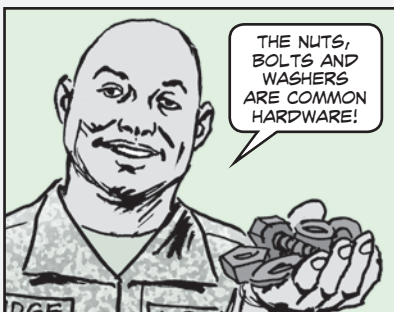
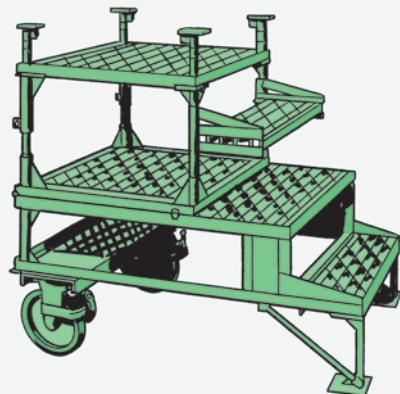
There isn't much maintenance on the stand anyway, but there are inspection criteria and replacement parts you can use to keep the stand in good shape.

Maintenance stand has no parts TM

The only inspection you need to do is a visual one. Also, make a note of the load rate: open 750 pounds.

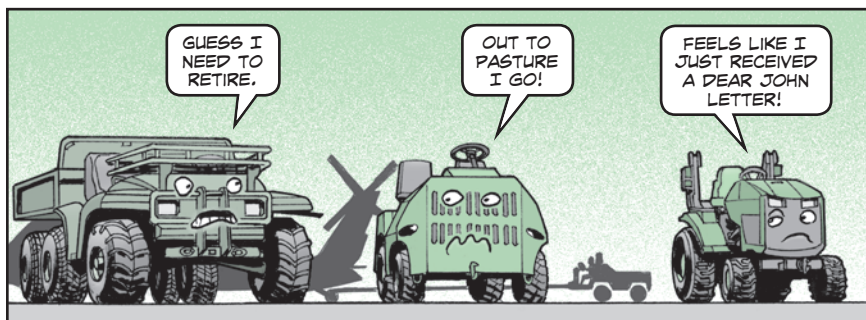
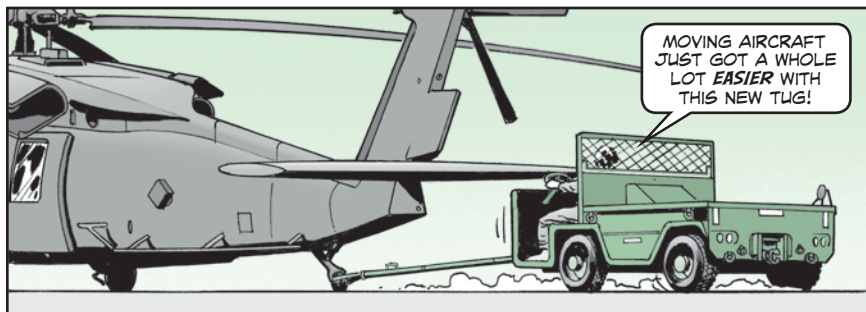
Here are the parts you can order:

- **Rigid caster**, NSN 5340-01-340-8799
- **Quick release pin**, NSN 5315-00-935-8804
- **Latch assembly-clamping catch**, NSN 5340-00-787-3209. This comes as an assembly. To order separately, use NSN 5340-01-295-4896 for the catch strike and order NSN 5340-00-821-0304 for the clamping catch.
- **Clamping latch catch spring loaded**, NSN 5340-00-860-3862. This is a nonstandard item.





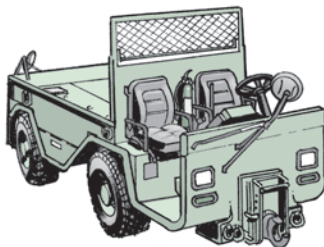
# NEW TUG IN TOWN



MECHANICS, MOVING AN AIRCRAFT FROM POINT A TO POINT B GETS A LITTLE **EASIER** NOW WITH A NEW PIECE OF GROUND SUPPORT EQUIPMENT ON THE SCENE.



YOU CAN SAY **GOODBYE** TO THE M-GATOR, THE OLD STANDARD TUG AND THE JOHN DEERE BECAUSE A **NEW TUG** IS ON THE BLOCK.

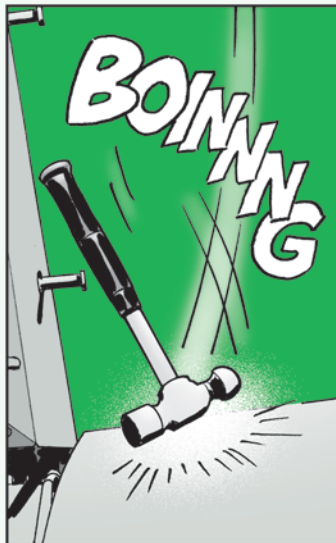
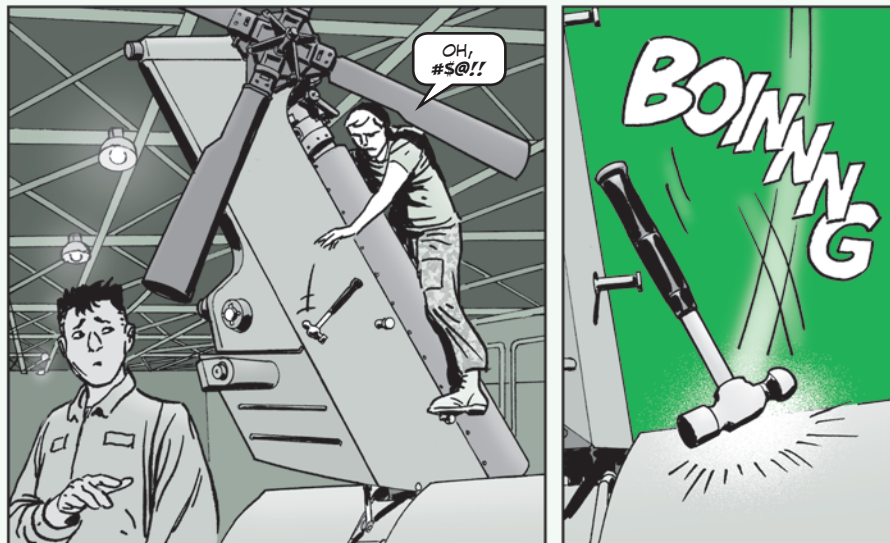


THE STANDARD AIRCRAFT TOWING SYSTEM (SATS), NSN 1740-01-557-5662, IS WHAT UNITS WILL NOW USE TO TOW GROUND SUPPORT EQUIPMENT AND AIRCRAFT.

AS YOU USE THIS TUG, REMEMBER TO KEEP IT **PROBLEM-FREE** BY FOLLOWING THE PMCS TASKS IN WP 0017 00 OF TM 1-1740-221-13&P.



# NEWS YOU CAN USE: AIRCRAFT ADVANCED COMPOSITES



On Page 41 of PS 688, we told you about the one-stop-shop for up-to-date aviation information: the joint technical data integration (JTDI) website.

PM JTDI maintains websites for various Army aviation subjects and topics, such as Aeromechanics, AH-64, Black Hawk, Chinook, Kiowa Warrior and AGSE.

Now JTDI is sponsoring another tool for aviation. Go to:

<https://www.jtdi.mil>

You'll find a new site: "Advanced Composites." This is a one-stop-shop where you can get information on composite repair issues.

Over the years, aircraft designs have improved with the use of advanced materials such as composites. An excellent example is the UH-60M Black Hawk, which now has a composite folding stabilator. The prototype integration facility (PIF) at Redstone Arsenal not only administers the website, but spearheads many composite repair efforts for all Army aircraft.

HERE IS A SHORT LIST OF WHAT YOU'LL FIND AT ADVANCED COMPOSITES...

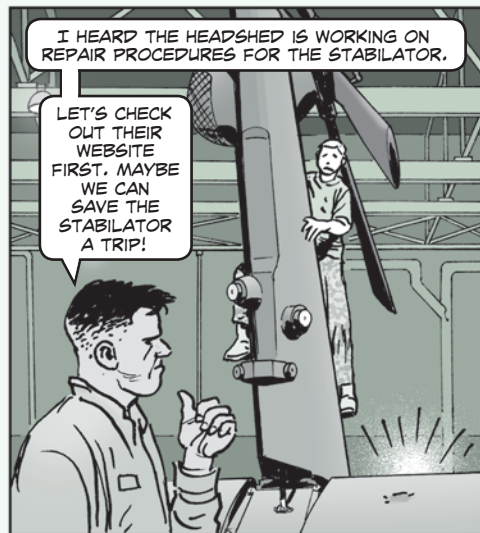
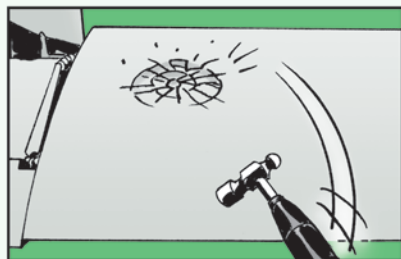
- Lists of proper tools and materials for composite repairs
- Approved, but as yet unpublished, repair procedures
- POCs for engineering, training, and general repair issues
- White papers full of information on a variety of composite-related subjects
- Training resources
- How to obtain free materials and equipment as they become available (such as prepreg)
- A forum on the site for questions and requesting assistance from experts in the field



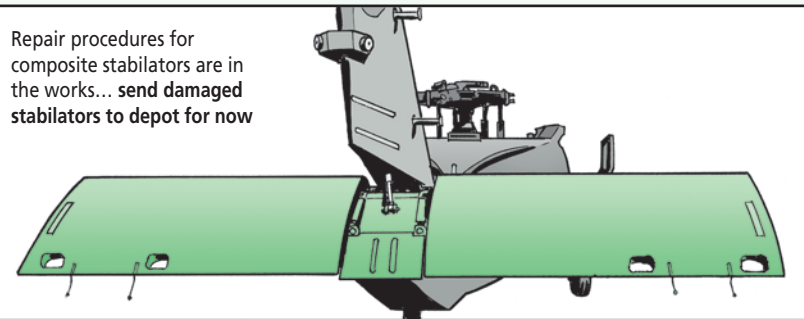
So, check out the Advanced Composites website now so that you'll have the 'know how' to repair composite material in the future.

Hopefully in the not too distant future, situations like someone damaging a Black Hawk composite folding stabilator because they forgot to use a cover will not result in it having to be sent to depot for repair, as is the case now.

If you are not registered, you can still access the site. But to have full access and to add people to our list of Army composite maintainers, you need to complete the registration process.



Repair procedures for composite stabilators are in the works... send damaged stabilators to depot for now



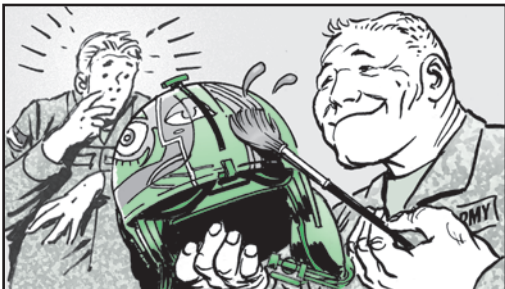
# YOUR NOGGIN AND HELMET NO-NO's

PILOTS AND GUNNERS, YOUR AH-64'S INTEGRATED HELMET AND DISPLAY SIGHTING SYSTEM (IHADSS) IS A **DELICATE** PIECE OF EQUIPMENT. IT PROTECTS AN EVEN MORE DELICATE ITEM—**YOUR NOGGIN!**

TO KEEP THE HELMET IN SYNC WITH WEAPONS, COMMUNICATING AND PROTECTING YOUR HEAD, HERE IS A **REMINDER** OF SOME THINGS YOU **SHOULD** ALREADY KNOW NOT TO DO.



