P.O. Box 299 Geneseo Illinois, U.S.A. 61254 Tel 309-944-6939 fax 309-944-6949 info@armalite.com

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TECHNICAL NOTE 62: LUBRICATION OF FIREARMS

1. INTRODUCTION: Without a doubt, the British SA-80 (L86A1 and L86A2) rifles have proven to be among the worst small arms ever developed. It is embarrassing that the SA-80 is a poor Royal Small Arms Factory (Enfield) derivative of ArmaLite's own AR-180. During many attempts to improve the SA-80, Engineers of the United Kingdom and Germany have learned much about rifle maintenance that may be applied to other more reliable rifles like the M16 family.

Any process that can keep the SA-80 operating is surely a good process. The purpose of this Technical Note is to present the lessons learned by the Armed Forces of both the United Kingdom concerning the SA-80 and U.S. Forces concerning the M16.

2. FIREARM PERFORMANCE IN ADVERSE CONDITIONS: Firearms do not perform reliably when too much sand, dust, snow, or water is blown into the mechanism by wind, moving vehicles (helicopters!), or by muzzle blast. Local conditions and exposure to contaminants must dictate the extent and frequency of cleaning. It takes more work to keep a firearm operating under extremely bad conditions.

3. CLEANING AND LUBRICATION IN ADVERSE CONDITIONS: U.S. Forces have followed a long tradition of leaving firearms dry of lubricant during desert operations under the belief that less sand adheres to a dry surface more than to a lubricated one. This tradition has been proven incorrect. The need for good lubrication even in the desert has been well established during desert training and peacekeeping operations, during the Gulf conflicts, and by trials in a variety of climatic conditions.

The following should be cleaned and left dry for firing:

Bore and chamber

Face of the bolt

Ammunition.

(Preserve the rifle, including these surfaces, with CLP for storage. Wipe dry before firing. NEVER lubricate or clean ammunition with CLP or any other oily material.)

The following should be cleaned and left dry (desert) or lightly lubricated (other):

Exterior surfaces and sights

The contact and bearing surfaces of these parts (as appropriate to individual firearms) should be *generously* lubricated:

Trigger mechanism

Pivot and takedown pins

Cam pin guide rail within the body (AR-180)

Guide rods and springs (SA-80, AR-180)

Breech bolt body and locking lugs

Moving/sliding surfaces of the bipod, if installed.

In short, all sliding or contact surfaces of the rifle should be lubricated, with emphasis on the following parts: carrier, cam pin, receiver, charging handle, operating springs, AR-10 or M15/M16 buffer, and AR-180 guide rods.

Most operators tend to put too little lubricant on the firearm. Many inspectors tend to criticize firearms that are properly lubricated. **A properly lubricated firearm will have as light amount of lubrication flowing away from the intended surfaces. Any surface that holds all the lubricant applied to it is probably not lubricated well enough.**

Primary lubricant: CLP

Critics of the M16/M4 rifles and the military's main cleaning solvent, Cleaner, Lubricant, and Preservative (CLP) made claims that were both deficient in desert conditions. The U.S. Army Infantry School therefore initiated an extensive series of independent tests at Aberdeen Proving Grounds that concluded that the best single product for maintaining most firearms is the updated Cleaner, Lubricant, and Preservative (CLP). The updated CLP omits the PTFE (Teflon) of the initial specification.

The Aberdeen "sand tests" surprised observers who expected one of the latest lubricants to prove superior. In the final analysis, CLP proved superior.

CLP has been developed to cover a wide range of climatic conditions and has been developed to act as a combination cleaner, a lubricant and a preservative. Other materials are highly regarded by many firearm users, but may cause reduced reliability unless proven under disciplined, independent testing.

Emergency lubricants: Until the Viet Nam era, U.S. forces didn't employ special lubricants for firearms, but instead used simple Rifle Bore Cleaner (RBC) and light oils of varying weights for lubrication. Today a wide variety of lubricants is available commercially and fine cleaners (i.e. Carbon Removing Compound, CRC) and modern lubricants are available in the unit Motor Pool and at auto supply stores. If there is a shortfall in the recent dust tests it is that these materials weren't evaluated during the tests. If CLP isn't available, CRC, automatic transmission fluid (ATF), and many other petroleum, oil, and lubricant (POL) products will suffice for cleaning and lubrication.

In an area where immediate lubrication is important, and absolutely no better material is available, a bit of oil drawn from an engine is better than operating the firearm dry. A vehicle dip stick can serve as an awkward applicator.

