

Issue 686



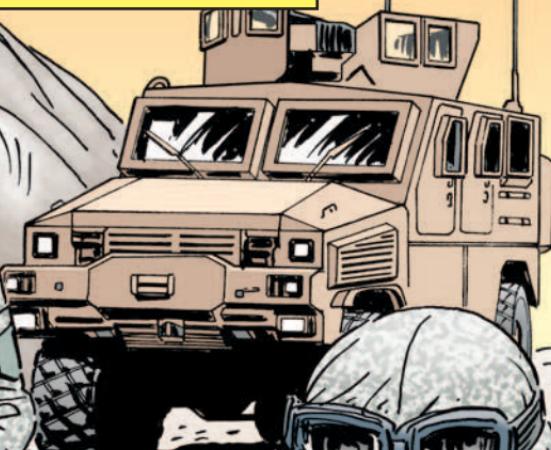
January
2010

THE PREVENTIVE MAINTENANCE MONTHLY

TB 43-PS-686

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THIS GUNNER
RESTRAINT
BELT IS
SHOT!



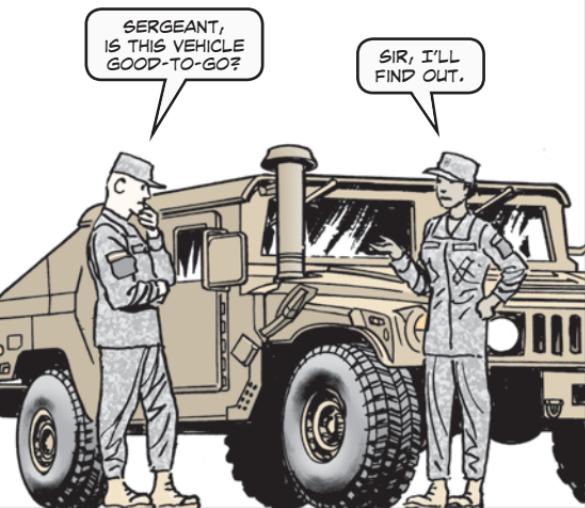
AH! I
FOUND IT!
THE INDEX
SHOWS A GRS
STORY IN THE
DECEMBER
ISSUE!

KJOE
UBER

2009
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27



Call It Like You See It!



Operators...what's the definition of a preventive maintenance program?

The answer goes something like this: "A preventive maintenance program prevents breakdowns and failures through adjustment, repair or replacement of equipment before a major breakdown or failure occurs."

That's a good textbook answer.

Now, here's another question: "Who's the best person to know what condition your unit's equipment is in?"

The answer is simple.

It's you—the operator. You're the closest person to the condition of your equipment. Think about that statement the next time you're pulling PMCS on a vehicle.

As an operator, you correct what you can, and report what you can't fix. So...just give 'em the facts on the vehicle's inspection worksheet. Don't fudge it!

Your CO uses this information to determine the unit's vehicle readiness. That same info also determines which units are ready for important assignments.

MAKE SURE YOUR REPORT TELLS IT LIKE IT IS!





**THE
PREVENTIVE
MAINTENANCE
MONTHLY**

ISSUE 686 JANUARY 2010



COMBAT VEHICLES

- Stryker Wheel Hub Drain Plugs
- Stryker Engine Foot Damage
- M2A3/M3A3 Bradley Periscope Cover Screws
- M2/M3-Series Bradley Fan Shaft Lubing
- DSESTS Turn-in Needed
- M88-Series Recovery Vehicle Stowage
- M77A2 Towed Howitzer Hydraulic Leaks
- M119A2 Towed Howitzer Elevation Firing Stop



WHEELED VEHICLES

- Up-Armored HMMWV Rollovers
- M117 ASV Serial Number Clarified
- FMTV Cargo Cover NSNs



SMALL ARMS

- Firing Range Supplies
- Small Arms Tracking Forms
- MK 19 Machine Gun Lubing
- M2 Machine Gun Headspace/Timing Sticker
- Mortar Bore Measuring
- Sharpening Stone NSNs



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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
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USAMC LOGSA (AMXLS-AM)
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

By order of the Secretary of the Army:

GEORGE W. CASEY, JR.
General, United States Army Chief of Staff

Official:

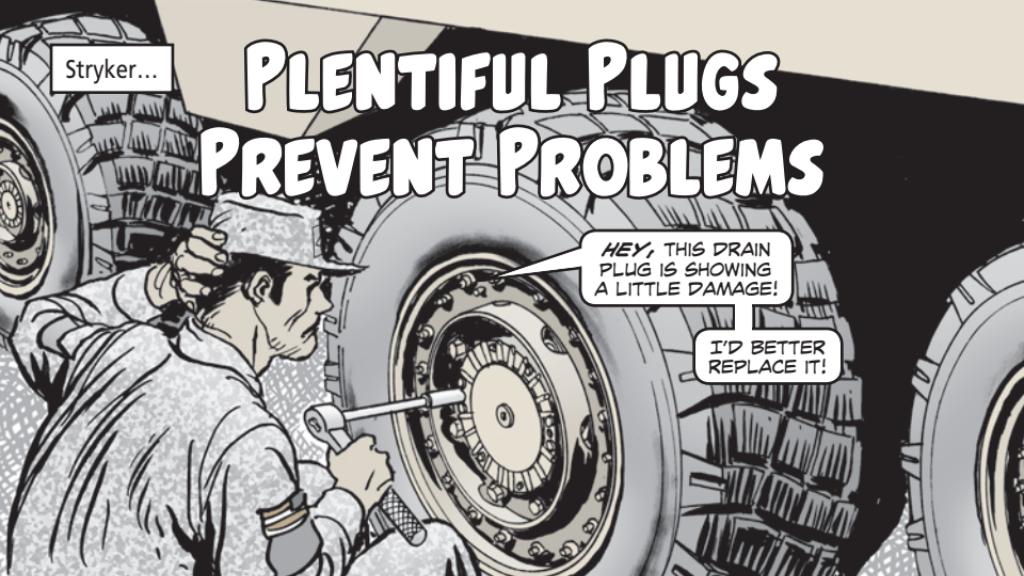
JOYCE E. MORROW
Administrative Assistant to the Secretary of the Army

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PLENTIFUL PLUGS PREVENT PROBLEMS



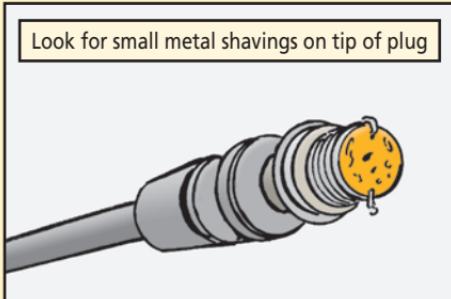
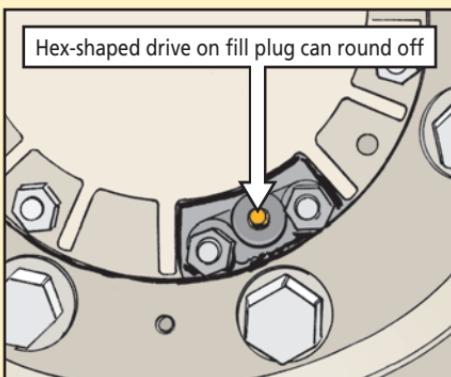
Need to add oil to the wheel hubs on your Stryker? Make sure you take it easy when removing or tightening the hub's filler/drain plugs.

The hex-shaped recessed area of the plug will strip and round off if you're not careful. That makes the plug very hard to install or remove.

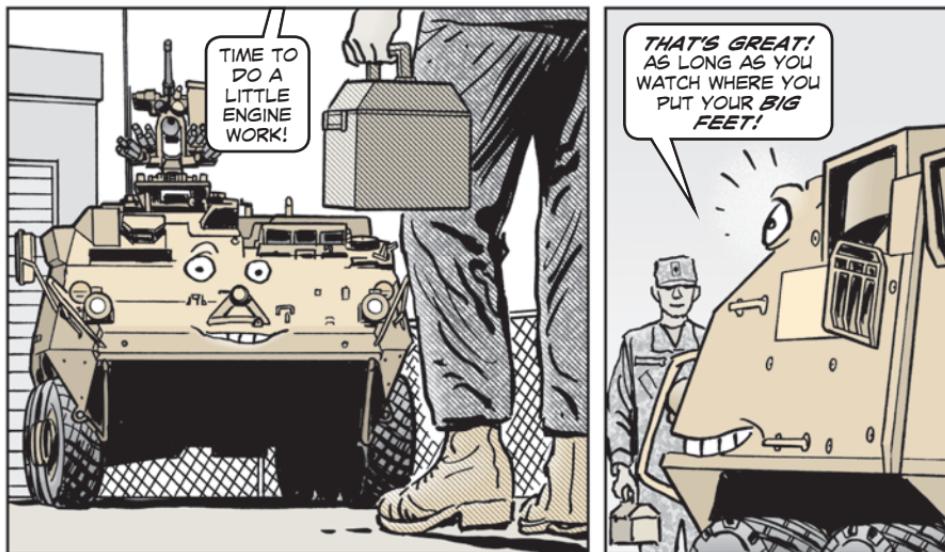
Make sure you insert your wrench **all** the way into the plug before turning. If you don't, the wrench will slip and the plug is damaged.

It's also a good idea to keep a few extra plugs, NSN 5365-01-157-1347, and gaskets, NSN 5330-12-156-4524, on hand in case one is damaged. A plug and gasket cost less than \$2, so having a replacement is more than worth it if a plug strips while you're in the field.

Once the plug is removed, look at the inside tip. The inside tip of the plug is magnetized, so you may find tiny metal shavings stuck there. Metal shavings could mean wear to the planetary gears in the hub. Tell your mechanic.



PUT YOUR BEST FOOT FORWARD

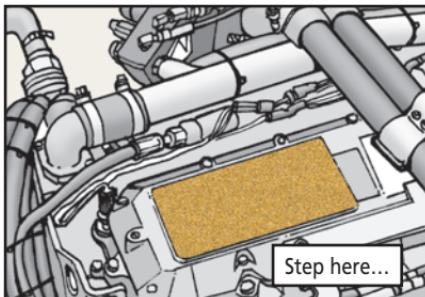


It's only natural, mechanics. When doing repair work in the engine compartment of a Stryker, most of your concentration is on what you're doing with your hands.

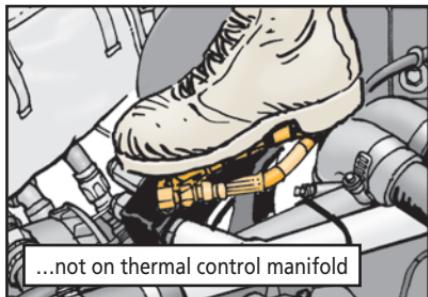
But where you place your feet needs attention, too.

A boot in the wrong place—say, on the thermal control manifold—is a big problem. Stepping on the manifold can loosen or even crack the seals on the two quick-disconnect couplings. Then you've got a hydraulic leak to fix and a big mess to clean up.

If you need a place to step on the engine, use the non-skid plate just to the side of the manifold of the CAT 3126 engine. Not only does that prevent damage, but you're less likely to slip and hurt yourself.

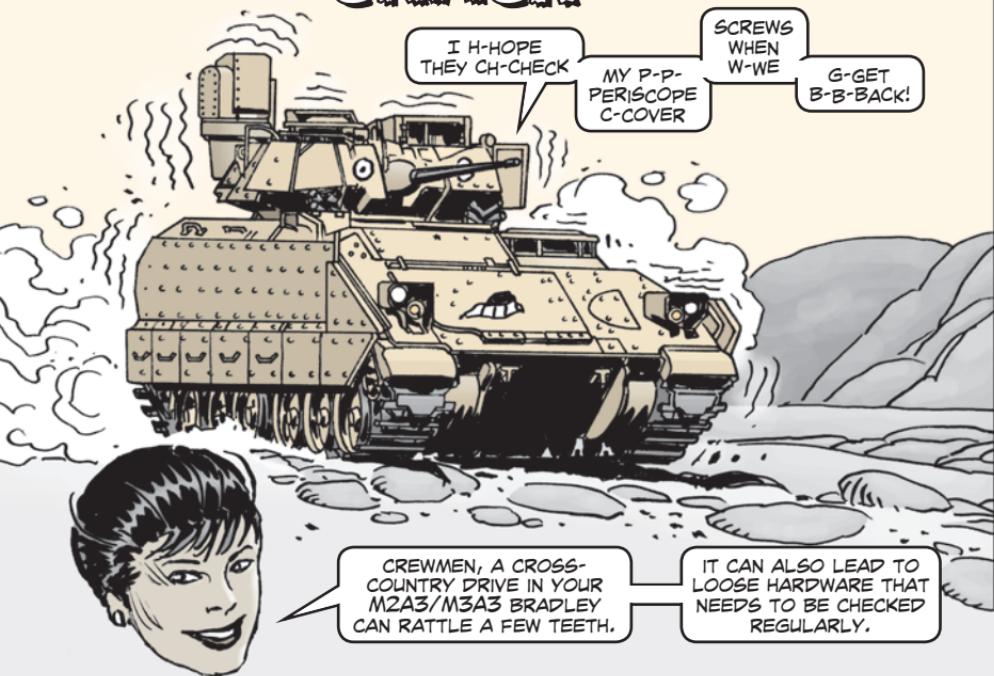


Step here...



...not on thermal control manifold

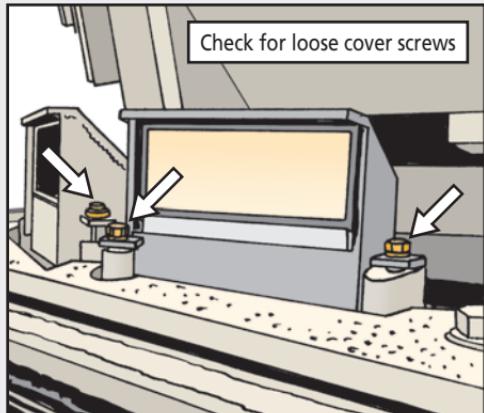
CROSS-COUNTRY CAN CRACK COVERS



A good example is the rear periscope cover screws. Enough vibration can loosen the screws. Eventually, that can lead to a broken cover. Replacement covers range from \$60 to nearly \$100 a pop, so you don't want to replace them too often.

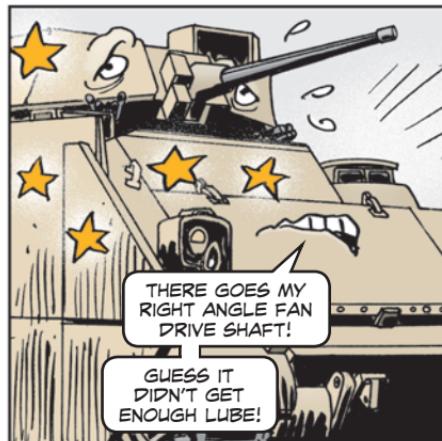
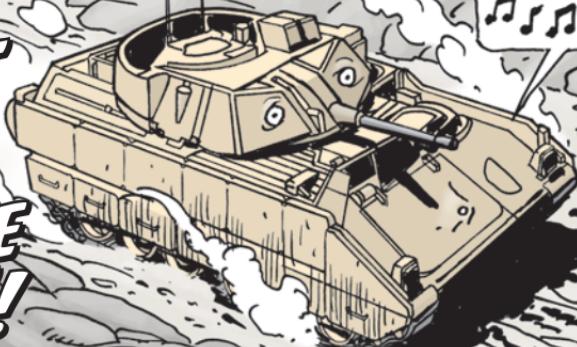
Check the screws during your PMCS inspection. If they're loose, tighten 'em. Replace missing screws with NSN 5305-00-068-0511 and missing flat washers with NSN 5310-00-080-6004.

And if you do find a broken cover, make sure you order the right replacement. There are six periscopes on the back of the Bradley and four different covers. You'll find them listed as Items 2, 14, 18, and 19 in Fig 34 of TM 9-2350-294-24P-1.



M2/M3-Series
Bradleys...

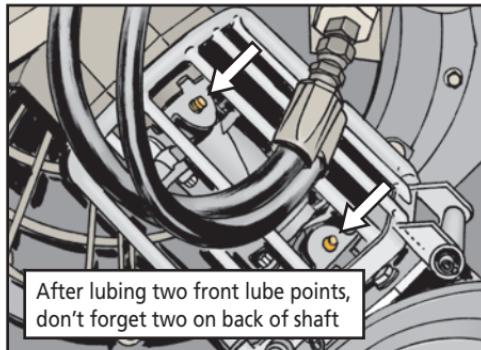
DON'T GIVE FAN THE SHAFT!



Mechanics, it's easy to neglect lubing some of the grease fittings on the Bradley's right angle fan drive shaft. After all, for each one that's visible, there's another one that's hidden behind the shaft.

But you must lube **all** the fittings to keep the fan turning. If you miss the ones in back, the shaft can seize up or even snap. With no cooling fan, the engine overheats.

The U-joints and shaft should be lubed semiannually with GAA. After you've lubed the front fittings, manually rotate the shaft until the rear fittings come to the front. Then lube them as well.



Turn in Serviceable DSESTS



Units are not turning in direct support electrical system test sets (DSESTS) when their missions terminate or transfer. That means the next unit assigned that mission can't carry out DSESTS testing.

