MANUAL M84 7.62MM MACHINE GUN

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MANUAL M84 7.62MM MACHINE GUN

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GENERAL STAFF OF THE ARMED FORCES OF THE SFRY ASSISTANT TO THE CHIEF OF STAFF for the Command of the Military **INFANTRY ADMINISTRATION** Internal No. 1002-2 9 Dec. 1989

On the basis of item 35 of the "Instructions for the production and use of military specialist literature" (edition IV of the administration of the General Staff of the Armed Forces from 1982), I hereby is sue the

MANUAL FOR THE M84 7.62mm MACHINE GUN,

which takes effect **immediately**.

CHIEF Major General Vladimir Stojanović, signed

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a) M84 7.62mm machine gun

The Manual for the M84 7.62mm Machine Gun consists of four chapters: Chap. 1 — Purpose, Combat Characteristics, Description and Functioning of the Components; Chap. 2 — Storage, Maintenance, Packing and Marking; Chap. 3 — Firing; Chap. 4 — Formations and Actions of the Machine Gun Squad.

The Manual also includes the necessary appendices for a complete understanding of the technical and ballistic characteristic of the M84 7.62mm machine gun.

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(1) Engaging small, stationary targets

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INTRODUCTION

The Manual for the M84 7.62mm machine gun is based on the instructions provided by the manufacturer, the theory of range firing and results of tests carried out in schools and units of the Yugoslav National Army related to the use and maintenance of this type of ordnance.

Full understanding and strict compliance with this manual are one of the main prerequisites for the proper use of the machine gun, and good combat performance and skills of the soldiers and cadets, as well as the officers of the Yugoslav Armed Forces.

The M84 7.62mm machine gun manual is intended for commanders of machine gun squads, professors at military academies and officers involved in combat training and education, as well as the soldiers and cadets. All officers of the Armed Forces have to be familiar with the provisions of this Manual.

All those using the Manual are encouraged to forward to the publisher their opinions, suggestions and observations made while studying and using the manual during training and combat.

Chapter I

PURPOSE, COMBAT CHARACTERISTICS, DESCRIPTION AND FUNCTIONS OF THE PARTS AND TESTING THE ACCURACY AND PRECISION OF THE MACHINE GUN

1. PURPOSE AND COMBAT CHARACTERISTICS

1. The M84 7.62mm machine gun (fig. 1) serves to neutralize and destroy uncovered and camouflaged units and important single targets, to neutralize enemy ordnance that operates through loopholes in bunkers and fortified buildings, to destroy and disable motorized and lightly armored vehicles and to destroy targets in the air.

2. The M84 7.62mm machine gun kit includes the weapon, tripod, and accessories.

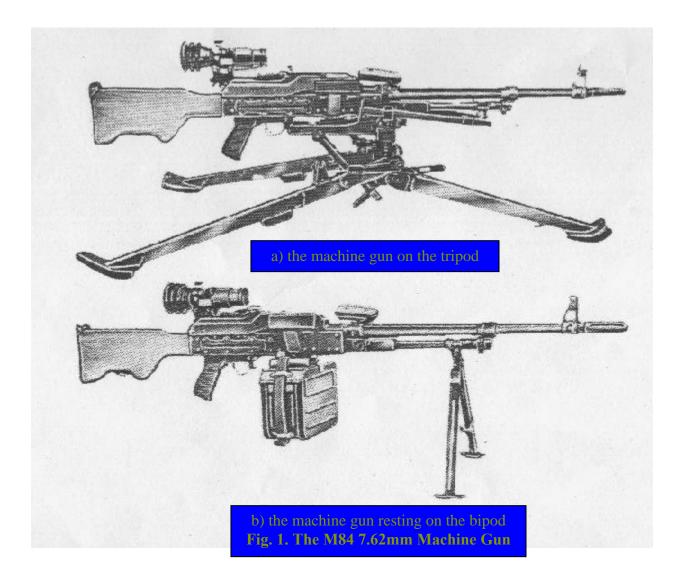
3. When the tripod is not in working order or may not be used for firing for other reasons, the machine gun is fired from the bipod.

4. The machine gun is effective on soft targets and targets in the air up to a range of 1,000 meters. Optimum results are attained by sudden bursts of fire up to 600 meters. Soft targets and ordnance may be neutralized or destroyed by concentrated fire of the machine-gun crew up to distances of 1,500 meters.

5. The machine gun may be fired in bursts (short bursts of up to 10 rounds, and long burst of 11 to 25 rounds) and in sustained operation up to 250 rounds.

6. The sight range is up to 1,500 meters. If needed, the machine gun can also employ a 5 x 80 passive night sight with which the sight range is 500 meters.

The rate of fire in combat is around 250 rounds per minute, and in theory 650 to 700 rounds per minute. The muzzle velocity is 825 m/s. The maximum killing range of the bullet is 3,800 meters.



7. The angle of the horizontal field of fire from the tripod at targets on the ground, with the use of the traversal stops is approximately 70° , and at targets in the air it is 360° .

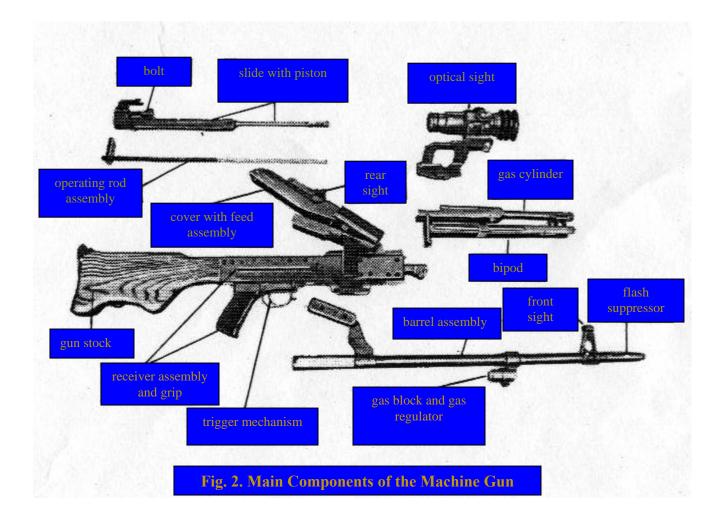
8. The machine gun fires combat ammunition, either ordinary (steelball), heavy (lead-core), tracer, armor-piercing incendiary, and armorpiercing-incendiary-tracer ammunition. The machine gun is fed by link

belts of 50 rounds (with or without a tab) from an ammunition box. Several link belts of 50 rounds may be combined into single longer one.

9. The machine gun is served by a three-man crew. It is transported by motor vehicle, the M84 two-wheeled cart and by pack animal, and in combat it is carried by the crew.

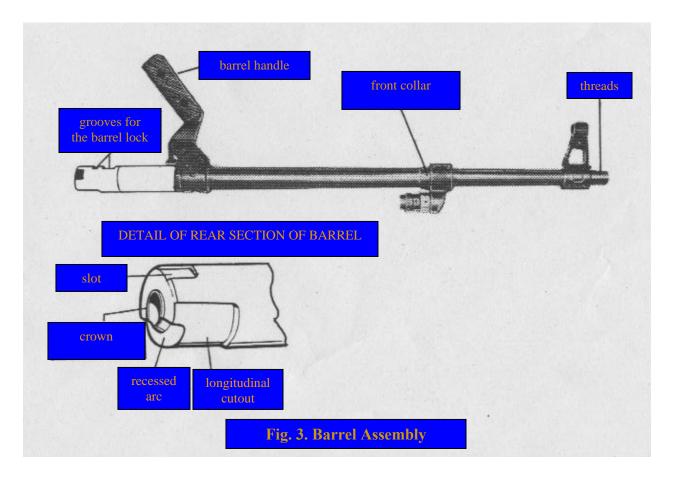
2. DESCRIPTION OF THE MACHINE GUN COMPONENTS

10. The M84 7.62mm machine gun has the following major components (fig. 2): the barrel assembly, receiver assembly and grip, cover and feed mechanism assembly, sight assemblies, gas block assembly with gas regulator, gas cylinder assembly, operating rod



assembly, slide assembly, piston assembly, bolt assembly, trigger assembly, gun stock assembly and bipod assembly.

11. The barrel assembly (fig. 3) is where firing takes place and gives the bullet its direction and spin during flight. The barrel houses the chamber and bore. The bore is rifled and has four grooves and four lands which twist to the right. The bore and chamber are chrome-plated. The distance between two opposite lands is called the caliber and is 7.62mm.



