

GROT A2-5.56 MM STANDARD RIFLE

OPERATOR'S MANUAL



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1. INTRODUCTION

1.1. Safety Rules

Read carefully the entire manual prior to use. Knowledge of the procedures and safety warnings contained therein is one of the fundamentals of the safe firearms handling.

<u>Caution</u>: Improper firearm handling threatens not only the shooter, but all other personnel present, therefore to keep safe and avoid mishaps, the following rules are to be adhered to at all times:

- **1.** Only an Operator trained in all handling procedures, i.e. inspection, maintenance, firing preparation, firing and cleaning should use the firearm.
- Firearm is to be fired only if serviceable, with proper ammunition (5.56 x 45 mm) of good quality, making sure the bore is free from obstructions BEFORE chambering any round.
- **3.** Always treat any firearm as loaded. Before performing any maintenance procedure, check visually and tactilely if the chamber is empty and firearm is unloaded.
- 4. Always point the rifle in a safe direction.
- 5. Always keep finger off the trigger guard, unless when actually firing the firearm.
- 6. The firearms are to be stored and transported unloaded (no cartridge chambered) the only exception is by direct order in combat environment.
- **7.** After round is chambered, always keep the safety ON. Take safety OFF only immediately prior to the firing.
- 8. NEVER abandon the loaded firearm.
- **9.** Firearm is to be stored in a secure location, strictly abiding by the acting local laws and regulations.
- **10.** Current cleaning and maintenance of the firearm is the direct duty of the Operator.
- **11.** Rifle is to be kept cleaned, lubricated and regularly maintained according to this manual.

- **12.** It is the duty of the Operator to provide current and PM-1 Level periodical maintenance of the rifle.
- **13.** Any alterations made to the design of the rifle may void the Manufacturer's Warranty and result in placing liability for any consequences on the Operator.
- **14.** Do not fire the rifle and the grenade launcher (GL) at the same time. Always put the rifle on safety prior to firing the GL, and put GL on safety, reverting to shooting the rifle.
- **15.** Never dry fire the rifle without the dummy round chambered. Dry firing the rifle results in shorter service life of the parts, especially the firing pin. Dedicated 'Drill Purpose' and 'Sectioned' rifles should be used for training purposes and demonstration. If no such items are available, at least use the dummy round to cushion the firing pin strike on dry firing.

1.2. Description of the Standard Rifle

Grot A2-5.56 mm Standard Rifle is a modular, select-fire, gas-operated individual weapon. With Grenade Launching Module (GLM) attached, it can also be used against lightly armored vehicles. For CQB scenarios a knife-bayonet can be attached.

Rifle (Fig. 1 & 2) is fitted with a side folding, telescoping buttstock of adjustable length of pull (LOP) as a standard option. Operator can adjust the LOP of the buttstock to his personal preference or tactical posture (e.g. individual armor worn) by sliding the buttplate in or out. This setting is then preserved while the stock is folded along the right side for transport or use in tight locations. The stock is fitted with an height- and angle adjustable cheekpiece. This enables the Operator to adjust the ergonomics of the rifle to his/her needs and current situation, e.g. while wearing respirator. The modular design allows for an easy and fast change of the ejection direction.



Fig. 1. General view - right side (with extra equipment)



Fig. 2. General view – left side (with extra equipment)

This rifle fires the **5.56x45 mm NATO** rounds and their national equivalents. It is fed with box magazines of straight and curved box designs. The Manufacturer guarantees proper functioning with the magazines delivered with the rifle. Moreover, the rifle works with MOST dedicated M16 (AR-15) magazines (<u>Caution</u>: does NOT include Magpul PMAG Gen 3 magazines and similar). The rifle is to be fired semi-automatically, in short bursts (2-3 rounds – no limiter) or fully automatically.

Most effective fire is achieved at the distances under 500 meters. The zeroing distance depends on sighting system used, and the direct fire distance at the torso target for this round is ca. 400 m. The initial velocity of the round is ca. 890 mps.

Cyclic rate of fire (ROF) is ca. 700-900 rpm, according to ammunition used, and the practical ROF is:

- Fully automatic up to 100 rpm;
- Semiautomatic up to 40 rpm.

This rifle is fully ambidextrous. All controls (fire selector-safety, bolt stop, magazine catch and cocking handle) are doubled on both sides of the rifle.

The rifle allows for easy barrel change at the Operator level by using an #5 Allen wrench, issued in the Cleaning Kit. This is just a design feature allowing for modularity of the system or ease of cleaning, and not meant as a tactical feature.

<u>Note:</u> This Rifle is NOT issued with a spare barrel, nor it is a quick-change barrel (QCB) weapon. The barrel is not designed to be changed while overheated. It should be granted a cool-off period before attempting any change, as otherwise it may get stuck in the front trunnion due to heat-expansion.

The ejection direction is being changed by rotating the bolt 180 degrees and replacing the unused ejection opening cover. For ejection to the right, the extractor

should point right. For ejection to the left, the extractor should be present on the left side of the bolt face.

Safety protects against accidental discharge from the firearm, by blocking trigger and the cocked hammer. The same control lever also serves as a fire selector, with settings marked with following pictograms. (Further in the manual, the names of the settings would be used):

- " ¬ SAFE safety on;
- " \bigcirc " FIRE safety off, semiautomatic firing mode;
- "000 AUTO safety off, fully automatic firing mode.

Automatic sear safeguards against the out-of-battery discharge. It released the hammer only if the bolt is closed (in foremost position) and fully locked ('in battery', i.e. bolt head has been rotated to place locking lugs into the locking recesses of the barrel extension by interaction of the cam pin and cam surface).

Monolithic mounting rail (MIL-STD-1913 / Picatinny) run alongside the entire dorsal length of the receiver and handguard, to mount any sighting equipment with suitable interface.

The rifle does not have any fixed sighting systems, neither mechanical, nor optical. The rifle is delivered with a set of foldable, detachable mechanical sights (BUIS-type) which consist of a separate peep sight and a front sight, mounted on the opposite ends of the dorsal rail, to extend the sighting radius.

Rifle is fitted with a detachable pistol grip, conforming to the AR-15 platform, to enable an individual Operator to exchange it for any other AR-15-compatible one, better suited to the needs. FB Radom's own pistol grip of smaller inclination comes with the rifle as a standard option. Also, the safety-selector lever is detachable, and conforming the Hera Arms standard.

The new feature of the A2 model is the elongated handguard with M-LOK slots, allowing extra equipment to be attached: mounting rails, foregrips, heat shields etc. to reconfigure the rifle to conform the Operator's needs. Additionally, with handguard removed, 40 x 46 mm (LV) Grenade Launching Module (GLM) with its own handguard may be fitted.

A ring, fitted to the barrel assembly, allows for the knife-bayonet to be attached for CQB scenarios.

The commercial name of the rifle is "5.56 mm MSBS GROT C16 FB A2 in classical configuration". The A2 indicates the modification status. Most of the earlier A1 model Standard Rifles were issued to the Polish Army. The main differences in A1 compared to A2 are: shorter MOE-style handguard with three rails (incl. one with strap QD attachment), differences in the bolt and firing pin, single- or dual-point strap, foregrip attached to the bottom rail, commercial cocking handle. All the above (excl. bolt and firing pin) are exchangeable for A2 parts.

As of Q4 2021 the MSBS GROT rifles (starting with s/n KN 54216), following changes were introduced:

- a) Upper receiver front corners were milled to enhance compatibility with the bullpup lower receiver,
- b) on both sides of the upper receiver curved arrows were added, showing the direction of unlocking the barrel with #5 Allen wrench,
- c) in gas block a projection was added to unable gas regulator disassembly from Normal or "1" position, lower projection with opening was removed, lower halfcircle was additionally milled,
- d) in the barrel extension two relief openings were added, enhancing the compatibility in bullpup configuration,
- e) in the Fire Control Group housing openings were cut to allow compatibility with bullpup configuration,
- f) folding stock tube was fitted with additional strengthening ribs, due to a change of the injection mold,
- g) handguard mounting pin is of different length, and has a conical groove,
- h) lower receiver mounting pin is of different length, and has a conical groove,
- i) bayonet ring is now solid (no openings),
- j) additional gas regulator protector was added to the A1 rifle.

All the above changes, points a) thru i) are fully implementable in MSBS GROT

A1, whereas change j) concerns exclusively the A1 variant.

1.3. Basic Characteristics of the 5.56 mm Standard Rifle

Basic tactical and technical data of the 5.56 mm Standard Rifle are set in Table 1.

Table 1. Basic tactical and technical data of the 5.56 mm Standard Rifle

Description	Parameter
Weight, empty, no magazine or sight	≤ 3.80 kg
Weight, magazine loaded (30 rounds)	ca. 0.52 kg
Length, overall	902/843* mm
Height, with 30 rd magazine	237 mm
Width	39/86** mm
Barrel length	406 mm (16")
Rifling: number of grooves, direction and pitch	6, R /1:178 mm
Modes of fire	Semi / Full
Initial velocity (ball, steel-cored)	≤ 870 mps
Muzzle energy (ball, mild steel-cored)	1,600 Joule
Effective range	ca. 500 meters
Cyclic ROF	700÷900 rpm
Practical ROF, full auto	90÷100 rpm
Service life (nominal)	10,000 shots

*

buttstock retracted
receiver width / maximal width, incl. cocking handles **

2. TECHNICAL DESCRIPTION OF THE 5.56 MM STANDARD RIFLE

2.1. Design and Functioning of the Standard Rifle, Component Parts and Groups

2.1.1. Controls

This rifle is fully ambidextrous.

Basic controls of the rifle are (see Fig. 3):

- cocking handle,
- trigger,
- magazine catch,
- bolt hold open,
- safety-fire selector,
- butt folding catch,
- butt sliding (LOP) catch,
- gas regulator.



Fig. 3. Controls of the rifle:

1 – gas regulator; 2 – cocking handle; 3 – magazine catch; 4 – safety-selector switch; 5 – buttstock folding catch; 6 – bolt hold open; 7 – trigger; 8 – buttstock sliding catch.

2.1.2. Composition of the Rifle

The Rifle consists of following groups (see Fig. 4):

- barrel group;
- upper receiver group;
- moving parts group;
- return spring group;
- lower receiver group;
- buttstock group;
- elongated hanguard;
- mechanical sights;
- magazine.



Fig. 4. Basic groups: 1 – buttstock; 2 – mechanical sights; 3 – upper receiver; 4 – barrel; 5 – return spring; 6 – lower receiver; 7 – magazine; 8 – moving parts; 9 – handguard.

2.1.3. Barrel Group

Barrel bore directs the bullet, its rifling imparts spin for stabilization. Barrel group (see Fig. 5) consists of barrel (406 mm long in Standard Rifle configuration), onto which flash hider, bayonet lug ring, gas block (incl. gas piston and gas regulator), operating rod support ring with rod and spring, and the barrel extension are mounted.



Fig. 5. Barrel Group:

1 – barrel extension; 2 – barrel extension pin; 3 – operating rod spring; 4 – operating rod; 5 – gas block with gas chamber; 6 – gas regulator; 7 – barrel; 8 – bayonet lug ring; 9 – flash hider; 10 – bayonet catch

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a – locking lugs; b – barrel positioning cut-out; c – recoil lug; d – operating rod guide and spring stop
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The barrel bore divides into a cartridge chamber and rifled bore. That latter is rifled, with 6 right hand twist grooves which imparts velocity and spin on the bullet passing through it. The grooves are separated by fields, and the diameter between the opposite fields is called 'the caliber'. The chamber and rifled bore are connected by a conical part called 'forcing cone'. Further up the rifled bore there is a side opening to bleed part of the gases from the barrel to the gas block, called the 'gas port'.

Muzzle device (flash hider) of a 'bird-cage' style has five longitudinal slots, set 60 degrees from each other, with bottom left solid, to act as a gas compensator to counteract the muzzle flip on firing. The front face of the device's bottom has got a semi-circular cut-out for bayonet cross-guard projection, stabilizing the attached bayonet. The muzzle device is press-fit to the muzzle and pinned with two cross-pins.

Bayonet lug consists of a ring on the barrel and a lug with rails to insert into the mortise of the bayonet pommel. The lug has a spring-loaded lever-type bayonet catch. The bayonet lug ring is inserted onto the barrel and pinned in place.

<u>Note</u>: as of Q4, 2021 the bayonet lug ring has been strengthened by removing the cut-outs.



Fig. 5a. Bayonet lug ring a) old style, b) new style.

Gas block (see Fig. 6) directs gases bled from the gas port of the barrel onto the gas piston, and contains piston and gas regulator.