DSESTS, which can't be procured, was fielded to perform off-vehicle testing of line replaceable units (LRU) and shop replaceable units (SRU) from the Bradley FVS and M1-series tank. A complete DSESTS comes in approximately 40 cases, along with ancillary equipment and fixtures.

The DSESTS consists of:

Units should check to see if they have any of this DSESTS equipment. If you find any, do the self-tests described in the TM 9-4931-586-series TMs to see if the equipment is serviceable. Serviceable excess DSESTS equipment should be turned in to your property book officer. Serviceable DSESTS equipment should also be turned in to the property book officer if your mission is soon to be terminated or transferred. TACOM-RI will reissue the equipment to the units taking over the missions. All unserviceable DSESTS equipment should be submitted through the Automated Excess Return Process (FTE transaction).

- general purpose interface assembly (GPIA), NSN 5998-01-382-7282
- operator interface unit (OIU), NSN 6625-01-225-8342
- DSESTS common resources (DRC), which includes the common function modules, NSN 6625-01-443-2478, and combined support functions module (CFSM), NSN 6625-01-559-2662, or the enhanced unit, NSN 6625-01-569-3614
- transfer standards adapter (TSA), NSN 6625-01-448-9832
- M1 tank Legacy and Bradley A2 ODS Legacy, NSN 6625-01-120-0764 (LIN T52849)
- M1 thermal imaging system (TIS), NSN 4931-01-263-7972 (LIN T92250)
- Bradley TOW system, NSN 6625-01-442-7490
- Bradley A3, NSN 6625-01-453-7394
- Common FLIR TIS, NSN 6625-01-443-8390
- Wolverine, NSN 6625-01-474-5713

If you have questions, contact TACOM-RI's Kelly Karcher at DSN 793-6094, (309) 782-6094, or email

kelly.karcher@us.army.mil

You can also contact Matisse Coffee at DSN 793-0718, (309) 782-0718, or email

sinclair.m.coffee@us.army.mil or Barry Tabron at DSN 793-1901, (309) 782-1901, or email barry.tabron@us.army.mil

Pack it RIGHT to Keep Crew SAFE!

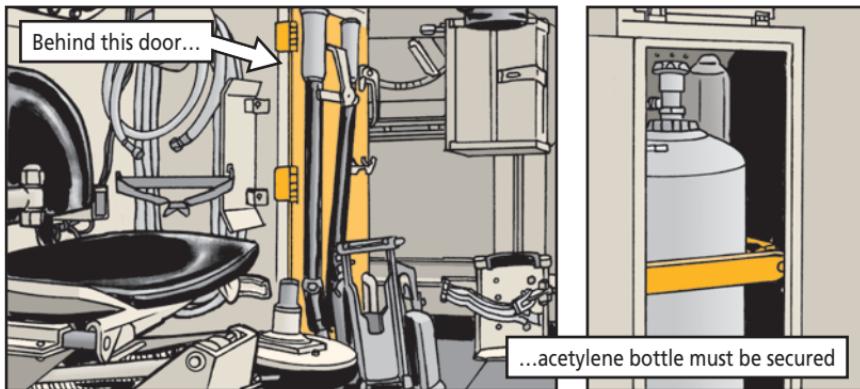
IF YOU THINK I
LOOK BAD ON THE
OUTSIDE, YOU OUTTA
SEE MY INSIDES!



A place for everything and everything in its place." — Benjamin Franklin

Truer words were never spoken, especially for recovery vehicle crewmen. Improperly stowed and unsecured items have a tendency to become lethal missiles when you're bouncing along the trail.

A recent incident involving an M88A2 and an unsecured acetylene bottle resulted in injuries to two crewmen and extensive damage to the vehicle. That could have been avoided had the acetylene bottle been properly stowed and secured.



You'll find the right place to store all your BII and COEI gear in App E of TM 9-2350-256-10 and WP 0136 00 of TM 9-2350-292-10.

What About the Other Stuff?

In addition to your own vehicle's stuff, you may have to return from a mission with items belonging to a disabled vehicle. So where do you store things like ballistic skirts, ballistic plates, suspension components and other items?

That's up to you. But regardless of where you stow the items, make sure you secure them so they don't break loose during the move.

Keep in mind that your vehicle could be subject to hostile fire, sudden stops, rough terrain or even a rollover accident. You don't want any of those items flying around if that happens.

COLD WEATHER CAN CAUSE LEAKS

THE HYDROSTRUT ASSEMBLY IS LEAKING LIKE A SIEVE!

HOW ARE WE EVER GONNA RAISE THIS HOWITZER?

Crewmen, if you're operating your M777A2 howitzer in **very** cold conditions, keep an eye on the suspension hydrostruts.

Units at Ft Wainwright, AK, noticed Class III leaks coming from the hydrostrut vent ports when they tried to raise howitzers that had been stored outdoors in temperatures below -10° F.

Turns out there's a slight problem between the hydraulic fluid and the hydrostrut piston seal, NSN 5330-99-679-8380. Over time, the seal loses its elasticity, especially in extremely cold weather. That can create leaks when the thermometer takes a nose dive.

If you notice a Class III leak at the hydrostrut vent valve, stop trying to raise the howitzer immediately. Lower the howitzer to the ground using the suspension levers and take the following action:

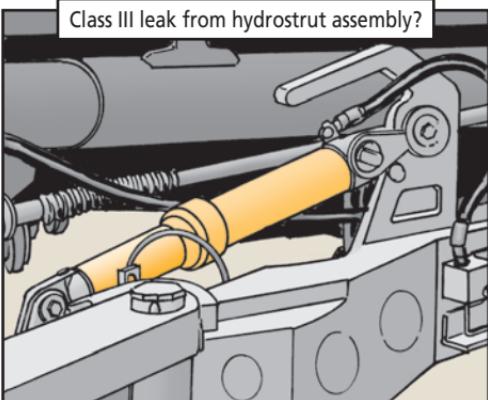
1. Deploy the wheel arm assemblies into the raised position, like it says on Page 2-124 of TM 9-1025-215-10 (Jun 06 w/Ch 3, Jul 08).
2. Return the wheel arm assemblies to the towing position (Page 2-175).
3. Try to build pressure with the suspension pumps, then relieve the pressure using the suspension levers.

Repeat these steps several times. That should energize the seals and help stop the hydraulic fluid leak. Once you're finished, make sure you check the suspension oil fluid level. If it's low, notify your mechanic.

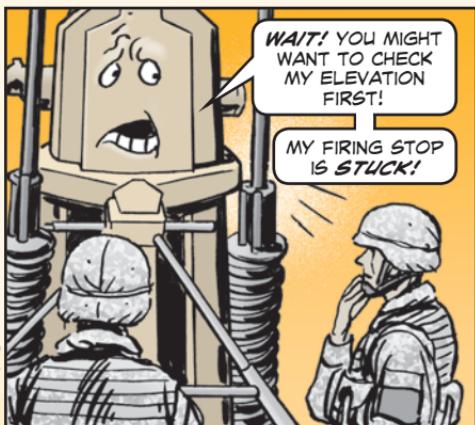
In most cases, hydrostrut leaks will stop by themselves when temperatures warm up. So keep this in mind before going beyond crew-level maintenance.

You'll find the complete scoop in TACOM Maintenance Action (MA) message 09-032:

https://aeps2.ria.army.mil/commodity/mam/tacom_wn/ma09-032.html



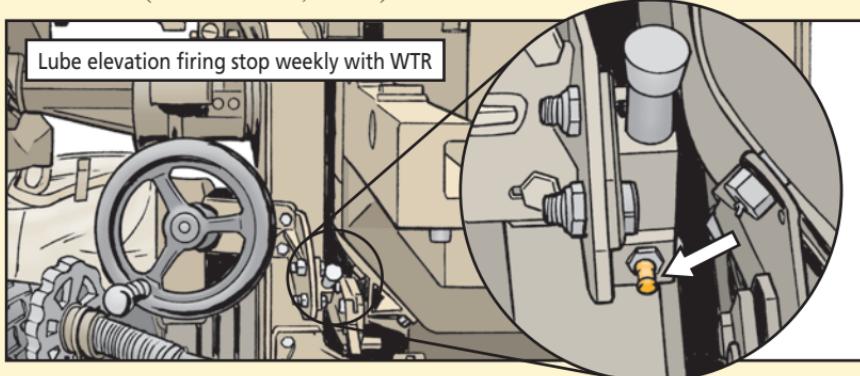
Stuck Stop a Real Show Stopper



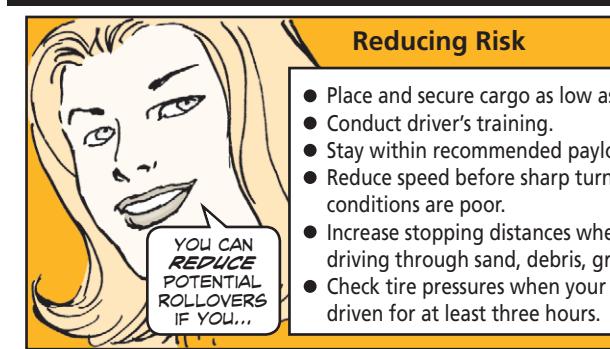
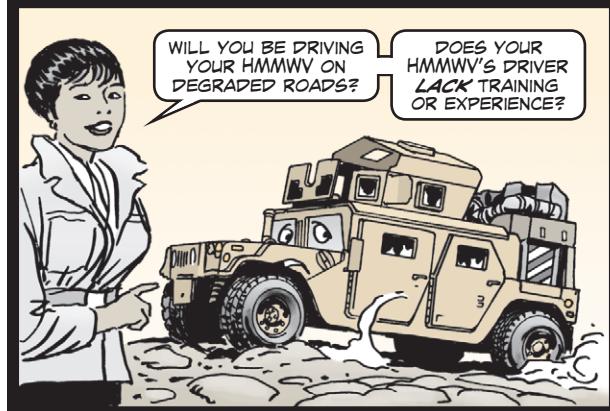
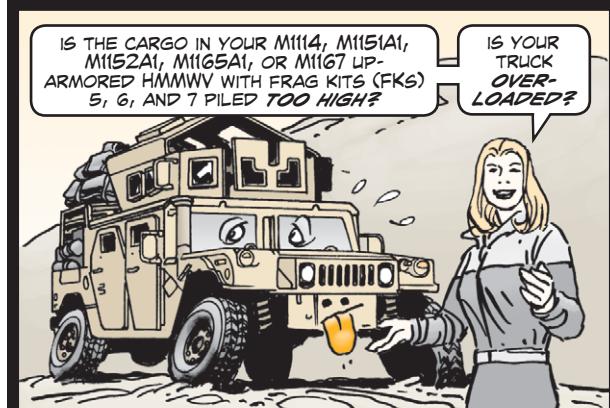
The elevation firing stop—also known as the taboo gear—is designed to keep your M119A2 howitzer from firing when the gun tube is elevated too high.

But the stop can't do its job if you don't keep it lubed. In fact, without regular lubing, the stop will stick. If that happens, the howitzer will fire past 1244 mils of elevation. The cannon tube will fall out-of-battery if the recuperator is low on nitrogen or the stowage/stop gun tube—also known as run back stop—is not in place. Someone could get hurt!

Avoid that problem by making sure you lube the elevation firing stop weekly with WTR, NSN 9150-00-944-8953. Then make sure you check the stop before every operation following the instructions in PMCS Item 21 in WP 0040 00-18 of TM 9-1015-252-10 (Jun 06 w/Ch 1, Jan 07).



REDUCE ROLLOVER RISK



Heavy Could Be Hazardous

AT THE BASIC GROSS VEHICLE WEIGHT (GVW)—12,100 POUNDS—RAPID STEERING INCREASES THE LIKELIHOOD OF A ROLLOVER AT SPEEDS AS LOW AS 35 MPH IN YOUR M1114, M1151A1, M1152A1, M1165A1, AND M1167.

GVW IS BASED ON AN UNLOADED VEHICLE WITH A PAYLOAD OF FOUR CREW MEMBERS WITH BASIC GEAR.

VROOSH!

NO RAPID STEERING!

FK 5 ADDS 3,000 POUNDS TO THE GVW; FKS 5 AND 7 ADD 4,000 POUNDS; AND FKS 5 AND 6 ADD 5,000 POUNDS.

THE PRESENCE OF SAND, DEBRIS, GRAVEL AND RAIN REDUCE THE STABILITY OF HEAVIER HMMWVS EVEN MORE.

Tire Pressure Formulas for Reduced Rollovers!

HMMWVs WITH FK 5 PLUS LOAD RANGE D TIRES/WHEELS EQUALS 50 PSI FRONT/50 PSI REAR TIRE PRESSURES

HMMWVs WITH FK 6 OR 7 PLUS LOAD RANGE D TIRES/WHEELS EQUALS NO GO! (THIS IS NEVER ALLOWED.)

HMMWVs WITHOUT FKS PLUS LOAD RANGE D OR LOAD RANGE E EQUALS 40 PSI FRONT/50 PSI REAR TIRE PRESSURES

HMMWVs WITH FKS 5, 6, OR 7 PLUS LOAD RANGE E WHEELS EQUALS 50 PSI FRONT/65 PSI REAR TIRE PRESSURES

Increase Braking Distance

At 50 mph on smooth, dry pavement, an M1114, M1151A1, M1152A1, M1165A1, or M1167 HMMWV with FKs 5, 6, or 7 has a braking distance up to 14 vehicle lengths. At GVW, the braking distance is ten vehicle lengths. Of course, increased loads and potentially hazardous road conditions further increase stopping distances.

Get more info on this by accessing the related rollover prevention smart card on AKO: <https://www.us.army.mil/suite/collaboration/GetDocument.do?doid=17249275>



BOTTOM LINE IS, USE EXTRA CAUTION AND THE GUIDELINES WE JUST GAVE YOU WHEN BEHIND THE WHEEL OF YOUR UP-ARMORED HMMWVs WITH FK 5, 6, 7, OR ANY COMBINATION.

THAT SHOULD HELP KEEP YOU AND YOUR BUDDIES SAFER—AND HOPEFULLY, ROLLOVER-FREE.

SMART CARD / G/T A Frag Kit 5 / Frag Kit 6 / Frag Kit 7

WARNING
At Gross Vehicle Weight (GVW) repeat steering action increases
braking distance up to 14 vehicle lengths.
35 MPH for M1114 / M1151A1 / M1152A1 / M1165A1 / M1167 w/ FK5 / FK6 / FK7
GVW = 12,100 lbs (approx)
DO NOT use an Uninflated tire or one with burst gear!
Tires with inflated pressures exceeding GVW by 10% will result in the
FK5 + FK6 + FK7 vehicle with inflated pressures exceeding GVW by at least 3000 lbs.
FK5 + FK6 + FK7 vehicle with inflated pressures exceeding GVW by at least 3000 lbs.
Road conditions such as wet, icy, or uneven surfaces will reduce stability.

CONTRIBUTING FACTORS TO ROLLOVER
--- Cargo placed high in vehicle --- Drivers Inexperience / Lack of Training ---
--- Driver's Physical Condition --- Environmental Conditions ---

ACTION TO REDUCE POTENTIAL FOR ROLLOVER
--- Photo and Secure Cargo on low or positive in the vehicle ---
--- Continue Driver's Training --- May Write-up for Inexperience / Poor Preparation ---

Reduce Speed When Driving in Hazardous Conditions
--- Reduce Speed When Driving in Hazardous Conditions When Road Conditions are Dangerous ---
Vehicles w/ FK5 + Load Range D Tires/Wheels = Tire Pressures of 50 psi front / 50 psi rear
Vehicles w/ FK5 or FK7 + Load Range D Tires/Wheels = NEVER RECOMMENDED!
Vehicles w/ FK5, FK6, or FK7 + Load Range E Tires/Wheels = NEVER RECOMMENDED!
Vehicles w/ FK5, FK6, or FK7 + Load Range E Wheels = Tire Pressures of 50 psi front / 50 psi rear
--- Check Tire Pressures when Tires are Cold (have not been driven on for at least 3 hours)

Braking Distance vs GVW Percent

GVW Percent	Braking Distance (ft)
10%	~10 ft
20%	~15 ft
30%	~20 ft
40%	~25 ft
50%	~30 ft
60%	~35 ft
70%	~40 ft
80%	~45 ft
90%	~50 ft
100%	~55 ft
110%	~60 ft
120%	~65 ft
130%	~70 ft
140%	~75 ft

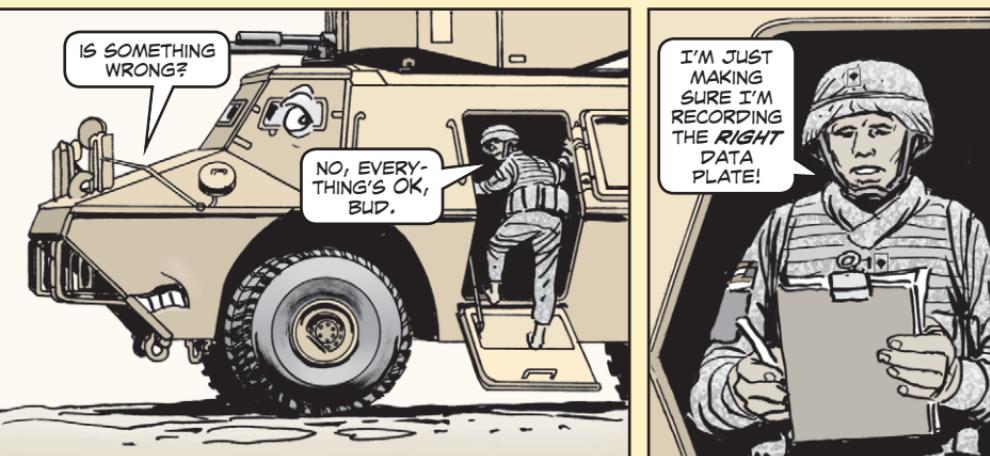
WARNING At 50 MPH on smooth dry pavement an overinflated M1114/M1151A1/M1152A1/M1167 has a braking distance up to 14 vehicle lengths.
Increased overinflated enduro road conditions such as sand, debris, gravel or rocks will further increase the vehicle's travel distance in excess of 30 MPH.
CAUTION: Commanders must assess risk when vehicles are overinflated, or cargo is placed high in the vehicle. The travel distance in excess of 30 MPH.
Recommending GVW = 12,100 pounds.