On the front end of the barrel assembly there are threads for screwing on the flash suppressor or a recoil device for blank ammunition. Behind the threads there are three grooves (two on the bottom that hold pins for attaching the front sight mount, and one on the bottom that simultaneously fastens the front sight mount and the flash suppressor latch). The gas block is attached to the front collar. On the top of the front collar there are two grooves which hold the pins. On the

bottom the front collar is notched, and limits the backward movement of the gas block ring when it is fitted onto the barrel.

At the rear of the barrel assembly there is a wide circular groove which holds the barrel handle. The longitudinal movement of the barrel handle is limited by two rings. The rear ring has a slot that limits lateral movement of the handle. Two smaller slots hold lugs on the front of the barrel socket which prevent the barrel from twisting. Behind the rings, on the chromed section of the barrel, there are two grooves on the top into which the lugs of the barrel lock fit and which lock the barrel into the barrel socket. On the rear surface of the barrel there is a recessed arc into which the extractor claw fits, which allows it to catch on the rim of the cartridge case. On the bottom a longitudinal cutout receives the lug of the slide, and on the right side there is a smaller slot into which the receiver lug fits. The rim of the cartridge case fits onto the crown of the barrel.

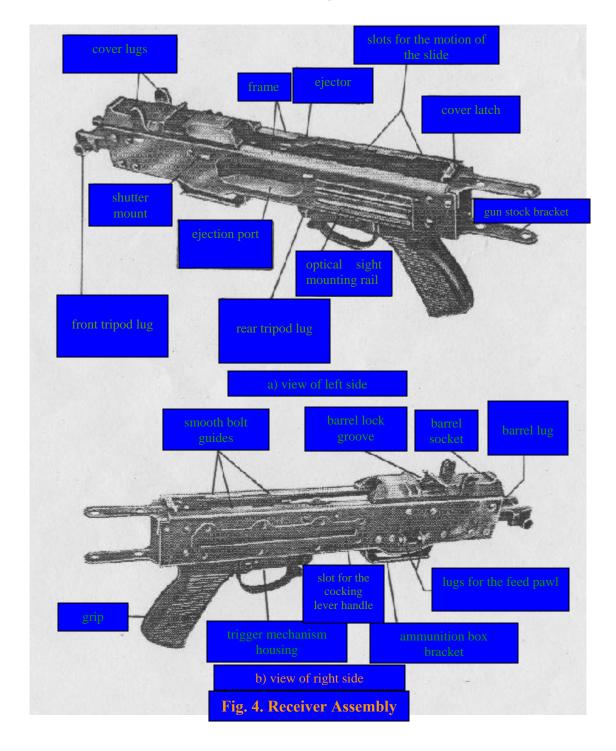
The **flash suppressor** serves to disperse the propellant gases at the muzzle, as well as to reduce flash and thus to conceal the position of the ordnance. It has five elongated vents for the release of the propellant gases. On the outside of the rear section it has five oval cutouts into which its latch fits, and on the inside there are threads for affixing it to the barrel. The flash suppressor is screwed onto the barrel by twisting it from left to right, and is removed by twisting it in the opposite direction.

The **barrel handle** facilitates the quick and easy removal of the barrel assembly from the receiver, as well as the transport of the ordnance. It is fastened onto the barrel by means of rings. The rings are each fastened to the barrel by three machine bolts, of which the two upper machine bolts serve to fasten the handle. On the bottom of the handle there is an oval opening into which the middle machine bolt fits, allowing the handle to move vertically. On the rear of the bottom of the handle is a tooth which rests against the front section of the barrel socket (when the handle is raised upward), and when the barrel is to be removed ensures the initial movement of the barrel forward. The panels of the handle are plastic and are joined together and to the handle with two machine bolts.

12. The receiver assembly and grip (fig. 4) serves to join all parts of the machine gun, to ensure their proper functioning and to guide the

movement of the slide and bolt. The receiver is sealed on the top by the cover.

The receiver assembly consists of three components: the receiver frame, the barrel socket and the gun stock bracket, which have



interlocking grooves and are riveted together. The receiver frame has a box shape. The tops of the sides are curved inward and serve to guide the slide.

On the left side of the receiver is the ejection port which can be closed with a shutter. The shutter is fastened to the receiver with a pin and a spring which continually presses it downward. The optical (passive night) sight mounting rail is welded to the receiver frame behind the ejection port. To the rear of the optical sight mounting rail are two circular openings which hold the wire latch of the shutter pin. The shutter arm is located inside the left side of the receiver frame and its front curved end protrudes through the ejection port. The arm serves to open the shutter as the slide moves to the rear position.

A rectangular slot on the front right side of the receiver frame holds lugs of the barrel socket, into which the feed pawl is attached along with its guard. To the rear of the feed pawl the receiver frame is grooved inwards longitudinally, with a profiled opening on the front end. The cocking lever fits into the cutout, and its tooth moves through the profiled opening. On the outside the cocking lever is fastened with a plate that has a longitudinal groove for the movement of the cocking lever. The plate is welded to the receiver frame.

The top of the receiver frame has a long slot, the rear section of which has wider cutouts which allow the slide to be removed from the receiver frame. The ejector is riveted to the upper part of the receiver frame.

Along the bottom, the receiver frame extends downward, and the lower leg of the feed pawl fits into this well. The round opening in the well serves to allow any water that might collect in the receiver to drain. The bracket for an ammunition box containing 100 rounds is attached over the well. To the rear of the bracket for the ammunition box there is a rectangular opening for the trigger mechanism.

The rear of the receiver frame is sealed by the gun stock bracket. The gun stock bracket consists of an upper and lower tab, each of which has holes for machine bolts that fasten the gun stock.

The front of the bracket has two round openings: the upper, larger opening allows the passage of the guide of the operating rod assembly,

and the lower, smaller opening allows bore sighting (when the gun stock has been removed) when the precision and accuracy of the machine gun is being tested. The top of the gun stock bracket is curved back at the front for latching the receiver cover closed.

The barrel socket has a round opening on the top. Behind the opening there are two lugs for attaching the receiver cover and the feed plate. Behind the lugs there is a lateral groove for the barrel lock.

On the front of the barrel lock there are the following: two lugs that prevent the barrel from twisting in the socket; a longitudinal cylindrical opening into which holds the barrel; an oval groove which houses the rear finger of the barrel; a vertical slot for the gas cylinder latch; two studs for mounting on the frame of the tripod cradle; two profiled lugs and two arced grooves for fitting the machine gun support on the tripod for engaging targets in the air; on the bottom, a rectangular longitudinal slot and two longitudinal grooves for attaching the gas cylinder.

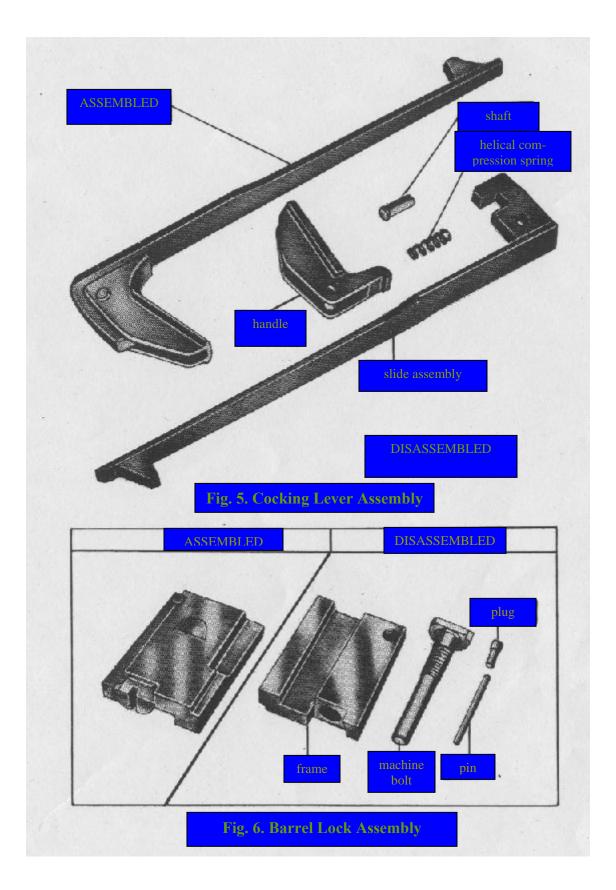
Inside the barrel socket there are the following: lugs for holding the bolt in locked position and a lug with a beveled surface which allows the initial rotation of the bolt when it is locked.

On its upper rear section the barrel socket has a longitudinal cutout for the ribs of the feed plate.