Fig. 6. Gas block:

1 – gas piston; 2 – gas chamber; 3 – gas regulator retaining catch; 4 – gas regulator retaining catch spring; 5 – gas regulator; 6 – gas regulator retaining catch pin; 7 – gas block attaching roll-pins;

a – gas regulator retaining grooves; b – gas regulator lug cut-outs; c – gas regulator sealing grooves; d – gas regulator ports; e – gas regulator lugs; f – gas piston sealing grooves;
 g – gas block exhaust openings; h – channels for gas block attaching roll-pins

The gas block is pinned to the barrel with two roll-pins. The upper part of the block houses the gas piston and the gas regulator. The front face of the upper tube has two rectangular cut-outs for gas regulator lugs, and two retaining grooves for the gas regulator retainer, denoting gas regulator settings '1' (normal conditions, incl. silencer use) and '2' (heavy fouling or dusty environment).

Rear part of the gas block upper sleeve has six (three to a side) exhaust ports to relieve gases, redundant after the piston was actuated.

<u>Note</u>: As of Q4, 2021 changes were made to the gas block: a projection was added to prevent regulator disassembly from position '1', lower projection with opening was removed, lower semi-circle was additionally milled.





Fig. 6a. Gas block: a) old style, b) new style.

Gas regulator of the open type adjusts the amount of gases actuating the gas piston. For that purpose the regulator has two perpendicular gas channels of different diameter, connecting the barrel gas port to the gas regulator axial channel, leading to the piston chamber, thus allowing larger or smaller amount of gas to actuate the piston, depending on the gas regulator setting. The regulator has got two lugs, upper and lower, connecting the regulator to the gas block, and a housing containing the regulator retaining catch, keeping the regulator in a chosen setting. Exterior of the regulator has gas sealing grooves, acting as a labyrinth seal.

Gas piston propels the bolt carrier by indirect gas impingement (via operating rod) during the operating cycle. For that purpose the piston has got an opening, housing the front end of the operating rod. Exterior of the piston has got gas sealing grooves, acting as labyrinth seal, same as on gas regulator.

Barrel extension connects the barrel to the receiver, allows for closing and locking of the bolt. The extension is press-fitted and pinned on the breech end of the barrel, while its rear chamber acts as locking recess for the bolt locking lugs. On the exterior part of the extension there is a recoil lug, imparting the recoil onto the receiver. The upper and lower part of the extension feature positioning lugs, upper extension of the upper one forms a guiding ring for the operating rod and provides a rear stop for its return spring. On the underside of the extension there are two symmetrical diagonal cut-outs for the barrel retaining wedges. The rear flat has eight rectangular cut-outs for bolt locking lugs and extractor. Right behind the two ventral ones there are two loading ramps aiding in chambering of the rounds.

Note: as of Q4, 2021 the barrel extension has been fitted with two relieve openings.

2.1.4. Upper Receiver Group

Upper receiver (Fig. 7 & 8) connects all groups and parts of the rifle and directs the reciprocation of the moving parts group. The upper receiver group includes the upper receiver housing, bolt carrier guides left and right, front and rear trunnions, brass deflector, ejection opening cover and retaining screws.



Fig. 7. Upper receiver, seen from the right:
1 – rear trunnion with buttstock hinge guide ribs; 2 – rear trunnion retaining screws; 3 – right bolt carrier guide retaining screw; 4 – brass deflector; 5 – brass deflector retaining screws; 6 – front trunnion retaining screws; 7 – front trunnion; 8 – receiver housing; a – dorsal MIL-STD 1913 monolithic rail; b – right cocking handle slot; c – cooling slots; d – cut-outs for hand guard pivots

Receiver housing made of light alloy, is fitted with a dorsal mounting rail (MIL-STD-1913 or Picatinny standard). This rail is provided for mounting the sighting systems and other accessories. Underneath the rail, on both sides, there are slots provided for cocking handles. Inside, running parallel to these slots under the rail, bolt carrier guide ribs are fitted. The rear part of the receiver is reinforced with a rear trunnion, held by four screws, two on each side. Outer vertical edges of the rear trunnion serve as guide ribs of the buttstock hinge. In the central part of the housing ejection openings are cut, and bolt carrier guides are connected with the front trunnion. Brass deflector and ejection opening cover are screwed in by the rear edge of each ejection opening, side depending on shooter preference (right handed shooter: deflector – right, cover – left, for the left-handed one, the other way around. Deflector directs ejected brass frontwards, preventing them from being ejected

rearwards. The ejection opening cover blocks the unused ejection opening, preventing dust and debris from entering the receiver. Front part of the right bolt carrier guide has a clearance cut for bolt cam pin movement during locking and unlocking of the bolt.

Six cooling slots, three on each side, are cut through the upper part of the housing to aid in dissipating heat from the barrel. Two cut-outs are made in the front face of the housing for the handguard pegs.

<u>Note</u>: As of Q4, 2021 the upper receiver front corners are additionally milled to enhance the compatibility with the bullpup configuration.



1 – ejection opening cover; 2 – ejection opening cover screws;
 a – handguard pivot cut-outs; b – front trunnion retaining lug cutouts; c – bolt cam pin clearance cut; d – cocking slide guide ribs; e – buttstock hinge guide ribs

Front trunnion (Fig. 9) is cuboid, with through channel for the barrel. Front has got vertical retaining slots for the barrel extension lugs. Underneath the barrel channel there is a perpendicular cut-out housing the barrel latch. Lower surface of the cut-out is semi-cylindrical, while the upper is rectangular, to ensure proper positioning of the barrel retaining lugs and prevent their rotation. Underneath the retaining lugs channel there is an opening for a screw-positioning roll-pin, reaching into the central recess of the screw, to ensure that the barrel retainer screw would

rotate, but never displace, only actuating the barrel retainers alongside. In the rear part of the trunnion, there is a transverse cut-out for the cocking slide catch, preventing the cocking slide with cocking handles from moving with the bolt during firing.



Fig. 9. Front trunnion:

1 – right barrel retainer; 2 – barrel retainer screw retaining pin; 3 – left barrel retainer; 4 – barrel retainers actuating screw;

a – cocking slide catch groove; b – handguard pin channel; c – barrel retainer screw Allen wrench socket (left); d – lower receiver pin socket.

<u>Note</u>: As of Q4, 2021 on both sides of the barrel trunnion curved arrows were added, showing the direction of #5 Allen wrench turning to remove barrel.



Fig. 9a. Wrench turning arrows for barrel group removal on both sides of the front trunnion

Barrel retainers (left and right) are trapezoid lugs shaped to conform the barrel retainers channel shape, and fitted with a threaded channel for the barrel retainer actuating screw. The upper asymmetrical part of each retainer acts like a guide lug,

fitting into the barrel retainer grooves cut into the bottom of the barrel extension. Pressure the retainers exert at the exterior of the barrel extension ensures linear immobilization of the barrel in the front trunnion.

Retainer screw acts like the so-called 'Roman Screw', and is cylindrical with each of the halves threaded in opposite direction. Each of the ends has a hexagonal Allen wrench socket in it. In the center there is a perpendicular cut-out for the barrel retainer screw retaining roll pin, ensuring symmetrical positioning of the screw in the front trunnion.

Cocking slide (Fig. 10) allows cocking of the moving parts. Includes cocking handles, cocking slide (riding on the guide ribs inside upper receiver), cocking slide catch with a spring (corresponding with the groove in the front trunnion and bolt carrier cut-out), cocking handles mount with two screws, cocking handle covers (plastic) and two roll-pins.

The cocking slide remains stationary during shooting. Should the moving parts stop short of battery, it can be manually closed. To use the cocking slide as the bolt closure device, one has to retract the cocking slide until the cocking ratchet clicks into the bolt carrier and then push on the cocking handle.



Fig. 10. Cocking slide (caution: muzzle direction is to the right):
1 – left cocking handle cover; 2 – cocking handle cover pin; 3 – cocking handle;
4 – cocking slide; 5 – cocking slide ratchet; 6 – cocking slide ratchet spring; 7 – cocking handle mount; 8 – cocking handle mount screws;

a – cocking slide ratchet spring channel; b – cocking slide ratchet pivot slots; c – cocking handle cut-out; d – cocking slide guide ribs; e – cocking slide ratchet pivots; f – forward ratchet tooth (catching on the front trunnion); g – rear ratchet tooth (catching on the bolt carrier).

2.1.5. Moving Parts Group

Moving parts group (Fig. 11) consists of bolt, bolt carrier, cam pin, firing pin with retainer, and the anti-rebound device.



Fig. 11. Moving parts group:

1 – inertia pellets; 2 – rubber O-ring; 3 – firing pin retainer; 4 – bolt carrier; 5 – bolt group; 6 – anti-rebound device screws; 7 – firing pin; 8 – cam pin;
a – return spring channel; b – cam pin inserting opening; c – cocking ratchet groove;
d – inertia pellets channels; e – firing pin channel; f – firing pin retainer channel;
g – bolt carrier guide rib channel; h – bolt carrier locking cam

<u>Note</u>: in the A2 Rifle the bolthead was modified alongside the firing pin; the extent of the modification prevents exchangeability of those two parts between the A2 and A1.

Bolt carrier (Fig. 12) performs cycling actions, cocks the hammer and automatic sear. It is of cuboid form with upper edges cut diagonally. Bolt carrier body has channels for bolt, firing pin, firing pin retainer, return spring guide, and inertia pellets of the anti-rebound device.

Upper front edge has a transverse groove for the cocking slide ratchet rear tooth. Inside the bolt carrier body, under the return spring channel, there is a locking cam, guiding the cam pin, ensuring the bolt's locking and unlocking turn. Upper face of the carrier is a contact surface for the operating rod. Vertical channel on the upper right side of the carrier allows for the cam pin installation and removal.

On both sides of the carrier body longitudinal rectangular-section channels are cut for the bolt carrier guide ribs of the upper receiver. Inside the carrier channels are drilled for tungsten inertia pellets of the anti-rebound device, held inside with ARD screws. The device is to ensure against the moving parts 'rebounding' off the front trunnion on impact.

In the rear lower part of the bolt carrier, on either side, there are shoulders, cocking the automatic sear, and on top of these a transverse firing pin retainer channel is drilled. The upper part of the bolt carrier has a longitudinal return spring rod channel.



Fig. 12. Bolt carrier: a – automatic sear actuating shoulders.

Bolt (Fig. 13) chambers the rounds, locks the bore, fires the round and extracts and ejects the spent brass off the receiver through the ejection opening. Bolt group consists of bolt body, extractor with spring and elastomeric bumper pin, ejector with helical spring, extractor pivot pin and ejector retaining pin.



Fig. 13. Bolt group: 1 – bolt head; 2 – extractor pin; 3 – ejector pin; 4 – ejector spring; 5 – ejector; 6 – elastomeric bumper pin; 7 – extractor spring; 8 – extractor claw; a – cam pin channel; b – locking lugs; c – extractor channel

Bolt body has:

- <u>at front face</u>: a cylindrical cut-out for case head ('bolt face') with a firing pin orifice and a channel for ejector with spring;
- <u>around the front circumference</u>: six locking lugs, inserted into the locking recesses of the barrel extension; two lower locking lugs are alternating as feed horns to feed and chamber fresh rounds;
- at right side: extractor and extractor spring cut-out;
- at the back: transverse cam pin channel;
- at the front: extractor pin and ejector pin channels;
- inside: firing pin channel.

Extractor and spring extracts the spent brass from the chamber and holds it to the bolt face until ejected. Extractor has a claw on the front and two projections with extractor pivot pin openings.

Ejector with spring ejects the spent brass, extracted by the extractor. Of plunger type, actuated forward by the helical spring. The side cut-out is for the retaining pin.

Firing pin (Fig. 14) detonates the primer and retains the cam pin in the bolt. Has a point, guide ring (rests on the rear flat of the bolt body), and two rings for the firing pin retainer.



Fig. 14. Firing pin: a – retainer rings; b – guide ring (resting on the bolt rear flat); c – firing pin point.

Cam pin (Fig. 15), interacts with the locking cam of the bolt carrier to rotate bolt during locking and unlocking. Has a cylindrical portion with firing pin channel and a head interacting with the right bolt carrier guide.



Fig. 15. Bolt cam pin:

a – cylindrical portion interacting with the locking cam; b – firing pin channel; c – cam pin head, interacting with right bolt carrier guide rib.

Firing pin retainer retains the firing pin in the bolt carrier.

2.1.6. Return Spring Group

Return spring group (Fig. 16) returns the bolt carrier to battery and keeps it there, until shot is fired. It consists of return spring rod, return spring, return spring stop, back plate with a bolt carrier bumper and a roll pin, connecting all of the above. The back plate is pinned to the return spring rod. Along the rod, the spring reciprocates, buttressed against the return spring ring, which transfers the spring tension upon the bolt carrier. Back plate positions the return spring group in the upper receiver. On the inner side of the back plate, there is an elastomeric bolt carrier bumper, dampening the bolt carrier bump. On the outer side of the back plate there is a cuboid projection, acting as the buttstock hinge retainer.



