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Department of Defence (Army Office)(D Inf)  
Headquarters Training CommandFor Information:Technical Services Unit  
Army Development Establishment

DESIGN

SELF LOADING RIFLE, 7.62MM, L1A1

- References:
- A. Department of Defence (Army Office) SSO  
727-R3-56 dated 5 Jul 74
  - B. Department of Defence (Army Office)  
431-6-2 (SASG 288/74) dated 1 Nov 74

Introduction

1. Since its introduction into service in 1959, the Self Loading Rifle (SLR), L1A1, has gained a reputation as an effective, operationally proven, small arms weapon. The weapon has been demonstrated to be robust and reliable in combat conditions in Malaysia, Borneo and Vietnam. The capability of the 7.62mm NATO (7.62mm x 51mm) round to penetrate foliage cover to inflict casualties, and the apparent accuracy of the weapon in these theatres (where the majority of engagement ranges was less than 100m), has contributed to the belief that the SLR is an adequate weapon for the Infantry rifleman at present, and perhaps for another fifteen years into the future.
2. However, it now seems appropriate, while the Army is not committed to operations, to critically examine the SLR on the basis of likely future tactical employment and current technology. Such an examination indicates that the SLR is unlikely to achieve battlefield accuracy at ranges up to 300m. The inaccuracy of the SLR is not compensated for by the rate of fire of the weapon, which is comparatively lower than that of other armies' rifles and assault rifles. The inadequacies of the SLR may possibly be overcome by modification, improvement in production technique and more rigid quality control, and the introduction of new standards of weapon care. Efforts to improve the SLR are unlikely to provide a long term solution though, so the design/selection criteria for a replacement weapon should be considered now.

Weapon Accuracy

3. Current doctrine (Infantry Training Volume 1, Pamphlet No 3B - The 7.62mm Self Loading Rifle and Bayonet, and the 7.62mm Automatic Rifle (All Arms) 1971) states that the SLR is capable of "a high rate of accurate aimed fire (up to 20 rounds a minute) at ranges up to 300m". To justify this statement, a properly zeroed SLR should be able to hit an enemy rifleman on the battlefield at up to 300m. A reasonable shooting range interpretation of this requirement would be for the weapon to fire consistent 30cm groups at 300m.

This interpretation can be extended by presuming that a weapon type which achieves a 90% probability of attaining a 30cm group at 300m is producing "effective" fire at that range. A sample of effective ranges of 7.62mm calibre (7.62mm x 51mm, and 7.62mm x 39mm) rifles used by other armies, firing semi-automatically, is shown below:

- a. Automet Kalashnikov (AK47 and AKM series)  
(USSR) - 400m,
- b. Heckler and Koch G3 (West Germany) - 540m, and
- c. Rifle M14 (USA) - 450m.

The above figures are given by reasonably credible authorities such as Smith and Smiths "Small Arms of the World (Eighth edition - 1966 - published by the Stackpole Company USA), and US Army "Weapons and Equipment Recognition Guides". Even if the other authors' concepts of "effective range" are at variance with the criteria listed above the figures given indicate that the various weapons listed are certainly capable of producing effective fire at a range of 300m.

4. The SLR is not effective up to 300m. Reference A indicates that in a test sample of 144 new SLR and 112 Factory Thorough Repair (FTR) rifles, 21% of the sample was incapable of achieving a 30cm group at 200m. The probability of an issue rifle, which has been subjected to abuse on a drill square, cleaned constantly (possibly with abrasives) by its owner, or carried on damaging training activities such as obstacle courses, battle efficiency tests or field exercises, being capable of achieving an acceptable group at 300m is a matter of depressing conjecture. Objective consideration of the statistics given in References A and B indicates that the SLR is certainly not capable of accurate fire at a range of 300m.

#### Rate of Fire

5. Combined with the inaccuracy of the SLR, its comparatively low rate of fire - as a semi-automatic weapon - is another cause for criticism. The fire power of an infantry section has been drastically reduced by the introduction of the Light Machine Gun L4A4 (Bren), which suffers as much as an eight second stoppage whenever a magazine has to be replaced. Thus an Australian infantry section armed with one 30 round box magazine fed machine gun, two small bore automatic rifles (M16) and seven semi-automatic L1A1 rifles suffers a serious disadvantage in fire power compared to a conventional enemy infantry section armed with a 75 round drum magazine fed machine gun (RPD or RPK) and eleven automatic assault rifles of the AK type.