M1114/M1151A1/M1152A1/M1165A1/M1167 HMMWV
ROLL-OVER PRECAUTION
SMART CARD FKS/PK6/FK7

PS END

M1117 ASV/Supply Management...

DON'T WAIT! CHECK THE PLATE



IS SOMETHING WRONG?

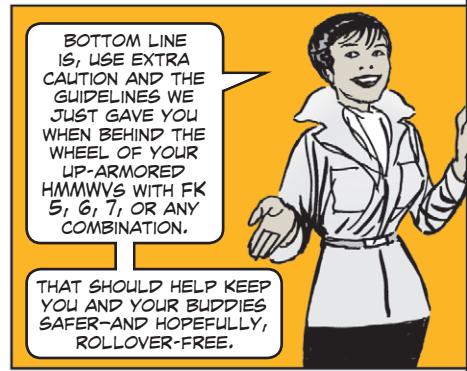
NO, EVERYTHING'S OK, BUD.

I'M JUST MAKING SURE I'M RECORDING THE RIGHT DATA PLATE!

Increase Braking Distance

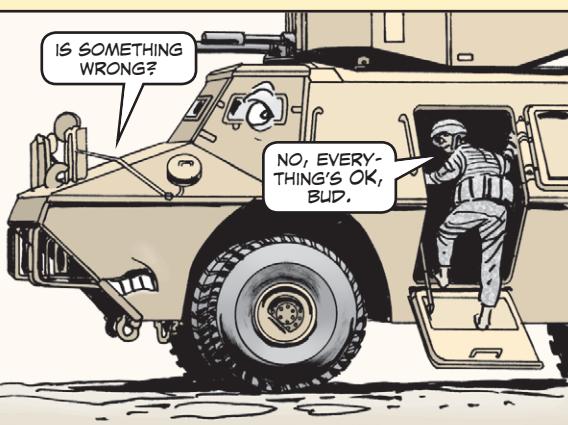
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M1117 ASV/Supply Management...

DON'T WAIT! CHECK THE PLATE



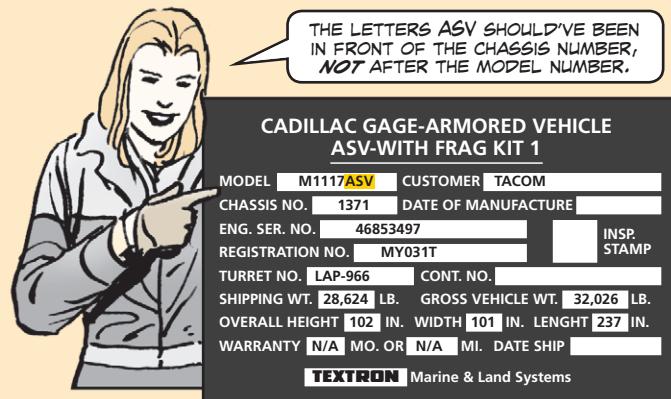
Heads up, Soldiers! Entering an incorrect serial number (SN) from an M1117 Armored Security Vehicle (ASV) data plate into PBUSE can cause a conflict between PBUSE records and the TAMMS Equipment Database (TEDB) Ground Equipment Tracker master records.

Here's the scoop. The correct SN has the letters "ASV" and a 3- or 4-digit chassis number (for example, ASV123 or ASV1234). This format should be entered in PBUSE records to ensure compatibility with the TEDB master records.

Confusion occurs because the ASV has two data plates and both are located inside the driver's side door.

One is the standard full identification and specification data plate with a black background. Use this data plate for property book accountability. Note: The chassis number is the serial number on this vehicle.

For example, this data plate below should read "ASV1371". The letters ASV should've been placed in front of the chassis number, **not** after the model number. New equipment data plates will prefix the serial (chassis) number with ASV. The other is a UID data plate with three bar codes. Caution: The UID plate's SN is different and entering this SN into PBUSE conflicts with production and government acceptance records.



Do not use this UID data plate for property book accountability

Tip: The M1117 chassis number is also found on the front-left lift bracket.

- If your ASV's chassis number is 001 through 999, your SN should be 6 characters. Example: ASV849
- If the chassis number is 1000 or above, the SN should be 7 characters long. Example: ASV1371

 Anything other than these two formats is wrong.



You can verify your ASV's SN and registration number in LOGSA's Logistics Information Warehouse: http://weblog.logsa.army.mil/Veh_reg/main_input.cfm

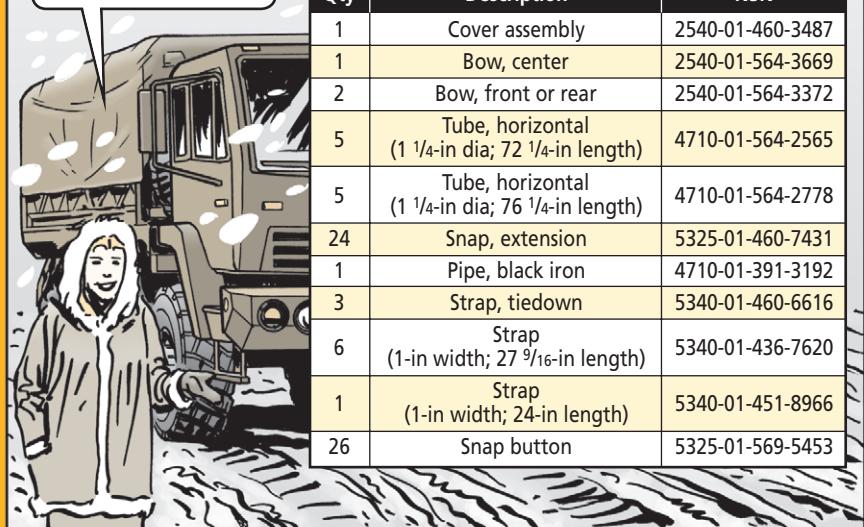
Enter NIIN 014376957 and click "Submit." Then scroll down to your SN to view the assigned registration number.

FMTVs...

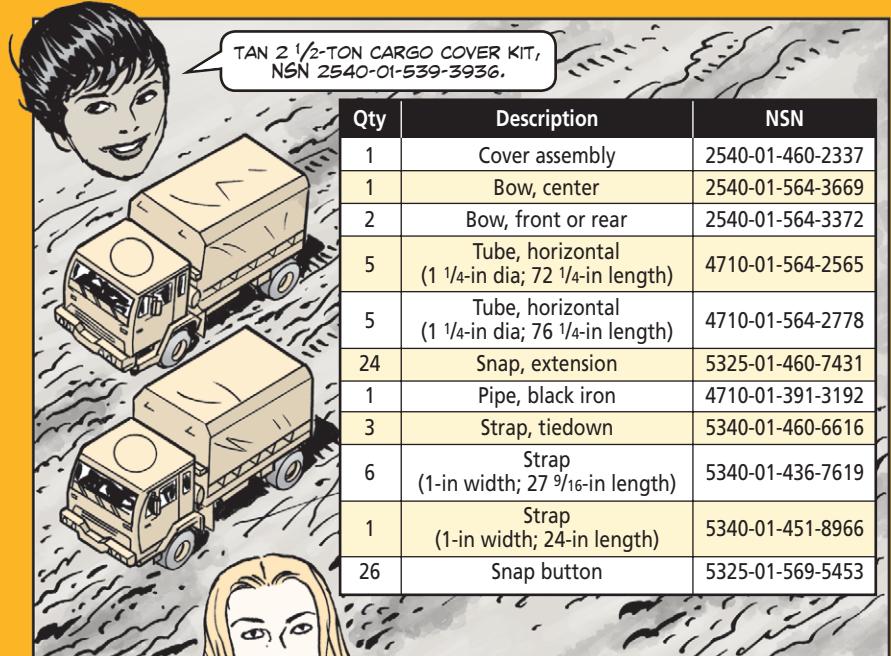
Cargo Cover Kits Break-down



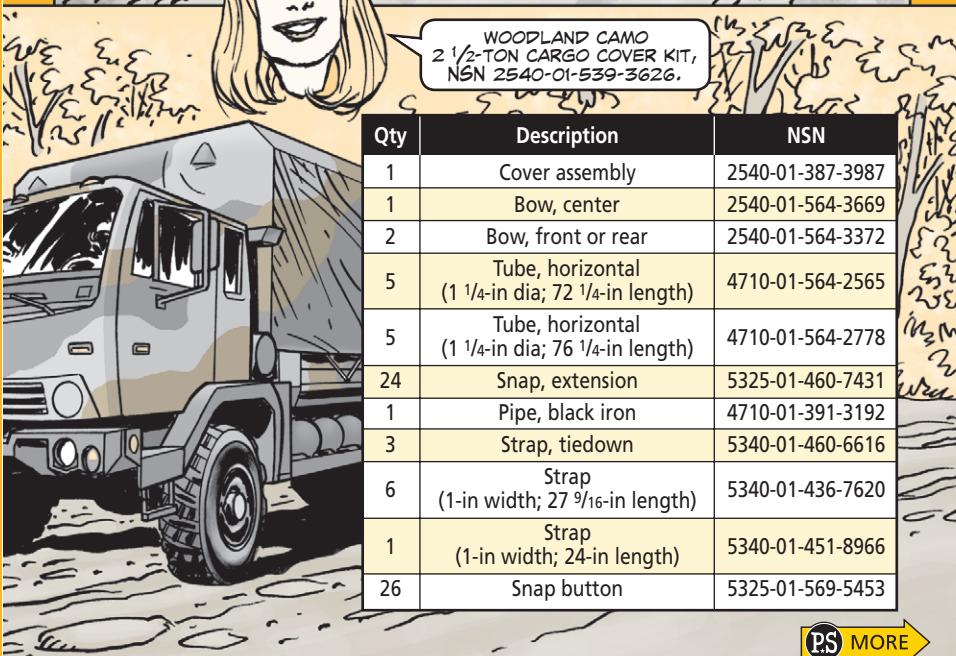
ARCTIC 2 1/2-TON CARGO COVER KIT, NSN 2540-01-539-3903.



Qty	Description	NSN
1	Cover assembly	2540-01-460-3487
1	Bow, center	2540-01-564-3669
2	Bow, front or rear	2540-01-564-3372
5	Tube, horizontal (1 1/4-in dia; 72 1/4-in length)	4710-01-564-2565
5	Tube, horizontal (1 1/4-in dia; 76 1/4-in length)	4710-01-564-2778
24	Snap, extension	5325-01-460-7431
1	Pipe, black iron	4710-01-391-3192
3	Strap, tiedown	5340-01-460-6616
6	Strap (1-in width; 27 9/16-in length)	5340-01-436-7620
1	Strap (1-in width; 24-in length)	5340-01-451-8966
26	Snap button	5325-01-569-5453

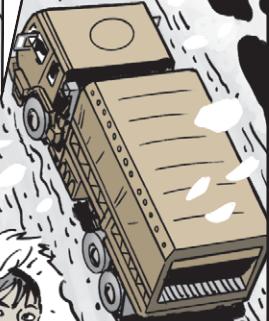


Qty	Description	NSN
1	Cover assembly	2540-01-460-2337
1	Bow, center	2540-01-564-3669
2	Bow, front or rear	2540-01-564-3372
5	Tube, horizontal (1 1/4-in dia; 72 1/4-in length)	4710-01-564-2565
5	Tube, horizontal (1 1/4-in dia; 76 1/4-in length)	4710-01-564-2778
24	Snap, extension	5325-01-460-7431
1	Pipe, black iron	4710-01-391-3192
3	Strap, tiedown	5340-01-460-6616
6	Strap (1-in width; 27 9/16-in length)	5340-01-436-7619
1	Strap (1-in width; 24-in length)	5340-01-451-8966
26	Snap button	5325-01-569-5453



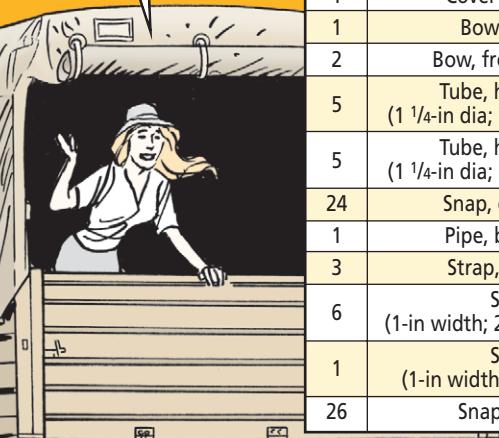
Qty	Description	NSN
1	Cover assembly	2540-01-387-3987
1	Bow, center	2540-01-564-3669
2	Bow, front or rear	2540-01-564-3372
5	Tube, horizontal (1 1/4-in dia; 72 1/4-in length)	4710-01-564-2565
5	Tube, horizontal (1 1/4-in dia; 76 1/4-in length)	4710-01-564-2778
24	Snap, extension	5325-01-460-7431
1	Pipe, black iron	4710-01-391-3192
3	Strap, tiedown	5340-01-460-6616
6	Strap (1-in width; 27 9/16-in length)	5340-01-436-7620
1	Strap (1-in width; 24-in length)	5340-01-451-8966
26	Snap button	5325-01-569-5453

ARCTIC 5-TON CARGO COVER KIT,
NSN 2540-01-539-3915.



Qty	Description	NSN
1	Cover assembly	2540-01-460-0898
1	Bow, center	2540-01-564-3669
2	Bow, front or rear	2540-01-564-3372
5	Tube, horizontal (1 1/4-in dia; 76 1/4-in length)	4710-01-564-2778
5	Tube, horizontal (1 1/4-in dia; 93 1/4-in length)	4710-01-564-2798
24	Snap, extension	5325-01-460-7431
1	Pipe, black iron	4710-01-391-3192
3	Strap, tiedown	5340-01-460-6616
6	Strap (1-in width; 27 9/16-in length)	5340-01-436-7620
1	Strap (1-in width; 24-in length)	5340-01-451-8966
26	Snap button	5325-01-569-5453

TAN 5-TON
CARGO COVER KIT,
NSN 2540-01-539-3946.



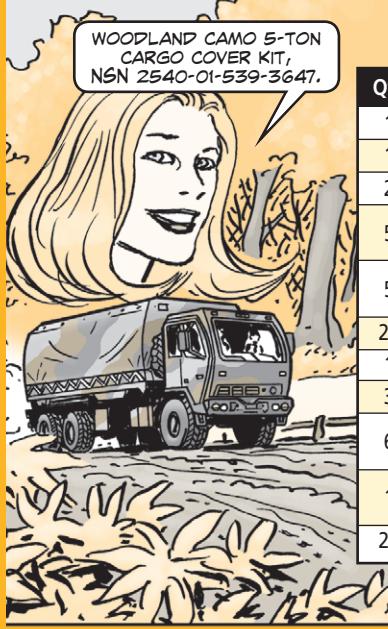
Qty	Description	NSN
1	Cover assembly	2540-01-460-1075
1	Bow, center	2540-01-564-3669
2	Bow, front or rear	2540-01-564-3372
5	Tube, horizontal (1 1/4-in dia; 76 1/4-in length)	4710-01-564-2778
5	Tube, horizontal (1 1/4-in dia; 93 1/4-in length)	4710-01-564-2798
24	Snap, extension	5325-01-460-7431
1	Pipe, black iron	4710-01-391-3192
3	Strap, tiedown	5340-01-460-6616
6	Strap (1-in width; 27 9/16-in length)	5340-01-436-7619
1	Strap (1-in width; 24-in length)	5340-01-451-8966
26	Snap button	5325-01-569-5453

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JAN 10

WOODLAND CAMO 5-TON
CARGO COVER KIT,
NSN 2540-01-539-3647.



Qty	Description	NSN
1	Cover assembly	2540-01-472-5091
1	Bow, center	2540-01-564-3669
2	Bow, front or rear	2540-01-564-3372
5	Tube, horizontal (1 1/4-in dia; 76 1/4-in length)	4710-01-564-2778
5	Tube, horizontal (1 1/4-in dia; 93 1/4-in length)	4710-01-564-2798
24	Snap, extension	5325-01-460-7431
1	Pipe, black iron	4710-01-391-3192
3	Strap, tiedown	5340-01-460-6616
6	Strap (1-in width; 27 9/16-in length)	5340-01-436-7620
1	Strap (1-in width; 24-in length)	5340-01-451-8966
26	Snap button	5325-01-569-5453

ARCTIC 5-TON LWB
CARGO COVER KIT,
NSN 2540-01-539-3909.



