



Indian Special Forces training with an 84mm Carl Gustav M2. Note the sub-machine gun carried by the gunner. (PHOTO: Indian MOD)

LIGHT ANTI-ARMOUR WEAPONS ANTI-EVERYTHING?

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As is often noted, the dismounted close fight is rarely won with small arms fire. By far the most decisive weapons are those that project high explosive (HE). While mortars have traditionally been the most effective and efficient method of projecting HE, the last 40-60 years have seen the emergence of anti-armour weapons, with a usefulness beyond that of merely killing tanks. In fact it can be suggested that the need for such weapons to kill tanks has substantially misled their development.

The development of the shaped charge warhead combined with cheap and effective solid fuel rocket motors in the early 1940's meant that by the end of World War Two, both the US and Germany had developed effective man carried anti-armour weapons. The Germans had been the most innovative with the Panzerfaust and Panzerschreck. The Panzerfaust was a family of one-shot disposable weapon, while Panzerschreck was a launcher which could be reloaded. These two different approaches have come to inform weapons design to the present day.

Most famous amongst the launchers and worthy of note is the

RPG-7. The RPG-7 infamy ranks alongside the AK-47, and like the AK, its success is far more a product of myth than its actual effectiveness. The RPG-7 is cheap and simple, to make, maintain and operate, however the critical part of the equation is the PG-7 grenade itself. There are at least 12 different commonly encounter varieties of PG-7 grenade, all with differing performance characteristics, from at least 7 different manufacturers. The original PG-7, weighing 1.95kg, has been constantly upgraded over the years to the likes of the tandem warhead PG-7VR capable of defeating 750mm of steel or 1.5m of reinforced concrete. It should be noted that the PG-7VR round weighs 4.5kg. As we will see later, this is significant. The

emergence of the fuel-air explosive TBG-7 has further improved the RPG-7's usefulness against non-armour targets for only a marginal increase in weight. However the RPG is far from accurate, with the peculiar characteristic of tracking into wind when fired, due the low velocity and surface area of the tail fins. That is not to say that it does not have sufficient accuracy to be an effective weapon at close range and where the targets, such as bunkers and buildings, are static. The RPG's alleged effectiveness as an anti-helicopter weapon is largely a product of being employed against aircraft flying low and slow, as well as the sheer volume of rockets fired at them. It is also interesting to note that during operations in Iraq and

Afghanistan, some figures suggest that as many, if not more aircraft have been hit and survived RPG strikes than those brought down.

For reasons that are not entirely clear, some US authors have recently voiced the opinion that the US Forces need to adopt an RPG-like weapon. While it is true that the Israelis adopted the RPG, they did so out of expedience and need, rather than preference, and have since begun to move away from the weapon, to those developed by their own indigenous industry. As we shall see the idea that the US or anyone else needs an RPG is open to debate.

The most common and successful western launcher is the Carl Gustav 84mm, manufactured by SAAB Bofors Dynamics. While commensurately more complex, and expensive, the "84" as it is commonly called, throws more explosive further, and more accurately, than the RPG. For example the M3 variant can throw a high explosive dual purpose round (HEDP

502) out to 1,000m. This is impressive for a weapon which only weighs 8.5kg and a round that weighs 3.3kg. It is also a more flexible weapon, in that it can employ an illumination round, as well as other types of dedicated anti-armour natures.

In realisation to the limitations of the RPG-7, the Russian have developed the RPG-29, which is a 11.5kg launcher and a 6.7kg projectile available as either a high explosive anti-tank round (HEAT) capable of defeating 750mm of rolled homogenous armour or a thermobaric round for use against positions and structures. The RPG-29 has a range of 450m and the was used by Hezbollah during the summer of 2006 against the IDF. Despite some success, post operational analysis suggests, its effectiveness may have been overstated.

LAWS

The thinking behind the one-shot Light Anti-armour Weapon, the LAW, was that it enabled you to provide

every soldier in the squad or platoon with some anti-armour capability, in an efficient and effective package. However it can be argued that this thinking has been somewhat corrupted by the desire to gain more and more terminal effect from LAW type weapons.