Fig. 16. Return spring group: 1 – back plate; 2 – return spring rod pin; 3 – return spring; 4 – return spring ring; 5 – bolt carrier bumper; 6 – return spring rod.

2.1.7. Lower Receiver Group

Lower receiver group (Fig. 17) consists of lower receiver body with magazine well and pistol grip, the fire control group, magazine catch, bolt hold open and their reinforcement insert.

<u>Note</u>: the new FB Radom made pistol grip was fitted to the A2 model, with less inclination, but still conforming the AR-15 (M16) standard of attachment.

Lower receiver body has front projections with transverse channel for a pin connecting the lower receiver to the front trunnion, and a rear projection resting against the rear trunnion and held closed by buttstock hinge. The rear projection contains the QD sling swivel attachment point (ambidextrous). Above the pistol grip there is a transverse channel for the safety-selector lever shaft with pictograms (bottom to top) for SAFE, FIRE and AUTO. Inside the lower receiver the FCG housing is secured with the screw to the bottom to prevent it from shifting. Transverse channels are drilled in the FCG housing for pivot pins of the firing mechanism components. In front of the FCG housing, magazine catch and bolt hold open device are fitted into their reinforcing insert.

Note: as of Q4, 2021 the lower receiver was modified by enlarging the FCG housing's side opening, allowing to use the same housing for the bullpup configuration as well, and the lower receiver connecting pin is different in length, and fitted with conical groove.





1 – safety-selector lever screw; 2 – safety-selector lever; 3 – safety-selector shaft; 4 – lower receiver body; 5 – fire control group; 6 – FCG retaining screw; 7 – bolt hold-open (BHO); 8 – lower receiver reinforcing insert; 9 – pistol grip screw; 10 – pistol grip; 11 – pistol grip screw nut; 12 – right magazine catch; 13 – BHO flippers; 14 – BHO retaining pin; 15 – lower receiver pin retainer spring; 16 - lower receiver pin retainer; 17 – lower receiver pivot pin; a – QD swivel bushing; b – left magazine catch; c – magazine well; d – lower receiver pivot pin channel

Fire control group (FCG) (Fig. 18) releases the hammer from sear or automatic sear engagement, and thus initiating the automatic cycle, selecting the fire mode, safeguarding against unintended discharge as well as against the out-of-battery discharge.

FCG consists of the FCG casing, with channels for pivot pins holding hammer with hammer springs (left & right), trigger with trigger spring, disconnector with spring and automatic sear with spring. Large transverse channel is for the safety-selector shaft.



Fig. 18. Fire control group:

1 – automatic sear spring; 2 – automatic sear strut; 3 – automatic sear; 4 – left
 hammer spring; 5 – hammer; 6 – right hammer spring; 7 – FCG casing; 8 – safety
 retainer; 9 – safety retainer spring; 10 – safety retainer adjusting screw;

11 – automatic sear pivot circlips; 12 – automatic sear pivot; 13 – trigger and hammer pivots; 14 – trigger sear; 15 – trigger; 16 – trigger spring; 17 – sear spring;
 18 – disconnector spring; 19 – disconnector;

a – automatic sear arms (engaged by bolt carrier shoulders); b – hammer front notch;
c – automatic sear bend (engaged by hammer front notch); d – hammer middle
notch; e – hammer rear notch; f – hammer trunnion; g – automatic sear pivot
channel; h – hammer pivot channel; i – trigget pivot channel; j – safety-selector shaft
channel; k – safety-selector shaft notches; I – trigger spring notch; m – disconnector
hook (engaging with hammer middle notch); n – sear edge engaging with the
hammer rear notch; o – diconnector tail (engaged by safety-selector shaft);
p – disconnector spring seat

Hammer with doubled hammer springs hits on the firing pin. Hammer has got three notches (front, middle and rear), pivot trunnions and hammer spring notches.

Hammer springs, set onto the hammer trunnions on either side, are tensioned between the hammer spring notches and the trigger pivot pin. Front notch engages with the automatic sear. Middle notch engages with the disconnector hook (during semi-automatic fire. The rear notch engages with the trigger sear.

Trigger keeps hammer cocked and releases it. The lever in the front of the trigger acts as a trigger sear, engaging with the hammer rear notch. The longitudinal cut-out at the rear of the trigger holds the disconnector with spring, and trigger blade extends down, into the trigger guard. Edges of the rear parts have notches engaging with the safety-selector shaft and the trigger spring notch. On the left of the trigger, alongside, runs the trigger spring, with front arm pressing on the FCG casing and rear arm pressing on the trigger spring notch, cut into the left of the trigger body.

Disconnector has a hook on top, which in semiautomatic fire holds down the hammer released by the automatic sear, until the trigger is held. Disconnector is mounted coaxially on the same pin as the trigger, inside the longitudinal cut-out of the rear trigger body. Disconnector is spring-loaded at all times. The rearmost part of it forms a tail, with which the safety-selector shaft engages to keep the hook out of the way of hammer in fully automatic fire.

Automatic sear releases the hammer automatically whenever the moving parts are in battery. If the safety-selector is set to AUTO, the disconnector is pivoted out of the way, and the hammer upon release strikes the firing pin to initiate another cycle. It is a spring-loaded lever, supported by a spring strut, pivoted with a foremost pin of the FCG. The automatic sear has channel for the pivot pin, upper arms engaging with the shoulders on the underside of the bolt carrier, sear bend (engaged by the front hammer notch) and automatic sear strut projection.

Safety-selector lever enables the Operator to set FCG to SAFE, FIRE or AUTO setting. The selector comprise a shaft with two identical levers attached at the outer ends by screws on either side of the lower receiver. Settings selected are held by a spring-loaded retaining catch, set in a diagonal channel of the lower receiver rear part, engaging into the cut-outs of the safety-selector shaft.

Magazine catch (Fig. 19) enables one to attach and detach the magazine. The magazine catch comprises of: left and right magazine catch levers with pivot pins and a spring.

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Fig. 19. Magazine catch and bolt hold-open:
1 – left magazine catch; 2 – magazine catch pivot pin; 3 – bolt hold-open shaft; 4 – BHO actuator pin; 5 – BHO guide pin; 6 – magazine catch spring; 7 – right magazine catch; 8 – BHO pivot pin; 9 – BHO lever pin; 10 – BHO spring; 11 – BHO spring stop; 12 – BHO flapper.

Pivot pins and spring are set into their openings in the magazine catch and bolt hold open (BHO) reinforcing insert. Right magazine catch lever has a button, projection with peg (engaging with the left lever wishbone) and a vertical pivot pin channel. Left magazine catch lever has a button, wishbone, pivot channel and a magazine catch projection, engaging with the magazine slot. Both levers rotate in opposite directions, pivoting around their pins in a scissor movement, governed by the engagement of the right lever peg with the left lever wishbone.

Bolt hold open (BHO) device (Fig. 20) is set within the lower receiver reinforcing insert, placed in the middle of the lower receiver housing, flush with the ejection openings rear edge. The BHO arrests the bolt carrier automatically in the rear position after the last round is spent. The BHO consists of the BHO lever, BHO spring with spring stop, and BHO shaft.



1 – BHO spring stop; 2 – BHO spring; 3 – BHO shaft; 4 – BHO guide pin; 5 – BHO actuator pin; a – BHO lever pin groove; b – magazine catch lever cut-out

The BHO is actuated by a pin engaging with the magazine follower. On the opposite side of the shaft there is a guiding pin, engaged into a vertical slot of the reinforcing insert, to prevent rotation. Clearance cut-out enables proper operation of the magazine catch. Lower portion of the BHO shaft doubles as the BHO spring rod. The lower end is threaded for the BHO spring stop. The BHO lever pivots around the pin set in the lower part of the magazine well. BHO lever pin (in the middle of the lever paddle) engages with a groove of the spring stop, transferring the pressure imparted on the paddle by the Operator, releasing the bolt carrier from the BHO.

2.1.8. Telescoping Buttstock Group

Telescoping buttstock (Fig. 21) facilitates aiming the rifle, and enables the Operator to fit the rifle to his/her needs by adjusting the length of pull and height/angle of the cheekpiece.

To adjust the cheekpiece:

- 1. slide the buttplate out to at least '1';
- 2. pull the cheekpiece to the rear;
- 3. set it into the needed height/angle, then slide forward to latch.

The buttstock group consists of: stock hinge, front tube, buttplate slide, cheekpiece with spring, hinge catch with button, lever and spring, buttstock hinge latch and the carrying strap QD swivel points (left and right).



Fig. 21. Buttstock:

1 – left QD swivel socket; 2 – cheekpiece latch screw; 3 – cheekpiece latch; 4 – cheekpiece; 5 – buttplate slide latch pin; 6 – buttplate slide latch peg; 7 – buttstock front tube;
8 – cheekpiece spring screw; 9 – cheekpiece spring; 10 – buttstock hinge; 11 – buttstock pivot sockets; 12 – buttstock latch; 13 – buttstock latch spring; 14 – buttstock pivot pin; 15 – buttstock latch pin; 16 – buttstock pivot spring; 17 – rubber buttplate; 18 – buttplate slide latch lever; 20 – buttplate slide latch button pins; 21 – buttplate slide latch button; 22 – right QD swivel socket; 23 – buttplate slide latch spring; 24 – buttplate slide stop screw; 25 – buttplate slide stop;

a – buttplate slide latch sockets; b – buttstock pivot sockets; c – cheekpiece positioning pegs; d – cheekpiece pegs guides; e – buttstock front tube hinge ramps; f – buttstock hinge ramps

Buttstock front tube has got six guiding grooves (two groups of three) at each side engaging with four pegs inside the cheekpiece, to allow for adjustment of the cheekpiece height and angle. Cheekpiece is being stabilized in each chosen position by flat spring, held by the screw on top of the buttstock front tube. The same top surface has five sockets for the buttplate slider latch, allowing for the length of pull adjustment. By pressing the slide latch button underneath the buttplate, the buttplate slide latch lever is actuated to withdraw the slide latch peg down from the socket,

thus enabling sliding buttplate in or out. To allow for automatic latching of the slide in the new position, simply release the button.

Front end of the front tube holds the buttstock hinge latch, holding the stock in unfolded and folded position. In the unfolded position it is held by a spring-loaded catch, engaging with the bracket of the buttstock hinge, and released by pressing on the latch button. Two projections to the right of the front tube's face are buttstock pivot sockets. Their edges are provided with ramps, engaging with similar ramps of the buttstock hinge to lift the buttstock and hold it in the folded position, alongside the right side of the receiver. The buttstock hinge spring prevents unintended opening of the folded buttstock. Buttstock hinge has rails, engaging with rear trunnion guide ribs to secure the hinge, with a backplate projection acting as a buttstock hinge latch to secure the hinge in position.

Note: As of Q4, 2021 the buttstock tube had additional ribs in the rear part.



Fig. 21a. Additional strengthening ribs inside the rear part of the buttstock tube

2.1.9. Extended Handguard

Extended handguard (Fig. 22) sheaths the barrel from below under the receiver and from the above in the gas block region, shielding the gas regulator. Longitudinal slots in the sides and bottom of the handguard allow for attaching the accessory rails or directly the accessories fitted with M-LOK interface, such as the foregrip, taclights and optoelectronic sights. Same slots act as cooling slots for the barrel during the firing. On top of the handguard, a bridging part with additional MIL-STD-1913 rail (aka Picatinny rail) is attached. Lower rear edge has got a transverse channel for handguard mounting pin, going through the front trunnion.



Fig. 22. Extended M-LOK handguard group:
1 – accessory rail (3 slots); 2 – sling QD attachment; 3 – top rail attaching screws; 4 – top rail; 5 – M3 pin retainer grub screw; 6 – pin retainer spring; 7 – pin retainer; 8 – lower receiver and handguard mounting pin; 9 – A2 extended handguard

Note: the A2 Rifles are fitted with the extended handguard with top rail and one accessory side rail, attached to the M-LOK socket, while the A1 Rifles have shorter handguards with 3 short accessory rails attached to the MOE standard sockets – which means the rails are NOT INTERCHANGEABLE. The whole hanguard groups as such are interchangeable between A1 and A2, though.

<u>Note</u>: as of Q4, 2021 the handguard mounting pin length was changed, and the pin was fitted with conical groove.

Moreover, in the A1 handguard, a gas regulator protector was added.