1. If you catch the Picasso bug and want to paint, grab a canvas and go for it. Just don't put a paint brush to the helmet. And forget stickers. The only authorized paint for the helmet and shell is touch-up paint, NSN 8110-01-331-6113, listed in TM 9-1270-233-23&P and EM 0126, TM 1520-Longbow/Apache.



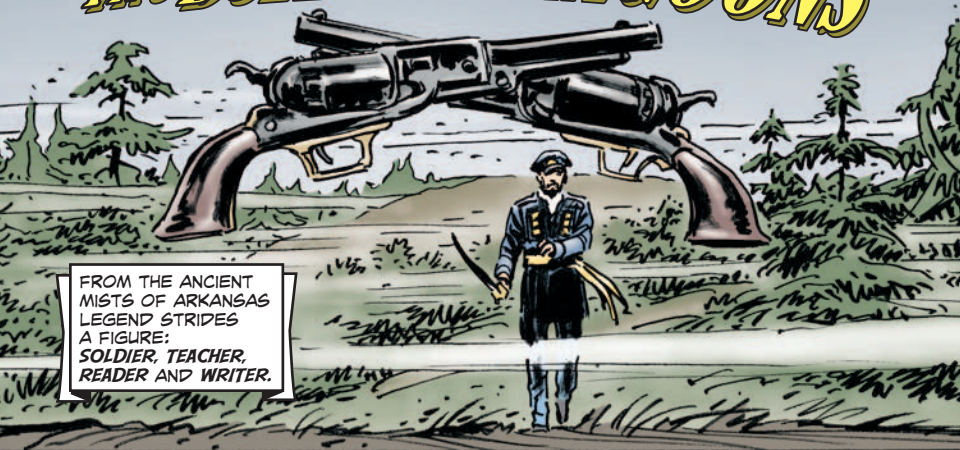
2. If you don't want to hear the wrath of your ALSE tech, take your helmet with you when leaving the aircraft. Don't leave your helmet in the cockpit or a car. The inside of a cockpit and car can get hotter than a two dollar pistol. That heat can cook the helmet and fry all its parts.
3. Avoid the habit of stuffing the inside of your helmet like a holiday turkey with gloves, maps, flashlights, checklists and knee boards. The helmet is fitted for your head only. Anything stuffed inside can ruin that fit.
4. Don't snatch the IHADSS helmet harness out of the ICS cord when the mission is over. This breaks pins in the harness connector and the wires in the ICS cord. Then you won't be able to boresight the aircraft weapons or communicate.
5. The helmet is not a seat, so don't sit on it. Sitting on your helmet can create soft spots that put your noggin in harm's way.



**TAKE CARE OF YOUR HELMET AND IT'LL TAKE CARE OF YOUR NOGGIN!**



# The DUELING DRAGOONS



FROM THE ANCIENT  
MISTS OF ARKANSAS  
LEGEND STRIDES  
A FIGURE:  
**SOLDIER, TEACHER,  
READER AND WRITER.**

SUCH IS THE LEGACY OF **ALBERT PIKE**.  
MANY OF YOU HAVE HEARD TALES OF  
ALBERT'S FAMOUS ANCESTOR, ZEBULON,  
BUT OUR AL'S ADVENTURES CANNOT BE  
OVERSHADOWED BY A MERE **PEAK**!



WHEN THE BROUHAHA KNOWN AS THE  
MEXICAN-AMERICAN WAR ROILED ACROSS  
THE SOUTH, AL WAS CAPTAIN OF THE  
**LITTLE ROCK GUARD**. THIS RAG TAG BAND  
WAS OFFICIALLY PART OF THE **ARKANSAS  
VOLUNTEER REGIMENT**.

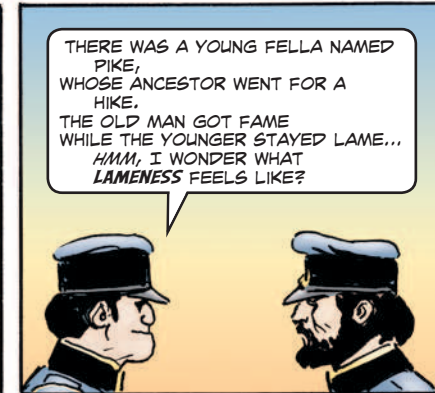
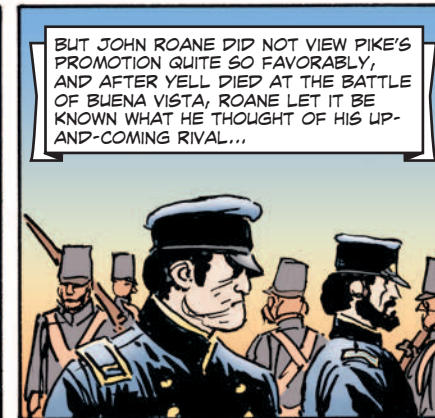
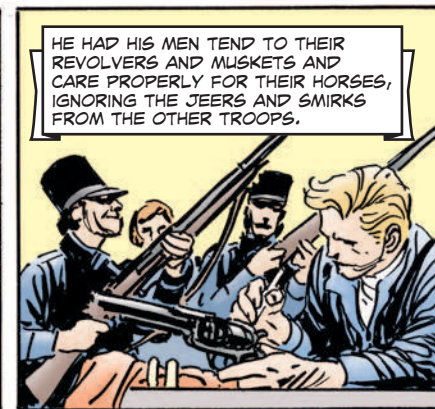
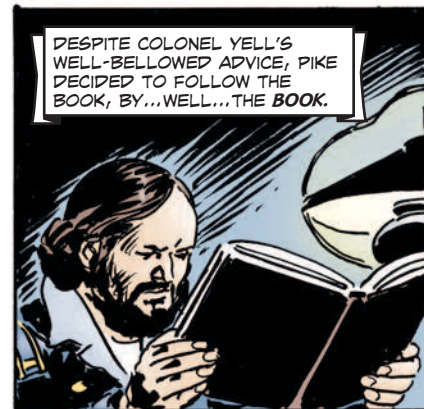
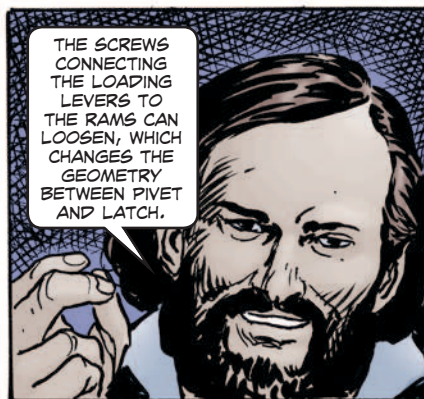
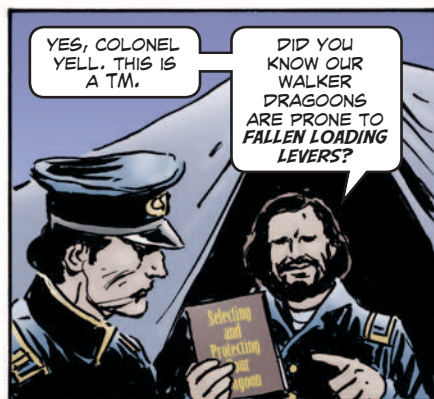
BUT BEFORE THE WAR, THEIR DUTIES  
WERE LIMITED TO FIRING OFF CANNONS  
FOR VISITING DIGNITARIES.



IN 1846, AL AND HIS LADS WERE  
SENT SOUTH TO FIGHT SANTA ANNA.  
AL PAID FOR HIS TROOPS' SUPPLIES  
OUT OF HIS OWN POCKET, AND  
MOST OF WHAT HE LEARNED ABOUT  
SOLDIERING CAME FROM READING  
**BOOKS** EN ROUTE TO THE BATTLE.

**PIKE!**  
READING  
AGAIN?









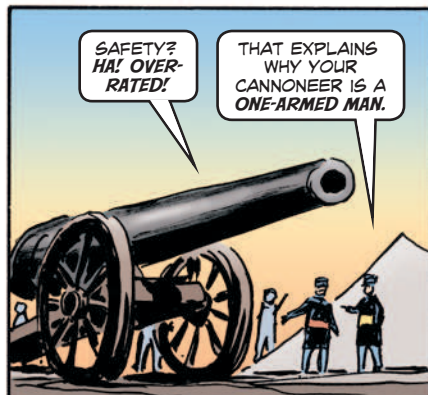
SPEAKING OF **LAME**, ROANE, I SAW THAT YOUR HORSE THREW A **SHOE** TODAY.

WHAT ARE YOU IMPLYING?



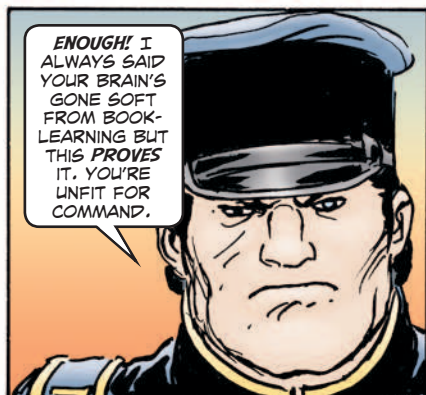
NOTHING. BUT IT'S A **SAFETY** ISSUE.

THOUGHT YOU'D WANT TO KNOW.



SAFETY? **HA! OVER-RATED!**

THAT EXPLAINS WHY YOUR CANNONEER IS A **ONE-ARMED MAN**.



**ENOUGH!** I ALWAYS SAID YOUR BRAIN'S GONE SOFT FROM BOOK-LEARNING BUT THIS **PROVES** IT. YOU'RE UNFIT FOR COMMAND.



SO SAYS THE MAN YELLING LIKE OLD YELL-ER.

I WONDER HOW BRAVELY YOU'D BELLOW OVER REVOLVERS AT DAWN?



FIND OUT, PIKE!

**NAME YOUR SECONDS!**

I GENERALLY ONLY TAKE SECONDS ON **DESSERT!**



I'LL HAVE NO MORE INSOLENCE FROM **YOU**, YOU YOUNG JACKANAPES.

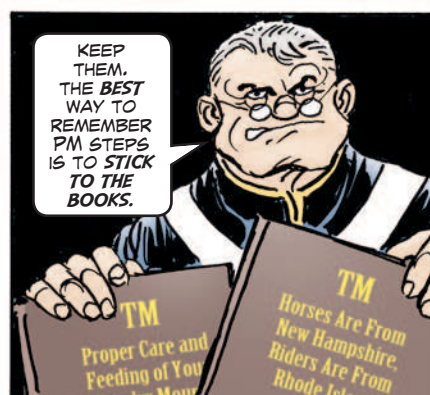
OUR DRAGOONS MEET AT DAWN!