Qty	Description	NSN
1	Cover assembly	2540-01-460-0428
2	Bow, center	2540-01-564-3669
2	Bow, front or rear	2540-01-564-3372
5	Tube, horizontal (1 1/4-in dia; 76 1/4-in length)	4710-01-564-2778
5	Tube, horizontal (1 1/4-in dia; 72 1/4-in length)	4710-01-564-2565
5	Tube, horizontal (1 1/4-in dia; 93 1/4-in length)	4710-01-564-2798
24	Snap, extension	5325-01-460-7431
1	Pipe, black iron	4710-01-391-3192
3	Strap, tiedown	5340-01-460-6616
6	Strap (1-in width; 27 9/16-in length)	5340-01-436-7620
1	Strap (1-in width; 24-in length)	5340-01-451-8966
26	Snap button	5325-01-569-5453

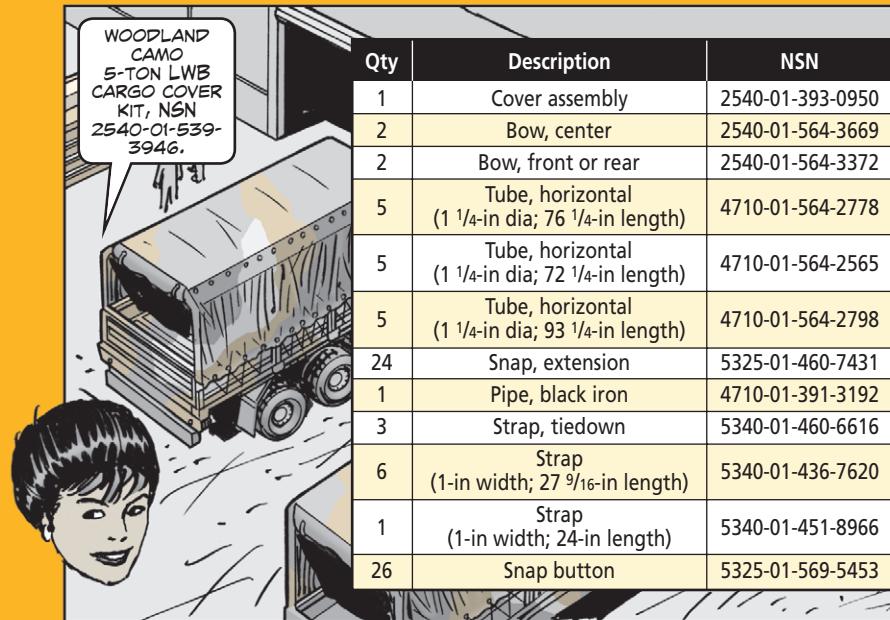
PS MORE



Qty	Description	NSN
1	Cover assembly	2540-01-479-5022
2	Bow, center	2540-01-564-3669
2	Bow, front or rear	2540-01-564-3372
5	Tube, horizontal (1 1/4-in dia; 76 1/4-in length)	4710-01-564-2778
5	Tube, horizontal (1 1/4-in dia; 72 1/4-in length)	4710-01-564-2565
5	Tube, horizontal (1 1/4-in dia; 93 1/4-in length)	4710-01-564-2798
24	Snap, extension	5325-01-460-7431
1	Pipe, black iron	4710-01-391-3192
3	Strap, tiedown	5340-01-460-6616
6	Strap (1-in width; 27 9/16-in length)	5340-01-436-7619
1	Strap (1-in width; 24-in length)	5340-01-451-8966
26	Snap button	5325-01-569-5453



Qty	Description	NSN
1	Cover assembly	2540-01-479-5026
1	Bow, front	2540-01-564-3372
1	Bow, center	2540-01-564-3669
1	Bow, rear	2540-01-564-4936
5	Tube, horizontal (1 1/4-in dia; 51 5/8-in length)	4710-01-565-1202
5	Tube, horizontal (1-in dia; 51 5/8-in length)	4710-01-564-9737
5	Tube, horizontal (1 1/16-in dia; 74 1/2-in length)	4710-01-573-0305
24	Snap, extension	5325-01-460-7431
1	Pipe, black iron	4710-01-391-3192
3	Strap, tiedown	5340-01-460-6616
6	Strap (1-in width; 27 9/16-in length)	5340-01-436-7619
1	Strap (1-in width; 24-in length)	5340-01-451-8966
26	Snap button	5325-01-569-5453



Qty	Description	NSN
1	Cover assembly	2540-01-393-0950
2	Bow, center	2540-01-564-3669
2	Bow, front or rear	2540-01-564-3372
5	Tube, horizontal (1 1/4-in dia; 76 1/4-in length)	4710-01-564-2778
5	Tube, horizontal (1 1/4-in dia; 72 1/4-in length)	4710-01-564-2565
5	Tube, horizontal (1 1/4-in dia; 93 1/4-in length)	4710-01-564-2798
24	Snap, extension	5325-01-460-7431
1	Pipe, black iron	4710-01-391-3192
3	Strap, tiedown	5340-01-460-6616
6	Strap (1-in width; 27 9/16-in length)	5340-01-436-7620
1	Strap (1-in width; 24-in length)	5340-01-451-8966
26	Snap button	5325-01-569-5453



Qty	Description	NSN
1	Cover assembly	PN 12420313-006*
1	Bow, front	2540-01-564-3372
1	Bow, center	2540-01-564-3669
1	Bow, rear	2540-01-564-4936
5	Tube, horizontal (1 1/4-in dia; 51 5/8-in length)	4710-01-565-1202
5	Tube, horizontal (1-in dia; 51 5/8-in length)	4710-01-564-9737
5	Tube, horizontal (1 1/16-in dia; 74 1/2-in length)	4710-01-573-0305
24	Snap, extension	5325-01-460-7431
1	Pipe, black iron	4710-01-391-3192
3	Strap, tiedown	5340-01-460-6616
6	Strap (1-in width; 27 9/16-in length)	5340-01-436-7620
1	Strap (1-in width; 24-in length)	5340-01-451-8966
26	Snap button	5325-01-569-5453

EVERYTHING NEEDED FOR FIRING RANGES

Dear Editor,

As a former NCO responsible for supporting weapons qualification ranges and also a captain for a marksmanship team, I've gathered many NSNs for my work. I think anyone involved with small arms will find them helpful. So here they are:

Item	NSN
Sandbags (100)	8105-00-285-4744
Staple gun	5120-00-889-1796
Staples, 1/2-in	5315-00-889-2605
Staples, 3/8-in	5315-00-889-2604
Fire extinguisher	4210-01-149-1356
Glue, target adhesive	8040-00-275-8105
Stopwatch	6645-01-106-4302
Tape, 100-mph, 2-in	7510-00-515-0319
Tape, 100-mph, 1-in	7510-00-890-9872
Tape, engineer white	8315-01-463-5853
Magazine, M16 (30 round)	1005-00-921-5004
Magazine, M9	1005-01-204-4376
Magazine, M14	1005-00-628-9048
Pasters, black (5,000)	6920-00-165-6354
Pasters, white (5,000)	6920-00-172-3572
Nails, 10d (1-lb box)	5315-00-753-3883
Targets, M16A2 zero (25 meter)	6920-01-253-4005
Targets, M16A2 zero (15 meter)	6920-01-167-1393
Targets, M16A2 and M4 zero (25 meter)	6920-01-395-2949
Targets, M16A1/A2 (25 meter)	6920-01-167-1398
Targets, M16A1/A2 (15 meter)	6920-01-167-1396
E-type silhouettes, plastic	6920-00-071-4780
Targets, M9 pistol	6920-01-276-6604
CLP, 4-oz bottle	9150-01-079-6124
CLP, 1/2-oz bottle	9150-01-102-1473
Cleaning compound, rifle bore (RBC)	6850-00-224-6656
Oil, LSA (2-oz bottle)	9150-00-935-6597
Oil, LSA (4-oz bottle)	9150-00-889-3522
Toothbrush,	1005-00-494-6602
Swabs, M16 cleaning	1005-00-912-4248
Swabs (for M240B, M9, M2)	1005-00-288-3565



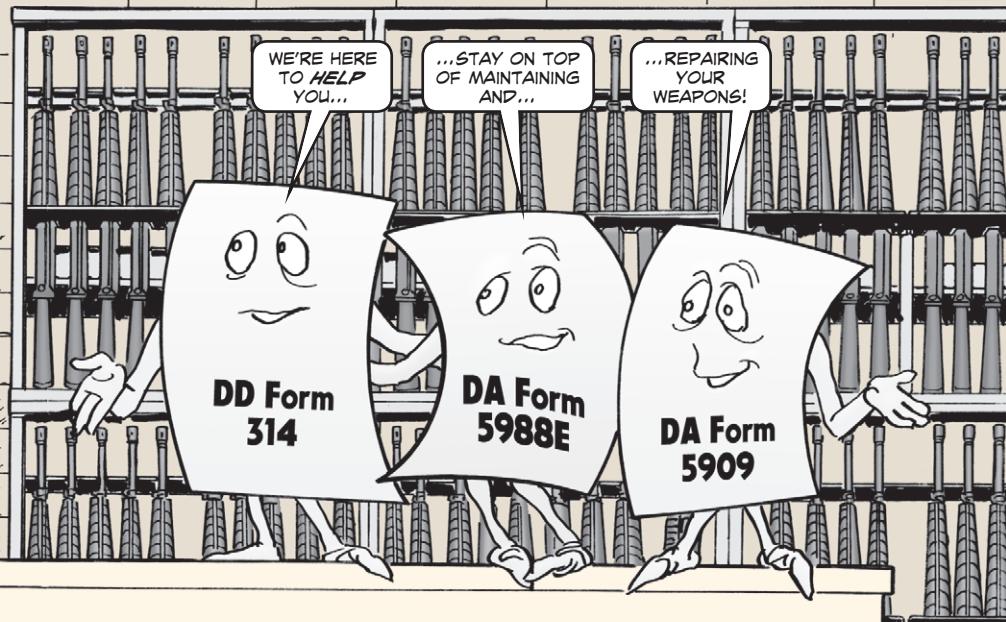
Item	NSN
Cleaners, pipe	9920-00-292-9946
VS17 panel, marker for helicopter landing	8345-00-174-6865
Cups, styrofoam 6-oz (1,000)	7350-00-721-9003
Earplugs, foam (200)	6515-00-137-6345
Earplugs, combat (50 pr)	6515-01-466-2710
Earplug cases (20)	6515-01-100-1674
Rod, brass (for clearing M16, M4, M249)	3439-00-244-4541
First aid kit,	6545-00-922-1200
Flag, red range	8345-00-025-3355
M249 front sight tool	5120-13-112-9600
Assault pack, ACU Molle	8465-01-524-5250
Trash bags, clear (33 gal)	8105-01-183-9768
Trash bags, clear (10 gal)	8105-01-195-8730
Ziplock bags, clear (quart)	8105-00-837-7755
Rags (50-lb bundle)	7920-00-205-1711
Case, weapons cleaning, with ALICE belt clip	1005-00-781-9564
Cleaning kit, M16, Otis (with flexible rod)	1005-01-424-2999
Cleaning kit, M40A1 sniper rifle, Otis (with flexible rod)	1005-01-453-3783
Chemlights, green (for night firing)	6260-01-074-4229
Chemlights, red (for night firing)	6260-01-178-5559
Flashlight filter, green	6230-00-504-8341
Flashlight filter, red	6230-00-504-8342
Sunblock	6505-01-121-2336
Cooler, water (5 gal)	7330-01-449-2319

MSG Ernie Hammons (Ret)
Camp Beauregard
Pineville, LA

Editor's note: Whew, master sergeant, you just saved lots of NCOs lots of NSN work. Thanks for sharing your list.
Always remember to use only the cleaning and lubing supplies listed in the -10 TM. That should be your PM guide.

Small Arms...

Good Form in the Arms Room



Dear Bonnie,

A unit armorer has many weapons to keep track of. He must worry about which weapons need fixing, which ones are due gaging, and which weapons are off to maintenance. If the armorer makes a mistake, he can find himself in hot water PDQ.

I organized my arms room by using the forms below. I think this method will help other armorers both stay on top of what *needs* to be done and document what *has* been done.

DD Form 314—I use one 314 for each rack of weapons, listing all the weapon serial numbers in that rack on one form. The 314 tracks what services have been done and when they should be done again. Each month I check the 314s to see what needs to be done for that month.

DA Form 5988E—I have our SAMS clerk print out a 5988 for each weapon listing the weapon's serial number and TM number. When a soldier checks out and checks in a weapon, I have him fill out the 5988 showing anything he found wrong. I also have him list the PMCS item number for any problems spotted during PMCS. I then use these 5988s to keep track of what needs to be fixed and what parts need to be ordered for repairs. I also use them to note anything I find during my own quarterly inspections.

DA Form 5909—I use the 5909 to request repairs from higher level maintenance. This gives me documentation for why a weapon isn't in the arms room.

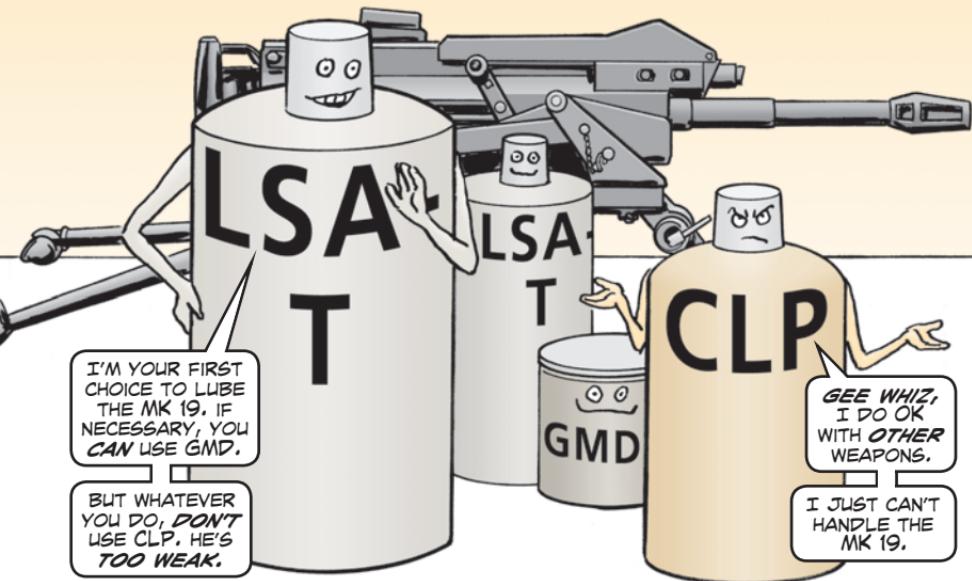
I give all of this information to the SAMS clerk so it can be entered into the automated system. That way all the information is backed up and I will be automatically notified when weapon services are due.

SPC Kyle Adams
554th Co, 92d Engineers
Ft Stewart, GA

GOOD FORM, INDEED.
THANKS FOR SHARING
YOUR SYSTEM WITH
OTHER ARMORERS.



Make LSA-T First Choice



Dear Editor,

I noticed in PS 679 (Jun 09) that you said to use GMD (grease, molybdenum disulfide) to lube the MK 19 machine gun.

Actually, TM 9-1010-230-10 says to make LSA-T the first choice to lube the MK 19. Use GMD only when you can't get LSA-T. Also, GMD has one major drawback: If you get it on your uniform, you can't get it out.

LSA-T is readily available now. You can order it in an 8-oz tube, NSN 9150-00-949-0323, or 1-lb can, NSN 9150-01-109-7793.

One other point: I often see units go to the range without all the equipment needed to fire their MK 19s. That leads to all kinds of firing problems. You should always take feed throats, round removal tool, combination tool, feed slide adjustment tool, and LSA-T to the range. It's a good idea for the unit armorer to go, too. He can learn more on the range than in the arms room.

Gerald Davison
TACOM-RI logistics assistance representative
Ft Riley, KS

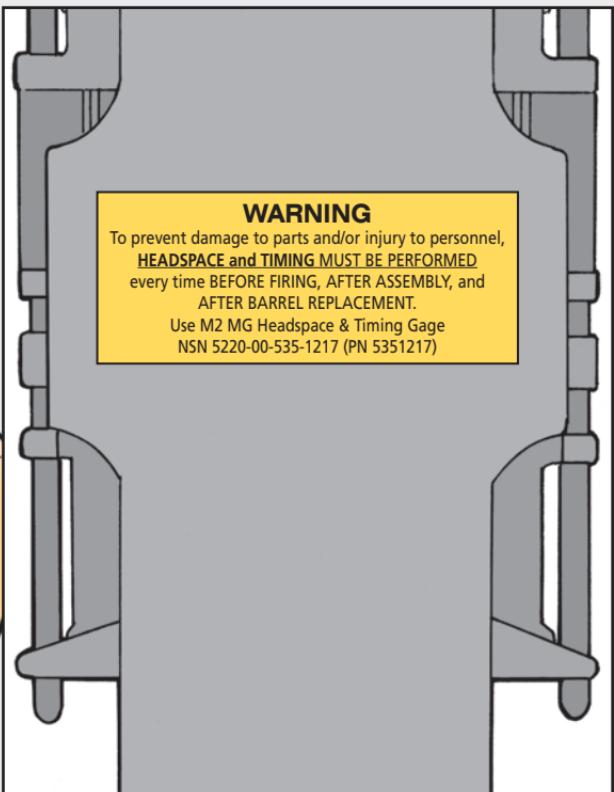
Editor's note: Good points, Gerry. The main thing to remember is **never** use CLP on an MK 19. CLP is just not strong enough to do the job and will cause damage to your MK 19.