Fig. 22a. A1 handguard with gas regulator protector added, with two retaining screws.
Functioning of the Groups and Component Parts

<u>Caution:</u> Functioning of the weapons' mechanisms is described for the right-side brass ejection configured rifle.

2.1.10. Principle of Operation

This is a gas-operated weapon, in which portion of the expanding gases is being bled off from the bore through a gas port to operate the short-stroke gas piston.

During the discharge, some of the gases expanding behind the bullet in the bore flows through a port in the barrel wall into the gas chamber, where it impinges upon the gas piston. The gas pistol is pushed back, taking the operating rod with it, which in turn impacts on the front part of the bolt carrier, pushing it back. The bolt carrier, being pushed back, through interaction of cams, rotates the bolt to unlock it. Then the bolt is travelling back with the bolt carrier, extracting the spent case from the chamber and ejecting it from the receiver. At the same time the hammer is cocked, return spring is being compressed, and the follower spring causes to follower to rise, and with it the cartridges in the magazine.

Arriving at the rearmost point, the bolt carrier hits the bumper and stops, then under the power of the compressed return spring starts to reciprocate. On its way back to battery, one of the lower two locking lugs is pushing the topmost round from under the magazine lip, and chambers it. After the bolt reaches the foremost position, the bolt carrier continues forward, rotates bolt to lock it, by placing the locking lugs in the locking recesses of the barrel extension. After the bolt is locked, bolt carrier releases the hammer from the automatic sear. If the safety-selector lever was set to AUTO, the hammer is free to strike the firing pin again, to start another cycle of operation. This would repeat itself until there are fresh rounds in the magazine, or the trigger is released. If the safety-selector is set to FIRE, the hook of the disconnector would catch the hammer, and no further shot would follow. To fire again the Operator has to reset trigger.

After the last cartridge is shot, the moving parts would stop on bolt hold open device. To continue shooting, the Operator has to release the empty magazine, replace it with a fully loaded one and push the BHO lever to release the moving parts and allow them to return into battery with a fresh round chambered.

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To put the rifle on safe, one has to rotate the safety-selector lever to SAFE (horizontal) setting. The rifle can be put on safe with hammer in any position.

2.1.11. Parts and Groups Disposition Prior to Loading

Before the rifle is loaded, parts and groups are as follows:

- moving parts in battery, under tension from return spring;
- gas piston is in the foremost position, under the op rod spring tension;
- return spring is tensioned in the least;
- barrel bore is closed by the bolt, which is locked (the bolt is rotated to the right, the locking lugs are placed behind the locking surfaces of the barrel extension);
- automatic sear is rotated forward by the bolt carrier shoulders;
- hammer is released and rests on the rear of the bolt carrier;
- the firing pin is pushed forward by the contacting hammer;
- hammer springs are tensioned in the least.

2.1.12. Functioning of the Parts During Loading

A. Magazine Attachment

- 1. During the magazine attachment, magazine catch projection of the left magazine catch lever is being pushed off by the magazine housing, until it falls into the magazine catch slot. The magazine is now inserted into the magazine well and is being held by the catch.
- **2.** The first round in the magazine is contacted and pushed slightly down by the bolt carrier bottom, slightly compressing the follower spring.

B. Cocking the Bolt Carrier

- **1.** When the bolt carrier is being pulled back, the cam pin interacts with the unlocking cam and rotates the bolt leftwards.
- This rotation withdraws the locking lugs from behind the locking abutments of the barrel extension – the bolt unlocks.
- **3.** Bolt carrier shoulder releases the automatic sear, which rotates towards the hammer under the tension of its own spring.
- **4.** As the bolt carrier rearward stroke continues, the bolt is fully extended and finally starts to withdraw with the carrier.

- 5. The chamber is now open.
- 6. Bolt carrier pushes the hammer back, tensioning the hammer springs.
- **7.** Trigger sear (hinged from the trigger forward arm) clears, then engages the hammer rear notch.
- **8.** As the hammer continues to be cocked, the automatic sear engages with the hammer front notch, blocking the fully cocked hammer.
- **9.** When the bolt carrier bottom clears the magazine well, the cartridges rise, pushed up by the tensioned follower spring, until the topmost cartridge comes to rest against the inner surface of the magazine lip.
- **10.** All the while, the return spring is being compressed.

C. Moving Parts are Released

- **1.** After the moving parts are released, the tensioned return spring pushes it forward, into battery.
- 2. One of the two lower locking lugs is pushing the topmost round from the magazine, and chambers it, as the bolt moves forward.
- **3.** Other cartridges in the magazine are pushed up by the follower, until the next topmost of these rests against the bolt carrier bottom.
- **4.** The case of the round being chambered pushes the ejector inside, compressing the ejector spring.
- 5. When the ejector spring is compressed, the extractor clam engages the case rim.
- 6. The chambered round pushes back on the firing pin, slightly protruding from the firing pin orifice in the bolt face.
- 7. The bolt being held by the chambered round stops, but bolt carrier continues the carrier locking can interacts with the cam pin, rotating the bolt rightwards.
- The bolt rotation moves the locking lugs behind the locking abutments of the barrel extension – the bolt is locked.
- **9.** Upon locking, the bolt carrier shoulders are rotating the automatic sear forward and downward, releasing the hammer.
- **10.** Hammer, propelled by the tensioned hammer springs rotates, until the trigger sear re-engages into the rear notch.

<u>Warning</u>: The rifle is now ready to fire (with safety-selector lever either in FIRE or AUTO setting. If the firing is not intended to follow immediately, put the safety on.

With safety-selector rotating to the SAFE setting, its shaft blocks the trigger.

2.1.13. Functioning of the Parts in Fully Automatic Fire

With safety-selector rotated to AUTO, the trigger is no longer blocked, and at the same time the safety-selector shaft cam rotates the disconnector hook out of the way of the hammer.

A. On Trigger Pull

- **1.** As the trigger is being depressed, the trigger sear on the front arm of the trigger disengages from the hammer's rear notch.
- 2. The hammer speeds forward, propelled by the compressed hammer springs and hits the firing pin.
- **3.** Firing pin point is being extended from the bolt face orifice and strikes the primer of the chambered round.
- **4.** The priming compound detonates, flame enters the case by the flash holes and ignites the propellant.
- **5.** The pressure of the powder gases rises to point when bullet is being dislodged from the case and propelled down the bore.
- **6.** As the bullet clears the gas port, portion of the gases escapes into the gas chamber of the gas block.
- **7.** Gas piston is being forced back by the expanding gases, taking operating rod with it, until it hits the front portion of the bolt carrier.
- **8.** As the piston is actuated, now redundant gases are released through the gas block exhaust ports.
- **9.** The operating rod stroke finishes, with its return spring being compressed.
- **10.** By that time the bullet exits the bore.
- 11. The bolt carrier continues recoil, acting in the same way as during manual cocking see Section 2.2.3. B (except 7., as the trigger is still held);
- **12.** As the bolt moves rearward, the extractor claw pulls at the case head rim, while chamber walls ensure it being extracted in straight line.
- 13. As the spent casing neck clears the breech, the force counteracting it's being rotated by the ejector disappears the casing is swung right and flies away through the ejection opening.

- After moving parts hitting the rear plate, they start forward under tension of the compressed return spring, in the same way as during manual cocking see Section 2.2.3. C;
- **15.** As the moving parts reciprocate while the trigger is still depressed, the hammer is only held by the automatic sear, engaged in its front notch.
- **16.** As the bolt carrier slams into battery, the automatic sear is released, freeing the cocked hammer.
- **17.** Hammer speeds forward and strikes the firing pin again, starting another cycle of operation.

This is being repeated until:

- trigger is released the trigger then is rotated by the trigger spring and its trigger sear engages into the rear notch, holding it cocked – the firing stops, until the trigger is depressed again;
- the last round is spent.

2.1.14. Functioning of the Parts in Semiautomatic Fire

After safety-selector switch is being rotated to FIRE, the shaft cam is withdrawn, allowing the disconnector to move forward under its own spring pressure. The disconnector rotates forward in its nest in the rear part of the trigger, into position, when the disconnector hook can engage the hammer middle notch.

A. On Trigger Pull

- 1. After the trigger is depressed, the trigger sear disengages from the hammer's rear notch. At the same time the disconnector is rotated forward and upward with the trigger pulled.
- 2. The hammer is released same as in fully automatic fire.
- **3.** As the recoiling bolt carrier cocks the hammer, the disconnector hook engages with the middle notch.
- As the moving parts return to battery, the automatic sear is being released but the hammer is still held by the disconnector hook.

B. On Trigger Release

- 1. Released trigger rotates back under trigger spring tension, withdrawing the disconnector hook with it.
- 2. The disconnector hook disengages with the the middle notch and releases the hammer.
- **3.** The hammer speeds forward, but its rear notch is engaged with the trigger sear, so it remains cocked.

C. After Trigger Reset

- **1.** After another trigger pull, the hammer is again released to hit the firing pin.
- 2. Next shot is fired. The automatic cycle is repeated.

2.1.15. Functioning of the Parts After the Last Shot is Fired

A. Chambering the last round from the magazine

- After the last cartridge is chambered, the follower rises under tension from the follower spring and contacts the actuating pin of the bolt hold open (BHO) device.
- After trigger is pulled, the automatic cycle is being repeated, be it in FIRE or AUTO mode – see Sections 2.2.4. and 2.2.5, accordingly.
- **3.** On recoil stroke, after the bottom of the bolt carrier clears the magazine well, the follower would rise all the way up and carry with it the BHO actuator pin.
- **4.** On counter-recoil the bolt would engage with the BHO shaft and stop in rear position.

B. On detaching (exchanging) magazines with the BHO activated

- After detaching magazine the BHO shaft is no longer actuated by the follower. After exchanging the magazine for a loaded one, the follower is being depressed beneath the magazine lips height, and no longer actuates the BHO shaft.
- **2.** Although the BHO spring is compressed, friction of the bolt holds the BHO shaft high, thus blocking the way forward.

To release the moving parts the Operator has to either:

C. Push down on the BHO lever

- **1.** Pushing down on one of the BHO flippers lowers the BHO shaft.
- 2. As soon as the obstacle is removed, the return spring decompresses, moving parts into battery and/or chambering the new round

Or

D. Pull on the Cocking Handle

- **1.** On pulling either of the cocking handles the moving parts are retracted, releasing the pressure on the BHO shaft.
- **2.** BHO spring lowers the BHO shaft.
- **3.** As soon as the obstacle is removed, the return spring decompresses, moving parts into battery and/or chambering the new round.

2.2. Standard Rifle Equipment

Basic set of equipment for the MSBS Grot A2 Standard Rifle consists of:

- 1. Cleaning kit (incl. Blank Firing Attachment),
- 2. 30-round magazines (number as per contract),
- 3. Magazine coupling devices,
- 4. Set of mechanical sights (BUIS),
- 5. Knife-bayonet,
- 6. Carrying strap (2-point),
- 7. M-LOK foregrip,
- 8. Handguard heat shields (number and types as per contract):
 - M-LOK hand stop
 - M-LOK lower 2-slot heat shield
 - M-LOK side 2-slot heat shield
 - M-LOK side 3-slot heat shield

Cleaning kit (Fig. 23) contains the accessories useful for disassembly / assembly of the rifle, as well as cleaning and care of it.

The cleaning kit contents:

- four section cleaning rod,
- bore snake,
- bore brass brush,
- bore bristle brush,
- patch holder,
- gas block brush,
- double-ended brush on stem,
- Allen wrench 1/8 inch,
- Allen wrench #2,
- Allen wrench #3,
- Allen wrench #4,
- Allen wrench #5,
- oil bottle,
- cleaning patches (flannel),
- front sight adjustment wrench,

- cloth case,
- Blank Firing Attachment (BFA).



Fig. 23. Cleaning kit and contents:

1 – cleaning rod; 2 – bore snake;3 – bore brass brush; 4 – bore bristle brush; 5 – patch holder; 6 – gas block brush; 7 – double-ended brush on stem; 8 – Allen wrenches: 1/8", 2 mm, 3 mm, 4 mm, 5 mm; 9 – oil bottle; 10 – front sight adjustment wrench; 11 – cloth case; 12 – BFA

Cleaning rod aids in thorough cleaning of the barrel bore, gas chamber, bolt carrier and other channels of the rifle. The cleaning rod consists of four screw-in segments: two have connecting threads – internal and external – on either end, one has two external threads on both ends, one has an internal thread on one end, and rotating plastic handle on the other.

Bore snake allows for fast barrel bore cleaning in the field. Consists of two portions, one of small diameter is introduced into the breech end of the barrel, then pulled towards the muzzle to drag the working part, with brass wire interwoven, through the bore. Several repetitions cleans the bore satisfactorily.