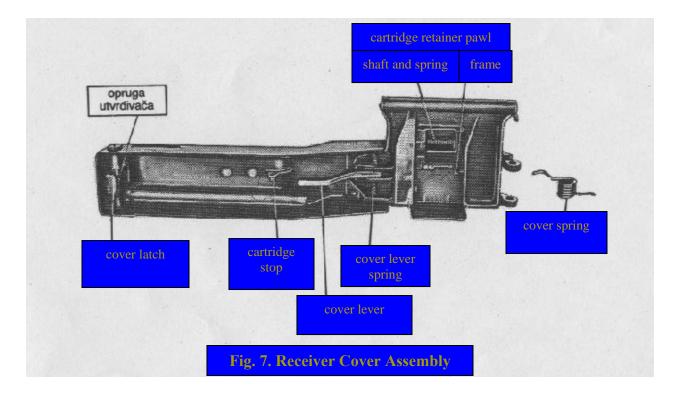
The cocking lever serves to move the bolt into its rear position. It consists of the slide, handle, helical compression spring and shaft (fig. 5).

The grip serves to facilitate the handling of the machine when firing. It is fastened to a lug on the frame of the trigger mechanism with a machine bolt.

The barrel lock assembly serves to fasten the barrel into the barrel socket and to adjust the headspace between the bolt and the rear section of the barrel. It consists of the following: the body, a machine bolt, a plug and a pin (fig. 6). On the bottom of the body are two lugs and a groove for fastening the barrel. On the top there is a stepped cutout along which the feed pawl claw passes. The body has a longitudinal threaded opening for the machine bolt. The plug limits the movement of the lock into the extreme leftward position; Behind the lock, on the right side, there is a transverse, beveled recess into which the feed pawl fits.



13. The receiver cover and feed assembly serve to close the top of the receiver and ensure the fitting and function of the components of the feed.



The front of the **cover assembly** (fig. 7) has two lugs which hold the retaining pin, which fastens the cover onto the barrel socket. A helical torsion spring is slipped onto the retaining pin and holds the cover in an upright position when it is opened. The recessed surfaces of the lug bases limit the degree to which the cover can be lifted. A longitudinal opening houses the shaft of the cartridge retainer assembly.

The rear sight base and the rear sight bar guard are riveted to the top of the cover assembly.

The front section of the cover has two lugs which hold the pins and the springs of the shutters (the entry shutter is on the right and the exit shutter is on the left). The shutter springs hold the cover in the closed position.

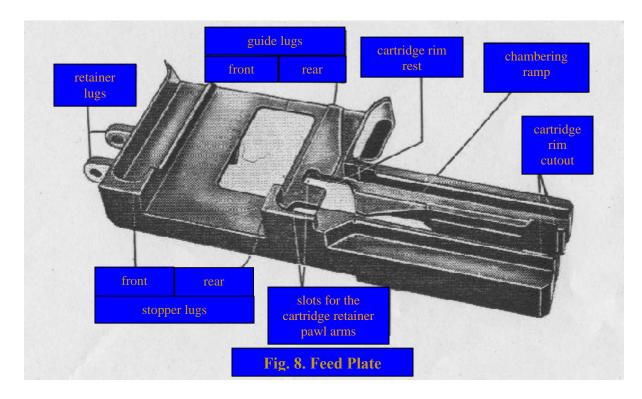
At the rear of the cover assembly is a square opening into which the cover latch fits. The body of the latch is notched so it may be easily

pressed forward, and on the bottom extends out into a tooth. The latch assembly is fastened by a shaft. The latch spring presses the assembly tooth forward.

In the center of the inside of the cover is a longitudinal rectangular slot into which the cartridge stop fits. In front of the cartridge stop the cover is cut out in a profile with two lugs. The cover lever fits into the recess between the lugs and is fastened with its pin. The helical torsion spring presses the cover lever downward. In the front area of the interior there are guide lugs. The cartridge retainer pawl and its helical torsion spring fit into the groove between the lugs.

The feed assembly serves to ensure that the cartridge is fed onto the axis of motion of the bolt. It consists of the following components: the feed plate, the feed pawl and guard, and the cartridge retainer pawl.

The feed plate (fig. 8) serves to direct the motion of the link belt and to direct the cartridge as it is fed into the chamber. On the front area of



the feed plate there are two lugs for the cover retaining pin, which fastens it to the barrel socket. On the front left side there is a round hole which holds the feed plate latch. The latch consists of the body and a spring and serves to hold the feed plate in the open position.

On the top of the feed plate there are two sets of lugs (the guide lugs and the stopper lugs), which feed the next cartridge towards the extractor claws on the barrel socket. Between the lugs there is a lateral opening allowing the movement of the feed pawl arm. In the rear guide lug there are profiled recesses (into which the legs of the cartridge retainer pawl fit) and the cartridge rim rest.

On the top of the rear of the feed plate there are ribs between which there runs a longitudinal groove which allows the extractor to move. The groove has a longitudinal slot and in the front, on the sides, there is a chambering ramp which cams the cartridge into the chamber. In the rear, the groove has vertical recesses allowing the rim cartridge case to pass.

On the bottom, the feed plate has external ribs which fit into the grooves on the barrel socket, and two internal ribs under which the slide moves.

The feed pawl serves to feed the link belt with the cartridges onto the feed plate. It consists of the frame, roller and pin, arm and spring, the guard, the pivot pin and helical torsion spring.

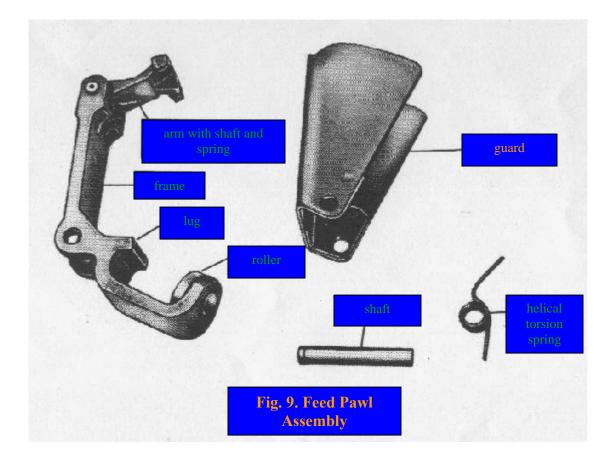
The feed pawl frame has a lug that slides along the groove on the right side of the slide. The roller with its pin fits into the groove on the left side of the slide. The feed pawl arm has three teeth on its underside. The guard protects the feed pawl frame from mechanical damage and dirt and closes the recess on right side the feed plate.

The cartridge retainer pawl holds the link belt back and prevents cartridges from being jammed against the guide lugs of the feed plate. It consists of the frame, the pin and spring (shown in the receiver cover assembly, fig. 7).

14. The sights of the machine gun are: mechanical sights (front and rear), an optical sight (ON–M80), and a 5 x 80 passive night sight (PN–5 x 80).

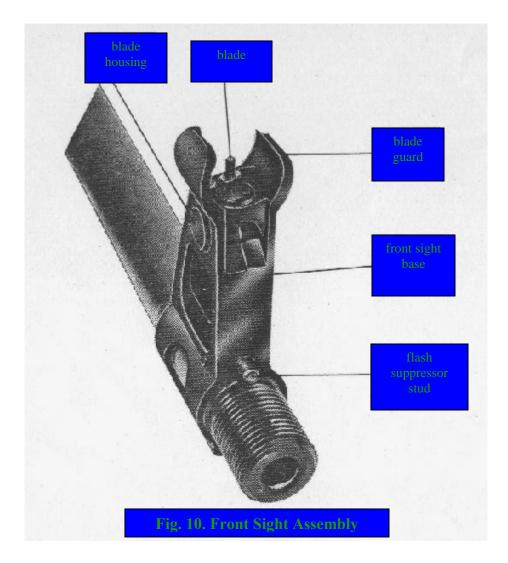
The front sight assembly (fig. 10) consists of the following components: the base, the blade housing and the blade. The base is

pulled on to front of the barrel and fastened with three pins. The top of the base has the shape of a semi-circular ring and serves as the sight blade guard.



Under the blade guard there is lateral hole which holds the blade housing. On the front side of the base, on a beveled recessed surface, there is a notch for checking the proper position of the blade housing. Below the beveled recess of the base there is a hole for the flash suppressor stud. The lower part of the base is ring-shaped and slipped onto the barrel, and has holes for the retainer pins.

The blade housing has a threaded hole where the blade is screwed into place. A line is engraved on the front side of the blade housing which is lined up with the notch on the beveled recess in the base. The blade is screwed into the hole in the base. Its lower part is split for a better fit into the housing.