A quick case study may be instructive. In the British Army, the 84mm Carl Gustav M2 (the older 14kg version of the M3) and the 66mm M72 LAW co-existed side by side in the platoon and section from the mid 1970's until the early 1990's. They were both then replace by one weapon, the 94mm 'LAW 80'. The LAW 80 weighed 10kg, and had a range of 500m. It was also bulky and has now been withdrawn on safety grounds.

The British Army has replaced the LAW 80 with the AT-4CS also made buy SAAB Bofors, while it waits for the Next Generation Light Anti-Armour weapon (N-LAW) to be developed. The AT-4 is the "closed space" version of the one shot AT-4 LAW that is in service



An instructor for Talley Defense seen introducing the improved M72 to the US Marine Corps, for employment in Iraq (PHOTO: USMC)



US Troops training the AT-4. Note the back blast of the weapon. (PHOTO: US Army)

with US Forces (designated the M136) and others world wide. It is interesting to compare it to the same companies' M3 84mm. The M3 weighs 8.5kg plus a 3.2kg HEAT = 11.7kg. The basic AT-4 disposable one-shot launcher weighs 6kg. However 4 x AT-4 weighs 24kg. 1 x M3 + 4 x HEAT rounds weighs 21.3kg, and any additional re-supply will weigh 46% less. A similar analysis can be carried out with the RPG-7 or 29, against the Russian LAWs, such as the RPG-18/22/26/27.

While this may seem like a compelling argument in favour of dedicated launchers, it could be suggested that it misses the point.

The primary utility of one-shot launchers is that they can be distributed across a platoon, and thus the sighting or location of the weapons is not as critical as it might be with a dedicated launcher. On shot launchers also enable the simultaneous engagement of targets or for the weapons to be used in salvos. It is obviously better to destroy two armoured vehicles

simultaneously, in preference to having to reload to take a second shot. Also once fired, the launch tube can be discarded, or if retained for security reasons, it is substantially lighter. The problem with one shot launchers is that in response to the perceived need to defeat the glacis armour of current or near future main battle tanks, they have become bulky, heavy and cumbersome. For example, the basic AT-4 has an 84mm warhead and will defeat 365mm of armour. Based on a dispersion of <1.3mils, the AT-4 has an effective range of 250m. This capability comes at a weight of 6.7kg, and a length of 101.6cm. The AT-4CS, (confined space) version weighs 7.5kg, and can be fired from within a 35.6m³ room. The AT-4CS has an effective range reduced to some 230m, based on a dispersion of 1.5mils. This is because the AT-4 CS has muzzle velocity of 220m/s compare to the standard AT-4 (M-136) at 290m/s. The CS version will theoretically defeat 500mm of armour. On the face of it, this is an extremely

impressive weapon.

An alternative is the Talley Defense M72A6, which weighs 3.45kg and is 77.5cm long in its carriage configuration. The M72A6 is a much-improved version of the older M72A1/2 66mm LAW.

The M72A6 has an effective range, based on dispersion of 1.5mils at 250m and the A6 warhead will defeat 150mm of armour. On detonation the M72A6 warhead produces a lethal radius of approximately 9m to each side of its direction of travel, and external to the point of impact. The M72A6 is about half the weight and one third the bulk of the AT-4. US Army and manufacturers tests have shown, that when fired from within a 35.5m³ concrete enclosure (a room 12 x 15 x 7 feet), the M72A6 produces lower sound pressure levels (db) that have a shorter duration than that produced by the AT-4CS. This means the M72A6 is a very viable alternative to the AT-4CS for operations in complex or urban terrain, where firing locations



The use of synthetic training ranges vastly increases the effectiveness of LAWs and Launchers.

may be enclosed; especially when the lighter weight and bulk is critical to dismounted mobility. Heavy bulky weapons are also more likely to suffer damage while being carried.

The M72A4 version is identical to the A6 in every respect, except the warhead will defeat 355mm of armour, with the same external lethal radius. While not penetrating homogeneous armour to the same degree as the A4, the A6 produces greater fragmentation and lethality behind the armour it hits and is thus more effective against structures, and light armoured vehicles. At the time of writing there is a thermobaric M72 under development. The real utility of the light anti-armour weapons is that they are light. It is a poor use of dismounted infantry to have them seeking to confront main

battle tanks head on and to equip them with the impedimenta that enables them to do so.