Headspace and Timing Sticker



ARMORERS, NOW YOU CAN GET STICKERS FOR YOUR M2 MACHINE GUNS THAT WARN GUNNERS THEY NEED TO HEADSPACE AND TIME THE M2 BEFORE THEY FIRE.

THE STICKER SAYS...



WARNING

To prevent damage to parts and/or injury to personnel,
HEADSPACE and TIMING MUST BE PERFORMED
every time BEFORE FIRING, AFTER ASSEMBLY, and
AFTER BARREL REPLACEMENT.
Use M2 MG Headspace & Timing Gage
NSN 5220-00-535-1217 (PN 5351217)

The sticker has been assigned NSN 9905-01-573-6847. Each package contains 25 stickers. Many units still haven't gotten the poster, smart card or video that details the entire timing and headspacing procedure. Your pubs clerk can order the poster with DA PAM 750-98 and the smart card with GTA 09-06-045. Order at least one smart card for every gunner in your unit so that he can keep the card in his pocket to refer to.

The video can be downloaded at

<https://aepts2.ria.army.mil/Services/Training/50Cal/headspac/headspac.cfm>

You will need to use your AKO login and password.

The video is large and takes quite a while to download. You can get a DVD of the video from your local TACOM-RI logistics assistance representative or Army Learning Center.

Mortars...

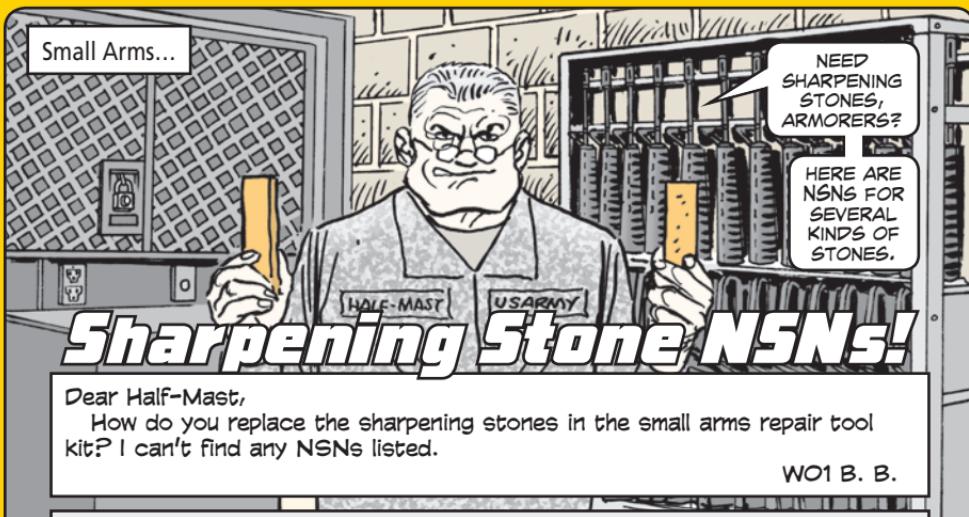


How to Measure the Bore

Some mortar crews are confused about the cannon bore measurement when they fill out DA Form 2408-4, *Weapons Record Data Card*.

They think they should take several measurements of the inside of the bore and then figure out the average of the readings. That is wrong. What you should do is take several measurements and enter the largest reading on the 2408-4.

TM 9-1000-202-14, *Cannon Tube Evaluation*, should always be your guide on measuring the bore.



Dear Mr. B.B.,

Use these NSNs to replace the sharpening stones:

- NSN 5345-00-243-6086, rectangular hard select Arkansas fine slip stone
- NSN 5345-00-198-8060, round hard fine slip stone
- NSN 5345-00-184-1372, $\frac{1}{4}$ -in square hard fine slip stone
- NSN 5345-00-584-4483, $\frac{1}{2}$ -in square hard fine slip stone
- NSN 5345-00-224-6595, half-round aluminum oxide

Half-Mast

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Need a Back Issue of PS Magazine?

Email: half.mast@us.army.mil

Don't forget to include your name, unit, and a valid postal address.

UH-60M...

PAY ATTENTION TO THE MFDS

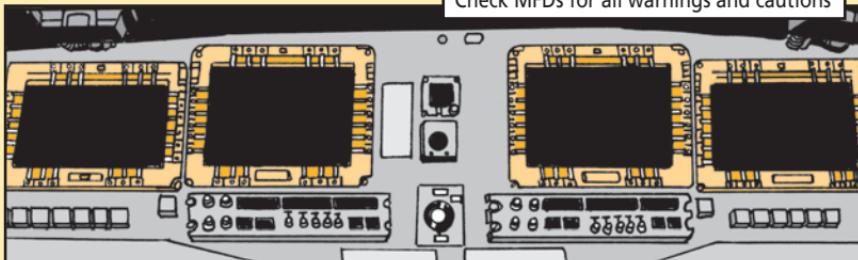
OK, I'M READY
TO RELEASE THE
ROTOR BRAKE!

HOLD UP!
THE GUST
LOCK NEEDS
TO BE
RELEASED
FIRST!

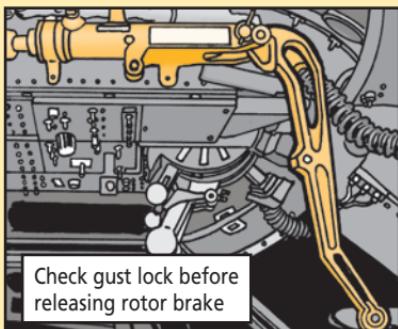
Pilots and copilots, now that your Black Hawks have multi-functional display (MFD) panels, a little more attention to detail will help you avoid disastrous results.

Make sure you don't rush through the pre-flight steps on the MFD panel and in your -10 operators manual. Check all warnings and advisories on the MFD and posted signs to prevent damage or death.

Check MFDs for all warnings and cautions



Believe it or not, one pilot paged through the advisories and warnings on the MFD too quickly, released the rotor brake while the gust lock was still engaged and destroyed the gust lock!



Check gust lock before
releasing rotor brake

When the engines are running during pre-flights, you cannot release the rotor brake until the gust lock is released. The MFD panel instructions walk you through pre-flight procedures and tell you the gust lock is engaged, but if you miss the information by rushing, damage will occur.



Follow all
warnings
and cautions
for gust lock

50-Carat Advice for .50-cal

LISTEN UP TO THESE TIPS ON KEEPING YOUR OH-58'S GUN FIRING ON TARGET!

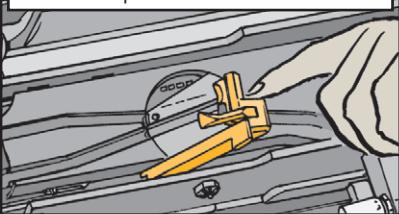
BRATTABRA

Dear Editor,

While maintaining the .50-cal machine guns for our unit's Kiowa Warriors, we've come up with a few tips to keep the guns up and firing:

- Make sure everyone knows what needs to be done with the extractor while unloading the .50-cal. To unload, the extractor must be flipped up. But after you're finished unloading, you must put the extractor back down before you pull back the bolt to clear the weapon. Otherwise, the bolt will jam and possibly be damaged. Then the extractor itself will no longer go up and down and your gun is out of action.

When you're finished unloading, extractor needs to be pushed back down

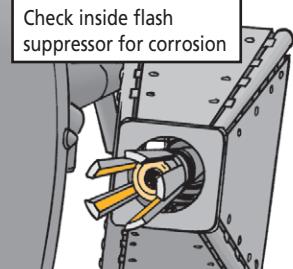


• Check the inside of the flash suppressor for corrosion. The flash suppressor can become so corroded that it can break loose and fly off during firing. If you spot any corrosion, clean it off with a wire brush. Prevent corrosion by giving the flash suppressor a light coat of MIL-PRF-32033 when you clean and lube the rest of the .50-cal. If you spot cracks in the flash suppressor, get it replaced. It's in no shape for firing.

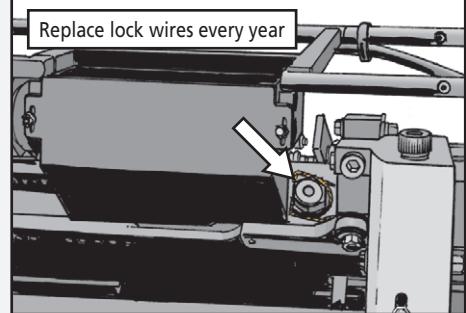
Get MIL-PRF-32033 with NSN 9150-00-458-0075. It replaces VV-L-800, which is obsolete.

• Replace the lock wires for the gun's bolts every year. Some Soldiers thought that wasn't necessary as long as the .50-cal passed its gaging. **Not true!** We had bolts actually fall off during firing because they weren't lock wired securely. That can lead to jamming and gun damage.

SGT Andrew Guiher
SGT Daniel Tharp
603rd Aviation
Hunter Army
Airfield, GA

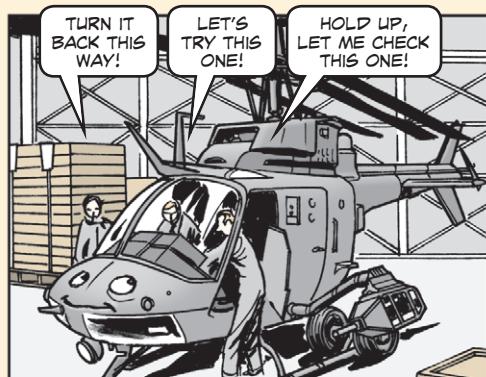


Clean out corrosion with a wire brush



Editor's note: Those are high caliber tips, Sergeants. Thanks for sharing your experience.

As the Knob Turns



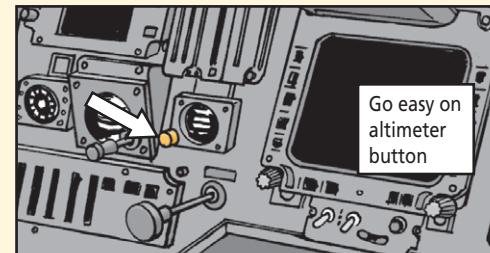
Playing with knobs and buttons is fascinating. We turn 'em, pull 'em, push 'em and press 'em.

For the Kiowa Warrior, the standby altimeter button is not a button to play with. In fact, whether the aircraft is running or not, go easy on all the cockpit knobs, switches and buttons.

The standby altimeter measures air pressure to let you know how far your bird is above sea level.

Fumbling around with the standby altimeter button or turning it roughly can easily strip its gears. Even turning it too fast while adjusting the settings can strip the gears. If that happens, the altimeter will display incorrect readings on the multi-functional display (MFD) panel. That could cause uncomfortable ground contact!

Damage the altimeter button and you'll be ordering a new altimeter, NSN 5841-01-374-6039. And, until it comes in, you won't be flying anywhere. Your bird will be grounded!



Go easy on altimeter button

RUBBING AND SHAKING NOT ALLOWED



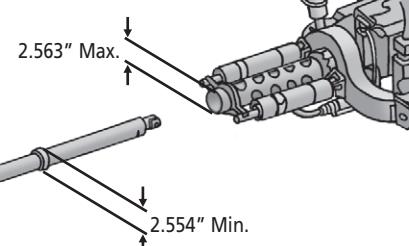
It may stop the vibration in the short term, but it will create long term problems if you don't locate the root cause of the problem.

It's a chore trying to find the source of the vibration but it can be done. Locating and repairing vibration problems will help your M230 fire straight and true.

USE THESE TIPS TO SHAKE DOWN THE VIBRATION PROBLEM.

- With barrel removed, check the front inside diameter of the barrel support for excessive wear. The diameter should be no more than 2.563 inches (65.1 millimeters).

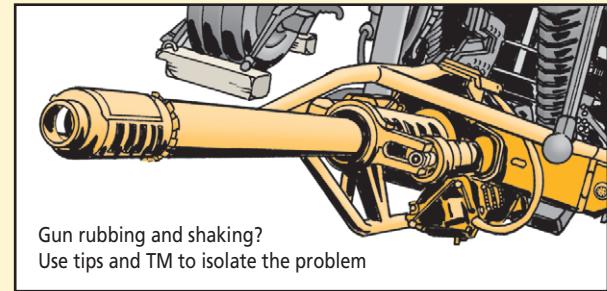
- Check the mating area (raised area where the barrel contacts barrel support) for excessive wear. The diameter of the raised portion should be no less than 2.554 inches (64.8 millimeters).



- Use calipers to measure at several locations around the diameter. Replace parts where the damage exceeds the limits.
- Make sure your recoil adapters are properly serviced and check out the vibration related fault isolation procedures (Armament System FIPs) in your TMs.



These tips and other measurements for checking turret vibration have been added to tasks in IETM 1-1520 Longbow Apache and in TM 9-1090-208-23-1-1. Look for them in upcoming changes.



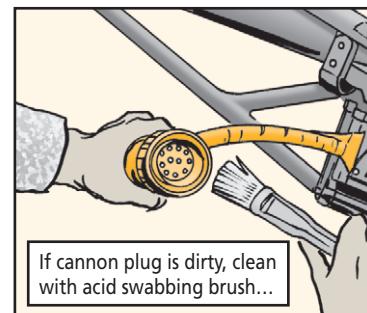
Gun rubbing and shaking?
Use tips and TM to isolate the problem



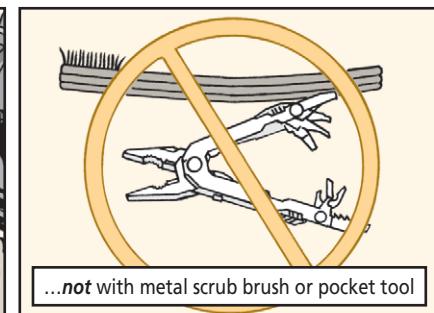
Mechanics, use the proper tools and materials to clean the 30mm gun motor cannon plug on your AH-64s

When cleaning gun parts, the right tool always does the best job. The wrong tool, like your handy-dandy pocket tool, causes damage.

Clean the grit and corrosion from the cannon plug and its pins with an acid swabbing brush, NSN 7920-00-514-2417, and isopropyl alcohol, not a pocket tool.



If cannon plug is dirty, clean with acid swabbing brush...



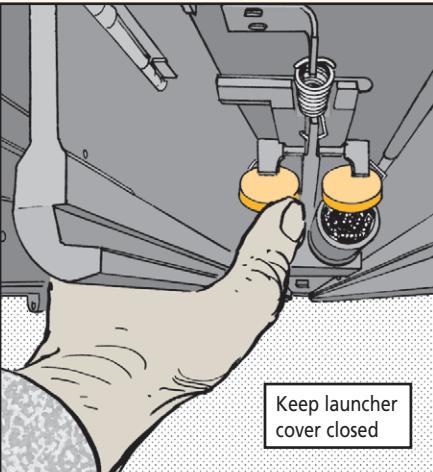
...not with metal scrub brush or pocket tool

A pocket tool is handy for all types of things, but not for a cannon plug. It can cause damage to the plug and pins.

Take Sand Seriously



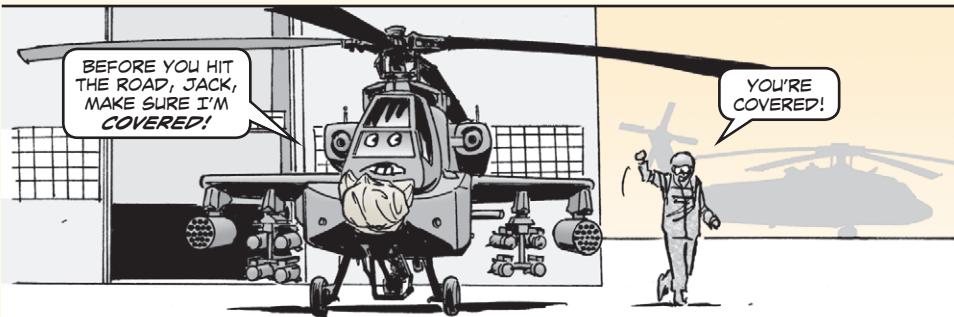
When missiles are not installed on an aircraft, make sure the shotgun connector, door assembly cover, NSN 1440-01-127-2427, is closed on the launcher. And cover the missile shotgun connector, too. This will keep sand out.



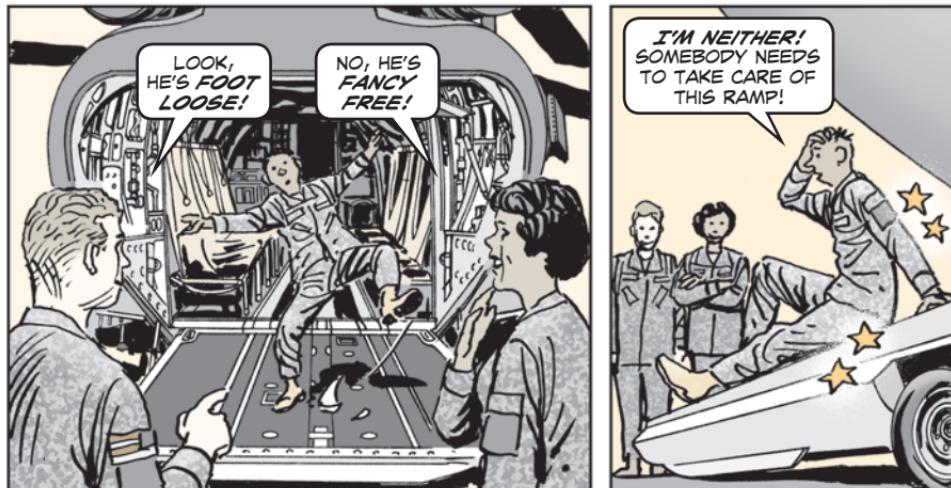
The missile shotgun connector cover is issued only to units deployed in theater. Contact your depot maintenance technician (DMT) or the Joint Attack Munitions Systems (JAMS) Project Manager at mslsjamswarroom@msl.army.mil if you require the missile shotgun connector cover.