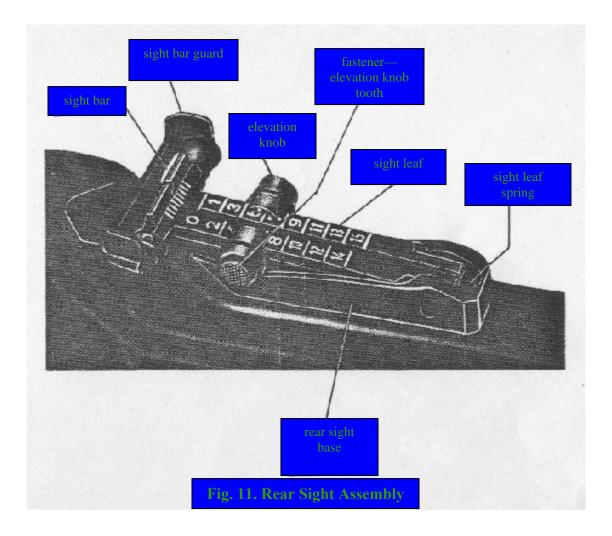
The rear sight assembly (fig. 11) consists of the base, leaf, elevation knob, leaf spring and sight bar assembly.

The sight base is riveted onto the receiver cover. On the front of the sight base there is a projection which fits through the longitudinal rectangular slot in the receiver cover and functions as the cartridge stop. The top of the base is cut through in order to hold the leaf spring.

The leaf and elevation knob serve to set the firing range. The upper surface of the leaf has an engraved scale with divisions representing values of 100 meters, in marks numbered 0-15. The "0" mark corresponds to the "4" mark and is used when engaging targets in the air.

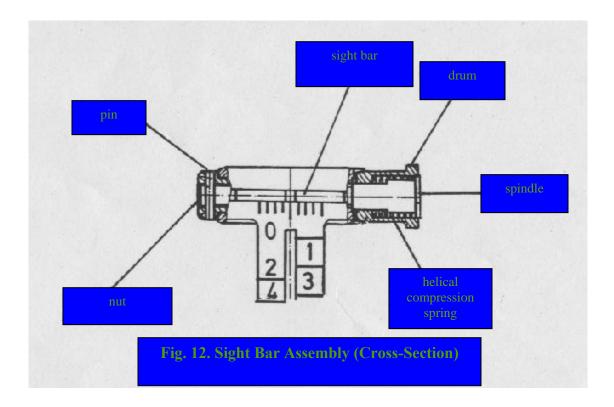
The lower right side of the leaf is serrated to fit the tooth of the knob fastener. On the front of the leaf is the sight bar slot, which on the rear surface has a scale from 0-16 mils, on which each mark has a value of 2 mils (0-02).

The elevating knob consists of the shank, fastener and spring. The fastener has a tooth, which the spring presses into the notches on the right side of the leaf.



The sight leaf spring is housed in the base and holds the leaf in the desired position by pressing its rear edge upward.

The sight bar assembly (fig. 12) serves to facilitate lead adjustment when firing on moving targets, and for compensating for the effects of crosswind. It consists of the sight bar, spindle, drum, spring and nut. The sight bar has an aperture in the center for sighting, and is moved back and forth by the spindle when the drum is turned. In order to move the sight bar one division on the scale, the drum must be turned 2 full rotations. The spindle is threaded. The nut is attached to its end and fastened with the pin. The drum is slipped onto the spindle on the right side. Its rim is notched in order to facilitate turning and on its left side there are two projections that hold it in the desired position. The spring is slipped over the spindle and its ends rest against the nut and the drum.



15. The M80 optical sight enables direct sighting of targets up to 1,500 meters in distance. It allows sighting in conditions of reduced visibility (twilight, moonlight, dawn, etc.) because it is equipped with a tritium light source for illumination of the reticle.

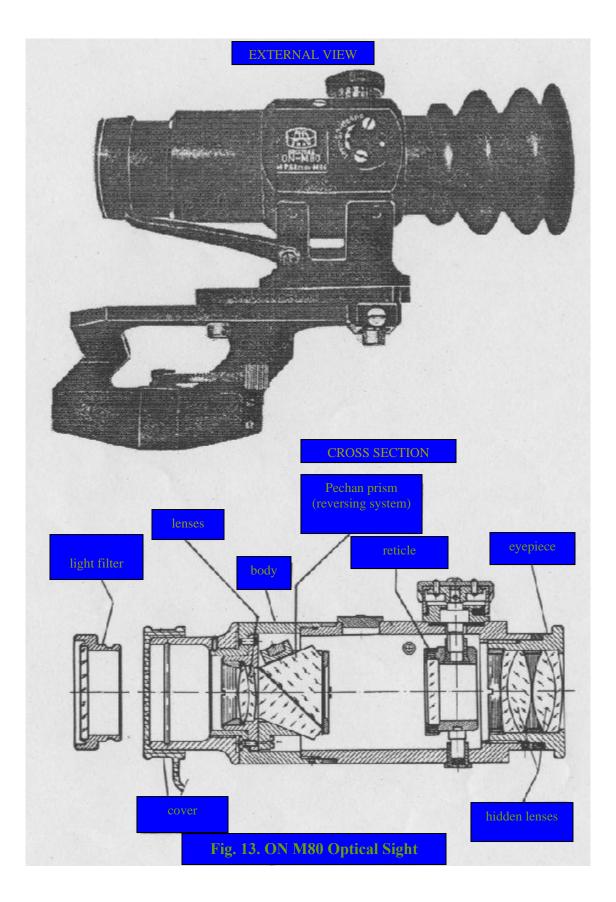
The optical sight (fig. 13) consists of the body, objective lens, range adjustment mechanism, windage adjustment mechanism, eyepiece, eye shield and reticle.

The body serves to house all parts of the optical sight It is of an aluminum alloy construction. On the front of the body there are threads for the objective lens mount to be attached. On the rear there are threads for attaching the eyepiece. On the right side of the body there is a plate with a warning that the sight is equipped with ampules of tritium. On the top there is a hole for the elevation adjustment mechanism and the housing for the light filter. On the left side of the body there is a hole for the windage adjustment mechanism and a plate with the manufacturer and device number. On the bottom there are lugs with four holes for attaching it to the sight mount.

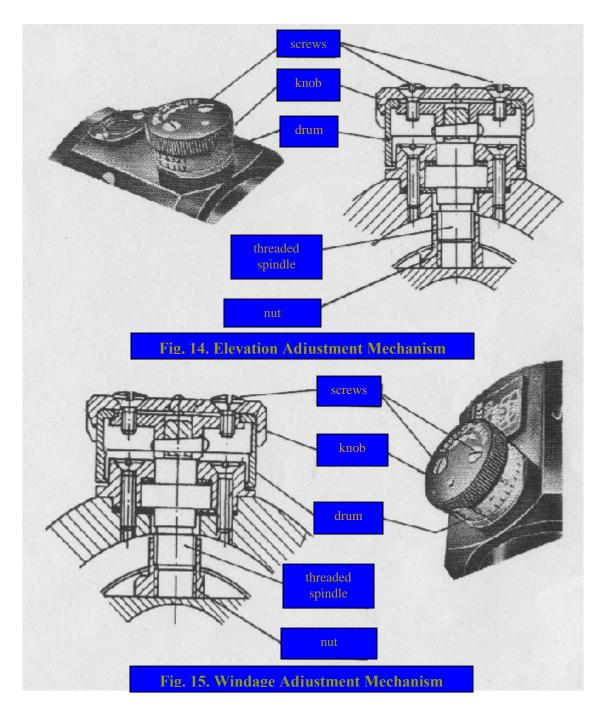
The objective serves to form and transfer a reduced image of the target to the reticle. It consists of the lens, the Pechan prism (reversing system), cover and filter (shown in fig. 13—cross section).

The elevation adjustment mechanism serves to set the distance to the target and changing the elevation of the reticle when testing the accuracy and precision of the machine gun. The mechanism (fig. 14) consists of the threaded spindle, nut (for connecting the reticle mount to the threaded spindle), the drum, the knob and the mounting screws. Turning the knob clockwise moves the reticle up (and vice-versa). The directions of the knob are engraved on the upper face of the knob and labeled "down—SP [center shot]—up". The scale with divisions marked with values from "0" to "11" is engraved on the drum. One division equals 100 meters. On the range mechanism base there is an engraved line with which the line of a given division on the drum is aligned. On the upper part of the drum there is an auxiliary scale which is used when zeroing the center shot on the aiming point, and the value of one division (the resolution) is one mil (0–01). A ball fastens the drum in a given position.