6. Since Nazi Germany developed the original concept of the assault rifle toward the end of World War 2 there has been a tendency in the world's major armies to arm riflemen with automatic weapons. The Mauser manufactured STURMGEWHR 45 (literally, "storm rifle") which fired a 7.92mm intermediate length round (Kurz) was a major influence in the Soviet development of the 7.62mm short round and the AUTOMET KALASHNIKOV assault rifle to fire it. The US approach has concentrated on producing a smaller calibre, high kinetic energy round which can be fired from a comparatively small, light automatic rifle - the .223 in (subsequently 5.56mm) ARMALITE, or M15/M16 rifle. This weapon is now the standard issue rifle to US infantry squad members. The tendency toward light automatic rifles which are a compromise between the traditional rifle and sub-machine gun designs is confirmed by the West German weapon family produced by Heckler and Koch, by the development of the Israeli GALIL sub-machine gun (despite its name this weapon is actually a 5.56mm assault rifle), and by Swedish experimentation with and development of 6.5mm automatic rifles. All of these technological developments have rendered the semi-automatic rifle as outdated as its bolt action predecessors, or the sub-machine gun firing 9mm x 19mm rounds.

#### Suggested Improvements Approach

7. Assuming that the Australian development of an accurate assault rifle as a replacement for the SLR is not feasible in the short term, some improvement

to the SLR is obviously necessary. Conversion of the SLR to an automatic weapon (a conversion which can be effected by unauthorised modification by any rifleman in a matter of minutes) involves such a trade-off in accuracy that it should not be further considered. Therefore, our disadvantage in fire power must be merely accepted. However, to accept the inaccuracy of the SLR without making an attempt to overcome this inadequacy could well be militarily foolhardy.

8. Causes of inaccuracy in a small arms weapon can be summarised as follows:

- a. poor basic design;
- b. poor production and quality control; and
- c. inefficient ammunition.

Australian produced ammunition appears to be of a very high standard; excellent shooting results have been obtained with various weapons other than the SLR (e.g. the Sportco Model 44 O Mark, the Steyr-Mannlicher SSG, the Heckler and Koch G3) using Australian ammunition in shoots conducted at the Infantry Centre. Therefore, design, production and quality control aspects of the SLR must be investigated with the objective of improving the weapon.

#### Design Faults

9. The most glaring fault in the SLR design is that the weapon breaks into two parts, joined centrally by a body locking pin located directly behind the magazine. The foresight is located on one part of the weapon, the rear-sight on the other part, and relative movement between the two sights results. A simple, rough test illustrates the magnitude of this fault. This test was conducted as follows:

- a. an SLR was set up with the butt held in a vice and the trigger guard resting on a wooden block;
- b. sights were set at 200m;
- c. one man noted point of aim on a screen positioned 3m forward of the rifle muzzle; and
- d. another man applied a moderate force in the horizontal plane to the gas plug area of the forestock, while the aimer noted the change in the point of aim.

The result was a +1cm (approximately  $\frac{1}{2}$  inch) shift in the point of aim at 3m. This represents a shift of more than 1m left or right of the point of aim at 300m. Technical investigation is required to either devise a modification which ensures rigidity throughout the length of the weapon, or to relocate the rear sight on the same part of the weapon as the foresight.

10. The size of the rear sight aperture also contributes to inaccurate shooting with the SLR. The aperture is obviously a compromise between a small aperture for daylight shooting and a large aperture for low light level shooting. The result is a sight which is inefficient for both conditions. The SLR rear sight further lacks a simple windage adjustment, and overall, compares most unfavourably with other military ironsights (e.g. those of the US M14 or the German G3).

11. Modifications to improve the handling and shooting characteristics other than those outlined above could include:

- a. production of a variable length butt;
- b. replacement of all woodwork by a synthetic material; and
- c. introduction of an approximately 1.5m long, 3cm wide, flat nylon web shooting sling with a flat buckle on one end, and a metal tip and clamp on the other.

Conclusion

12. Compared to the rifles produced by various other countries, the Australian manufactured SLR suffers the disadvantages of inaccuracy, and a low rate of fire. These disadvantages may be partially overcome by modification to the weapon, and by improved production technique and quality control. Improvements effected by these means may provide an acceptable rifle in the short term, but the development of an accurate reliable, reduced-weight, automatic assault rifle replacement for the SLR should be considered now. While the SLR has been an adequate weapon in counter-revolutionary warfare operations in South East Asian theatres in the past, it has now been rendered inadequate due to considerations of future tactical employment and advancing technology.



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