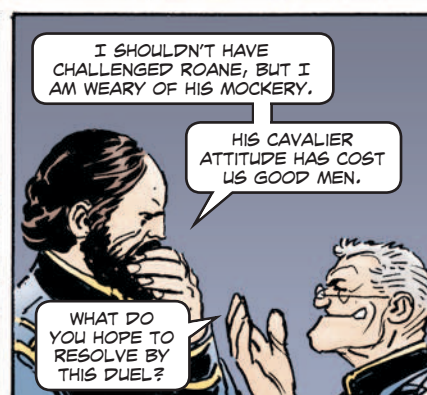
LATER IN HIS CAMP TENT...

THANKS FOR VOLUNTEERING TO BE MY SECOND IN TOMORROW'S DUEL, SERGEANT MASTERS.

BUT I MUST HOLD **YOU** PARTLY RESPONSIBLE FOR MY DILEMMA, SINCE YOU LOANED ME THESE TMS.



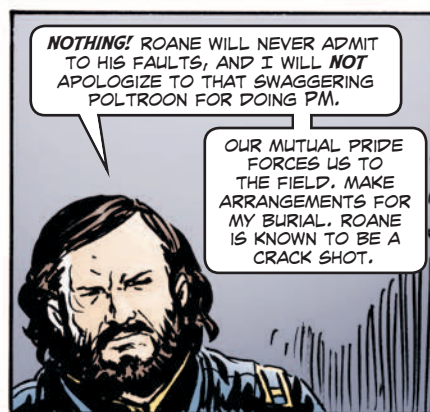
KEEP THEM. THE **BEST** WAY TO REMEMBER PM STEPS IS TO **STICK TO THE BOOKS**.



I SHOULDN'T HAVE CHALLENGED ROANE, BUT I AM WEARY OF HIS MOCKERY.

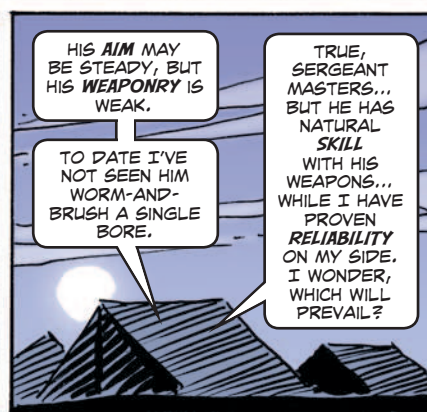
HIS CAVALIER ATTITUDE HAS COST US GOOD MEN.

WHAT DO YOU HOPE TO RESOLVE BY THIS DUEL?



**NOTHING!** ROANE WILL NEVER ADMIT TO HIS FAULTS, AND I WILL **NOT** APOLOGIZE TO THAT SWAGGERING POLTROON FOR DOING PM.

OUR MUTUAL PRIDE FORCES US TO THE FIELD. MAKE ARRANGEMENTS FOR MY BURIAL. ROANE IS KNOWN TO BE A CRACK SHOT.

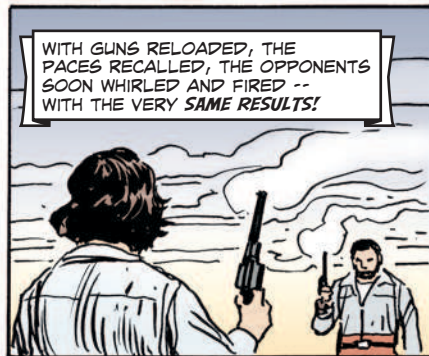
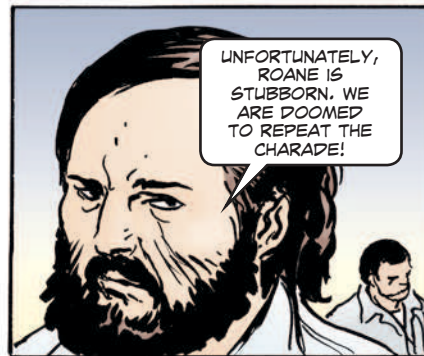
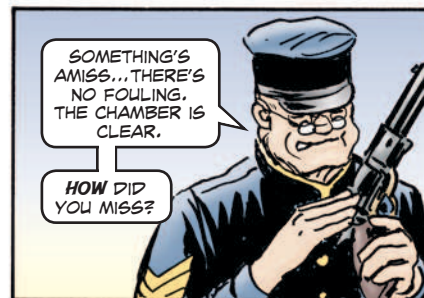
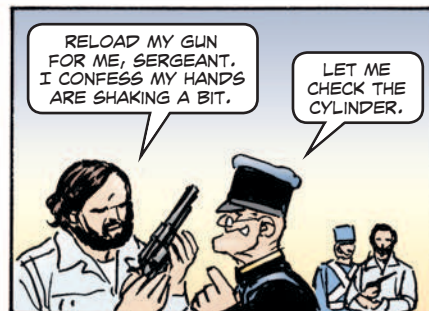
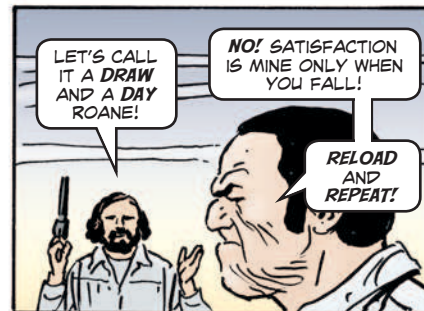
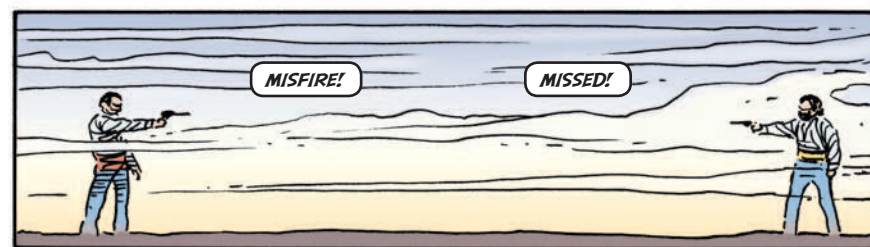
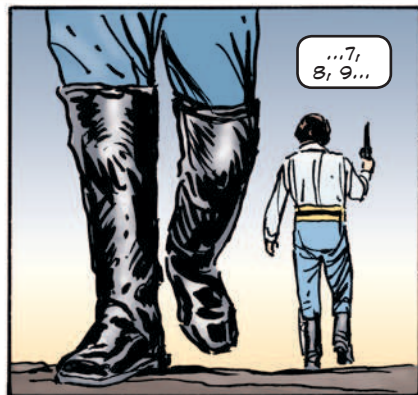
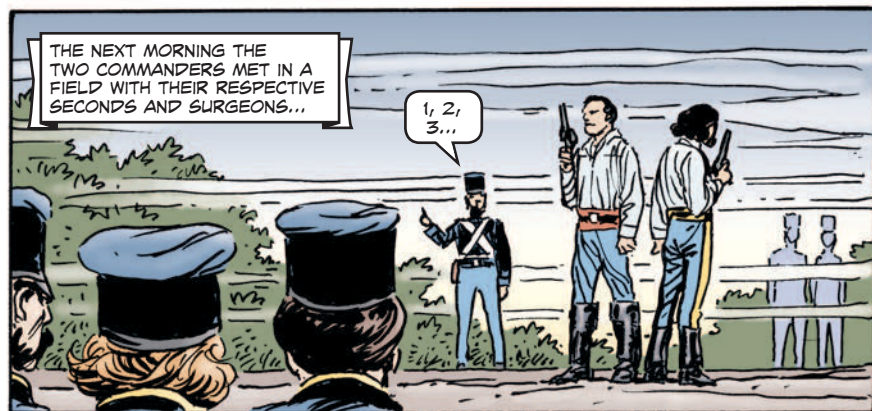


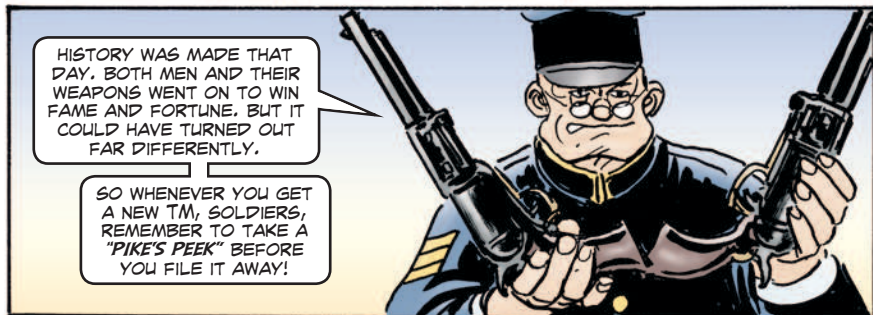
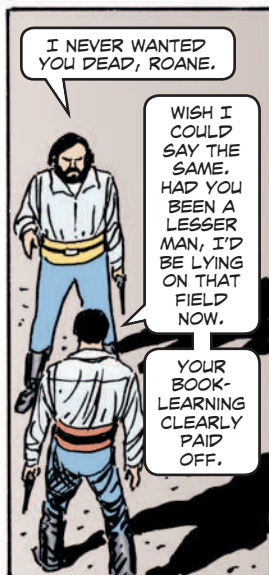
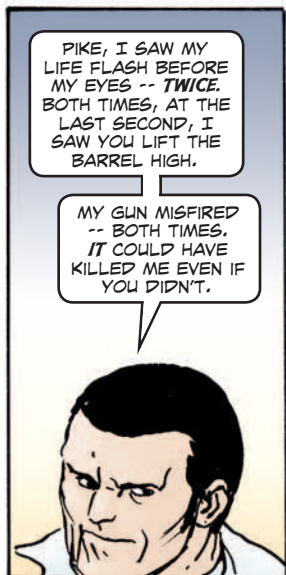
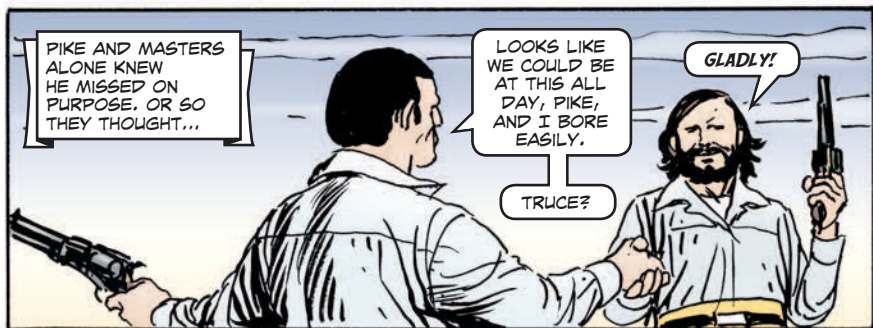
HIS **AIM** MAY BE STEADY, BUT HIS **WEAPONRY** IS WEAK.

TO DATE I'VE NOT SEEN HIM WORM-AND-BRUSH A SINGLE BORE.

TRUE, SERGEANT MASTERS... BUT HE HAS NATURAL **SKILL** WITH HIS WEAPONS... WHILE I HAVE PROVEN **RELIABILITY** ON MY SIDE. I WONDER, WHICH WILL PREVAIL?










Tools...

# New Aviation Tool Set Available




AVIATION  
REPAIRMEN CAN  
NOW ORDER  
JATS, THE NEW  
JOINT AVIATION  
TOOL SET.



JATS COMES IN  
BOTH AN ETCHED  
(ENGRAVED)  
VERSION, NSN  
5180-01-582-  
6072, AND NON-  
ETCHED VERSION,  
NSN 5180-01-  
582-6073.

JATS  
INCLUDES...