The windage adjustment mechanism (fig. 15) serves to allow the reticle to be moved horizontally when the accuracy and precision of the machine are tested, and to set windage corrections which compensate for



the influence of factors affecting the trajectory of the bullet along the horizontal plane. The windage mechanism has the same components as the range mechanism. The drum has an engraved scale with a total value of 20 mils (0–20), or 10 mils in each direction. The value of one division is 0–01. Every fifth division is marked by a number. The left side of the



scale (from 0 along the direction of the arrow on the dial) is marked "+" (plus), and the right side (opposite the direction of the arrow on the dial) is marked "–" (minus). On the upper part of the drum there is an auxiliary scale with the same divisions and purpose as the scale on the drum of the range mechanism.

Play in the range and windage mechanisms is eliminated by two pins which are pressed by springs into the threaded holes in the bottom of the optical sight body.

The eyepiece allows the gunner to see a magnified image as well as real image of the target and reticle. It consists of the socket, two hidden lenses, a spacing ring and a lens retaining ring.

The eye shield is fits onto the eyepiece housing. It allows accurate and more comfortable sighting, protects the gunner from impacts and injury during firing and also protects the eyepiece lenses from dirt and mechanical damage.

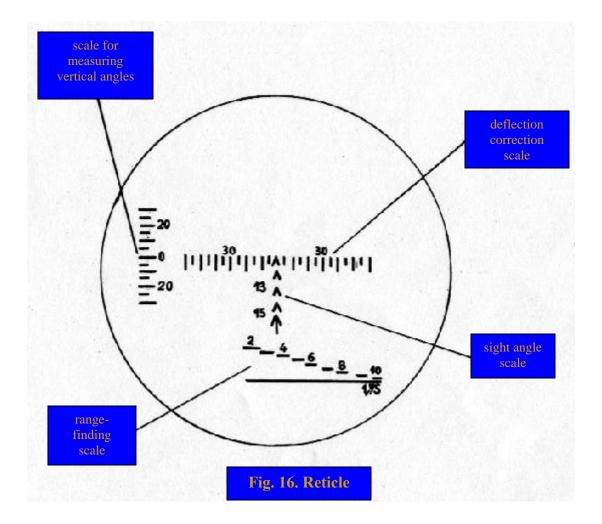
The reticle facilitates sighting and setting lead amounts when firing at moving targets, as well as the measurement of horizontal and vertical angles as well as the measurement of the range of the target.

The reticle is built into the reticle mount and is in direct contact with the range and windage mechanisms. It is illuminated by a tritium light source so that the division marks and labels can be discerned more easily at night and in conditions of low visibility. The tritium gas is housed in glass ampules which are affixed to the along the edge of the reticle with an adhesive.

The following are engraved on the reticle (fig. 16): a sight angle scale, a scale of deflection corrections, a range-finding scale and a vertical angle scale.

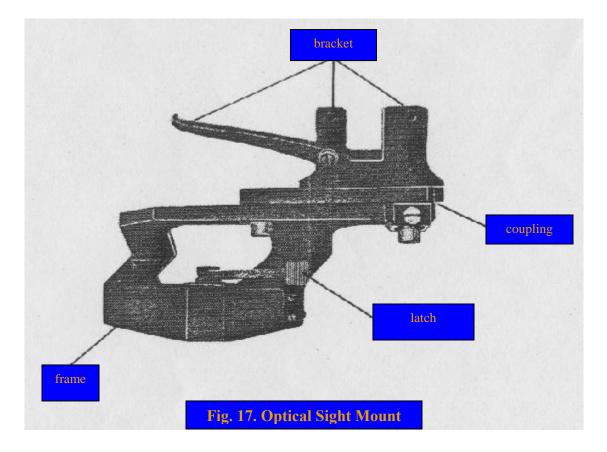
The range scale has a base marking, the arrow for sighting from 0 to 1,100 meters which is engraved in the middle of the lead scale. Below the base marking there are engraved arrows for ranges of 1,200, 1,300, 1,400 and 1,500 m. The marks for 1,300 and 1,500 m are labeled "13" and "15".

The scale of deflection corrections has a total value of 120 mils (1-20), 60 mils in each direction. The value of one division is five mils (0-05). In addition to its basic application, the scale is also used to measure the size of horizontal angles when firing on wide targets, through interspaces and along the flanks of friendly units.



The range-finding scale is based on the known average target height (1.75 m) and width (0.5 m). The scale includes even numbers from 2–10 which indicate hundreds of meters. The vertical angle scale has a total value of 60 mils or 30 mils in each direction. The value of a single division is 5 mils. The scale is used to measure vertical angles when firing at deep targets and over the heads of friendly units.

16. The mount of the optical sight and the mounting rail on the receiver of the machine gun fasten the optical sight to the machine gun. The mount assembly (fig. 17) consists of the frame, coupling, bracket and latch.



The frame of the mount slips onto the sight mounting rail on the receiver. On the lower part of the frame is a slot which holds the latch.

The coupling links the frame and the bracket. On the ends of the coupling there are two square grooves with holes. The holes hold inserts which are fastened with machine bolts. The inserts have threaded holes for the machine bolts that hold the coupling, frame and bracket together.

The bracket has two lugs on its bottom side and four arms on the top which are fastened to the lugs on the body of the optical sight by machine bolts. The cord of the sight cover is fastened to the front left arm.

The latch consists of the handle, spindle, spring tooth and nut. The handle and spindle are fastened with a pin.

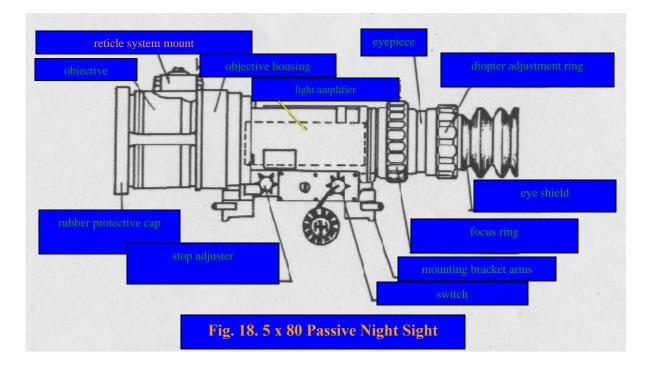
17. The 5 x 80 passive night sight (PN 5 x 80) is an electro-optical instrument facilitating the observation of the battlefield, sighting and firing of the machine gun at night at ranges up to 500 m. It operates on the principle of low-intensity white light (moonlight, starlight, and other natural sources). This sight allows the detection of, and in favorable circumstances engaging of all active equipment utilizing IR technology used by the enemy for observation and firing at night. The passive night sight cannot be detected by (IR or other electronic) sighting and observation instruments of the enemy.

The 5 x 80 passive night sight is sensitive to sources of highintensity light. It requires careful handling and regular maintenance, and therefore the following precautions must be observed: the rubber protective cap is allowed to be removed only at night or at dusk; never point the instrument in the direction of the sun or any other highintensity light source, not even with the objective cover on; if the rubber protective cap is damaged, the objective must be protected by other means from daylight and dirt; before and after use, be sure to check the cleanliness of the optical components and, if necessary, clean them in the manner described in items 121-23, and take special care that the instrument does not fall on the ground, strike other objects or be jostled during transport and carrying. When used in rain or high humidity, the instrument should be thoroughly wiped off and dried before packing. When not in use the sight is kept in its box with the lid closed.

The passive night sight consists of the following components (fig. 18): the objective, image lightness amplifier, eyepiece, reticle, and power source.

The objective is a combination of lenses and high reflectance mirrors and forms the image of the target and background and then transfers it onto the photocathode of the amplifier. The rims of the lenses, mirrors and other reflective elements of the objective are colored black in order to reduce parasitic light. All components of the objective are contained in a single housing, in the interior of which the amplifier and reticle also fit. A protective rubber cap protects the objective on the front; this cap is removed only at night. It protects the instrument from light of excessive intensity and the objective from mechanical damage.

To enable the testing of accuracy and precision there are four small holes on the front side of the protective rubber cap which allow the passage of light. The following components are located on the external surfaces of the objective housing: the focus ring, switch, stop, arms for fastening the sight on the mount, the reticle system mount and the battery housing.



The focus ring serves to attain a sharp image of the observed objects (targets) at ranges from 30 m to infinity. At ranges under 30 m, it is impossible to gain a sharp image of observed objects. The dial is turned clockwise when focusing distant objects.

The switch serves to turn the electrical current on and off, as well as to adjust the intensity of illumination of the reticle in relation to the target image. The switch has ten settings in addition to its neutral setting; the first of these serves to turn on the current, and the other nine adjust the illumination of the reticle.