Bore brass brush used with cleaning rod to clean the barrel bore.

Bore bristle brush used with cleaning rod to clean and preserve the bore.

Patch holder used with cleaning rod to clean and preserve the bore with flannel patches.

Gas block brush (large diameter) used with cleaning rod handle to clean the gas block.

Double-ended cleaning brush on stem (toothbrush-style) to clean external surfaces and hard-to-get places inside the receivers, handguard, magazines etc.

Allen wrench 1/8" for unscrewing and tightening the screws fastening M-LOK accessories like foregrip, additional rails, heat shields etc.

Allen wrench #2 for unscrewing and tightening the screws fastening the brass deflector and ejection opening cover.

Allen wrench #3 for safety-selector retainer adjustment.

Allen wrench #4 for unscrewing and tightening the screws fastening the magazine couplers.

Allen wrench #5 for unscrewing and tightening the barrel fasteners as well as BFA installing.

Oil bottle to keep and apply oil for cleaning and lubricating of the weapon.

Flannel patches for cleaning all parts, especially for barrel bore cleaning.

Front sight wrench to adjust mechanical front sight during zeroing of the rifle.

Cloth case to hold all accessories. Fitted with 25 mm MOLLE fastening system.

Blank firing attachment (BFA) – enables automatic function of the weapon while firing blanks. For BFA installation – see **Section 3.3.4.**;

 30 rds magazines (number as per contract) AR-15 M16) compatible, but some magazines may not seat or function properly, e.g. Magpul PMAG Gen 3. <u>Note</u>: before using any OEM magazines, the Operator should function check them by manually cycling the action with dummies, and shooting (if possible).

2. Magazine couplers enable two magazines to be connected.

In order to use the coupler:

1. Unscrew the coupler nuts on both upper and lower straps;

2. Put upper strap onto the magazines so, that the coupling screw is set between the magazines, then tighten the screw;

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3 Put lower strap onto the magazines so, that the coupling screw is set between the magazines, then tighten the screw;

- 4 Set the magazines in the coupler so that the right magazine is ca. 3 cm lower;
- 5 After checking everything is set right, tighten the screws finally.
- 3. Mechanical sights consists of separate folding rear sight with a peep and folding front sight, both fitted with MIL-STD 1913/Picatinny interface and meant to be mounted on either end of the dorsal rail. If the setting is awkward, sights can be re-arranged at any time. Just remember that after such re-arrangement re-zeroing the rifle is necessary.
- 4. Knife-bayonet see separate 'MSBS-Knife-Bayonet Operator's Manual'.
- 5. **Carrying strap, 2-point** facilitates carrying the rifle, leaving hands free for other activities. The strap is length-adjustable by adjusting the loop.



Fig. 24. Carrying strap attachment points (QD swivel sockets): 1 – handguard, 2 – lower receiver, 3 – buttstock

To attach the strap in 2-point configuration:

1 set the rifle on right side (for right-hand shooter);

2 insert the front QD swivel (with adjusting loop) into the socket (1) on handguard;

3 insert the rear QD swivel (with metal ring) into the lower receiver (2) or buttstock (3) socket.

<u>Note</u>: The strap may be applied to the three QD sockets in any chosen combination – according to Operator's preference and the mission.

While attaching the QD swivel MAKE SURE it is properly seated: pull energetically on each end of the strap to verify it won't fall off the rifle.

<u>Note</u>: After adjusting the length of strap, weave the strap ends once more through the buckle to secure against going loose.

- Foregrip has got the M-LOK attachment hardware and may be attached to any M-LOK slot (with M logo). Foregrip facilitates carrying on patrol and shooting. Foregrip attachment – see Section 3.3.5.;
- 7. Handguard heat shields with M-LOK attachment hardware are shaped specifically to conform the MSBS Grot A2 handguard. Attached to the gas block area, they protect the hand against the heat during the prolonged firing of the rifle. Heat shield attachment – see Section 3.3.5.;

3. DISASSEMBLY / REASSEMBLY OF THE STANDARD RIFLE

Disassembly can be either partial (field strip) or detailed. The rifle is being field stripped for routine clear and care, while the detailed disassembly is needed for the periodical maintenance. The rifle is easily serviceable, diagnosed and repaired, as per requirements of the NO-06-A104:2005 norm.

Stripping and reassembly is best done on a table or other clean surface. Parts and groups are to be laid-put in the sequence of disassembly, taking care not to throw them from the height and not pile them one on another. Never use excessive force or blows while disassembling or assembling the firearm or its components.

While stripping the firearm care should be taken to compare the serial numbers of the parts with the receiver number. All of those should be matching.

3.1. Disassembly and Assembly of the Rifle

3.1.1. Field stripping

To field strip the rifle:

- 1. Unload and clear weapon by detaching the magazine and checking chamber for remaining cartridges, casings or parts thereof:
 - Depress the magazine catch button on either side and detach the magazine;
 - Pull the moving parts all the way back and activate bolt hold open device by lifting one of the BHO flippers to block the bolt carrier in the rear position;
 - Check if there's still a round chambered;
 - Release the moving parts upon checking the chamber, either by pushing on the BHO flipper or pulling the cocking handle;

- 2. To detach handguard from the upper receiver (Fig. 25):
 - Remove the mounting pin attaching the handguard to the barrel trunnion;
 - Pull the handguard forward to detach the handguard's top from the upper receiver (**ONLY pull handguard forward, DO NOT rotate downward**);



Fig. 25. Detaching the Handguard

- **3.** To detach the gas mechanism parts (Fig. 26):
 - Turn regulator towards setting '2', then beyond work settings, until the regulator handle is set horizontally (disassembly position) and withdraw from gas block (<u>Note</u>: as of Q4 2021, starting with s/n KN 54216 a gas regulator stop was added at setting '1' to prevent turning beyond the setting the only disassembly position now is beyond setting '2');
 - Lift the rifle pointing barrel down to let the gas piston fall from the gas chamber. If the gas block remains stuck, cycle the moving parts several times manually, until piston falls out.



Fig. 26. Stripping the gas mechanism

- 4. To detach buttstock (Fig. 27):
 - Press the buttstock catch button and fold the stock to the right;
 - Press and hold the back plate projection;
 - Slide the buttstock hinge down from the rear trunnion guide ribs;



Fig. 27. Detaching the buttstock

- 5. To detach moving parts group (Fig. 28):
 - Withdraw the return spring group out of the upper receiver
 - Lift the rifle barrel up and catch bolt and bolt carrier falling out of the rear trunnion;



Fig. 28. Detaching return spring group and moving parts group



Fig. 29. Rifle field stripped:

1 – buttstock group; 2 – moving parts group; 3 – return spring group; 4 –gas piston; 5 –gas regulator; 6 – A2 style extended handguard

3.1.2. Reassembly after field stripping

To reassemble the rifle:

- 1. Attach the gas mechanism parts:
 - Insert gas piston with flat face frontwards;
 - Insert gas regulator into the socket, setting regulator lugs into the rectangular cut-outs and turn until retainer clicks in working position '1' (<u>Note</u>: as of Q4, 2021, starting with s/n KN 54216 gas regulator stop was added beyond the setting '1' to prevent getting the gas regulator into the assembly / disassembly position from the side of setting '1'; to attach the gas regulator, insert it from the side of the setting '2' and rotate towards setting '1');

<u>Warning</u>: After attaching the gas regulator, do check if the gas regulator retainer plunger clicked into the retaining notch for the in setting '1'; NEVER leave the gas regulator in unstable settings, especially close to the outer limits of travel.

- 2. To attach the extended handguard:
 - Slip the hanguard onto the barrel and upper receiver, until the rear projections of the top accessory rail support enter into the cut-outs of the upper receiver (<u>Note</u>: keep hanguard PARALLEL to the barrel – NEVER rotate);
 - Align the pin channels of the handguard and barrel trunnion;
 - Insert the mounting pin;
- **3.** To insert moving parts into the upper receiver (Fig. 30):
 - Fit the bolt carrier guide slots onto the receiver guide ribs, taking care to turn bolt into unlocked (fully forward) position;



Fig. 30. Reassembly of the moving parts group – the required bolt position

- Slide bolt carrier fully forward, into battery;
- Insert the return spring group into the bolt carrier channel.
- **4.** To attach the buttstock (Fig. 32):
 - First make sure the hammer (Fig. 31, 1) is cocked and held by the automatic sear (31, 2); if not – cock hammer, and make sure the automatic sear is turned forward;



Fig. 31. Cocking hammer and setting the automatic sear

- Rotate the lower receiver up, until it fits FLUSH with the upper receiver;
- Press and hold back plate projection;



Fig. 32. Attaching buttstock

• Insert rear trunnion guide ribs into the buttstock hinge rails, and slide up until back plate projection snaps into the buttstock hinge socket.

3.1.3. Detailed Disassembly of the Rifle

To disassembly the rifle completely:

- 1. Field strip the rifle (see Section **3.1.1**.);
- 2. To detach lower receiver:
 - Push the lower receiver mounting pin out of the channel in the front trunnion and front projections of the lower receiver; pin is captive do not detach;



Fig. 33. Pushing out the lower receiver mounting pin

- **3.** To detach and strip the barrel group:
 - Insert Allen wrench #5 into the hexagonal sockets of the barrel retainers screw and turn until it stops;

<u>Caution</u>: Insert the wrench DEEP into the socket.

<u>Note</u>: as of Q4, 2021, the both sides of the barrel trunnion are marked with curved arrow pointing in the direction of releasing the barrel retainers – see Fig. 9a).

• Slide barrel forward (Fig. 34);



Fig. 34. Detaching the barrel

- Pull operating rod spring towards the muzzle, so that its rear end clears the socket in the guide ring on the barrel extension (Fig. 35, 1);
- Tilt the operating rod out of engagement with the guide ring slot (35, 2);
- Withdraw the operating rod from the gas block and slide its spring off (35, 3);



Fig. 35. Stripping the barrel group

- 4. To detach bolt from bolt carrier (Fig. 36):
 - Push the firing pin retaining pin out;
 - Take the firing pin out;
 - Take the cam pin out;
 - Slide forward the bolt group, detach from bolt carrier.



Fig. 36. Detaching the bolt group from the bolt carrier

3.1.4. Reassembly After Detailed Disassembly

To reassemble the rifle after detailed strip:

- 1. Attach bolt group to the bolt carrier:
 - Insert bolt group into the bolt carrier;
 - Align the holes in bolt carrier and bolt, then insert the cam pin through these.
 <u>Warning</u>: Make sure the cam pin head is pointing outwards.

Warning: Make sure the extractor of the bolt is pointing towards the ejection opening in use. Failure to do so may result in a stoppage, with bolt trying to eject spent brass through the closed ejection opening.

- Insert firing pin, leaving it protruding by 2-3 mm out of the rear wall of the bolt carrier;
- Insert firing pin retaining pin until it sets FLUSH with the bolt carrier side;

<u>Warning</u>: Make sure the firing pin retaining pin is NOT protruding from the bolt carrier. Failure to do so would prevent moving parts from entering the upper receiver.

- **2.** To reassemble and attach the barrel group:
 - Insert the operating rod spring onto the rear end of the operating rod;
 - Insert the front end of the operating rod into the gas block;
 - Compress the operating rod spring and hold;
 - Tilt the operating rod towards center line of the barrel, through a slot in guide ring of the barrel extension;
 - Release the spring and make sure it is set into the spring socket of the guide ring;
 - Insert the barrel group into the front trunnion;

<u>Warning</u>: When inserting the barrel group make sure the barrel is inserted ALL the way, and barrel extension recoil lug is contacting the front trunnion. Failure to do may damage the barrel retainers and barrel's retainer socket.

• Turn the barrel retainers screw until the markings of the screw and its socket are matching;

<u>Caution</u>: If the screw allows to be turned beyond the markings, do not release it.



Fig. 37. Attaching the barrel

- **3.** To attach the lower receiver:
 - Align the mounting pin channel of the lower receiver with mounting pin channel of the front trunnion;
 - Insert the mounting pin all the way;
- 4. The rest of the reassembly is to be done according to **Section 3.1.2.**;

3.2. Barrel Exchange

To exchange the barrel:

- **1.** Unload and clear weapon:
 - Press the magazine catch button and detach magazine;
 - Pull the cocking handle to the rear and lift the bolt hold open flipper to arrest the moving parts in the rear position;
 - Check the chamber;
 - Leave the bolt open.
- **2.** To detach the barrel (Fig. 38):
 - Detach handguard see Section 3.1.1. #2;
 - Turn the barrel retaining screw with the Allen wrench #5;

<u>Caution</u>: Make sure the wrench is set all the way in. Failure to do so may damage the barrel retaining screw wrench socket.