4. CLEAN OFTEN, BUT DON'T BE RIDICULOUS ABOUT IT: Under extreme conditions of sand and dust, frequent opportunities should be taken to verify firearm cleanliness and to clean and re-lubricate the firearm during lulls in firing if needed. In particular, the gas-affected parts should be cleaned after firing around 350 rounds, and the breech mechanism and recoil springs and rods lubricated.

CLP and similar materials consist of three elements: a cleaner, a lubricant, and a preservative. If possible, the solvent portion of the CLP should be allowed to evaporate after cleaning and before using the firearm, leaving behind a well lubricated surface. Ignore the "white glove" standard of cleanliness; it destroys more rifles than does field use. CLP must be well shaken to thoroughly mix it before use; otherwise little lubrication will be left behind when the solvent evaporates.

In conditions of extreme cold, a lighter lubricant such as "PLS" should be used. PLS is a light oil.

5. ABRASIVES: A carbon-removing pad (like Scotchbrite) is mildly abrasive and should not be used. Its use on optical sights will quickly damage lenses and remove paint from the sight body. Its use on the exterior of the firearm will remove the protective coating which will allow rapid corrosion. Abrasive cleaners should not be used in the bore at any time.

6. LACK OF TIME: Under high-tempo operations there may not be enough time to strip the complete firearm at any one time for detail cleaning. It is therefore permissible to unload the firearm and perform a "combat cleaning." Clean just the upper or lower receiver group inside and out by wiping, generously lubricate, and then clean in more detail at the next short opportunity. Pay particular attention to cam pins and other contacting surfaces.

7. MAGAZINES are THE rifle component most prone to trouble. They are prone to the entry of sand and dust and should be protected by a plastic bag or other enclosure before use. They should be periodically stripped and cleaned when exposed to sand and dust.

Particular attention should be paid to the follower and *lightly* lubricating the magazine shell surfaces that touch the follower.

Ammunition should be checked, dried, and cleaned before reloading the magazines. In sandy/dusty conditions, it is advisable to load magazines with less rounds than their maximum capacity. This reduces the load on the compressed magazine spring and allows space for sand and dust to collect in the bottom of the magazine.

Avoid repetitively chambering any single round as this act can inactivate the primer or deform the cartridge, leading to a tactical embarrassment at a crucial moment.

8. DO NOT EXPERIMENT WITH OTHER OILS AND GREASES. Military personnel, especially, should not experiment with other lubricants (WD40, vehicle lubricating oils, etc) unless CLP or another military-grade cleaner or lubricant is not available. Many commercial products are poor lubricants and can interact badly with the lubricants already on the firearm if the first layer is not thoroughly removed. Graphite-bearing lubricants actually initiate a galvanic reaction in the presence of aluminum and steel and can quickly corrode aluminum parts… do not use them.

Try to avoid loading a rifle immediately after cleaning the chamber with CLP. Let the solvent portion of the CLP evaporate away for 30 minutes so that no trace of solvent remains to cause a chambered cartridge to corrode firmly into the chamber. (This is normally a problem seen only with firearms that are left loaded for long periods with cartridge cases in contact with solvent.)

9. OVERHEATING: Care should be taken that allowed rates of fire are not exceeded; they're generally a waste of ammunition anyway. As firearms heat up, it gets harder for the breech mechanism to extract the hot cartridge case because a hot case tends to stick to the chamber walls, and hard extraction or failures to extract can result. In addition, the risk of the rapid cook-off of a chambered round increases with heat.

10. FIREARM PROTECTION: Keep ejection port covers closed, and get into the habit of periodically checking to assure that the cover has not flipped open inadvertently. Muzzle covers will prevent sand and dust or other debris getting into the bore. (Middle Eastern desert sand is different from beach sand. It is as fine as talcum powder and can infiltrate down the rifle bore and pack around the bullet so tightly that the bullet cannot even begin to move when the rifle is fired. The result can be failure of the rifle breech and destruction of the rifle.) Use plastic rifle covers if available, alternatives if necessary, but NEVER PUT A PLUG OR COVER INSIDE THE BORE.

11. SERVICEABILITY OF CLEANING KITS: Cleaning kits aren't just nice to have; they're critical to the successful use of any firearm. The contents of cleaning kits should be periodically checked for serviceability and replenished when needed. Brushes for the bore and chamber and for general purpose use, and carbon removing abrasive pads are all subject to wear and tear and should be exchanged once they become ineffective. Use only approved cleaning materials and tools. Do not invent "improved"

tools such as smashed clothes hangers or dental picks to remove harmless materials like the carbon on the muzzle face or at the bottom of the gas cylinder within the bolt carrier.

The correct chamber cleaning brush is exceedingly important for successful cleaning and rifle function. No owner or operator of a modern firearm should be without a good supply of them.

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