The stop adjuster serves to prevent the harmful effects of excessive light coming from the horizon or some other intensive light source on the upper half of the visual field of the eyepiece. The arms for attaching the sight to the mount are standard and allow the sight to be mounted on various types of weaponry (ordnance). The passive night sight is fastened to the mount by two machine bolts.

The reticle system mount fits in the upper front end of the housing. On its front it has a screw for elevation correction, and on its left side a screw for windage correction. During correction, the reticle may be shifted 0–23 to the left, 0–23 to the right, and vertically \pm 0–23. One step in shift (the resolution) equals 0.5 mils. In order to move the reticle to the right in the visual field, the screw is turned clockwise, and vice-versa. The center shot is thereby moved in the opposite direction. In order to move the central shot upward, the reticle must be moved upward, by turning the screw counterclockwise.

The battery housing is attached to the right side of the objective housing and is sealed with a lid. The lid comprises the "ground" in the circuit and the instrument may not be used without it.

The image light amplifier is a three-degree electronic fiber-optic tube. It serves to amplify the incoming light by a factor of at least 30,000, but in the process the increase in the image size remains within the limits of magnification (a factor of 5). The light amplifier has an automatic light intensity control, which means that the image illumination is kept constant within certain limits. For this reason, if light of excessive intensity appears the sight automatically shuts off, whereby the observer's eye is protected from blinding. When the excessive intensity of the light reduces, the sight turns on automatically.

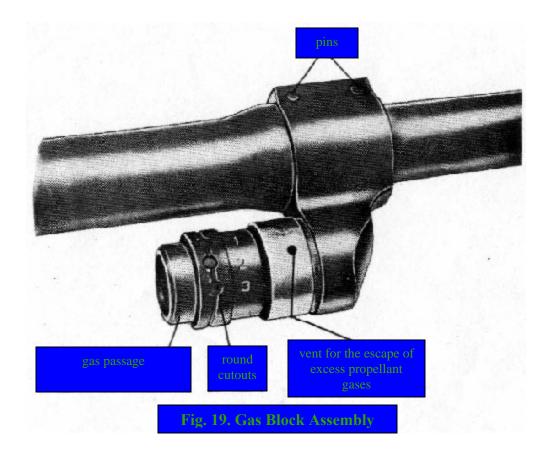
The eyepiece facilitates the viewing of the image, background and reticle. The eyepiece consists of the body, the lens system, the diopter adjustment ring and the rubber eye shield.

The diopter adjustment ring of the eyepiece can be adjusted according to the vision of the gunner/observer within a range of ± 5 diopters. There are 2 projections on the ring and the bottom of the body which allow the diopter to be set at night as well.

The rubber eye shield protects the gunner's head from possible injury due to the recoil of the machine gun during firing. At the rear of the rubber eye shield there is a mechanism with a movable stop which opens when pressure is applied to the eye shield and closes when the pressure ends. It serves to prevent light from being emitted by the instrument and to prevent reflections on the gunner's face, i.e., it reduces the possibility of exposing the gunner and revealing the position of the ordnance.

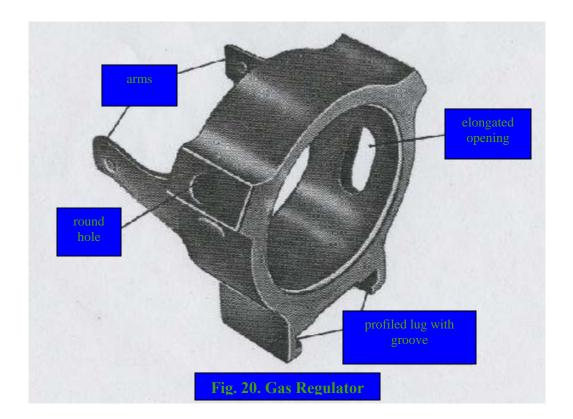
The power source of the passive night sight is a 2.48 volt NiCd battery with a high voltage converter which is built into the light amplifier. The capacity of the battery is 0.7 Ah. When the battery loses its charge, it is recharged with a 70 mA charger, with a maximum recharge time of 14 hours. The battery charge lasts 15 hours without illumination of the reticle, and with illumination of the reticle it lasts 10 hours.

The reticle system is housed in the reticle mount, and the reticle is located on the longitudinal axis of the passive sight, between the objective lenses. The reticle facilitates sighting with the passive night sight. It is illuminated by a special light source. The intensity of the illumination of the sight markings is adjusted with the switch knob.

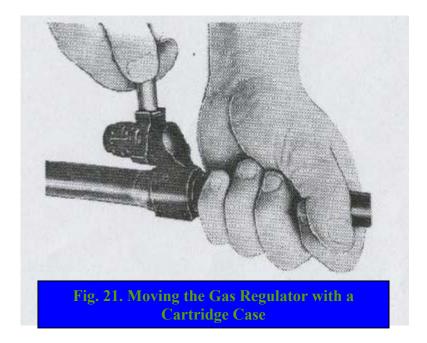


18. The gas block assembly with the gas regulator serves to direct the propellant gases diverted from the barrel and to regulate the amount of propellant gases acting on the slide piston.

The gas block assembly (fig. 19) slips onto the barrel and is fastened with two pins. On the bottom in the elbow joint of the block there is a hole which allows the passage of the propellant gases from the barrel. The front ring has a vent for the escape of excess propellant gases. The rear ring has three round cutouts and a round groove. The arms of the gas regulator fit into the cutouts and groove. The round cutouts are marked "1", "2" and "3", and indicate the three positions of the gas regulator on the gas block. Position "1" is used after 3,000 rounds have been fired from the machine gun and is the basic position of the gas regulator. Position "2" is used in case the slide does not return fully to the rear position, and position "3" is used when the machine gun is fired in adverse conditions (low temperature, rain, when the machine gun is dirty from propellant gas products, etc.) and during the first 3,000 rounds. The rear section of the gas block fits into the gas cylinder.



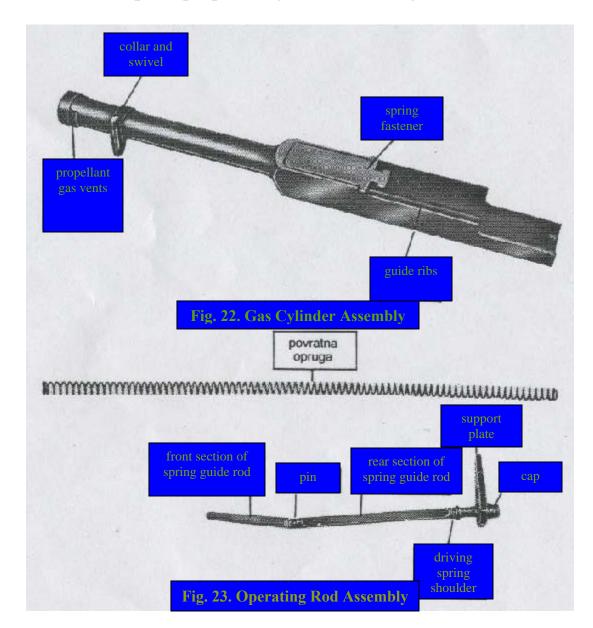
The gas regulator (fig. 20) has two vents on the sides: on the left side there is an elongated opening and on the right side there is a round hole. The openings serve to release the propellant gases from the gas port. When the regulator is in position "1", both vents are open; in position "2" only the left vent of the gas block is open; in position "3" both vents are closed. There are two rectangular lugs on the sides of the gas regulator which facilitate its being switched from position to position. The gas regulator arms fasten it to the gas block. On the ends of the arms are small studs that fit into the round cutouts and round groove on the gas block. On the bottom of the regulator there is a profiled lug with a groove in which the rim of a cartridge case fits. The cartridge case and groove are used to move the regulator from position to position when this cannot be done with the fingers (fig. 21).



19. The gas cylinder (fig. 22) serves to direct action of the slide and piston, and for fastening the bipod.

The rear part of the gas cylinder has a rectangular shape for the passage and correct guiding of the slide, and the front part is cylindrical for the passage and guiding of the slide piston. The upper rear face of the gas cylinder is cut out. At the front end of the cutout is a spring fastener which fastens it to the receiver. The fastener at the rear end is a profiled

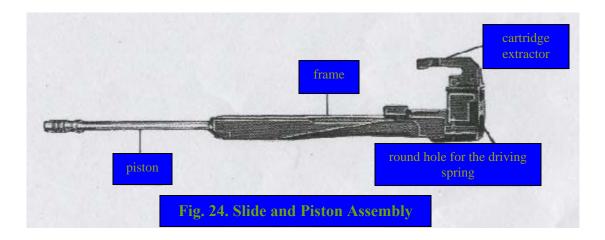
lug which fits into the vertical slot in the barrel socket. On the sides of the gas cylinder there are two guide ribs which fit into the longitudinal grooves on the barrel socket. The upper rear of the gas cylinder is cut away in the shape of a rectangle to allow the movement of the cocking lever. A swivel for attaching the front end of the sling is on the front cylindrical end. In front of the collar there is a round groove and in front of it a ring with a cutout which serves to fasten the bipod. There are four holes for the escape of propellant gases on the ring.