Fig. 38. Detaching the barrel

• Slide barrel group out of the front trunnion.

<u>Caution</u>: The barrel can only be detached with bolt open!

- **3.** To attach the other barrel group:
 - Insert the barrel into the front trunnion socket (only possible with bolt open!);

<u>Warning</u>: When inserting the barrel group make sure the barrel is inserted ALL the way, and barrel extension recoil lug is contacting the front trunnion. Failure to do may damage the barrel retainers and barrel's retainer socket.

• Turn the barrel retainers screw until the markings of the screw and its socket are matching;

<u>Caution</u>: If the screw allows to be turned beyond the markings, do not release.

• Release the bolt;



Fig. 39. Barrel inserting and fastening

• Attach handguard - see Section 3.1.2. # 2;

3.3. Rifle Re-Configuration

3.3.1. Changing the Brass Ejecting Direction

Left-handed shooters may change the direction, in which the spent brass is ejected for their convenience.

To change direction of the ejection:

- 1. Field strip the weapon see Section 3.1.1. (excl. ## 2 & 3);
- 2. Detach the bolt from bolt carrier see Section 3.1.3. #4;



Fig. 40. Changing the brass ejecting direction: a) extractor set to eject the brass to the right; b) extractor set to eject the brass to the left

- **3.** Turn bolt 180° and insert it into the bolt carrier with extractor pointing in the required direction;
- 4. Attach bolt to the bolt carrier see Section 3.1.4. # 1;
- 5. To detach ejection opening cover and brass deflector:
 - With an Allen wrench #2 detach the ejection opening cover;
 - With an Allen wrench #2 detach the brass deflector;

Warning: Insert Allen wrench into the screw socket ALL the way.

6. To replace ejection opening cover and brass deflector:

- Insert ejection opening cover into the ejection opening NOT to be used, setting it with front lip against the edge of the opening, and align screw openings in the rear with the screw sockets, then fasten with screws;
- Install the brass deflector at the rear edge of the ejection opening to be used, match screw sockets and fasten with screws;

<u>Caution</u>: Prior to attaching the screws, apply a modest amount of the threading compound. The Manufacturer recommends Loctite 243 for that purpose.

7. Reassemble the rifle – see **Section 3.1.2.**;

3.3.2. Rearrangement of the Accessory Rails

Accessory rails can be mounted into the handguard slots, according to the needs of the Operator.

To replace the accessory rail:

 Loosen up the M-LOK nuts with 1/8" Allen wrench through 90 degrees to rotate them out of engagement and enable to detach the rail from the mounting slot;



Fig. 41. Re-arranging the accessory rails

- 2. Insert the rails into the new slot;
- Tighten the M-LOK nuts with 1/8" Allen wrench 90 degrees to fasten the rail and prevent detaching from the slot;

Note: The A2 Standard Rifles are delivered with an elongated handguard and one accessory rail attached to the M-LOK standard slot, while the A1s were fitted with a shorter handguard with 3 rails attached to MOE standard sockets. The rails are NOT interchangeable between the rifles, but the whole hanguard groups are.

3.3.3. Adjustment of the Safety-Selector Retainer Tension

The tension of the safety-selector retainer is adjustable.

To change the retainer tension:

- 1. Field strip the rifle see Section 3.1.1. (excl. ## 2 & 3);
- 2. With #3 Allen wrench turn the adjusting screw:
 - clockwise to increase resistance;
 - counter-clockwise to reduce resistance;



Fig. 42. Safety-selector retainer adjustment screw

3. Reassemble the rifle – see Section 3.1.2.;

3.3.4. Preparation for Firing Blank Ammunition

A Blank Firing Attachment (BFA) needs to be installed on the muzzle in order to increase the gas pressure to secure proper automatic functioning of the rifle with blank ammunition.

To prepare rifle for shooting with blank ammunition:

- 1. Insert BFA onto the muzzle device outer lip;
- **2.** Use #5 Allen wrench to turn the fastening screw until its frontal cone is forced into the flash-hider inner cone.



Fig. 43. The BFA attachment

3. Perform other firing preparation as per Section 5.1., but load blanks into the magazines.

The rifle is ready for firing blank ammunition.

WARNING: After the blank firing is done, it is particularly important to make sure the BFA was detached from the muzzle device. Failure to do so WOULD result in **barrel damage and/or possible injury** if bulleted ammunition is then fired.

3.3.5. Attachment of Foregrip and Heatshields

The rifle can be fitted with extra equipment enhancing the ergonomics. Due to using M-LOK sockets all of these are easily configurable.

The extra equipment includes:

- 1. M-LOK foregrip;
- 2. M-LOK hand stop;
- 3. M-LOK 3-slot side heat shield;
- 4. M-LOK 2-slot side heat shield;
- 5. M-LOK 2-slot bottom heat shield.

To attach the extra equipment:

- determine the placement of the item (e.g. foregrip), turn M-LOK retaining nuts lengthwise and insert into the slots;
- Insert the 1/8" Allen wrench into the M-LOK attachment screws' socket and turn 90 degrees to prevent detachment from the slot;

<u>Note</u>: To allow turning attachment locks sideways, the locks must be inserted ALL the way, clearing the handguard wall.

To remove extra equipment:

 Insert the 1/8" Allen wrench into the M-LOK attachment screws' socket and turn 90 degrees to allow detachment from the slot;



Fig. 44. Attachment of extra equipment:

1- M-LOK foregrip; 2 – M-LOK hand stop; 3 – M-LOK 3-slot side heat shield; 4 – M-LOK 2slot side heat shield; 5 – M-LOK bottom 2-slot heat shield



Fig. 45. Possible configuration of the extra equipment on the handguard

3.3.6. Attaching the Knife-Bayonet

For CBQ scenarios a knife-bayonet can be attached to the rifle.

To attach the knife-bayonet:

 Take the knife-bayonet out of the sheath and slide at the same time onto the muzzle device and bayonet lug, pulling to the rear (Fig. 46, 1) until the catch clicks.



Fig. 46. Rifle with knife-bayonet attached

To detach the knife-bayonet:

• Press the catch button at the side of the pommel (Fig. 46, a) and slide knifebayonet out towards the muzzle until it separates (Fig. 46, 2).

3.3.7. Attaching the Grenade Launcher Module

The rifle is fitted with mounting points for the underbarrel grenade launcher. Prior to using the GLM, read carefully the separate '*Operator's Manual. 40 mm Modular Grenade Launcher (Underbarrel)*'.

To attach the GLM (Fig. 47a):

In order to attach the GLM, rifle's handguard (A1 or A2 style) has to be removed first (see Section 3.1.1 #2). Before attaching the GLM handguard, MAKE SURE the GLM mounting pin is extended sideways (see Fig. 47a, marked red), then insert handguard pegs into upper receiver cut-outs (Fig. 47a, 1), align the mounting pin with barrel group's channel and insert it all the way (see Fig. 47s, 2). Fig. 47b shows the rifle with GLM attached.

To detach the GLM, simply reverse the procedure.



Fig. 47a. Attaching the 40 mm GLM



Fig. 47b. Forward part of the rifle with GLM attached

WARNING: NEVER attach GLM and knife-bayonet SIMULTANEOUSLY. Noncompliance WOULD result in a risk of damaging the rifle AND grave injury to the shooter and accompanying personnel.



Fig. 48. Rifle with both knife-bayonet and GLM attached – a very dangerous combo

4. CARE AND MAINTENANCE

4.1. Periodic maintenance

4.1.1. Types and Timetable of the Periodic Maintenance

Technical maintenance of actively employed weapons and equipment is meant to ensure their serviceability, extend the period between repairs, as well as timely detect the indications of the premature wear and adopt proper countermeasures. The scope, types and timetable of the scheduled maintenance and repairs should conform the acting Army regulations. The rifle is subjected to following types of periodic maintenance:

- Lower Order maintenance, by Operator:
 - Daily Care (DC);
 - Periodic Maintenance # 1 (PM-1).
- Higher Order maintenance, by Unit Armorer:
 - Periodic Maintenance # 2 (PM-2).

Lower order care and maintenance is performed by the Operator himself with accessories from the cleaning kit. **Daily Care** is performed directly before and after shooting or once a week if the weapon was not fired.

PM-1 is performed by the Operator under supervision of the immediate superior, depending on the intensity of usage, but at least once in three months. Immediate PM-1 is required in following circumstances:

- after tactical exercises involving live or blank shooting;
- after other incidents involving considerable fouling of the weapons;
- after weapons were used in inclement weather;
- after the rifle was dropped or otherwise abused.

PM-2 is performed to check the technical condition of the rifle, to find and remove malfunctions occurring during the periods between scheduled maintenance, or after a long-term storage, as well as to make the rifles ready for further use or storage. PM-2 is performed by unit armorer, at least once in three years. The long-term stored weapons are maintained according separate regulations, taking into consideration the applicable regulations, terms of storage and type of preservatives used.

4.1.2. Lower Order Maintenance Handbook

The scope of the Lower Order Maintenance is set in Table 2.

ltem	Туре	Activities
1.	DC	1. Field strip – see Section 3.1.1.
		2. Component group cleaning – see Section 4.2.1.
		 Component group care – see Section 4.2.3. – DO NOT perform before shooting
		4. Lubrication – see Section 4.2.2.
		5. Reassembly after field strip – see Section 3.1.2.
		6. Inspection of the assembled rifle – see Section 4.3.1.
2.	PM-1	1. PM preparation
		2. Inspection of the assembled rifle – see Section 4.3.1.
		3. Detailed disassembly – see Section 3.1.3.
		4. Cleaning of the parts and groups of the disassembled rifle – see Section 4.2.1.
		5. Inspection of the disassembled rifle – see Section 4.3.2.
		6. Component group care – see Section 4.2.3.
		7. Reassembly after detailed disassembly – see Section 3.1.4.
		8. Function checking – see Section 4.3.1. # 2 thru 10
		 Enter record of the maintenance into the Individual Armament File Card (only PM-2)

Table 2. The scope of the Lower Order Maintenance

4.2. Cleaning, Lubrication, Care and Storage

Rifle should be always kept in the state of technical efficiency and serviceability. To maintain that goal, the rifle should be skillfully cared for and cleaned, stored in proper conditions, carefully handled and undergo the periodic maintenance according to the schedule, as well as immediate repairs.

For cleaning, care, lubrication and maintenance only use the Armed Forcesapproved or Manufacturer-recommended (e.g. Brunox or McKenic 9-in-1 Oil) cleaning and lubrication materials. The names used above are just commercial trademarks of their manufacturers, so the Operator should take care which of the many products sold under the same brand is meant for what use. E.g. one of these products may be used for cleaning only, while the other is needed for lubrication. Always follow the product manufacturer's guidelines and warnings!

Only use preservatives that form solid, non-sticky protective film. Universal preservatives are allowed only after tested to prove they do not dissolve plastics or damage the outer surfaces of the metal parts. Preservatives to be only used on the well cleaned and dry metal surfaces, immediately after cleaning.

4.2.1. Cleaning

The rifle should be cleaned according to the maintenance timetable **see Section 4.1.1.** as well as:

- During a preparation for firing: clean the barrel bore,
- If possible, immediately after firing: clean and lightly oil the barrel bore, clean and lubricate the gas piston and gas regulator;
- During a prolonged period of firing, whenever possible: clean the gas block, lubricate the cam pin and bolt carrier guides
- After the rifle was heavily fouled (with sand, snow, water, mud etc.): field-strip and clean the groups;
- After using in inclement weather, immersing incident, or using in otherwise extremely wet conditions, the rifle should be field-stripped, dried, cleaned and obligatorily lubricated;
- Whenever there is a longer lull in combat or field training: field strip, clean and preserve the groups and parts.

<u>Note</u>: all steel parts that are blued (e.g. barrel group components, bolt or bolt carrier parts, screws, cam pin, firing pin etc. – require systematic care and preserving with products listed in Section 4.2.

After intense use – especially after shooting blanks or shooting under adverse conditions (e.g. wet or humid) the steel parts that were not sufficiently protected with a preservative, might be covered with red deposits, which are to be cleaned and lubricated as soon as possible.

DO NOT allow your rifle to get heavily fouled if that can be avoided!

According to the level of disassembly (field strip or detailed disassembly), take particular care to clean:

- at field strip:
 - barrel bore and chamber,
 - gas regulator,
 - gas piston face,
 - bolt face and locking lugs.
- at detailed disassembly:
 - barrel bore and chamber,
 - gas regulator,
 - gas piston,
 - gas chamber,
 - firing pin and firing pin channel,
 - bolt and bolt socket,
 - bolt cam pin and bolt carrier locking cam,
 - fire control group,
 - front trunnion and barrel extension.