No matter where equipment is located, sand will find a way into the shotgun connectors. If that happens the missiles will not properly seat in the launcher, pins can get bent by slamming missiles in place and that could result in misfires or a damaged missile.

If sand gets into the shotgun connectors, blow it out with compressed air. But be careful the compressed air doesn't introduce moisture to the system.



FOOT LOOSE AND FANCY FREE



Losing your footing on the Chinook's ramp area happens for two reasons.

One reason is that boots going up and down the ramp wear off the non-skid coating. That exposes the bare flooring and makes the ramp's walkway slippery and dangerous.

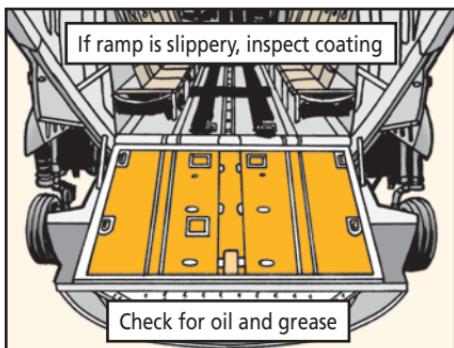
The second reason is an accumulation of transmission oil and/or hydraulic fluid during maintenance or from leakage from the many lubrication lines and hydraulic components in the ramp area. That can lead to slips and falls.

So pay attention mechanics and crew members and be careful when walking on the ramp. If you notice shiny areas through the non-skid coating, maybe it's time to resurface. If the non-skid coating is OK, and you notice a oily area, use some elbow grease and clean it up.

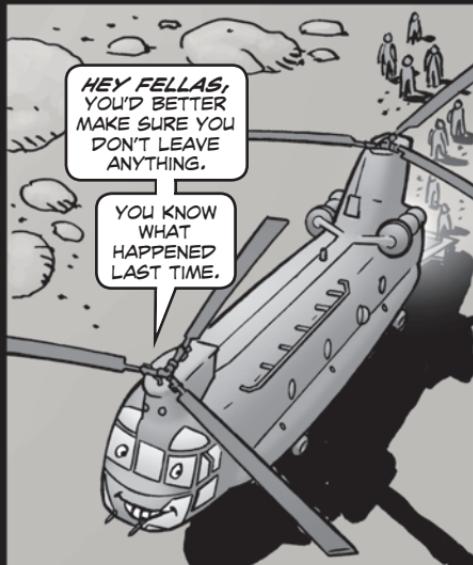
Whether it's worn out non-skid coating or oily build-up, **don't wait!** Fix the problem unless you like dealing with broken bones.

Walking on areas of your bird that have slippery walkways puts you in harm's way. So take the time and let your fingers do the walking through the TM pages on caring for your aircraft walkways.

Check out paragraph 6-12 of TM 55-1500-345-12 for the details.



NIGHT MAINTENANCE



Mechanics, night maintenance on your Chinook calls for extra attention to detail. Without daylight, it's easy to leave items in the wrong place.

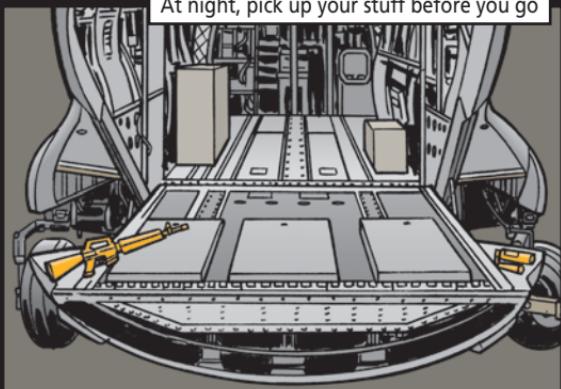
When performing night maintenance, pay particular attention to the ramp side areas prior to raising the ramp. Make sure nothing is left on the ramp sides that may put the ramp or other equipment in harm's way. Pick up anything that is loose and put it away.

Oil cans, ammo cans, and even combat helmets sometimes get left on the ramp sides. If the area is not picked up, the ramp and what-ever is placed on the ramp sides will get crushed or destroyed when the ramp closes.

The ramp side areas are just thin sheet metal, so anything that gets caught there will punch a hole through the ramp and likely destroy a portion of the airframe. It will definitely destroy whatever is left on the ramp side.

Eyeball the area when nighttime maintenance is complete to avoid the crushing problem of airframe repair.

At night, pick up your stuff before you go



A DOZEN TIPS TO KEEP YOU SAFE!



HERE ARE A DOZEN TIPS TO KEEP YOU, THE NCO IN CHARGE, AND YOUR SOLDIERS SAFE WHEN YOU ERECT AN ANTENNA AND MAST.

MAKE A COPY OF THESE TIPS AND STICK IT IN EACH ANTENNA PARTS' BAG. READ IT, THEN READ IT TO YOUR SOLDIERS BEFORE YOU ERECT AN ANTENNA!

1. Before you connect the first piece or drive the first stake in the ground, know each and every caution and warning in the antenna technical manual. Then, do what they tell you to do and don't do what they tell you not to do. And keep your TMs close at hand.



2. Always wear protection. That includes safety goggles, a helmet and gloves. A poke in the eye; a bash on the head; smashed hands, burned palms and pinched fingers are the most common injuries that occur when an antenna is being erected.

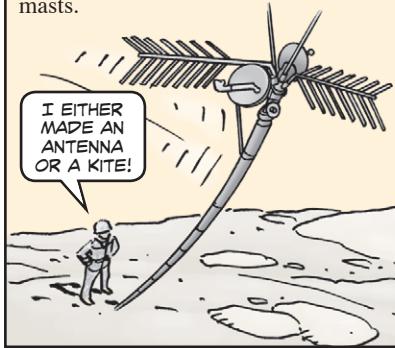
3. Do not erect an antenna in the immediate vicinity of power lines. Treat all unknown lines, wires and cables as if they were power lines. If you must erect in an area with unknown lines, find out what they are, first.

4. Know your guys! Check all guy wires and fasteners for wear and damage before your erection mission. Do not use a damaged guy wire.

5. Mark your guys! You must put signs or streamers or both on your guy wires to keep Soldiers from tripping over them. A trip can cause an injury and rip the guy wire from the ground, bringing down the antenna.

6. Keep your guys from crossing roadways and other paths of travel. If an antenna location forces you to stretch a guy wire across a path, walkway or roadway and you can't put the antenna anywhere else, close the path and make that closure obvious.

7. Don't mix antenna parts. Even if you can make it fit or make do, don't! Order replacement parts and keep the structural integrity of your antennas and masts.

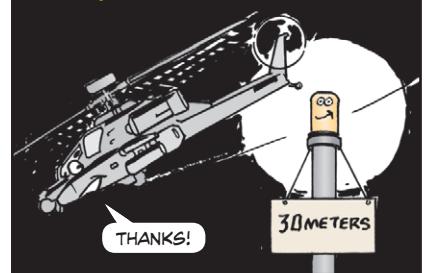


8. Don't modify your antenna. Use only the equipment specified in your technical manual. Too many of you are adapting your antennas to the situation and making hazards in the process. Yes, sometimes wartime measures apply, but make sure you have your commander's approval and that you have thought through all the potential risks.



9. Ground the mast and antenna just like your technical manual tells you. Don't cut corners.

10. Mark the working area surrounding your antenna with warning signs, lights and glow-in-the-dark tape. Use the signs to describe the potential hazards such as tripping, falling parts and shock. Don't forget to light the top of the 30-meter mast to prevent helo strikes!



11. Hold a class and instruct everyone that will regularly be in the vicinity of the antenna about electrical storms and lightning hazards. Do they know what electrical flashover is? Do you?



12. Have a plan in place to deal with any injury that does happen. Don't leave your response to chance. Know what can happen, from shock to concussion to worse. Make sure you and your Soldiers know exactly how to respond.

THE 201 IS NOT REPLACING THE 254!

HOLD YOUR HORSES,
COWBOY, IF YOU'RE
THINKING ABOUT REPLACING
THE OE-254/GRC ANTENNA
WITH THE COM-201B.

THE RUMOR THAT THE
COM-201B IS REPLACING
THE OE-254 HAS BEEN
SWEEPING THE PRAIRIE, BUT
IT'S JUST NOT TRUE!



THE OE-254 HAS BEEN IN SHORT SUPPLY BECAUSE OF DEMAND AND FAILURE TO TURN IN REPARABLE ONES. BUT SUPPLY HAS IMPROVED, SO SUBMIT YOUR REQUISITIONS.

THERE ARE SEVERAL REASONS YOU WANT TO STAY WITH THE OE-254 INSTEAD OF SWITCHING TO THE COM-201B.

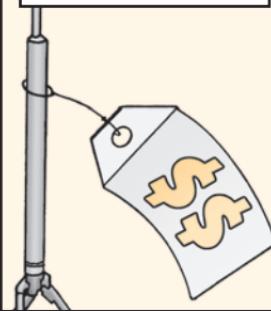
FIRST, IN TEST AFTER TEST, THE OE-254 OUT PERFORMS THE COM-201B.



SECOND, THE OE-254 IS A FIELD-LEVEL REPARABLE ITEM. THE COM-201B ISN'T.



FINALLY, THE OE-254 IS CHEAPER! THE COM-201B COSTS TWICE AS MUCH.



ONCE THE REQUISITIONS FOR THE OE-254 START ROLLING IN AGAIN, DEMAND WILL DEPLETATE THE SUPPLY. SO, CHECK YOUR UNIT AREA FOR REPARABLE ANTENNAS AND TURN THEM IN! SEND THEM TO:

**Tobyhanna Army Depot
11 Hap Arnold Blvd.
Tobyhanna, PA 18466**

USE A RIC OF BY6, AN SOS OF BIG6 AND A DODAAC OF W25G1W. THERE IS NO CREDIT FOR THE RETURN OF THIS MAJOR ITEM, AND YOU WILL NEED TO SUBMIT A NEW REQUISITION IN ORDER TO REPLACE IT.

IF YOU HAVE QUESTIONS ON REQUISITIONING THE OE-254, CONTACT CECOM LCMC AT DSN 992-4189 OR (732) 532-4189, OR EMAIL: lynda.macdonald@us.army.mil



Study to Show Thyself Approved

The image shows the homepage of the LandWarNet eUniversity website. At the top, it features the "LANDWARNET" logo with "eUNIVERSITY" underneath. Below the logo is a photograph of a soldier in camouflage gear working on a complex antenna system. To the right of the photo is a "Welcome to LandWarNet e-Universit" banner. A text box below the photo contains the following message:

SIGNAL NCOs, AND THOSE WHO
WANT TO BE, ABSOLUTELY,
POSITIVELY NEED TO HAVE
<https://lwn.army.mil>
BOOKMARKED AS ONE OF YOUR
FAVORITE INTERNET SITES.

Below this message is another text box containing:

AND YOU NEED TO
CHECK IT **REGULARLY!**

To the right of the website screenshot is a cartoon illustration of a woman with blonde hair, wearing a white blouse and a dark skirt. She is gesturing with her hands as if speaking. In the background, there's a "LOGIN" button and some contact information for the eUniversity Support Desk.

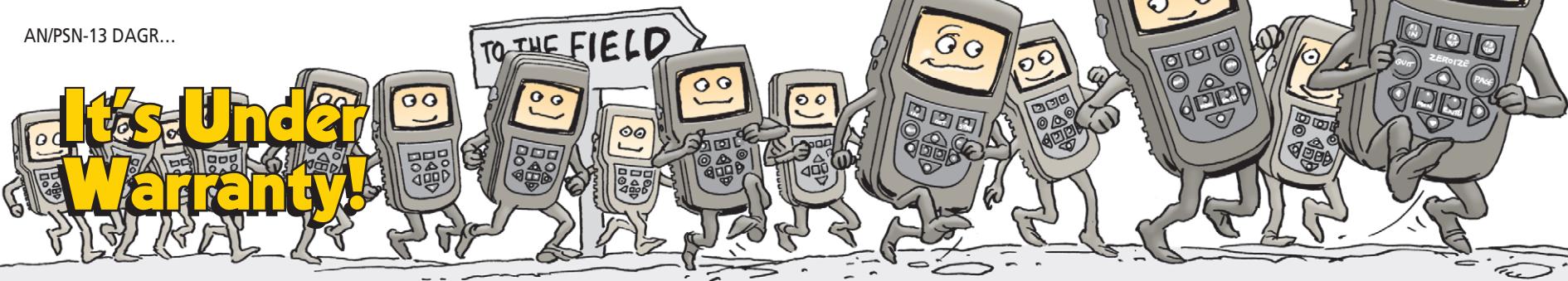
This website is the online home of LANDWARNET eUNIVERSITY. This eUNIVERSITY will provide you and your Soldiers training on almost every piece of signal equipment in the Army. It will also instruct you in the many areas an advancement-minded signal NCO needs to know.

To access the website, you'll need a valid AKO login ID and password.

Once at the website, scan the Main Menu, the Popular Links, the Latest Downloads and the Popular Downloads. From these you'll find hot issues that need your attention.

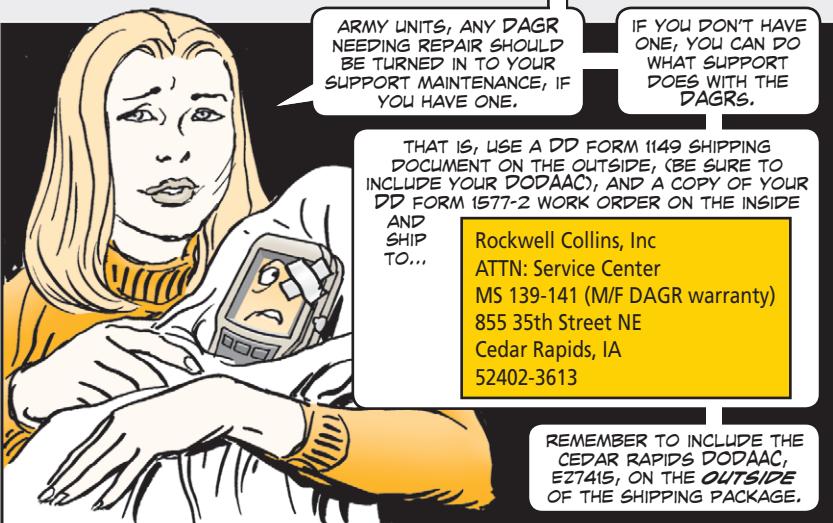
To find courses for specific signal equipment, type the equipment name in the SEARCH function. You'll be surprised at all the instruction available at your fingertips.

There's no substitute for training. Yet, too often, training stops after a Soldier leaves Ft Gordon. It shouldn't. And now, it doesn't have to. For the moment, put down PS, get on the Internet and explore the LANDWARNET eUNIVERSITY.



THE DEFENSE ADVANCED GPS RECEIVER (DAGR), BOTH THE AN/PSN-13 AND AN/PSN-13A MODELS, ARE UNDER WARRANTY FROM THE MANUFACTURER, ROCKWELL COLLINS.

THIS IS GOOD NEWS SINCE OVER THE LAST FOUR YEARS 200,000 DAGRS HAVE BEEN FIELDED!



To find the status of any DAGR you have sent to Rockwell Collins for repairs, you can contact the project manager for global positioning systems (PM GPS) at DSN 298-9366 or (410) 278-9366.

To get the info, you'll need to give them your DODAAC and the DAGR serial number.

Notify your property book officer (PBO) as soon as you ship the DAGR in for replacement. For more info on DAGR warranty returns, go to the PM GPS website:

<https://gps.army.mil>

When you get your replacement DAGR, don't forget to register the change in serial numbers with your PBO.

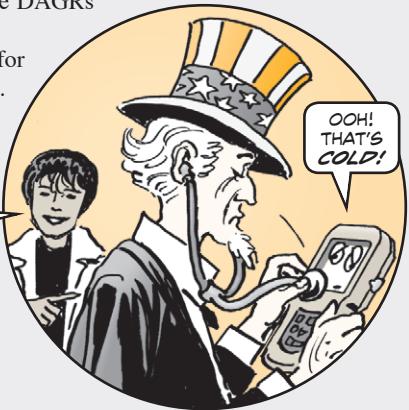
One more important thing to remember: Not all damage to the DAGR is covered by the warranty. In fact, about half of all the DAGRs returned fall under warranty exclusions.

Does that mean you, the user, must pay for repairs if a warranty exclusion kicks in? No. No matter the problem, your warranty turn-in procedure remains the same.

SO WHY
DO YOU
NEED TO
KNOW THIS
INFO?