20. The operating rod assembly (fig. 23) serves to return the slide and piston to the forward position. It consists of the spring guide rod, the driving spring and the support plate.

The spring guide rod consists of the front and rear parts which are joined by a pin. On the rear there is a shoulder against which the driving spring rests. The support plate serves to reduce the impact of the slide frame in the rear position. The plate slips onto the rear end of the spring guide rod and is fastened from behind with a cap. The cap is fastened on the rear end of the spring guide rod with a pin and serves to stabilize the support plate, and also serves as a lug for joining the operating rod to the receiver frame. The support plate has a hole for bore sighting when testing the accuracy and precision of the machine gun.

21. The slide and piston assembly serves to house the bolt, extract cartridges from the link belt, lock the bolt from below when it is in the forward position, absorb the force of the propellant gases, unlock the bolt and return it to the rear position, as well as to cock the trigger mechanism. The slide with piston (fig. 24) consists of the frame, piston, and the cartridge extractor.



The frame has a hole in the back for the driving spring, a lug with a hole for the pin of the cartridge extractor and a hole for the bolt body. On the interior surface of the hole for the bolt body there is a semi-circular groove for guiding the lug of the firing pin during locking and unlocking.

On the sides of the slide frame there are grooves that guide the motion of the slide frame along the curved sides of the receiver. The right groove has a further slot in it which allows passage of the ejector. On the top of the lug of the slide frame is a lateral groove with two teeth which holds the cartridge extractor. On the upper rear, in front of the extractor lug, there is a spiraled groove for the profiled lug of the bolt. On the left side of the spiraled groove is a beveled lug onto which the beveled face of the profiled lug of the bolt fits. On the bottom of the slide frame there is a cut out lug which is held by the sear tooth when the slide is in the rear position and the trigger is not pulled. On the sides of the frame grooves have been cut out for guiding the feed pawl. On the right side of the frame is a lug which the cocking lever tooth catches. On the front of the frame are profiled lugs for attaching the piston.

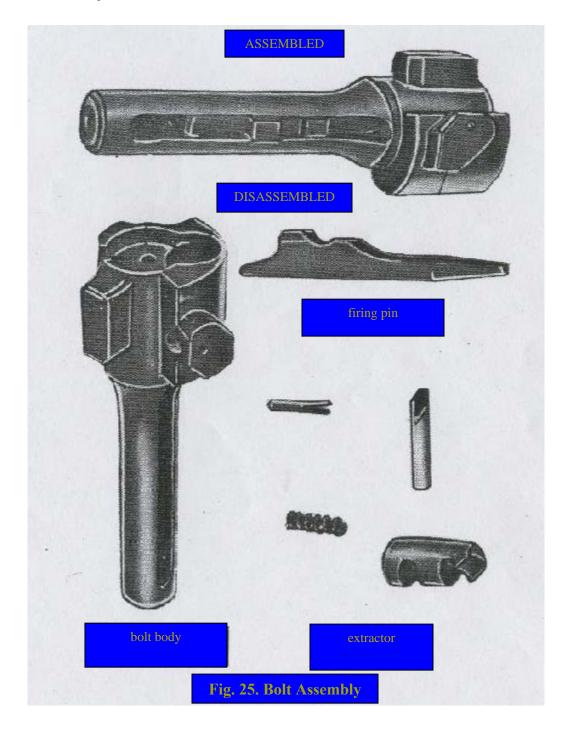
The piston serves to absorb the pressure of the propellant gases and transfer it to the slide frame. The rear of the piston has a shoulder which fits into the profiled lugs of the slide. The slide and piston are joined by a pin. On the front of the piston there are rings and grooves for sealing the gas block. The rear or guide ring guides the motion of the piston in the gas cylinder.

The cartridge extractor fits onto the lug on the slide frame and is fastened with a pin. Its bottom has a profiled lug and its top has two claws with a vertical slot for catching the cartridge case rim.

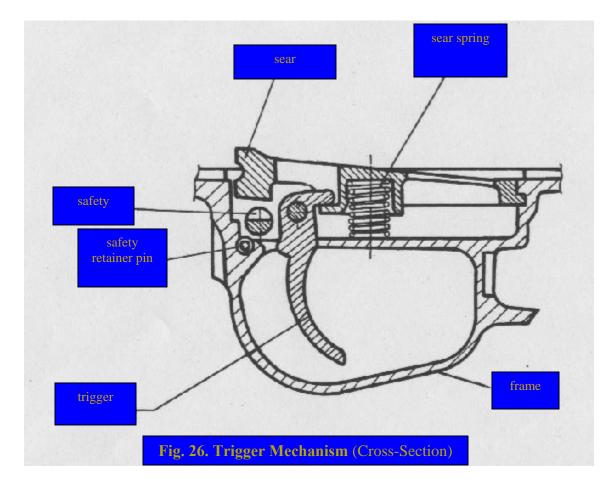
22. The bolt assembly (fig. 25) serves to feed the cartridge into the chamber, close the barrel, ignite the primer cap of the cartridge, and extract the cartridge case. It consists of the body, the firing pin and the extractor.

On the front of the bolt body there is a round cutout for the cartridge head and an oval cutout for the extractor. In the round cutout there is a hole for the firing pin. On the top of the bolt body there is a semi-circular lug on which there is a smaller profiled lug. Under the profiled lug there is a round hole which holds the extractor shaft. On the side of the body there is a rectangular lug which allows the bolt to be locked and unlocked, and a longitudinal groove along which the ejector tooth slides. The lower part of the bolt is the shaft which feeds the cartridge.

The extractor consists of the body, helical compression spring, shaft and pin. The firing pin has a lug which guides it through the bolt body and allows easy removal.



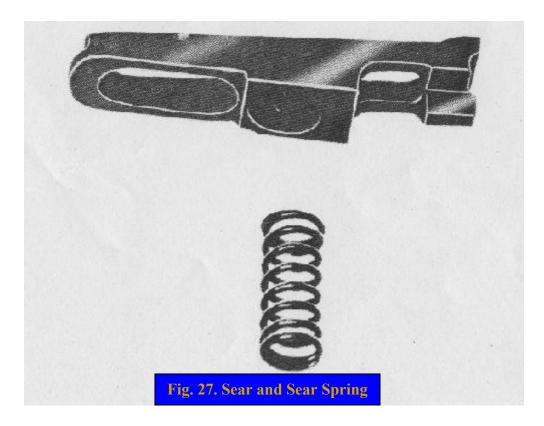
23. The trigger mechanism (fig. 26) serves to catch the slide in the rear position, to release the slide when the trigger is pulled, ensuring burst firing and the cessation of fire. It consists of the frame, sear and spring, trigger with pivot pin and safety.



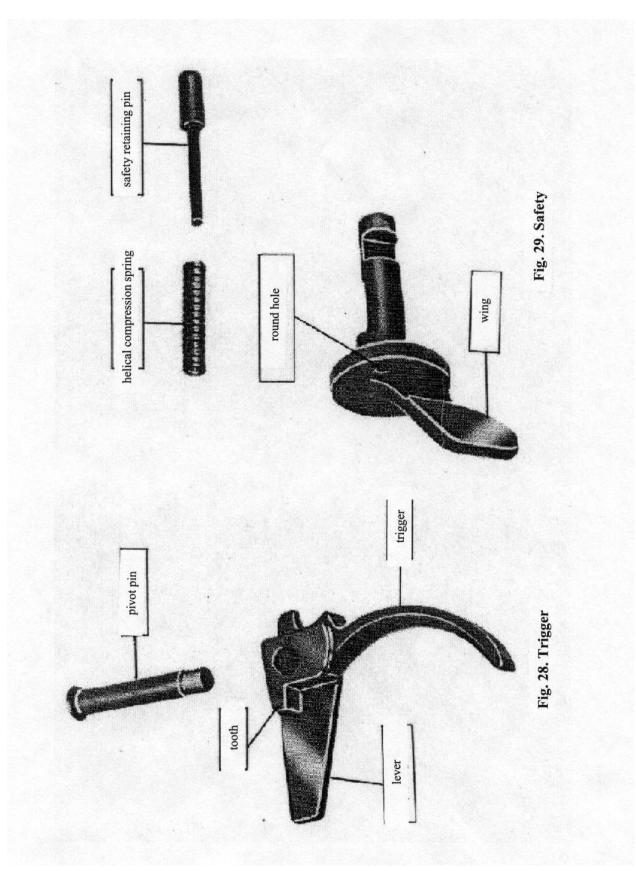
The frame serves to hold and stabilize the trigger components, to fasten the machine gun on the tripod and to attach the grip. The trigger mechanism housing is riveted to the receiver. On each side of the frame there is a lug for attaching the machine gun to the tripod, and three round holes: for the trigger pivot pin, the safety and the safety retainer pin. On the bottom of the frame is the trigger guard with a lug for fastening the machine to the tripod and a rectangular opening for the trigger. On the rear of the frame there is a projection with a lug which has a threaded hole which holds the machine bolt of the grip.