To clean the rifle, following order of activities is to be kept:

- **1.** Prepare cleaning and preservation materials.
- 2. Check the accessories for technical condition and prepare them to use in the required scope of cleaning.
- **3.** Disassemble the weapon (partial or detailed strip as required).
- 4. Clean the barrel bore:
- Attach brass or bristle bore brush or patch holder with a clean flannel patch to the cleaning rod, as required;
- Apply cleaning preservative to a brush or patch;
- Wipe the bore with the soaked brush or patch several times, if needed, clean the brush or replace the patch and repeat;
- Allow some time to soak, then wipe the bore with dry, clean flannel patch.

<u>Caution</u>: If during the cleaning the brush or patch would be stuck, or jammed in the bore, pour cleaning oil into the bore, leave it for several minutes to soak, and try to continue IN THE SAME DIRECTION. DO NOT reverse the brush or patch mid-stroke. If that does not help, send the weapon to the armorer.

- 5. Clean chamber and muzzle device (flash hider).
- 6. To clean the gas chamber:
 - Detach gas regulator and piston;
 - Soak gas chamber with cleaning preservative and clean with gas chamber brush;
 - Wipe dry.
- 7. To clean gas regulator and piston;
 - Wipe with a patch soaked in cleaning preservative or double-sided bristle brush;
 - If needed (heavy fouling) wrap into oil soaked patch and leave for 3-5 minutes to dissolve the cruds,
 - Wipe regulator and piston dry.
- 8. Once again wipe the barrel bore with dry, clean patch.
- **9.** Check the barrel bore from both breech and muzzle end, inspect the rifling grooves for debris left by the patches.
- **10.** To clean bolt face and locking lugs:
 - Brush the bolt face and locking lugs with the double-sided brush, taking care not to leave any debris under the extractor claw;
 - Wipe the bolt head and face dry.
- **11.** Upper receiver, bolt carrier and bolt wipe with preservative-soaked patch, then wipe dry.
- **12.** Other metal parts wipe with dry, clean cloth, if heavily fouled, wipe with cleaning preservative, then wipe dry.
- **13.** Plastic parts wipe with dry cloth.

Additionally, at PM-1:

- **14.** To clean firing pin and firing pin channel:
 - Firing pin wipe with cleaning preservative soaked patch, then wipe dry;
 - Firing pin channel wipe with bore brush.
- **15.** To clean cam pin:
 - Wipe with cleaning preservative-soaked patch, then wipe dry.
- **16.** To clean bolt, bolt socket:
 - Outer surfaces of the bolt wipe with cleaning preservative-soaked patch, then wipe dry;
 - Bolt socket brush with double-sided brush and wipe dry.
- **17.** To clean the fire control group:
 - Wipe with cleaning preservative-soaked patch to soak carbon fouling;
 - With double-sided bristle brush remove debris, unburned powder grains, filings and other foreign matter;
 - Wipe with dry cloth to remove carbon fouling and excessive preservative.
- **18.** To clean front trunnion and barrel extension:
 - With double-sided bristle brush clean the trunnion, taking care not to leave any debris in the barrel retainer channel;
 - External surfaces of the barrel extension wipe with cleaning preservativesoaked patch, then wipe dry;
 - With double-sided bristle brush clean the barrel extension, taking care not to leave any debris in the locking recesses and around the barrel extension shoulder or recoil lug.

4.2.2. Lubrication

Reliability and service life of the rifle depend on proper lubrication of the moving parts.

For lubrication only compounds approved for service use in the Armed Forces should be used. To lubricate, simply apply a drop of oil onto:

- bolt carrier guides;
- cam pin;
- lower portion of the hammer;
- cocking slide guides.

Warning: For lubrication DO NOT use solid lubricants!



Fig. 49. Lubrication diagram:

1 – bolt carrier guides; 2 – cam pin; 3 – lower part of hammer; 4 – cocking slide guides

4.2.3. Lubrication (cont.)

The rifle should be lubricated in the following sequence:

- Barrel bore: attach bore brush to the cleaning rod, apply small amount of lubricant, wipe bore from breech end towards muzzle, 2 or 3 times, in long, steady strokes, to apply a thin film of lubricant throughout;
- 2. Wipe the chamber with soaked brush, then remove excess oil with a dry patch;
- **3.** All other metal parts wipe with oiled cloth.

<u>Warning</u>: Excessive amount of preservative attracts fouling and may cause stoppages. DO NOT oil plastic parts. NEVER oil magazines or ammunition!

- 4. Clean magazines and accessories with dry cloth.
- **5.** Metal parts of the accessories might need lubrication to preserve them from corrosion.

4.2.4. Storage

Rifle should be stored and transported unloaded. Only in combat situation exceptions are allowed by direct order.

Rifles should be stored in warehouses, heated or unheated, according to acting Armed Forces regulations concerning care and inspections. For long-term storage oil-free methods are recommended.

The rifle arrives from the factory preserved and packaged in a sealed VCI (Volatile Corrosion Inhibitor) plastic bag, with VCI rod inserted into the barrel bore. The bag and rod emit corrosion inhibitors, which create the protective atmosphere and settle upon metal surfaces to preserve them from rust.

The rifle is issued with Rifle Log Book and Individual Armament Chart. The Operator is responsible for systematic applying of current entries.

During the rifle service time, the Operator makes following entries into the Logbook:

- Notice on passing and accepting the rifle by the subsequent users;
- Zeroing results;
- Notice on long-term storage care and maintenance;
- Dates and types of the training shooting sessions;
- Number of shots fired and types of ammunition;
- PM-2 logs, repair data, inspection results.

Notes should be applied to correct rubric, in legible writing, by permanent method (ink, not pencil), with no deletions and corrections, dated, and signed with the writer's name and rank.

Entries concerning the technical maintenance and repairs are applied by authorized personnel. The Operator is responsible for proper logbook storage and keeping.

4.2.5. Consumption of the Consumables

Lubricants and preservatives standards of the consumption for the rifle cleaning and care set in Table 3 are valid for the:

- Daily Care (DC);
- Periodic Maintenance 1 (PM-1).

Table 3. Standards of consumables consumption per rifle in service

Type of servicing	Armed Forces-approved or Manufacturer- recommended (Brunox, McKenic 9-in-1) preservative	Cleaning cloth
DC	15 ml	200 cm ²
PM-1	20 ml	200 cm ²

Consumables consumption per long-term stored rifle are set in Table 4.

Table 4. Standards of consumal	bles consump	tion per rifle i	n long term storage

Armed Forces-approved or Manufacturer- recommended (Brunox, McKenic 9-in-1) preservative	Kerosene, Antykor (or other solvent)	Cleaning cloth	Microwaxed paper or VCI plastic	LIK paper
20 ml	50 ml	25 cm ²	Microwaxed paper 5000 cm ² VCI plastic sleeve 103 cm x 30 cm	7000 cm²

4.3. Inspections

Inspections are performed to check:

- condition,
- proper use, storage or preservation,
- compliance of the recorded and factual status,
- whether the equipment is complete and the operational documentation is kept properly.

Weapons and ammunition inspections in the units are performed according to actual regulations. The scope and frequency of the weapons and ammunition inspections by the appointed personnel is regulated by the relevant regulations.

The malfunctions of the weapons and equipment found on inspection should be removed, if possible, by the Operator. If not possible, the rifle should be sent for repair. Faults (corrosion traces, chipping, rifling wear in the bore and on the muzzle) found by inspector should be recorded in the weapon's log book.

4.3.1. Inspection of the Assembled Rifle

During the inspection, care should be taken if all parts and components are present, and check:

- Outer metallic surfaces for rust, dirt, dents or burrs able to precipitate malfunctions, adversely influence the accuracy or lacerate the Operator's hands;
- 2. Switch the gas regulator between the settings, check if the regulator keeps securely in either position;
- 3. Function check the rifle. To do that: pull back on the cocking handle (the moving parts should move fluently, without jarring, with perceptible resistance from the return spring. Release the cocking handle the bolt carrier should return fully into battery;
- Put the rifle on safe (rotate the safety-selector lever to SAFE) and pull trigger the hammer should NOT fall;

- Release the trigger, move the safety-selector to either FIRE or AUTO, pull the trigger and hold – now the hammer should fall. Check whether the safetyselector retainer keeps the lever in chosen setting;
- 6. Not releasing the trigger, cock and release the moving parts several times. The hammer should act in keeping with the setting: in FIRE the hammer should remain cocked, in AUTO should fall after the bolt returns to battery;
- **7.** Stand the rifle upon its buttstock, pull the moving parts ca. 1 inch to the rear and release the bolt should return to battery by return spring alone;
- 8. Check the magazine catch the magazine should be securely kept in the magazine well, and the magazine release button should allow the magazine to be detached freely (most would free-fall);
- 9. Check the BHO insert empty magazine and cock the weapon, the moving parts should be arrested in rear position. Upon pushing down on either BHO flipper, the moving parts should return to battery;
- Detach the magazine, pull cocking handle all the way back and release the moving parts should return to battery without engaging the bolt hold open device;
- Load magazine with training dummies, and keep manually cycling the action.
 With each repetition dummies should be chambered, extracted and ejected, until the BHO activates after the last round was ejected;
- **12.** Inspect the magazines: housings should not have indents, the follower should move freely and return to top of the magazine energetically;
- 13. Inspect the handguard (Classical configuration only): the attached hanguard should be kept immobile, with barely perceptible play. The mounting rails should be stable, with no play at all. Check for burrs and breaks, especially by the mounting pin holes;
- 14. Inspect the buttstock (Classical configuration only): the buttstock hinge should have no play against the upper receiver. The buttstock should develop no excessive play, the slider catch should keep it in chosen position. Upon pressing the slider catch, slider should slide in and out freely from the front tube. Hinge catch should keep the buttstock in unfolded position. Buttstock hinge ramps should stabilize the folded buttstock;
- **15.** Inspect the equipment it should match the list, see **Section 2.3**.

4.3.2. Disassembled Rifle Inspection

To inspect the disassembled rifle, first perform the detailed stripping, and wipe the parts dry.

While inspecting the disassembled rifle, the matching of serial numbers should be checked, and all parts examined for chipping, dents, burrs, stripped threads, traces of corrosion and dirt, and on plastic parts: cracks and dents endangering the reliable function or accuracy of the weapon. Moreover:

- **1.** While inspecting the barrel, check for:
 - mechanical damage including bulges;
 - functioning of the gas regulator;
 - proper fastening of the gas regulator in the gas block.
 - To inspect barrel, rise it to the eye level, point to the source of light in such a way, that the light hits not the eye, but insides of the barrel bore. Roll the barrel and carefully inspect the rifling, looking from both breech and muzzle end. Inspect the chamber from the breech end, paying attention to its cleanliness.
 - While inspecting the barrel, following faults are to be expected:
 - <u>burnout grid</u> looks like a grid of thin crossing lines, starting in most cases at the lead (forcing cone) of the bore. With the rising number of shots, the bore lining starts to crack, then burn grid appears and flaking starts, first small dark points, which enlarge, and then regular flakes are torn. If the cleaning is not thorough enough, these flakes turn into corrosion pitting.
 - <u>pitting</u>, dents in the surface of the bore, when large corroded particles were torn away, especially after a large number of shots. Pitted barrel should be cleaned with particular care;
 - <u>field and groove abrasion</u> (especially visible at the left edges), visible with a naked eye;
 - <u>barrel bulging</u>, visible as a transverse dark ring of shade inside and as a visible bulge on the outside surface of the barrel

If any of these are encountered during inspection, they should be duly annotated in the rifle logbook and the rifle file card.