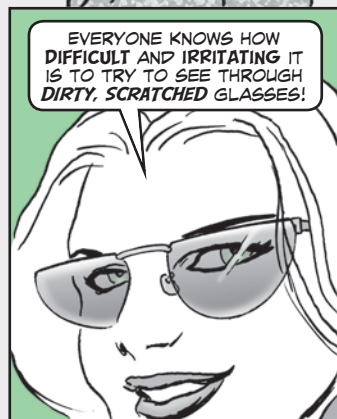
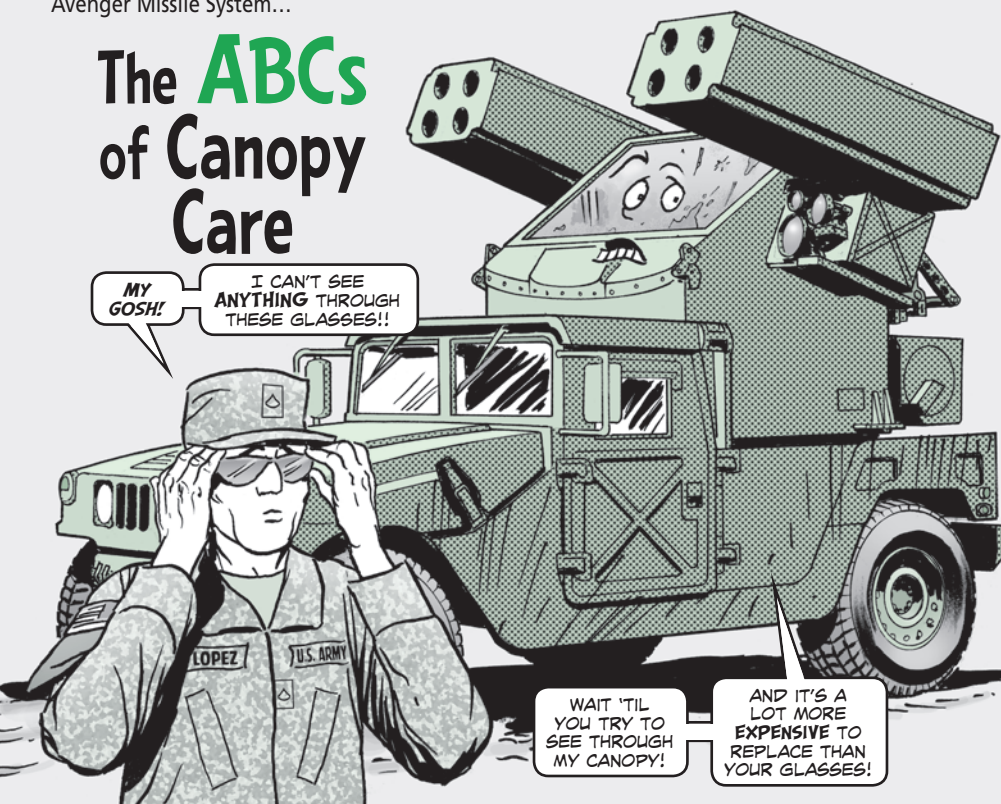
- 
- "No questions asked" lifetime warranty for the Pelican tool chest
  - "No questions asked" lifetime warranty for the wrenches, sockets and ratchets
  - Aerospace standard tools
  - Foam inserts for instant inventory
  - Attached wheels and a handle for easier transport

For more information about JATS, contact TACOM's Dan Stark at DSN 786-3678, (586) 239-3678, or email: [daniel.g.stark.civ@mail.mil](mailto:daniel.g.stark.civ@mail.mil)

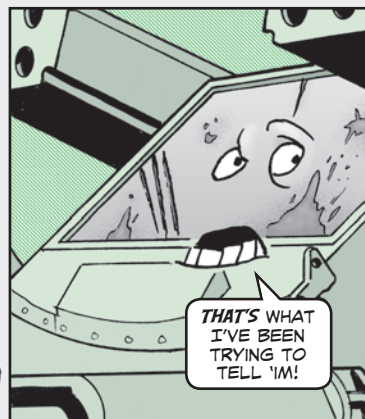
or George Lingris, DSN 786-8632, (586) 282-8632, or email: [george.r.lingris.civ@mail.mil](mailto:george.r.lingris.civ@mail.mil)



# The ABCs of Canopy Care



IT'S JUST AS DIFFICULT AND IRRITATING TO TRY TO SEE THROUGH YOUR AVENGER'S CANOPY IF YOU DON'T FOLLOW THE ABCs OF CANOPY CARE.

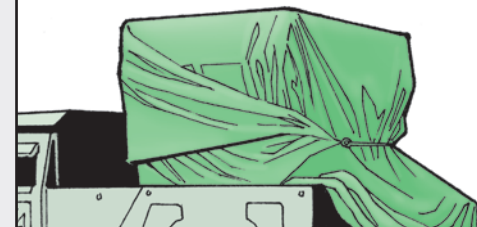


The first rule of canopy care is to protect it. If you leave the canopy uncovered day after day as it sits in the motor pool, blowing sand and dirt will scour its surface. Soon you can't see through it and your unit has to spend big bucks replacing it.

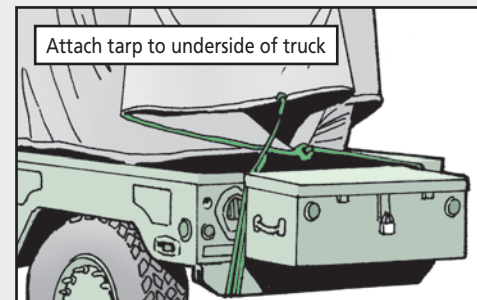
If your Avenger's canopy cover is shot or missing, it's hard to get a replacement because it doesn't have an NSN. You're better off using an old Bradley tarp, which will cover not only the canopy but the entire turret. A green Bradley tarp comes with NSN 2540-00-587-2532 and a tan one with NSN 2540-01-330-8062. Either one will set you back \$150, so it's much cheaper to local purchase a tarp or have your canvas shop make one measuring 12x17 feet.

One caution: Don't tie off the tarp inside the truck. That ruins the door seals. The best way to tie it off is to attach bungee cords to the tarp's ropes and connect them to the underside of the HMMWV.

Bradley tarp covers entire Avenger



Attach tarp to underside of truck



ALL THAT PROTECTION IS FOR NOTHING IF YOU JUST GRAB ANYTHING TO CLEAN THE CANOPY.

STUFF LIKE RAGS, WINDOW CLEANER, AND MULTI-PURPOSE CLEANER WILL STRIP OFF THE CANOPY'S INFRARED COATING.

The right way to clean the canopy is to first flush it with lots of water. Then use your bare hands (minus rings) and liquid dishwashing detergent, NSN 7930-00-880-4454, to clean off dirt. Flush the canopy again with lots of water and blot it—don't wipe it—dry with a clean cloth.

Use bare hands and dishwasher detergent to clean canopy



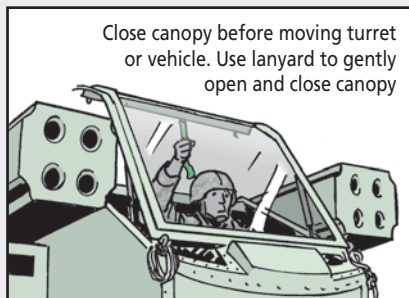
## A Line on Alignment

It doesn't take much to knock the canopy out of alignment and then it can't seal out fumes. That's why you should never move the turret or vehicle with the canopy open. That not only destroys the canopy's alignment but also the mounting brackets for the canopy struts. Shut and latch the canopy before any movement.

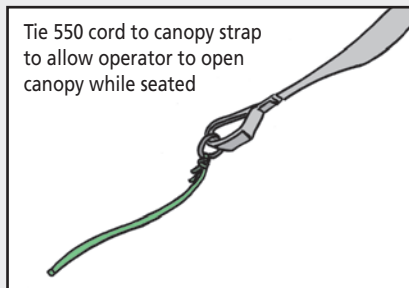
For the same reason, don't let the canopy spring open or slam shut. Use the lanyard to guide the canopy all the way up or down. Gunners often don't guide the canopy all the way up because the canopy lanyard is too short for them to do it while they're seated. So they let it go. An easy fix for that is to lengthen the lanyard by tying 550 cord to it.

Any time the canopy moves without resistance or won't stay open, you've got bad struts. Get them replaced.

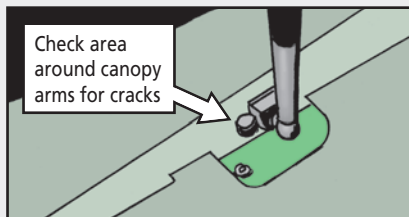
A good weekly PMCS tip is to check for cracks around where the canopy arms attach to the blocks mounted on the turret wall. If you catch cracks while they're small, they're easily fixed. But if the cracks get a chance to grow, the arms can rip right out.



Close canopy before moving turret or vehicle. Use lanyard to gently open and close canopy



Tie 550 cord to canopy strap to allow operator to open canopy while seated

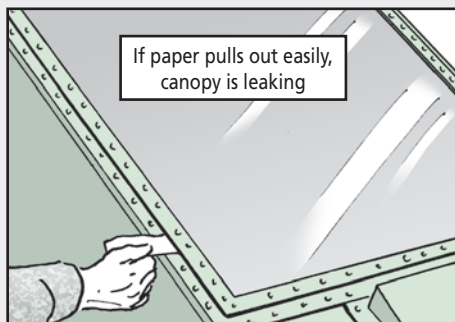


Check area around canopy arms for cracks

## The Seal of Approval

You certainly want to make sure the canopy has a good seal so you don't get missile exhaust in the turret. Here's an easy check:

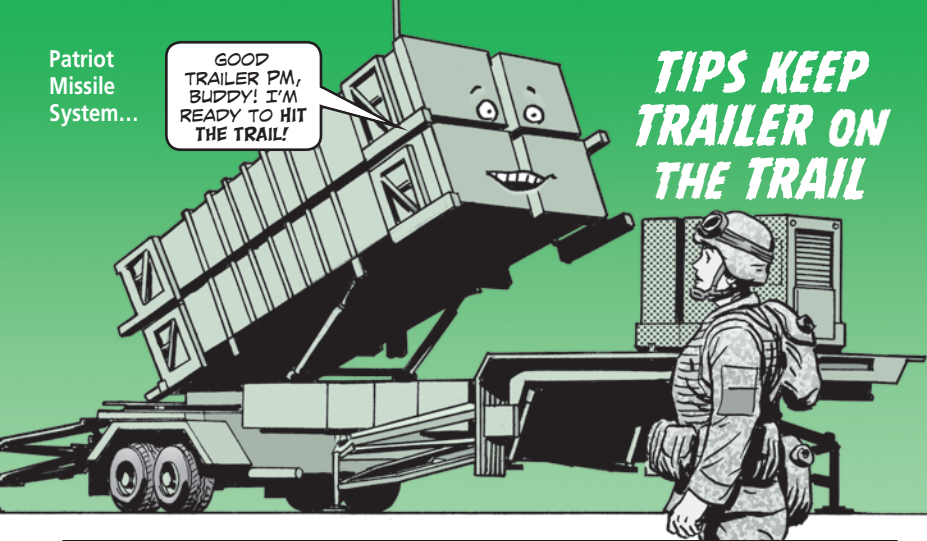
- Put 6x1-in pieces of paper half in and half out of each front corner of the turret.
- Close and lock the canopy.
- Pull on the paper.
- If either piece slips out easily, you've got a bad seal. Tell your repairman pronto.