BECAUSE UNCLE
SAM PAYS FOR
REPAIRS NOT
COVERED BY
THE WARRANTY.

YOU CAN HELP YOUR UNCLE
SAVE SOME MONEY, THOUGH,
BY TREATING YOUR DAGR
WITH A BIT MORE CARE.



One of the areas that takes a lot of abuse is the battery pack.

The battery pack has a tight fit to prevent water intrusion. That tight fit makes it hard to open when it's time to replace the batteries. Some of you are taking a screwdriver or anything sharp that's handy to pry off the battery pack.

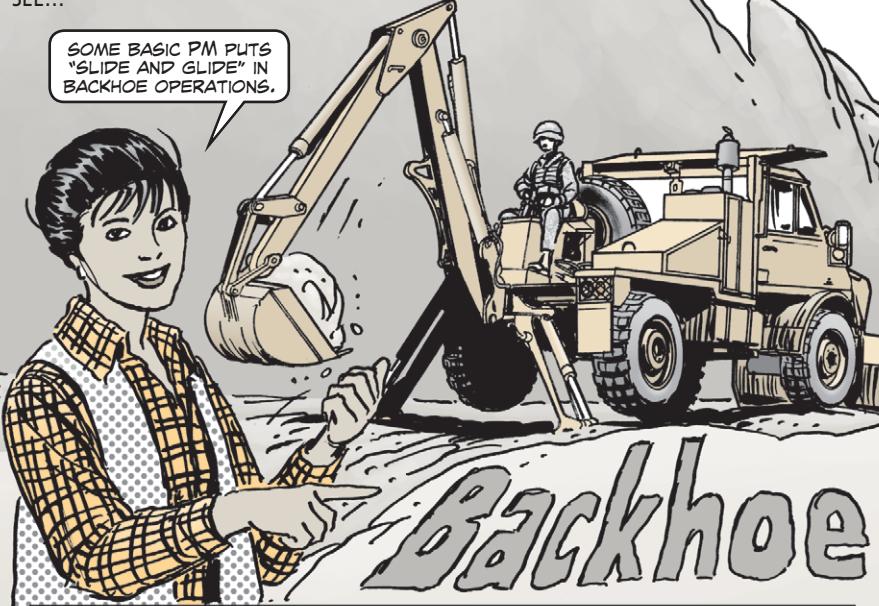
Bingo! Bang! You've ruined the integrity of the pack!

Instead of prying, try pulling. Hold the DAGR upside down with the battery pack at the top and facing you. Grab the pack firmly at both bottom corners. Pull down and you should hear the corner snaps release. Now give the pack a good tug and it should slip into your hand.

And, get this! Some units have returned DAGRs for repair without the battery pack! That's an incomplete end item. You can requisition extra battery packs to make battery swaps easier, but whenever you return a DAGR for warranty repair or you transfer ownership by lateral transfer, it must have a battery pack installed.

Another item that takes a lot of abuse is the display screen. A padded flap case for better protection of the DAGR and the screen will be soon available. Look for information about it, including an NSN to order it, here in PS.

SEE...

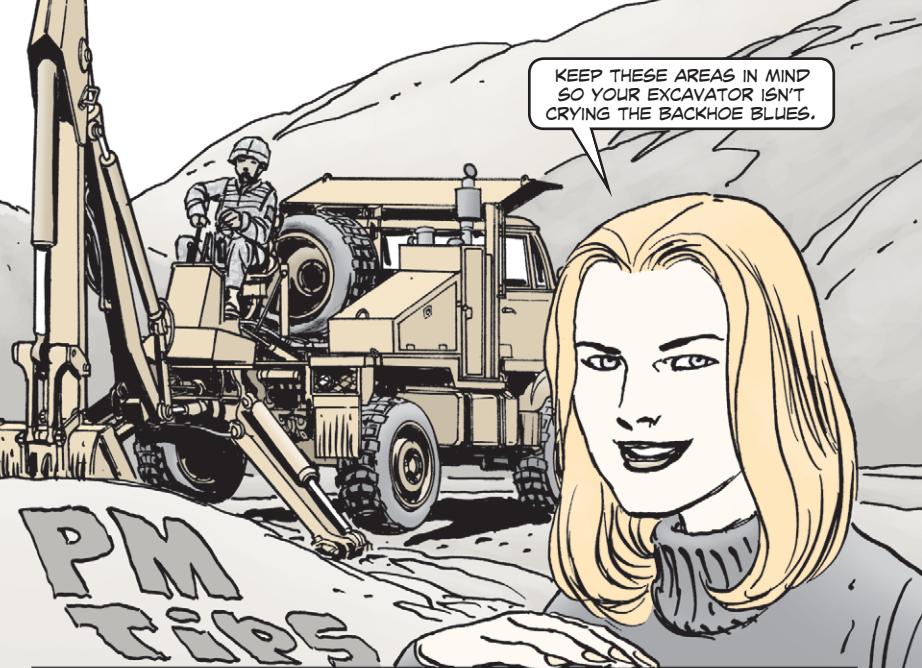
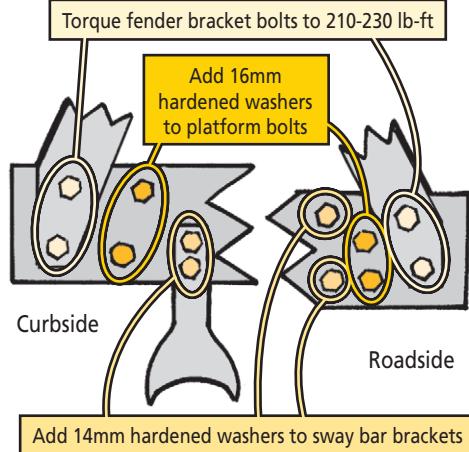


Keep Bolts Torqued

Wear and tear loosens the bolts on the rear fender bracket, sway bar and platform. Loose bolts chew into the vehicle's frame. Then the rear fenders and frame begin to fall apart during operations.

Before that happens, make sure all bolts are torqued properly. The fender bracket bolts should be torqued to 220 lb-ft. Add 16mm hardened washers, NSN 5310-01-305-2539, to the platform bolts and torque 'em to 220 lb-ft. Finally, add 14mm hardened washers to the sway bar bracket and torque the bolts to 150 lb-ft.

Order the 14mm washers on DD Form 1348-6 using CAGE code 64678 and PN 6819900440.



PM TIPS

Keep Fittings Lubed

One of the grease fittings missed is the one that lubes the backhoe's dipper pivot arm. That's because the fitting is out of sight, right under the bend (pivot) in the arm.

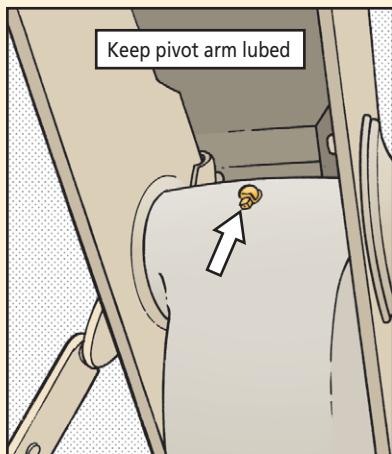
Without lube, the pivot arm's bearing can seize, causing the backhoe to bind. Not good!

So, keep the pivot arm lubed. During scheduled services, give the fitting four or five pumps of grease.

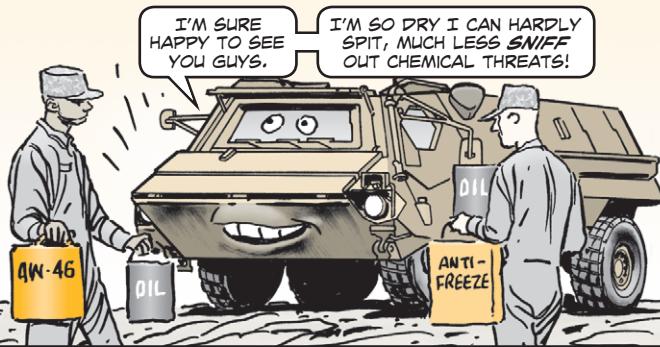
While you're at the back of the vehicle with grease gun in hand, a little lube goes a long way when it comes to the grease fitting for the backhoe's tilt cylinder.

This fitting is usually passed over because it's in the dark when the backhoe is in the transport position. With the backhoe up, the fitting is clear as day.

During scheduled services, pump four or five shots of grease in the cylinder. That way the backhoe will move smoothly back and forth.



DON'T LET FOX RUN DRY



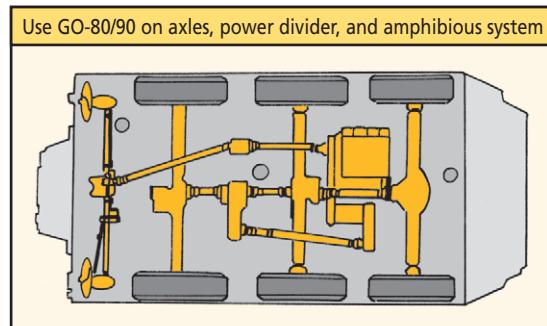
The Fox can be quite thirsty when it comes to fluids: engine oil, transmission fluid, hydraulic fluid, antifreeze, even grease. If you let your Fox run dry, it will stop in its tracks. Mission missed. Expensive repairs to follow.

Pay attention to fluids and where they go. Crews sometimes use the wrong fluid or put fluid in the wrong place. All the fluid filler spouts are clearly marked for what they go to. So make sure you don't pour oil or transmission fluid in the radiator. Yes, that has happened! Here's a quick rundown of the fluid checks and what specific fluids are needed:

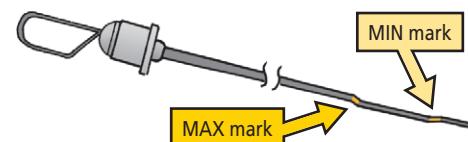
Axles, power divider, amphibious system. They take GO 80/90. For the axles, the fluid should reach the lower edge of the fill hole. On the planetary gear set cover of the first and second axle, read the fluid level in the window. For the steering knuckles, use the dipstick from your tool bag to measure.

Engine oil. Use OE/HDO-15/40. With the engine off, the reading should be between MIN and MAX. If the engine has been running, wait at least three minutes after shutdown to measure.

Transmission oil. Use OE/HDO-10. The transmission oil should be at MIN level before starting the engine. With the engine idling, the reading should be between MIN and MAX of the first range (30°C). But remember to pay attention to the engine temperature. Read the temperature gauge. The cold range on the dipstick is the lower range (30°C) and the warm range (80°C) is the higher.



Use GO-80/90 on axles, power divider, and amphibious system



Engine oil should be between MIN and MAX

MAX mark

MIN mark

Hydraulics. Do not use cherry juice. You are supposed to use H540, but unfortunately there is none in the supply system. Hydraulic fluid AW46 from your main battle tank can be used instead. Make sure it's not red and it's not petroleum-based. There is no NSN for AW46, but your Fox maintainer can get you all you need.

To check hydraulic fluid, turn the main power switch to Position 2 and wait until the electro-hydraulic pump shuts off. The fluid level should be between MIN and MAX.

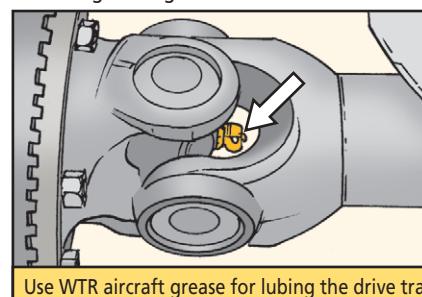
Brake system. Use H515 brake fluid only. The master cylinder reservoir under the dash should be up to MAX. The system expansion tank behind the driver should be up to MAX. NSN 9150-00-082-7524 gets 10 gallons of H515.

Air brake frost protector. Use denatured alcohol. On the dipstick it should read between MIN and MAX. When the locking T-rod is in WINTER (the lower) position, the brake system is fed with denatured alcohol and moisture in the air lines does not freeze. During the summer, turn the T-rod 90° and let the rod come up.

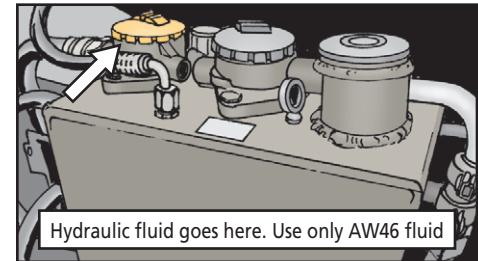
Cooling system. Use ethylene glycol antifreeze in a mixture of 1/2 antifreeze and 1/2 water. Check the antifreeze with the engine cold. The level should be within one inch of the sensor in the fill neck. Test the strength of the antifreeze with the antifreeze solution tester. You don't want the antifreeze too weak or too strong. If it's too weak, the coolant could freeze in the cold. If it's too strong, the engine won't be cooled sufficiently in hot weather.

Grease fittings. Use WTR aircraft grease. Use your on-board grease gun because US grease fitting adapters are a bit too big for the Fox fittings. Lube the fittings until grease becomes visible.

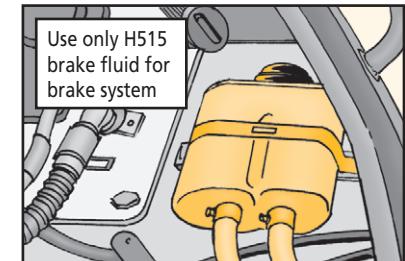
CHECK ALL
OF THESE FLUIDS
TO OUTFOX FLUID
PROBLEMS!



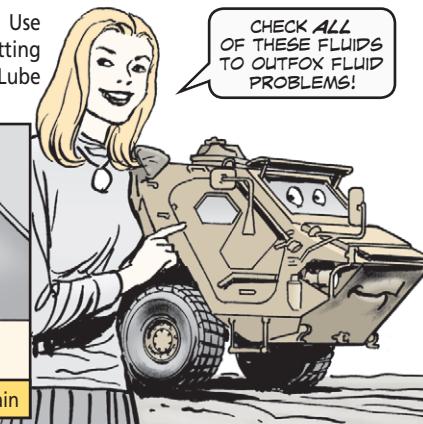
Use WTR aircraft grease for lubing the drive train



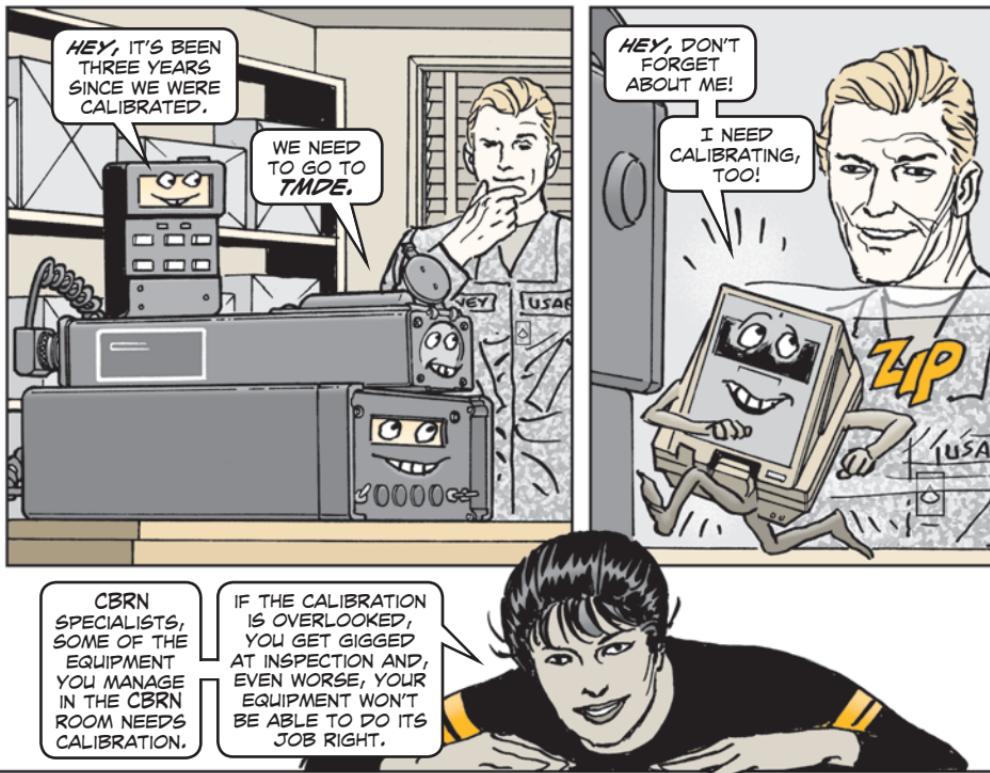
Hydraulic fluid goes here. Use only AW46 fluid



Use only H515
brake fluid for
brake system



Don't Forget CBRN Calibration



Radiac equipment and PATS are what you need to worry about. The AN/UDR-13, AN/VDR-2, AN/PDR-75, and AN/PDR-77 radiac sets need to be calibrated every three years. The M41 PATS should be calibrated every 18 months. The exception is surety sites, which should have their PATS calibrated every 12 months.

All of the radiac equipment and PATS should have labels that show when they were last calibrated. If they don't, contact your local TMDE and ask them to check when the equipment was last calibrated.