• While examining exterior of the barrel, check for:

- dents and burrs in the rear face of the barrel extension.
- 2. While inspecting upper receiver, check for:
 - cracks, dents, bends and burrs on the bolt carrier guide ribs and edges of the cocking slot;
 - if the handguard and lower receiver mounting pin channels are free from damage;
 - if the ejection opening cover and brass deflector are present, securely attached and free from damage.
- **3.** While inspecting the bolt carrier, check for:
 - burrs, cracks and dents on locking cam, guides and side surfaces.
- 4. While inspecting bolt, check if:
 - there are no cracks around the firing pin orifice in the bolt face;
 - the extractor and ejector are working properly, move freely and are free for damage;
 - cam pin is not cracked or otherwise damaged;
 - the firing pin is in working condition and moves freely in the required range.
 - To check for firing pin function, rotate the bolt to locked position (maximum retracted), set the moving parts group vertically with bolt face up and turn 180 degrees, bolt face down. The firing pin should move under its weight, and when pointing down, the firing pin point should exit the firing pin orifice in the bolt face. The firing pin point should be free from cracks and chipping, the firing pin should not be bent.
 - To inspect the extractor, try to push it out. It should only succeed with strong resistance, and if ever, the extractor should snap back immediately and energetically. Put the dummy into the bolt face and try to pull it straight forward. It should be held tight by the extractor. The extractor claw should be free from chipping and cracks.
 - To inspect the ejector, try to push it in, depressing the ejector pin below the surface of the bolt face. The spring should be very stiff, and if the pin is depressed below the surface, it should snap back when released. The extractor should be free from mechanical damage.
- 5. While inspecting the gas block, check if:

- the gas regulator is free from chips, burrs and bends;
- the gas piston is free from chips, burrs, cracks and considerable burnouts.
- **6.** While inspecting the return spring, check if:
 - return spring is not cracked or bent;
 - return spring rod is not bent;
 - back plate is free from cracks and chipping.
- 7. While inspecting the lower receiver, check if:
 - the lower receiver housing has no cracks, especially around the mounting pin channels;
 - the magazine catch and BHO works properly.
- 8. While inspecting the fire control group, check if:
 - hammer has no burrs and dents, if it properly engages with automatic sear, and trigger sear;
 - safety-selector and its retainer are working properly;
 - the disconnector hook engages with the hammer with the safety-selector set to FIRE;
 - the disconnector is kept out of the way of hammer with safety-selector set to AUTO.

4.3.3. Ammunition Inspection

Cartridges should be inspected before the firing. While inspecting ammunition, check if:

- the cases are not bend or crushed, and free from corrosion;
- the bullet is not moving in the case neck;
- the primers are free from deposits or cracks;
- the primers are not standing out of the case head;
- the live cartridges are not mixed with dummies or blanks.

5. SHOOTING THE STANDARD RIFLE

5.1. Preparation for Shooting

Preparation for shooting is meant to ensure the reliable functioning of the weapon. To prepare for shooting, perform the following:

- 1. do the Daily Care servicing (see **Section 4.1.2.**):
 - field strip,
 - clean the main groups,
 - lubricate (except gas mechanism and barrel),
 - reassembly,
 - inspect the assembled rifle.
- 2. check the gas regulator setting;

<u>Note</u>: For shooting in normal condition (incl. w/ silencer) set the regulator to '1'. Setting '2' is meant for operation in difficult conditions (dusty environment or heavy fouling).

- 3. inspect the ammunition (see Section 4.3.3.);
- **4.** load the required number of magazines.

<u>Caution</u>: For shooting only use good quality 5.56 x 45 mm NATO ammunition in good condition.

5.2. Firing the Rifle

During the firing following functions are performed:

- **1.** loading of the firearm;
- **2.** firing the firearm;
- **3.** unloading the firearm.
- **1.** To load the rifle:
 - Insert loaded magazine;
 - Pull cocking handle all the way back and release.

In case firing does not follow immediately after loading the rifle, put in on safe by turning the safety-selector lever to SAFE.

Note: The rifle can by cycled with safety on and off ('European safety').

- **2.** To fire the rifle:
 - Assume the shooting stance and point rifle towards the target;
 - Take safety off: set safety-selector lever to either FIRE or AUTO (depending on situation) and take aim;
 - Pull the trigger while keeping correct sight picture.
- **3.** To unload the rifle:
 - Put in on safe by turning safety-selector lever to SAFE;
 - Detach the magazine;
 - Pull the cocking handle to check for cartridges left in the chamber;
 - Release the bolt;
 - Set safety-selector lever to FIRE, while pointing the muzzle in safe direction;
 - Pull trigger to dry fire;
 - Put the weapon on safe by turning the safety-selector lever to SAFE.

5.3. Troubleshooting the Rifle

Standard Rifle, if properly maintained and operated, is a trustworthy and reliable weapon. But if mishandled, with parts fouled or worn, loaded with faulty ammunition or misassembled, malfunction can occur, interrupting the shooting.

To avoid malfunctions during shooting:

- Keep rifle clean and in good working order,
- Regularly and timely maintain, care and lubricate the rifle, paying particular attention to cleanliness and proper condition of the moving parts, barrel bore, gas regulator and magazines;
- After detailed disassembly, always pay attention to the direction of the extractor, whether or not it is matching the intended brass ejecting direction;
- DO NOT load cartridges in faulty condition or dirty;
- Protect the rifle from fouling and blows while handling, shooting or carrying;
- DO NOT allow the barrel to overheat;
- If the rifle was exposed to freezing temperatures for an extended period of time, or was rapidly transferred from cold into a heated room, manually cycle the moving parts several times before attempting to load and chamber the round.

In case of a malfunction during shooting, the Operator should try to remove it by applying Immediate Action: check if the magazine is properly seated, reload the weapon and try to fire (the 'Tap, rack, boom' or TRB method). If that does not help, or the malfunction repeats itself, the Operator should apply the Remedial Action: unload, investigate the reason and follow guidelines from Table 5, below.

Table 5. Ma	Ifunctions, P	robable	Causes and	Corrective	Actions

Item	Malfunction	Probable cause	Corrective action
1.	 Moving parts fail to get to battery 1. Round chambered. 2. Bolt carrier stopped short of battery. 	 Chamber fouled. Round defective or fouled. 	 Manually close with cocking handle. Remove round from the chamber, clean chamber and gas block. Clean weapon at the earliest opportunity. Change cartridges
2.	 Failure to Fire No discharge occurred. Bolt carrier fully in battery. Round chambered. 	 Faulty round. Rifle dirty. Faulty firing pin. Faulty or broken hammer. Broken hammer spring. 	 Extract and examine the chambered round. If struck too lightly, clean bolt, chamber and rubbing metal parts. Clean rifle. If firing pin point broken, exchange the firing pin. If actions 1-3 unsuccessful: send to maintenance.
3.	 Failure to extract Bolt carrier stuck midway. Fresh round stuck in feedway. Failure to eject Spent case extracted. Spent case stuck in the receiver. 	 Chamber dirty. Torn case rim. Extractor or extractor spring faulty. Gas block, gas regulator or chamber fouled. Bolt misassembled. Ejector or ejector spring faulty. 	 Remove magazine, energetically cycle the action several times. If action 1 unsuccessful: send to maintenance. Shake out the casing and continue firing. If reappears, lubricate the moving parts. Make sure the bolt is assembled correctly for the intended ejection direction. If actions 1-2 unsuccessful: send to maintenance.
5.	Transversal case rupture 1. Moving parts does not go into battery.	 Excessive headspace. Faulty cartridge. 	 Energetically cycle the action manually – if the cartridge was ejected with the front part of the ruptured case impaled, continue firing. If action 1 unsuccessful: unload, apply BHO, place ruptured case extractor in the chamber, release the moving parts, then energetically cycle the action. If action 2 unsuccessful: send to maintenance.

6.	 Failure to chamber Moving parts in battery. No round chambered. 	 Magazine attached not properly. 	 Push the magazine all the way into the magazine well, until the catch clicks, reload and continue firing.
7.	Runaway gun 1. The rifle continues to fire fully automatically after trigger released.	 Fire control group faulty. Rifle dirty. 	 Interrupt firing by detaching the magazine. Inspect the FCG and remove malfunctions. Clean rifle.

6. RIFLE ZEROING AND ACCURACY TESTING

6.1. Rifle Zeroing

Zeroing the rifle is a procedure of checking whether the rifle's point of aim (POA) coincides with the point of impact (POI), and undertaking the necessary corrections if the two point diverge. Ideally, the mean POI is as close to the POA or a designated Control Point (CP) as possible at a set distance.

All unit serviceable weapons should be kept zeroed, and zeroing is needed in case of:

- Repair or exchanging parts liable to influence the accuracy,
- Observation that the mean POI (mPOI) shifted, resulting in an inaccurate shooting.

The rifle should be zeroed at every possibility in combat conditions.

Prior to zeroing, the rifle should be thoroughly inspected and all malfunctions corrected.

The fact of zeroing is to be recorded in the Rifle Logbook. Ball cartridges are to used for zeroing, but care should be taken to use cartridges of the same lot, freshly extracted from a hermetic packaging.

Note: Rifle accuracy depends mainly on the level of firer's training.

To determine the rifle's mean POI (mPOI):

- 1. Fire 4 shots semiautomatically at the control target with a clearly marked POA;
- 2. Determine the X, Y coordinates of the impacts in relation to the POA;
- 3. Calculate the mean coordinates and determine the mPOI on the control target;
- 4. Calculate corrections for the sights taking into consideration the distance of shooting.

Alternative method of mPOI determination from 4 impacts:

- 1. Connect the impacts in pairs;
- 2. Divide the connecting lines into halves;
- 3. Connect the connecting lines midpoints;
- 4. The center of the line connecting the midpoints marks the mPOI of the string.

To determine mPOI from three impacts:

- 1. Connect the two closest impacts with a line, and divide in it two;
- 2. Connect the midpoint with the third impact, and divide the resulting line in three equal parts;
- 3. Point one third between the midpoint and third impact would mark the mPOI.



Fig. 50. Determining the mPOI (marked as SPT): a – by 4-impact method; b – by 3-impact method

6.2. Rifle Accuracy Testing

After the rifle is zeroed, accuracy and dispersion might be tested, by firing prone, with rifle rested, and buttstock supported on the shoulder. Accuracy testing is best performed at 100 meters distance.

To test accuracy and dispersion perform the following:

Test shooting is done on a control target with a black rectangle marked, 320 mm high and 250 mm wide, set against the white background 850 mm high and 600 mm wide. The Point of Aim (POA – marked in the drawing as 'PC') is the middle of the bottom of the black rectangle, set approximately at the height of the shooter's eye. On a vertical line, 250 mm above the POA ('PC') is the Control Point (CP, marked below as 'PK') determining where the mPOI of the shoots should be placed. After a determined number (4) of separate, deliberate, aimed shots are fired at the target, the mPOI and dispersion are determined.



Fig. 51. Rifle zeroing target

The dispersion is deemed normal, if all impacts are placed within 150 mm circle. If one was a flyer, the mPOI can be determined by the 3-impact method – provided the fourth impact is placed not further than 2.5 x the radius of the circle containing the three impact used for mPOI determination.

If the impacts are not contained within the circle so determined, firing is to be considered inconclusive and repeated.

If the dispersion of the impact is normal, mPOI is determined and its placement in relation to POA is examined.

The accuracy is deemed satisfactory if the mPOI coincides with CP, or falls within the 100 mm diameter Control Circle (marked 'KK' in the drawing) – in other words, if it deviates from the CP not more than 50 mm in any direction.

6.3. Sights Adjustment

If the mPOI deviates more than 50 mm from the CP, sights adjustment to correct the POI is necessary. The amount of corrections is being determined by examination of the relation between mPOI and POA:

- If mPOI is below CP, lower the front sight;
- If mPOI above the CP, rise the front sight;



Fig. 52. Front sight adjustment (lowering)

- if mPOI to the left of CP, shift the rear sight base to the right by turning windage knob clockwise;
- if mPOI to the right of CP, shift the rear sight base to the left by turning windage knob counter-clockwise.



Fig. 53. Rear sight adjustment: 1 – by shifting the base (turning the windage knob, L= left, P= right); 2 – by changing aperture (turning the aperture disc)

Rear sight adjustment (at 100 m):

- 1 full rotation of the windage knob shifts the POI by 143 mm;
- 1 click (full 1/11 rotation) of the windage knob shifts the POI by 13 mm.

Front sight adjustment (at 100 m):

• 1 full rotation of the front sight blade shifts the POI by 120 mm.

After corrections are introduced, shooting has to be repeated, to determine whether the corrections helped.

6.4. Aiming the Rifle at Various Distances

The rifle allows aimed fire at distances up to 500 meters with optical sight, with the most efficient range of fire being approx. at 300 meters.

The rifle is zeroed at the factory with the mechanical sights, with the smaller aperture.

For Close Quarter Battle (CQB) distances of up to 50 m it is recommended to use the larger aperture, allowing for quicker sight acquisition and environmental awareness.

The rifle is zeroed with bullets impacting 250 mm above the point of aim. This socalled 'battle-sighting' allows the torso figure target to be hit at any distance up to 400 m by bullet either raising or falling along the trajectory of its flight path.



Fig. 54. Aiming at 100 m

The bullet flight trajectory compared to the line of sight is shown in Table 6 and illustrated in Fig. 55.

									/																						
Distance [m]	0	20	40	09	08	100	120	140	160	180	200	220	240	260	280	300	320	340	360	380	400	420	440	460	480	500	520	540	560	580	009
Overheight [cm]	-7	0	7	14	20	25	30	34	37	40	42	43	43	43	41	39	36	31	26	19	11	2	-9	-21	-35	-50	-67	-86	-107	-130	-156

Table 6. Bullet flight trajectory