If paper pulls out easily, canopy is leaking

GOOD  
TRAILER PM,  
BUDDY! I'M  
READY TO HIT  
THE TRAIL!

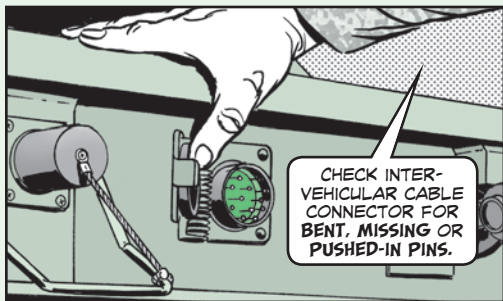
## TIPS KEEP TRAILER ON THE TRAIL



Dear Editor,

A Patriot system that has trailer problems is a Patriot that's not going anywhere. Here are a few tips to keep your Patriot trailers on the trail:

- If the trailer's brakes won't release, check the air pressure. It needs to be at least 120 psi. If that's not the problem, the glad hands for the trailer may be leaking from dry rot. Get your repairman to check it out.
- If the trailer lights won't come on, check the pins for the inter-vehicular cable connections. If pins are missing or bent, your repairman will need to be called in. But if the pins are just pushed in, you can use needle-nosed pliers to pull them out far enough so they make contact when the cable is plugged in.



CHECK INTER-VEHICULAR CABLE CONNECTOR FOR BENT, MISSING OR PUSHED-IN PINS.

If the pins are OK, the problem may be a bad ground. Check that the nuts for the grounding wires are screwed down tight and aren't rusted or painted over.

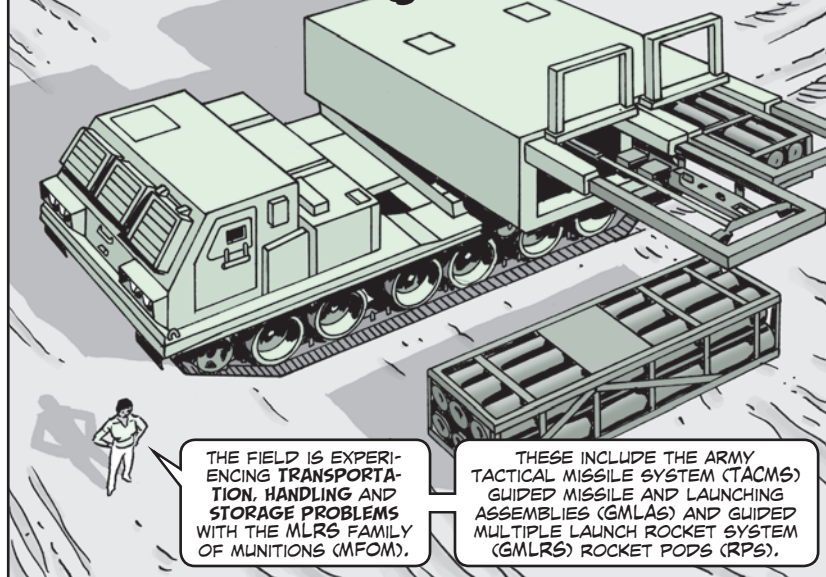
- Before you hook up trailers to their trucks, make sure the truck headlights are turned off. If the headlights are on when you plug in the inter-vehicular cables, arcing can burn out pins. That means no trailer lights.

CPL Marcelo Reyna  
45th ADA  
Ft Hood, TX

*Editor's note: Terrific trailer tips, Corporal. Thanks for sharing.*



# Safe Handling and Storage of MLRS Family of Munitions



ACCIDENTAL DAMAGE TO GMLAS OR RPs USUALLY OCCURS DURING HANDLING OPERATIONS.

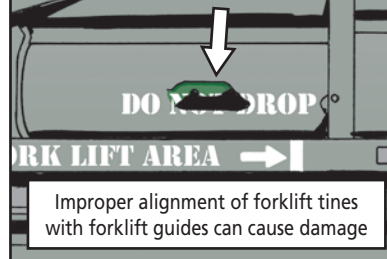
WHILE MOST COSMETIC DAMAGES DO NOT AFFECT MISSILES, SOME TYPES OF DAMAGE REQUIRE THAT ITEMS BE RETURNED TO THE DEPOT FOR REPAIR.



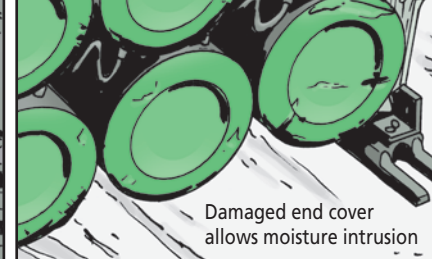
Examples of commonly reported damages are...

- Shunting plug (W1J1) damaged
- Inadequate or missing dunnage between pods
- Skid assemblies bent or missing
- Camouflage panels damaged
- Shorting plug missing
- Canvas covers ripped/fasteners broken
- W350 harness and/or connectors damaged
- Igniter wires broken or damaged
- Skid assemblies ground strap broken

Containers or tubes pierced by forklift tines



End covers cracked and gouged, sealant cracked



## Stacking Guidance

When stacking GMLAs or RPs, the alignment holes in the shock isolator (rubber) skids of an upper container must be properly aligned with the stacking pins of a lower container. That prevents undue stress on the shock absorbers and frame and stabilizes the stack.

Shock isolator skids **do not** adequately support a stack of two or more assemblies. In these cases, pod support dunnage must be installed directly **behind** the skids of the lower container(s) if stacks are two or more high.

Pod support dunnage **must** be used behind the skid feet of the lower RP (but not against RP radius blocks) if stacks are two or more high. Pod support dunnage is **not** required for a one-high assembly stack, or between the top two assemblies of stacks more than one high. Extra dunnage is not necessary for the top pod as the skids below it provide strong enough support.

Pod support dunnage consists of two 4-in. x 4-in. x 41 1/2-in. wood boards placed adjacent (towards center) to the vertical brace and the lifting rings if stacking two or more containers.

For stability, skids on lower containers should support a portion of the upper container weight when stacking.

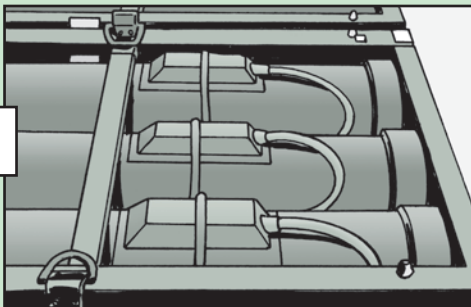
Do not stack GMLAs or RPs more than three high in the field, or more than four high when storing them inside magazines or igloos.

HERE'S SOME GUIDANCE FOR STACKING!



## GMLA and RP Handling Guidelines

- Lift only one GMLA or RP per move
- Always use a 6,000-lb (or heavier) forklift
- Position forklift tines properly and ensure forklift guides are securely attached to GMLAs or RPs
- When forklift tines extend past the bottom rail of the opposite side, position dunnage between the forklift and GMLA or RP to prevent damage to adjacent containers during stacking
- Never lift from either end of GMLAs to prevent connector and/or end cover damage



- Place dunnage between GMLAs or RPs. Ensure skids are attached

- Be sure stacking pins are aligned with holes in skids
- Use a strap to stabilize GMLAs or RPs when moving over rough terrain
- Do not walk or stand on top of GMLAs or RPs
- Do not drop, tumble, drag, pull or push GMLAs or RPs

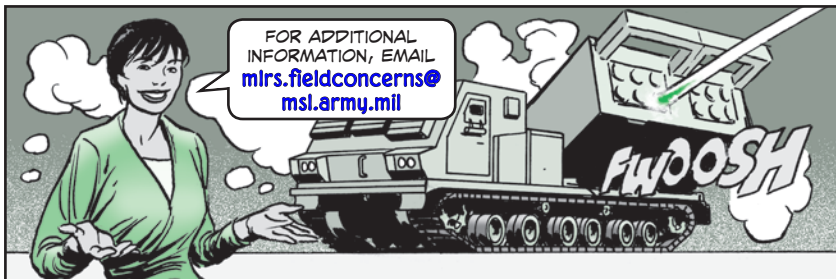
Use caution when placing dunnage to prevent damage to end covers and radial blocks located on top and bottom of FWD end of the GMLAs or RPs

## Caution

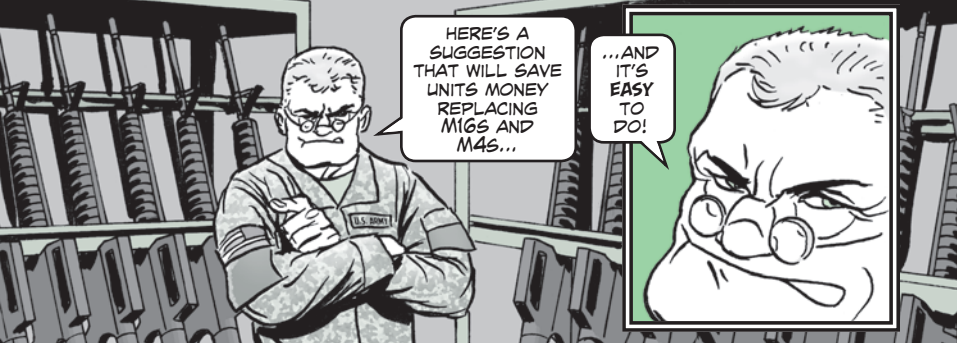
Do **not** mix different skid types on a container. Skids PN 13031726 and PN 13365803 should **not** be mixed due to differences in their height.

## Storage Temperature Limits

Temperature limits are -30°F to 160°F (-35°C to 71°C). Missiles or rockets exceeding these limits are to be placed in Condition Code J and reported to AMCOM LCMC via the Ammunition Condition Report.



# STORAGE PROBLEM SOLVED!



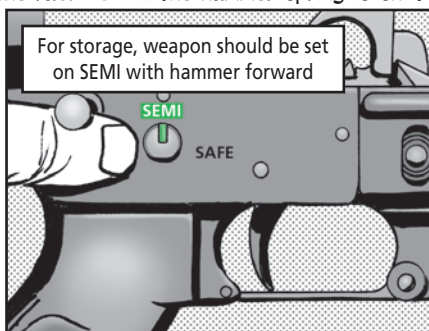
Dear Editor,

We continually run into the problem of M16 rifles and M4/M4A1 carbines being stored with the selector set to SAFE and the hammer cocked back. Leaving the hammer cocked wears out its spring. To replace the spring, you must take out the pins in the lower receiver. But removing the pins repeatedly enlarges the pinholes so much they can no longer securely hold the pins. Then the whole lower receiver must be replaced.

I think a big part of the problem is that Soldiers must clear their weapons before they turn them in to the arms room. To do that, they lock back the bolt and put the M16 or M4 on SAFE. They leave the weapon that way when they give it to the armorer. And the armorer leaves it that way when he puts the weapon in the rack. Soon the hammer spring is shot.

If armorers would stress to their units that after they clear their weapons they need to set them to SEMI with the hammer and bolt forward and the dust cover closed, this problem would be greatly reduced. And, of course, armorers need to check that weapons have been cleared before they store them in the rack.

SGT Elijah Kramer  
Camp Beauregard, LA



**Editor's note:** A simple check can save armorers and units time and money. And remember that your machine guns and pistols should also be stored uncocked with the bolts forward. Otherwise, their springs wear out, too. All springs should be relaxed for storage.