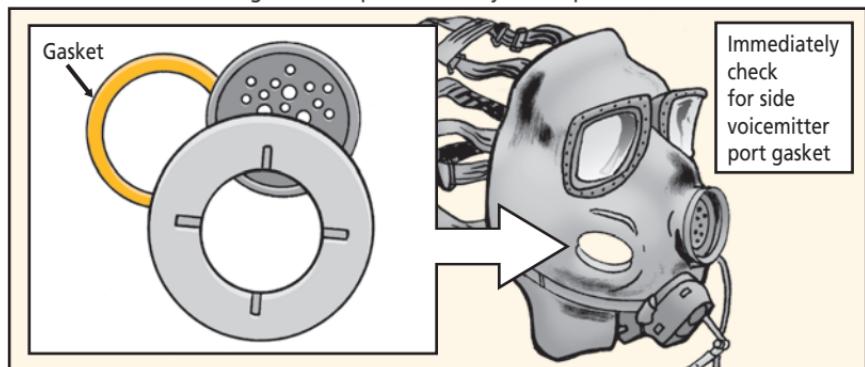
Your unit's SAMS-E system should have had these calibration requirements entered in it so that you would be notified automatically when equipment is due to go to TMDE. The problem is that many units take their equipment out of SAMS-E when they deploy and forget to put it back in when they return. Make sure your equipment is covered by SAMS-E.

CHECK FOR MISSING GASKET



A number of M40A1/M42A2 masks have gone to the field with the side voicemitter port gasket missing. Without the gasket, unfiltered air could enter the mask, providing no protection against chemical/biological agents.

All Soldiers should immediately check their masks for the side voicemitter port gasket. If it's missing or damaged, tell your CBRN specialist. He can replace the gasket, NSN 5330-01-260-8702. Also check the gasket for splits and sticky or compressed areas.



All masks in storage should also be inspected for a missing side voicemitter port gasket. If you find new masks or facepiece assemblies still in their unopened original packaging that are missing the gasket, file an SF 368, *Product Quality Deficiency Report (PQDR)*, and email the mask configuration manager:

bobbiejo.witherspoon@us.army.mil

and the item manager:

douglas.e.vanatta@us.army.mil

If the mask was part of lot number PBA08M002-165, you don't need to file an SF 368 or notify the configuration and item managers. They are already aware some masks are missing the gasket.

The mask lot number is on the lower right cheek strap and on the mask's shipping box label.

For more information, see TACOM LCMC safety of use message 09-024:

https://aeprs2.ria.army.mil/commodity/Soum/Tacom_WN/soum09-024a.html

RECENT OR Relics: IS YOUR UNIT USING THE LATEST PUBS?



How to Get a Unit-Tailored Pubs Listing

If you're stumped about which pubs are needed for your unit, the Logistics Support Activity (LOGSA) Equipment Oriented Publications Database (EOPDB) crew can help. You can receive customized listings of the equipment pubs needed to support your unit by emailing your six-digit unit identification codes (UICs) and maintenance levels (10/20, 10/30, etc.), your name, rank/grade, military address and phone number to the EOPDB team:

logsa.eopdb@conus.army.mil

A customized list is especially beneficial to units that are getting ready to deploy or returning from deployment. A response will come to you by return email within a few business days.

Questions? Contact the EOPDB team: DSN 645-9845 or (256) 955-9845

About the Unit Publications Tailored Listing

When you request a tailored listing from the EOPDB team, you'll get back a pdf broken out into three separate reports:

- **Publications tailored index by pub number**—Pubs required by your unit, sorted by pub number
- **Publications tailored index by equipment line item number (LIN)**—Pubs required by your unit and sorted by LIN
- **Publications tailored index rejected LINs**—All LINs included in your authorized equipment that do not have an associated pub (usually because it's an equipment item for which no Army pub was developed).

Your listings will begin with your six-digit UIC code, followed by three characters indicating the type of report, for example, PUB, LIN, or REJ. These characters will be followed by a pdf extension. The report will have a filename like: WXXXX1PUB.pdf, where the Xs represent alphanumeric characters.

Remember: Unit pub tailored listing reports are based upon the authorized equipment in your unit's current MTOE. However, the reports also include "On-Hand" (sometimes called subs) equipment, which are based upon your unit's property book. "On-Hand but Not Authorized by MTOE" equipment is identified by an asterisk (*) on the left side of the page.

Publications	Publications Title	Pub Date	Changes	Lst Chg Date	PIN	IDN
*TB 9-6150-2226-23	Warranty Program for Distribution Illumination Systems, Electrical	1991-09-17		1991-09-17	068614	255589

The *Unit Publication Guide* has additional detailed instructions and is available on the LOGSA website: <https://www.logsa.army.mil/etms/welcom1.cfm>

Using the team means that you get their expertise in dealing with the database. You also get three reports (the Pubs, LIN and Reject Reports) in place of the single LIW report.

EOPDB Team

REJECTED LINS

- 90937N
- 95157N
- 97274N
- 99161N
- 99172N
- A03169
- A0317
- A03185

REPORT BY PUB NUMBER

- LIN P91756
- NIIN 013388010
- LO 10-4320-
- 316-12
- PUMP UNIT,
- DIESEL, 65
- GPM

REPORT BY LIN

- LIN P91756
- NIIN 013388010
- LO 1-4320-
- 316-12
- PUMP UNIT,
- DIESEL, 65
- GPM

LIW Online Report

To run your own equipment publication lists on LIW you must have completed a systems access request (SAR). On the SAR you'll need to request access to the WebLIDB and ETMs. Go to <https://liw.logsa.army.mil>

Once you've logged in and are on the LIW homepage, scan down to the bottom of the middle column and click on WebLIDB. Then scan down the left column and click on Publications and then on Publication Selections. Click on Tailored Index Report By UIC, enter your UIC and click Submit, then click on the running man icon at the upper right to run the report.

Address: <https://liw.logsa.army.mil/index.cfm?fuseaction=home.main#>

LIW Logistics Information Web
Huntsville, AL

Queries and Reports
+ Expand All - Collapse All

Applications

- AOAP
- ILAP Army ILAP
- ETMs Online
- FEDLOG
- LOG911
- CBT
- Tactical RINN
- Parts Track
- PRJUSE-Mo
- PS Magazine
- PSCC
- RPA
- RPA Tools
- SKO
- WebLIDB

User Favorites List: [Update]

WebLIDB

Publications Selection

Select a report from the list below.

Publications

- Pubs Scheduled
- Pages Scheduled
- Age of Pubs

Total Pubs / Total EOPDB

- AMC Proponent Commands
- AMC STAFF Proponent Commands
- NON AMC Proponent Commands
- LINs Without Publications
- Tailored Index Report
- Tailored Index Report By UIC
- DA Index Report

To find the report, scan down the left column to Detailed Report Status. Click on it for options or the report under it for HTML.

Detailed Report Status

Report Information and Options

Information

- Rows: 2031
- Run Time: 00:00:11
- Status: Viewed

Links

- Configure Links

Tools

- User Preferences
- Feedback
- Bulletin Board
- Point of Contact Information
- My Table for EMIS
- Report Metrics
- Accessibility Notice

Report Selections

UIC = WH1ZD0

Viewable Reports

Submit Date Report Title

12-19-07 14:54 Tailored Index Report By UIC

Save Options

- Express HTML Full Format HTML
- Express Excel Full Format Excel

Other Options

- Edit Report
- Save Favorite Report

The Detailed Report Status has several download options. On this screen, single click the report title. The options will appear to the left.

- If you click on either HTML button, you can click on the publication number of an equipment manual to get a link direct to that publication.
- There are several Excel spreadsheet options as well. Pass the cursor over the buttons for a short description of their uses.

USAMC Logistics Support Activity

www.logsa.army.mil

PUBLICATIONS TAILORED INDEXED DRILLDOWN REPORT

(Report run on 2007-12-19)

Show Report Selections

LIN	LIN Description	NIIN	NIIN Description	Publication Number	Publication Title	Date Published	Changes	Last Change	EM No	EM PIN	EM ION
A22496	AIMING CIRCLE: 006140008	AIMING CIRCLE M2 WIE	DMR9-1290-262	AIMING CIRCLE M2 WIE	1988-04-01	1988-04-01					
A22496	AIMING CIRCLE: 006140008	AIMING CIRCLE M2 WIE	TM 9-1290-262-10	OPERATOR'S MANUAL FOR AIMING CIRCLE, M2 WIE (NSN 1290-00-614-0005) AND HAND RECEIPT MANUAL COVERING CONTENT OF COMPONENTS OF END ITEM (COE).	1981-04-15	1	2007-01-15	0041	075690	372453	
A22496	AIMING CIRCLE: 006140008	AIMING CIRCLE M2 WIE	262-10-HR	HAND RECEIPT MANUAL COVERING CONTENT OF COMPONENTS OF END ITEM (COE).	2001-12-01				2001-12-01	0065	075736
A22496	AIMING CIRCLE: 010670687	AIMING CIRCLE M2A2	DMR9-1290-262	AIMING CIRCLE M2 WIE	1988-04-01	1988-04-01					
A22496	AIMING CIRCLE: 010670687	AIMING CIRCLE M2A2	TM 9-1290-262-1	MANUAL FOR AIMING CIRCLE, M2 WIE (NSN 1290-00-614-0005) AND HAND RECEIPT MANUAL COVERING CONTENT OF COMPONENTS OF END ITEM (COE).	1981-04-15	1	2007-01-15	0041	075690	372453	
A22496	AIMING CIRCLE: 010670687	AIMING CIRCLE M2A2	262-1	MANUAL FOR AIMING CIRCLE, M2 WIE (NSN 1290-00-614-0005) AND HAND RECEIPT MANUAL COVERING CONTENT OF COMPONENTS OF END ITEM (COE).	2001-12-01				2001-12-01	0065	075736
A22496	AIMING CIRCLE: 010670687	AIMING CIRCLE M2A2	TM 9-1290-262-24	MANUAL FOR AIMING CIRCLE, M2 WIE (NSN 1290-00-614-0005) AND HAND RECEIPT, AND GENERAL MAINTENANCE.	1984-09-22	1	1999-12-01	0065	075736		
A33020	ALARM CHE AG AUTO M22	ALARM CHE AG AUTO M22	TM 3-6665-321-128P	MANUAL FOR AIMING CIRCLE, M2 WIE (NSN 1290-00-614-0005) AND HAND RECEIPT, AND GENERAL MAINTENANCE.	1998-03-01	1-3	2005-03-15	0045	075694	280821	
A33020	ALARM CHEMAG AUTOMAT	ALARM CHEMAG AUTOMAT	TM 3-6665-321-308P	MANUAL FOR AIMING CIRCLE, M2 WIE (NSN 1290-00-614-0005) AND HAND RECEIPT, AND GENERAL MAINTENANCE.	2002-05-28	1	2006-03-31	0236	080817	323775	
A707	ANALYZER SPECTRUM	ANALYZER SPECTRUM	ANALYZER SPECTRUM	MANUAL FOR AIMING CIRCLE, M2 WIE (NSN 1290-00-614-0005) AND HAND RECEIPT, AND GENERAL MAINTENANCE.	2007-04-25						
A707	ANALYZER SPECTRUM	ANALYZER SPECTRUM	ANALYZER SPECTRUM	MANUAL FOR AIMING CIRCLE, M2 WIE (NSN 1290-00-614-0005) AND HAND RECEIPT, AND GENERAL MAINTENANCE.	2006-03-31						
A707	ANALYZER SPECTRUM	ANALYZER SPECTRUM	ANALYZER SPECTRUM	MANUAL FOR AIMING CIRCLE, M2 WIE (NSN 1290-00-614-0005) AND HAND RECEIPT, AND GENERAL MAINTENANCE.	2006-03-31						

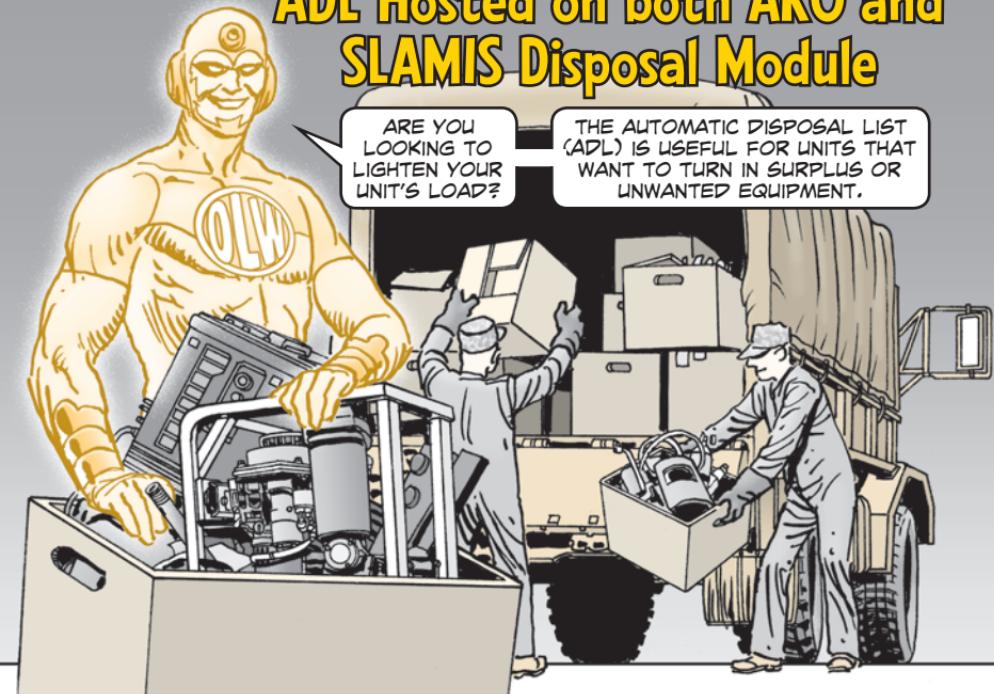
SO TAKE YOUR PICK!

THE CHOICE IS YOURS.

USE THE EOPDB TEAM OR DO IT YOURSELF ON LIW AND CHOOSE BETWEEN HTML AND EXCEL DOWNLOADS.

PS END

ADL Hosted on both AKO and SLAMIS Disposal Module



The ADL identifies equipment that can be turned into the Defense Reutilization Marketing Offices (DRMOs) without prior approval from the National Inventory Control Point.

The ADL is updated twice a year. A semi-annual review of the ADL gives component commands the chance to scrub their lists of equipment and add, delete or retain equipment to or from the ADL. This data is then used to issue a newly-updated ADL each spring and fall.

It is not mandatory to turn in ADL items, and obsolete items can be turned in directly without waiting for the next ADL. Equipment is turned in "as is."

NOTE: MTOE/TDA UNITS THAT WANT TO TURN IN ADL-LISTED ITEMS MUST DO SO THROUGH THEIR SUPPLY SUPPORT ACTIVITY. DIRECT TURN IN TO DRMOs BY MTOE/TDA UNITS IS NOT AUTHORIZED.

TO OBTAIN A COPY OF THE LATEST ADL...



1. Logon to AKO and go to:
<https://www.us.army.mil/suite/folder/17421428>
or

2. Logon to the SLAMIS home page:
<https://www.slamis.army.pentagon.mil>
Select "Disposition Instructions."

RG33L MRAP Transfer Gear Box

Use NSN 2590-01-535-6471 to get the transfer transmission assembly for the RG33L Plus and RG 33L HAGA Plus MRAP vehicles. This NSN replaces the one shown as Item 8 in Fig 65 of TM 9-2355-320-24P.

TRAILER HOOK HANG-UP

If you read the trailer safety chain article on pages 11-13 of PS 673 (Dec 08), you may have encountered a hang-up with hook, NSN 4030-01-531-2978. That's because the NSN doesn't exist anymore! The only lunette trailer using this 1/2-in safety chain hook is the *now obsolete* M345. If your unit hasn't turned in the M345s to DRMO, order that hook when you need it using part number 1029835 and CAGE code 76257 on DD Form 1348-6. Or look for a hook for a 1/2-in chain at a local hardware store.

LBS Left Out of M16 TM

The M16 rifle's TM 9-1005-319-23&P (Nov 08) accidentally left out the laser borelight system (LBS), NSN 5860-01-471-2091. The LBS replaces the M30 boresight, which **is** listed in the TM. The LBS is authorized by CTA 50-970 and can be ordered at the commander's discretion. If you need info on the LBS, see TM 9-5860-226-13&P, which can be found on LOGSA's ETM Online:

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

M1O9A6 Paladin Antenna Replaced

The Paladin's PLGR antenna assembly, Item 1 in Fig 246 of TM 9-2350-314-24P-2, has been replaced by the DAGR antenna assembly, Item 1 in Fig 246A, NSN 5985-01-543-0177. This change has been made in Change 5 to the TM. Continue to use the PLGR antenna, but when you replace it, order the DAGR.

MRAP RG33L Socket Screw

Use NSN 5305-01-547-4620 to get a socket-head screw for the MRAP RG33L Plus & HAGA Plus vehicles. This NSN replaces the one shown for the front wheel hub bolt, Item 7 in Fig 74 of TM 9-2355-320-24P.

TACOM Battery Training Videos

TACOM recently introduced vehicle battery training videos. The topics include maintenance recovery issues, charging systems, reasons for battery failure, battery maintenance, safe handling, and battery testing. Check out these videos online:

<http://www.army.mil/-news/2009/10/15/28860-tacom-battery-training-videos/>

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

Would You Stake Your Life *right now* on the Condition of Your Equipment?

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