Recent trends in LAWs have seen the emergence of dedicated anti-structure munitions, rather than the traditional approach of anti-armour weapons that may also be useful against structures. Working in with the Dynamit Nobel team, Rafael has developed the Matador MP, a 1m long, 12kg weapon with a range of 14-500m. Though a LAW, it has a Mil-Std 1913 sight attachment, which allows for the use of reusable targeting device comprising a Flexight reflex sight and an Enhanced Laser Range Finder (ELRF). These are also compatible with night vision goggles.

This has led to the development of the Matador AS, which is a pure LAW,

weighing 10kg and effective to 500m, as well as being able to be used from an enclosed space. This is reputed to have been chosen to fulfil the British Army's anti-structure munition (ASM) requirement. If 10kg seems excessive then a valid alternative is available in the form of Dynamit Nobel's RGW-60, which is a 60mm weapon weighing 5.8kg, and an effective range of 200m.

The Rafael lead team has also developed the Matador WB, wall breaching system designed to make holes large enough for troops to enter a structure through. Because it is intended for urban operations the range is limited to 120m, but can be used as close as 20m.

RANGE AND ACCURACY

The primary argument against the

effectiveness of the heavier LAWs is that they are not sufficiently accurate at the ranges required and certainly not against moving targets such as tanks. This argument is equally applicable to dedicated launchers, but here the solution is somewhat simpler. Adding a range finding electro optical sight with matched ballistic algorithms to an RPG-7 or 84mm can make the weapon far more effective.

The same simple technique can be applied to LAWs as well. The Dynamit Nobel Panzerfaust 3 is a one shot weapon using a 2.3kg re-usable dedicated sighting. This is 10.6kg HEAT round, capable of penetrating 700mm of amour at 300m for a moving target and/or 1.5m of concrete at 500m for a static target. The Panzerfaust 3 has been transformed into the PzF 3 IT-600 that uses an improved sighting unit called DYNARANGE. The DYNARANGE uses the Simrad IS-2000 sighting system to calculate weapon elevation and lead angle correction, allowing engagement of moving targets up to 600m. The Panzerfaust 3 can make use of an anti-bunker round, capable of perforating 360mm of concrete.

The Spanish company Instalaza,



The Matador MP is a general purpose LAW, not dedicated to the anti-armour mission (PHOTO: Rafael)

has followed much the same route, the ALCOTAN-100. This is a 10.8kg round capable of defeating >800mm of armour. The 4.5kg firing unit is a combined day and night sight, with a 2,000m range finding capability. There are also anti-personnel and anti-bunker rounds available and the ballistic algorithms for each are pre-programmed into the firing unit, which will automatically identify the type of round attached.

TRAINING AND LOGISTICS

There are some arguments which fall outside the basic characteristics of the weapons, and these are training and logistics. The simpler a weapon is

the cheaper and simpler it is to train with, store and possibly even procure.

LAWs can be stored and issued in the same way any form of ammunition might be. Launchers, even simple ones require armouries, transport cases and maintenance.

Synthetic training, or PC based training has made a huge difference to the cost of training with LAWs and launchers as well as the proficiency soldiers can gain. It is now entirely possible to teach soldiers to engage low and slow flying helicopters with 66mm M72, or any other type of LAWs or launchers, because they can practise thousands of shots in simulation. If this relatively rare and extreme task can be accomplished for minuscule cost, then the far more common and mundane tasks should be accomplished with ease!

The LAW and launcher requirement revolves around the issue of weight. Weight is everything. It defines the terminal effect and the usefulness of the sighting system. While the arguments may be reduced to purely matters of mechanics, material properties and physics, the area of human performance is equally important. Big, bulky LAWs will not leave the vehicle, or may be discarded under stress. Launchers that are complex, heavy and expensive to train with, will likewise not be employed to best effect. Getting the best LAW and launcher capability is about far more than the issues addressed on the specification sheet. The single most important feature is that it can be carried and used.



British Royal Marines, in Afghanistan, equipped with the M72A6. The M72 is not general issue in the UK, being restricted to Marines and Special Forces. (PHOTO: UK MOD)