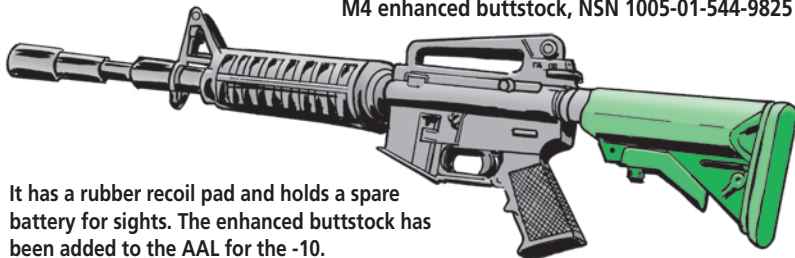
# LATEST AUTHORIZED ITEMS

HEY, THEY'VE ADDED SOME GREAT STUFF FOR OUR AAL.



Some Soldiers are unsure what is and isn't authorized for their M16-series rifles or M4/M4A1 carbines. Here are the latest additions to the additional authorization list (AAL) for TM 9-1005-319-10 and the auxiliary equipment list for the -23&P:

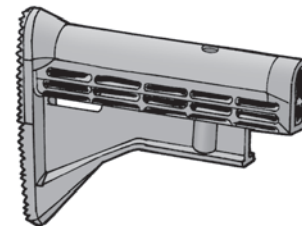
M4 enhanced buttstock, NSN 1005-01-544-9825



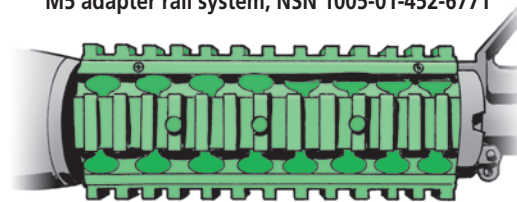
It has a rubber recoil pad and holds a spare battery for sights. The enhanced buttstock has been added to the AAL for the -10.

M16 hybrid buttstock kit, NSN 1005-01-569-6938

The hybrid buttstock reduces the length of the weapon for improved flexibility while in confined spaces or close combat. When the M16 is turned in, however, it must be returned to its original configuration with the standard buttstock. The hybrid buttstock has been added to the AAL of the -10.



M5 adapter rail system, NSN 1005-01-452-6771



The M5 can be installed on the M16A2 by replacing the handguard assembly. (The M16A3 and A4 are already equipped with the M5.) The M5 lets you mount a variety of optics and sights for better shooting. Installation instructions are in WP 0015 in the -23&P. The M5 will be added to the AAL table in the next change to the -10.

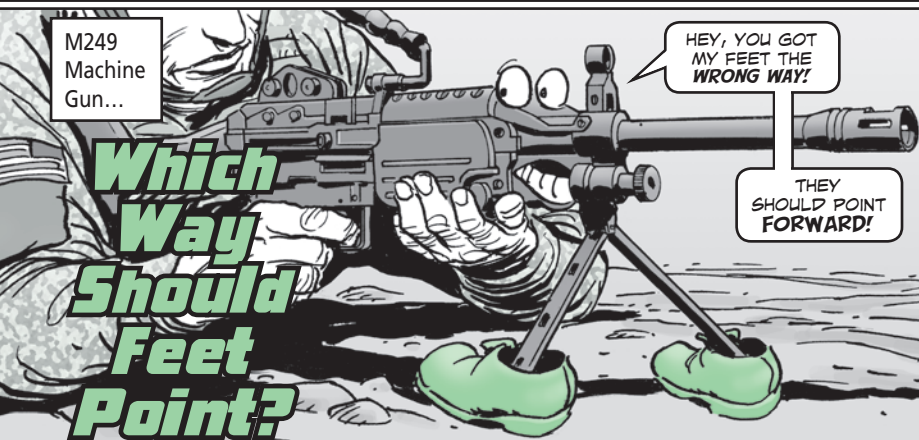
All other authorized items for the M16 and M4 are listed in the AAL in the -10 or the auxiliary equipment list in the -23&P. These are the only items you're authorized to use on your M16 or M4.

For the latest editions of the TMs, go to:

<https://www.logsa.army.mil/etms/online.cfm>

M249 Machine Gun...

## Which Way Should Feet Point?



Dear Half-Mast,  
Is there anything that specifically spells out which way the feet on the M249 machine gun's bipod should point? I have checked the TMs and can find nothing on this.

C.D.

Dear Mr. C.D.,

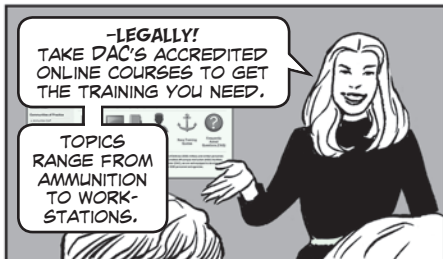
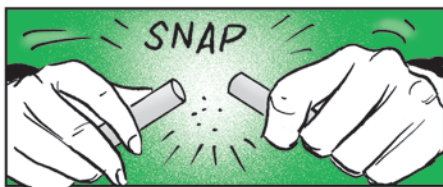
There are actually two different M249 bipods in the field. The older one that comes with PN 9348320 has a left lower leg and a right lower leg. If the legs are inserted correctly with their release pins facing out, the feet point forward. But it is possible to install the legs on the wrong side, which would point the feet in the wrong direction.

The new bipod, PN 13022645, has interchangeable legs with matching feet, so its feet can only point forward.

So, if your M249's feet don't point forward, you've got the legs reversed. You've got your M249 off on the wrong feet.

Half-Mast

# DISTANCE LEARNING OPTIONS ABOUND



Sometimes, just finding the time for learning can be a challenge when you're already swamped with daily duties.

Fortunately, the Defense Ammunition Center (DAC) offers distance learning courses. Online courses eliminate the high costs and hassles of TDY trips, and give students greater flexibility because they can complete class course work in their own time and at their own pace.

Currently, DAC has more than 50 accredited online courses. One example is the recertification refresher course AMMO-37-DL, *General Transportation of Hazardous Materials*. It meets the mandatory refresher training requirements found in the Defense Transportation Regulation (DTR) DOD 4500.9-R.

DOD personnel who handle HAZMAT preparation, packaging, marking, labeling or documentation can take AMMO-37-DL if they have completed one of the initial HAZMAT courses listed in Vol 2, Chap 204 of the DTR.

For the complete list of distance learning courses, visit: <http://ammo.okstate.edu/>

On the main page, select Online Training. You will need your CAC to register. For help with online courses, contact the Army Learning Management System at DSN 826-4745 or (877) 251-0730.

# Sign Up For CBRN Alerts

HERE'S  
HOW TO GET  
UPDATES ON  
ALL THINGS  
CBRN!



FROM MASK VALVE  
PROBLEMS TO THE  
LATEST ISSUE OF  
CHEM-BIO DEFENSE  
QUARTERLY  
MAGAZINE...

...JACKS  
HAS THE  
FACTS!

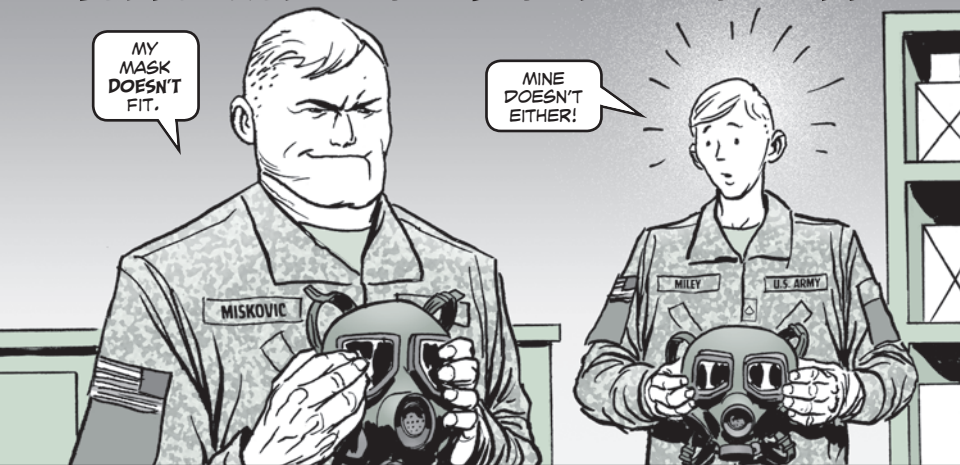
The Joint Acquisition CBRN Knowledge System (JACKS) website makes it a snap to get CBRN and shelf-life updates. Sign up through JACKS to receive emails with the latest info.

Here's how:

- Go to <https://jacks.jpeocbd.army.mil> and log in using your common access card (CAC).
  - Click on the Community tab and select My Profile from the dropdown menu.
  - On the Profile toolbar, click on My Subscription.
  - In the first section, *Step 1: Select Alerts*, place a check mark in the box preceding the alerts you want to receive:
    - CBRN advisory messages
    - Demil instructions
    - New CBRN equipment
    - Hot CBRN news
    - Shelf life updates
    - *Chem-Bio Defense Quarterly Magazine*—An alert will be sent to you whenever the latest issue is available for download. You can also choose to have the magazine mailed to you.
  - In *Step 2: Select Alert Frequency*, choose if you would like to receive messages, daily or weekly. You can also choose no messages if no updates have been made that day or week.
  - In *Step 3: Add Email Addresses*, click on Add Email and list the email addresses where you want the alerts sent.
  - In *Step 4: Save Your Subscription*, choose either Save Subscription or Cancel and Exit to save or cancel your alert setting.
- To modify your subscription, follow the steps above. To cancel it, click on Unsubscribe just below the profile toolbar.



# EASY HARD-TO-FIT SOLUTIONS



CBRN SPECIALISTS, FIRST CHECK TB 3-4240-341-20-1, WHICH COVERS HARD-TO-FIT SOLDIERS. AND HERE ARE A FEW **EASY** SOLUTIONS FOR HARD-TO-FIT SOLDIERS...

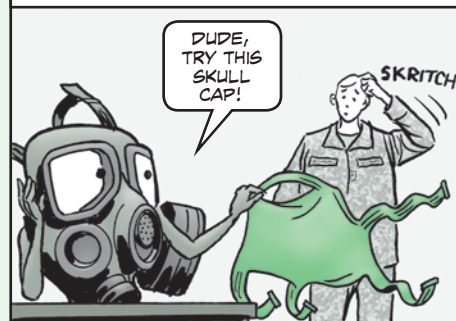
- Always use the M41 protection assessment test system (PATS) to test the mask fit. Banana oil is much less accurate and may flunk a mask that does in fact fit correctly.



- If a small mask is too big to create a good seal, readjust and tighten the head harness, then test with PATS again. Sometimes that's enough to do the trick. If it still flunks, check the head harness for elasticity. Replace it if necessary.



- If the small mask still doesn't pass, replace the head harness with a skull cap head harness, NSN 4240-01-390-3057, and re-check the fit.



- Still no luck? Try the M45 land warrior mask. It has an extra small size that might do the trick. The XL M45 is also slightly bigger than the M40/M42's large. Check out the TB for guidelines on ordering. The M45 is covered by TM 3-4240-348-10.

IF A SOLDIER MUST WEAR AN M45 BECAUSE THE M40/M42 DOESN'T FIT, HE IS AUTHORIZED TO KEEP THE M45 FOR THE REST OF HIS ACTIVE SERVICE. PARA 1 IN WP 0001 00-3/4 OF TB 3-4240-341-20-1 AUTHORIZES THAT.

IF NONE OF THESE SOLUTIONS WORK, CHECK OUT TB-3-4240-341-20-1 FOR FURTHER HELP. IT ALSO HAS ADVICE IF A LARGE MASK IS TOO SMALL FOR A SOLDIER.

IF NOTHING WORKS, TELL YOUR CO. HE WILL NEED TO DECIDE IF THE SOLDIER IS DEPLOYABLE.

AN/PDR-77 Radiac Set...

## Update Your TMs Please

Dear Editor,

While doing inventory of my AN/PDR-77 radiac sets, I discovered some corrections that need to be made to Page D-3 of TM 11-6665-365-12&P, which lists the components of end item:

- On line 5, the part number should be A3085186 and the nomenclature should read DT-616/VDR-2
- On line 8, the NSN should be 9330-01-375-2155
- These parts now have NSNs:
  - line 5, NSN 5985-01-251-2716
  - line 6, NSN 8010-01-440-8999
  - line 10, NSN 6665-01-394-2574
  - line 11, NSN 6230-01-470-2292
  - line 14, NSN 5355-01-440-9005
  - line 15, NSN 5120-01-396-8960

SGT Gus Barreto-Mendez  
Starke, FL

**Editor's note:** Thanks for the update, Sergeant. CBRN specialists, update your TMs now to save yourself trouble later.

# THE PERILS OF PACKING

WHAT'S THE HOLD-UP? I'M SO HUNGRY I COULD EAT MY BOOT!

WE'D BE WAITING A LOT LONGER IF THE EQUIPMENT HAD BEEN DAMAGED IN TRANSIT!

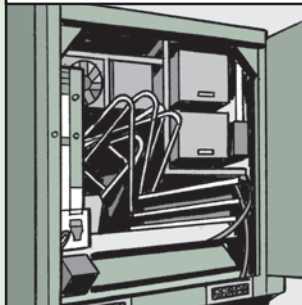
I'M GLAD THEY PACKED THIS KITCHEN UP RIGHT!

TAKE CARE WHEN YOU PACK GEAR IN THE MECHANICAL ROOM AT THE BACK OF THE CONTAINERIZED KITCHEN.

CARELESS PACKING CAN LEAD TO DAMAGED EQUIPMENT.

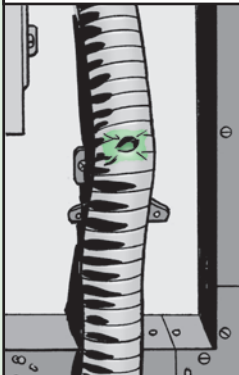
The mechanical room is only about 30 square feet. But it houses a generator, two air conditioners, ventilation and exhaust fans, a power distribution panel and more. The room also houses some removable gear: eight wing jacks, a ground rod, a slide hammer, screw jacks and corner jacks along with their extension base plates, stairs/ladders and six 5-gal water cans.

THE PROBLEM COMES WHEN YOU STOW THIS REMOVABLE GEAR LOOSELY INSTEAD OF SECURING IT IN BRACKETS OR STRAPPING IT DOWN.

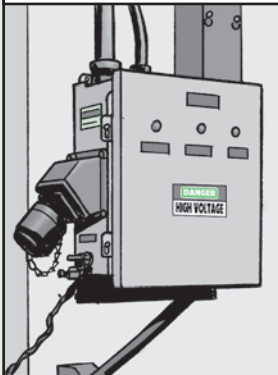


LOOSE GEAR CAN SHIFT IN TRANSIT... AND CAUSE DAMAGED EQUIPMENT!

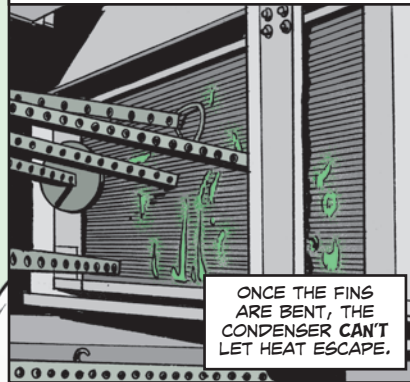
IT CAN PUNCTURE THE GENERATOR'S EXHAUST TUBE OR THE MODERN BURNER UNIT'S (MBU) FUEL HOSE.



IT CAN BEND THE EXHAUST PIPE COUPLING AND SMASH THE CIRCUIT BREAKERS ON THE POWER ENTRANCE PANEL.



THE AIR CONDITIONERS TAKE THE WORST BEATING. THE SLIDE HAMMER, THE GROUND ROD AND THE JACKS SLAM INTO THE CONDENSERS AND BEND THE FINS.



ONCE THE FINS ARE BENT, THE CONDENSER CAN'T LET HEAT ESCAPE.

SOMETIMES THE GEAR RAMS THROUGH THE FINS AND PUNCTURES TUBES UNDERNEATH, RELEASING HIGH-PRESSURE, COLD REFRIGERANT. THAT LIQUID CAN INJURE YOU.



EITHER WAY, THE AIR CONDITIONERS WON'T OPERATE.

KEEP IN MIND, THE AIR CONDITIONERS WORK IN TANDEM.

IF ONE GOES DOWN, THE OTHER ONE WON'T WORK EITHER. YOU MAY HAVE TO REPLACE THEM BOTH.

## A Packing Plan

Prevent damage to the mechanical room's equipment. Pack gear the right way. WP 0006 of TM 10-7360-226-13&P (Aug 01, w/Ch 4, Mar 07) shows you how. It has a loose item packout list of the stored gear. The work package leads you step-by-step on how to pack items. It tells you where to store them and how to secure them in place with brackets or straps.



# AN ABSORBING SUBJECT

**M**OTOR POOLS AND MAINTENANCE SHOPS ARE HOME TO FUEL, OIL, LUBRICANTS, CLEANING SOLVENT, DEGREASER, ANTIFREEZE AND BRAKE FLUID. SOONER OR LATER, SPILLS OR LEAKS OCCUR.

THAT'S WHEN YOU STEP IN TO CONTAIN, CONTROL AND ABSORB THEM QUICKLY AND SAFELY.

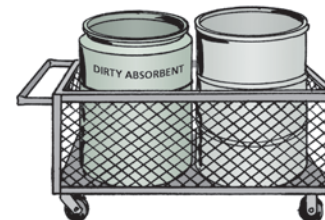


- They absorb better than clay-based products. That means you'll use less. They also may have higher up-front costs. But because you'll use less, organic products could save you money in the long run.
- Their recycling costs are cheaper than the disposal costs of clay products.
- Some varieties clump like some cat litters.
- They make clean-up quicker, easier and more efficient
- The loose-sweep form of organic products changes color when you apply it. Its natural tan changes to gray and then to black as the sweep absorbs the spill. When it turns completely black, it's time to change the sweep.
- The loose-sweep form of organic products is lighter than clay absorbents. If you use it outside, a stiff breeze can blow it away.
- Even though organic absorbents work well in sopping up spills, they can leave stains behind. Use general purpose detergent, NSN 7930-00-926-5280, to get rid of stains.
- Once they become soaked with petroleum, oil or lubricants (POL), you must handle them as hazardous waste—just as you would a clay absorbent.

Clean up is quicker and easier



Handle dirty absorbent as hazardous waste



THESE ARE SOME ORGANIC ABSORBENTS YOU CAN ORDER THROUGH THE DEFENSE LOGISTICS AGENCY (DLA).

As always, if you have any questions about hazardous materials, talk with your unit's HAZMAT officer or NCO. Or talk with the people at the environmental office supporting your unit or installation.

Item	NSN 4235-01-	Item	NSN 4235-01-
Spill clean-up kit	572-3891	Spill station	572-3936
20-lb bag	572-3892	Absorbent sock	572-3929
4-lb pouch	572-3902	Absorbent pillow	572-3933
20-lb bag, sweeping compound	572-3908	23-lb bag	436-8317*
		25-qt (50-lb) bag	430-2003

\* Order on DD Form 1348-6 and put "NSN not on the AMDF" in the REMARKS block.

PS MORE



## Before You Order

DO YOUR HOMEWORK BEFORE YOU CHOOSE AN ABSORBENT. HERE ARE SOME QUESTIONS TO CONSIDER...

- How effectively does it absorb POL spills and leaks?
- What are its total costs, including purchase, disposal, and storage and handling?
- How will you dispose of it? By burning? Putting it in a landfill? Recycling? Treating it biologically?

REMEMBER, ONCE THE ABSORBENT IS SOAKED WITH POL, YOU MUST HANDLE IT AS **HAZARDOUS WASTE.**

DISCUSS SOME OF THESE MATTERS—**ESPECIALLY DISPOSAL**—WITH YOUR UNIT'S HAZMAT OFFICER OR NCO. OR TALK WITH THE PEOPLE AT THE ENVIRONMENTAL OFFICE SUPPORTING YOUR UNIT OR INSTALLATION.

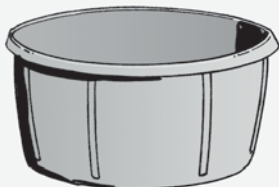
## An Ounce of Prevention

THERE'S ONE SURE WAY TO AVOID CLEANING UP VEHICLE LEAKS...

CATCH LEAKING FLUIDS BEFORE THEY GET OUT OF CONTROL. PUT SOME DRIP PANS UNDER LEAKS UNTIL YOU GET THEM FIXED.

PLASTIC DRIP PANS CAN CRACK AND LEAK. BUT RUBBER PANS WON'T CRACK, AND THEY'LL SNAP BACK IF THEY'RE CRUSHED. GET RUBBER PANS WITH THESE NSNs...

Rubber pans are more durable



Size	NSN 4940-01-490-
3 gal	2455
6 1/2 gal	2463
15 gal	2470

THE FOLLOWING RUBBER PANS COME WITH A 6-FT CHAIN AND CLIP FOR ATTACHING THE PAN TO YOUR EQUIPMENT...

Size	NSN 4940-01-
3 gal	504-5270
6 1/2 gal	504-5273
15 gal	505-0680

# WEAR IT *RIGHT* TO BATTLE BUGS

WEARING YOUR FLAME-RESISTANT ARMY COMBAT UNIFORM-PERMETHRIN (FR ACU-P) PROVIDES **SAFE, EFFECTIVE, PERMANENT** PROTECTION *AGAINST* INSECT BITES AND INSECT-BORNE DISEASES FOR THE LIFE OF THE UNIFORM.

Lone star tick



Deer tick



Deer fly



Sand fly



Horse fly



Ant



Chigger mite

Mosquito



## Remember these tips:

- Your ACU acts as a physical barrier against insects. In a field environment, keep your sleeves rolled down. Close all openings that might let in insects. Tuck pants into your boots or use your trouser drawstrings. Tuck your undershirt into your pants.
- Wear your ACU loosely because some insects, like mosquitoes, can bite through fabric that is pulled too tightly against the skin.
- Apply a thin coating of an insect repellent (DEET) to all exposed skin. Use the following NSNs to order your product of choice, and follow label directions for each one:
  - NSN 6840-01-284-3982 (3M Ultrathon™)
  - NSN 6840-01-584-8598 (Backwoods Cutter®)
  - NSN 6840-01-584-8393 (LipoDEET)
- Sleep or rest under a bed net treated with permethrin.
- Take malaria prophylaxis pills if you are directed to do so by your medical authority.
- Do not use aftershave lotions, colognes, perfumes, scented deodorants or perfumed soaps in the field. They may attract insects.
- Wash and inspect your body daily for insects and their bites or as often as the tactical situation permits.
- Use the buddy system to check your clothing for ticks.
- Wash your ACU routinely following factory care label instructions to remove insects and their eggs. See washing instructions in PS 706, page 54.



## Your FR ACU-P can be worn in many environmental conditions!

STAY WARM



STAY DRY



STAY BUG FREE

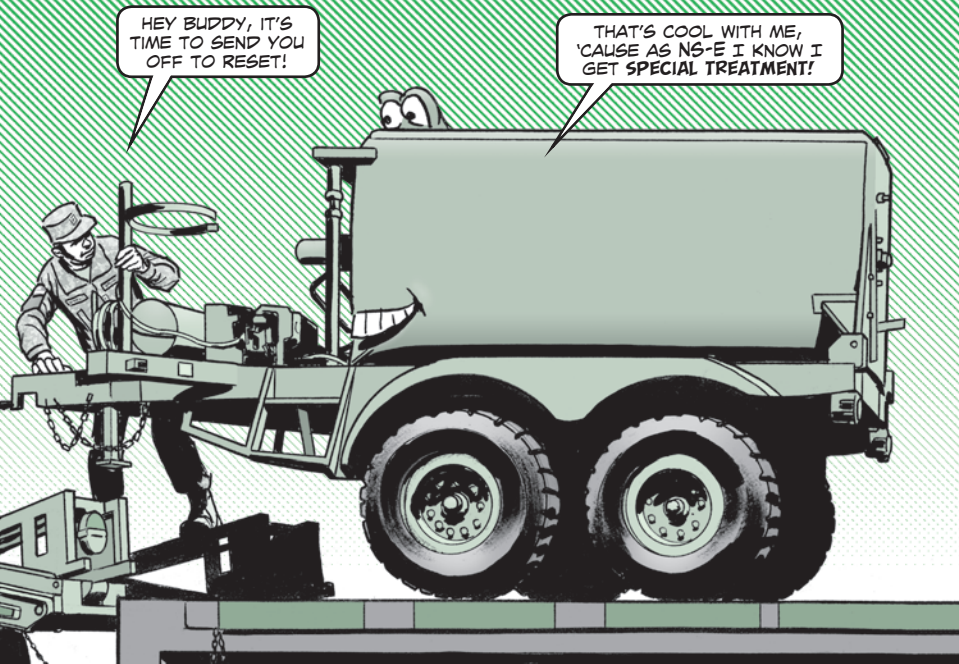


STAY HYDRATED





# NON-STANDARD EQUIPMENT RESET AND REPAIR PROCESS



**E**arlier this year, HQDA G-4 published an ALARACT message on maintenance of Non-Standard Equipment (NS-E). The message updated policy for the storage, Reset and repair of NS-E.

NS-E is commercially acquired or non-developmental equipment used to bridge mission capability gaps.

The Army Materiel Command (AMC) has the lead for Reset and repair of NS-E. AMC also arranges for commercial maintenance contract support.

Users can find product and maintenance information needed to repair and Reset NS-E at the Materiel Enterprise Non-Standard Equipment (MENS-E) database:

<https://www.mens-e.logsa.army.mil/>

Repair and funding for Reset NS-E is also through AMC. If units wish to repair non-Reset items, it is their responsibility to fund the repair through AMC.

For more information, contact Tommy Preston at DSN 224-0997, (703) 614-0997, or email:

[tommy.preston@conus.army.mil](mailto:tommy.preston@conus.army.mil)



LOGISTICS TOOLS ARE NOT ALWAYS EASY TO FIND, BUT FORTUNATELY, THE DEFENSE LOGISTICS AGENCY (DLA) HAS YOUR BACK WITH SPIDERS!

FOR  
EXAMPLE...

IBEX CAN ALSO TELL YOU IF PARTICULAR PORTS ARE DEEP ENOUGH TO SUPPORT SHIPS, IF CERTAIN ROADS ARE WIDE ENOUGH FOR YOUR SHIPPING CONTAINERS, AND HOW YOU CAN FIND SHORT SHELF-LIFE ITEMS EVEN IN REMOTE LOCATIONS.

**MREs LOCATED!  
SENDING QUANTITY  
AND STYLES...**

THE INDUSTRIAL BASE EXTENSION (IBEX) PROGRAM IN SPIDERS GIVES A **POWER BOOST** TO DEPLOYED UNITS BY TRACKING DOWN LOGISTICS SUPPLIES AND SERVICES IN OCONUS.

CAN THEY FIND  
SOMETHING THAT  
TASTES GOOD?

**PLENTY OF  
ROOM FOR SHIPS  
TO ENTER PORT**

# Support Planning Integrated Data Enterprise Readiness System

SPIDERS CAN  
HELP YOU AND  
YOUR UNIT WITH...

## CONTINGENCY PLANNING

## READINESS

**AND ASSET  
VISIBILITY.**

SPIDERS combines data from multiple sources to give you a complete picture of vendor capabilities in the US as well as third party logistical supplies and services providers overseas. This means you'll know if a vendor can supply what you need, when you need it or can go get what you need when all other conventional means are exhausted.

One of the most popular utilities in SPIDERS is a handy container calculator, which can help you figure out your supply transportation needs for Class I operational rations. It can calculate the number and size of shipping containers needed for a particular mission. And thanks to a recent upgrade, the calculator can even tell you how many cargo aircraft, helicopters or trucks it will take to get the job done.

For more information, or to sign up for an account, visit:

<https://spiders.dla.mil>

For questions or help with SPIDERS, call (215) 737-4357 or (877) 352-2255. You can also submit a request for support at the SPIDERS website.

ALTHOUGH SPIDERS HAS BEEN AROUND FOR AWHILE, SECURITY HAS BEEN **BEEFED UP** AND THE SITE IS NOW **CAC-ENABLED**.

SO KEEP THAT CAC HANDY WHEN YOU WANT TO TAKE SPIDERS FOR A WALK!

# DLA Grows Green Thumb



The Defense Logistics Agency (DLA) manages 4.8 million items across eight supply chains, including some traditionally hazardous materials.

DLA wants to help its customers 'buy green' and to do so, it has set up the Hazardous Waste Minimization (HAZMIN) and Green Products Program at DLA Aviation in Richmond, VA.

The team gives advice and practical assistance to authorized users of the federal supply system. They can help supply personnel identify and obtain environmentally sustainable or 'green' products.

Partial funding is also available for military HAZMIN projects that may result in adopting less hazardous products or processes throughout DOD.

Some examples of DLA's green products and services include:

- less hazardous/less polluting aircraft spot cleaners and degreasers
- re-refined motor oil
- recycled antifreeze
- bio-based penetrating lubricants
- recycled absorbents
- wet battery consignment program

The HAZMIN and Green Products Branch will be a key partner in the military's efforts to comply with Executive Order 13514. This presidential mandate requires that 95 percent of new contract actions are for products and services that are energy efficient, water efficient, bio-based, environmentally preferable or non-ozone depleting, and follow criteria set by the Environmental Protection Agency and the US Department of Agriculture.

GOING GREEN IS MANDATORY IN THE ARMY WHEN PROCURING CERTAIN ITEMS AND SERVICES, INCLUDING BUT NOT LIMITED TO...

- paper and paper products
- office products and equipment
- vehicle maintenance
- printing supplies or services
- appliances
- computers and other electronic equipment
- industrial supplies
- parks and recreation products
- building construction
- renovation or maintenance supplies



REMEMBER, WHEN YOU BUY GREEN PRODUCTS, YOU ARE HELPING THE ARMY PERFORM ITS MISSION BY...



- increasing energy efficiency
- improving workers' health
- promoting environmental stewardship
- creating markets for green products

With the exception of weapons systems, federal agencies must try to buy items that contain recycled content and are nontoxic.

For more information, visit:

[http://www.aviation.dla.mil/userweb/aviationengineering/BUY\\_GREEN/](http://www.aviation.dla.mil/userweb/aviationengineering/BUY_GREEN/)

Call DSN 695-4060, (804) 279-4060, or email:

[greenproducts@dla.mil](mailto:greenproducts@dla.mil)

## LOGSA UPDATES ETM CD-ROM/DVD LABELS



Look for the current Army Chief of Staff's name and official signature of the current administrative assistant to the Secretary of the Army

The name and signature verify your disk is DA-authenticated

The USAMC Logistics Support Activity (LOGSA) is updating CD-ROM/DVD labels on all electronic technical manuals (ETMs). The new labels include the current Army Chief of Staff's name and the signature of the current Administrative Assistant to the Secretary of the Army. These are required on all DA-authenticated technical manuals (paper or electronic format.) The new labels mean it's no longer necessary to keep the mailers that your disks came in to prove you have official, DA-authenticated CD-ROMs/DVDs. Questions? Contact ETM Customer Service at DSN 645-0809, (256) 955-0809, or email:

[logsa.logetm@conus.army.mil](mailto:logsa.logetm@conus.army.mil)

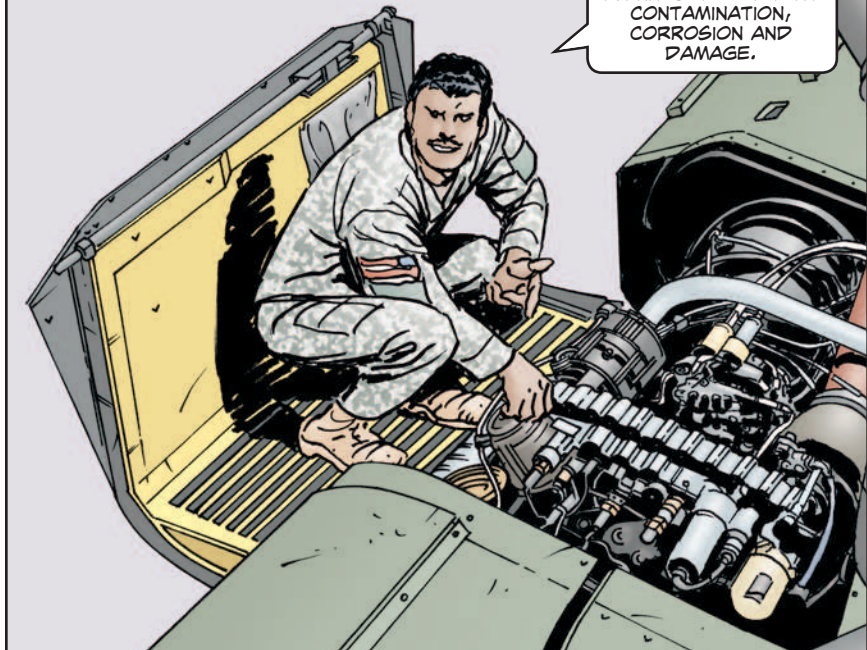
DISTRIBUTION: To be distributed in accordance with the initial distribution number (IDN) 340312, requirements for TB 43-PS-Series.

Would You Stake Your Life <sup>right now</sup> on the Condition of Your Equipment?



# CAP 'EM!

WHEN YOU REMOVE  
AN ENGINE FOR ANY  
REASON, ALWAYS CAP  
LINES, TUBES AND  
FITTINGS TO PREVENT  
CONTAMINATION,  
CORROSION AND  
DAMAGE.



**AIR**

PLUGS OPEN LINES AND  
CONTAMINATES OIL AND FLUID.

**MOISTURE**

LEADS TO CORROSION.

**PLUGGED CONNECTORS**

CAUSE BROKEN OR BENT PINS.