The sear and helical compression spring (fig. 27) holds the slide in the rear position when the trigger is forward. On the front end of the sear

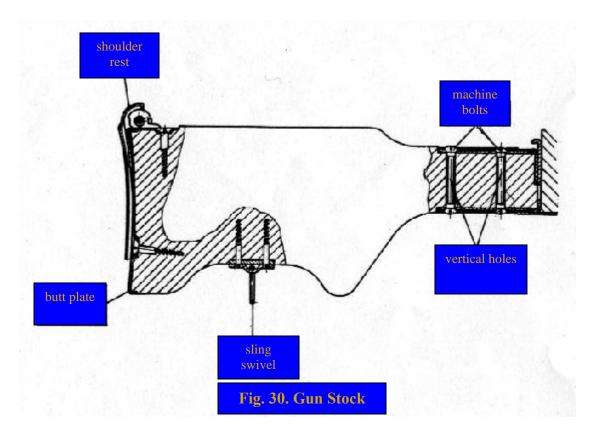
is a semi-circular recess which fits into a lateral slot in the trigger mechanism frame and stabilizes the front end of the sear. On the top there are two oval openings: the first reduces the mass of the sear and the second holds the trigger tooth. On the upper rear of the sear is the sear spring housing and a rectangular lug for preventing trigger pull when the machine gun is on safe. On the rear is an oval groove which into which the safety fits.



The trigger (fig. 28) has on its right side a lever, on the rear of which there is a lug which limits the movement of the trigger. On the front of the trigger is a tooth which connects the trigger with the sear. The trigger has a lateral hole for the pivot pin.



The safety (fig. 29) serves to prevent the trigger from being pulled. The wing is used to set the safety on either "U"—"SAFE" or "O"— "FIRE". On the rim of the safety there are two round holes into which the safety retaining pin fits. The following are on the shank of the safety: a lug that limits the leftward movement of the shank and fastens the safety in the housing of the trigger mechanism, and two slots (the larger one allows the rectangular lug on the sear to move and the trigger lever lug fits into smaller one).

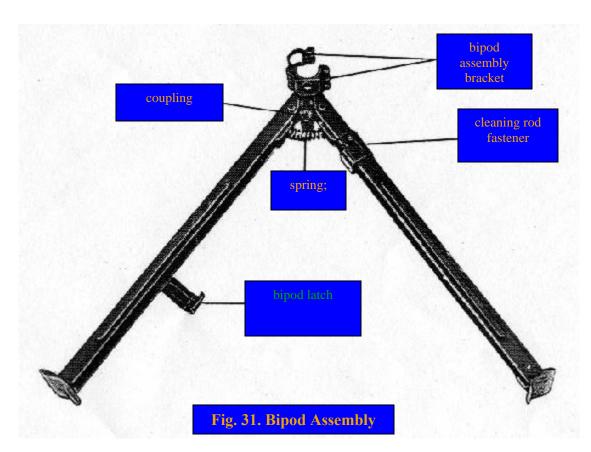


24. The gun stock (fig. 30) allows comfortable sighting of the machine gun. On the neck of the stock there are two grooves for the arms of the gun stock bracket and two vertical holes for the machine bolts which fasten the gun stock to the bracket. On the bottom the swivel strap is fastened with two screws. The butt plate is fastened to the back of the gun stock with two screws. The shoulder rest is fastened onto the lugs of the butt plate and is held in place by a retainer pin. The spring holds the shoulder rest in the folded or extended position.

25. The bipod assembly (fig. 31) is used to support the machine if necessary when firing. It consists of the bipod assembly pivot, coupling, helical compression spring, leg lock and bipod latch.

The bipod assembly bracket consists of an upper and a lower part which are joined with two pins through their lugs. On the bottom of the lower part there is a lateral oval opening which holds the beveled components of the bipod. The lower part of the bipod assembly bracket has a lateral hole for the coupling and a longitudinal hole for the coupling pin. On the front and rear of the lower part of the bipod assembly bracket there are slots for the bipod leg ribs when they are in the folded position.

The coupling joins the upper ends of the legs with the bipod assembly bracket and limits the sideward extension of the legs. It is fastened to the legs with pins.



The bipod legs end in the leg bottoms. The bipod latch is attached to the left leg with a wire fastener. The cleaning rod is located inside the right leg. The cleaning rod fastener is located in the upper end of the right leg and consists of body, pin and spring.

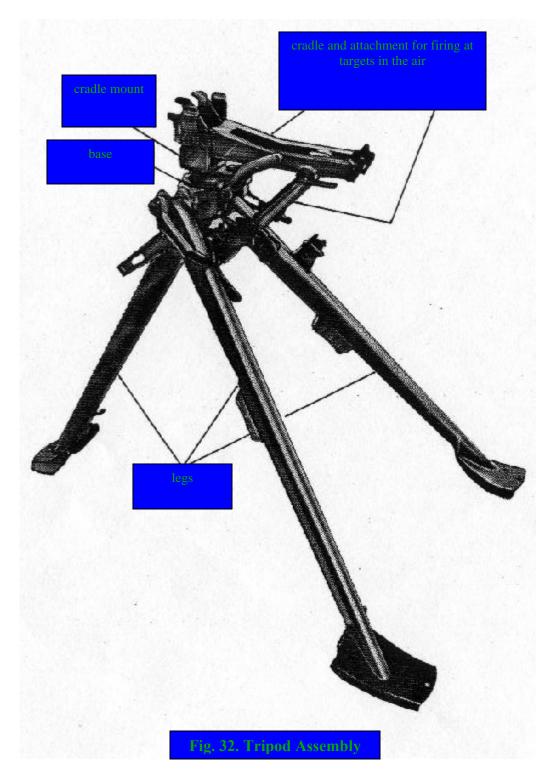
When the legs are released from the bipod latch, the spring presses them apart.

3. DESCRIPTION OF THE TRIPOD

26. The tripod serves to provide increased stability of the machine gun when firing from various positions, to facilitate firing at targets in the air and firing at linear and deep targets with sweeping fire. The tripod (fig. 32) consists of the following components: cradle, attachment for firing at targets in the air, cradle mount, base and legs.

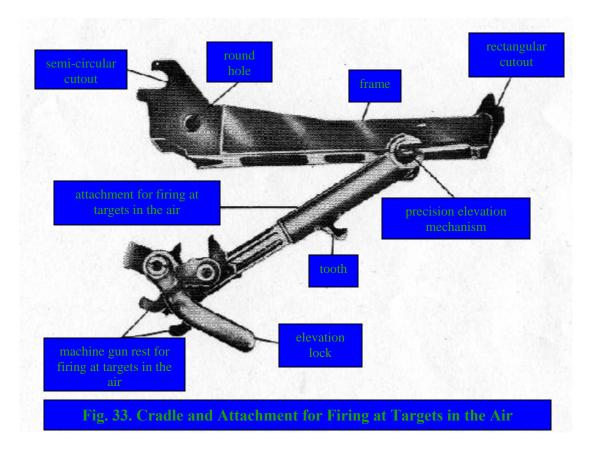
27. The cradle and attachment for firing at targets in the air (fig. 33) serves to fasten the machine gun to the tripod, to facilitate firing at targets on the ground and in the air, and firing at targets with depth. It consists of the following components: the cradle frame, attachment for firing at targets in the air, and precision elevating mechanism.

On the front end of the **cradle frame** (fig. 33) there are lugs with semi-circular cutouts into which the studs of the barrel socket fit. On the sides of the front part of the frame there are round holes which hold the machine bolts, which join the cradle frame with the cradle mount. Washers and nuts are affixed to the machine bolts. On the front of the cradle frame there is a profiled opening which holds the cradle latch when the machine gun is set up for firing at targets in the air. On the rear of the cradle frame there are lugs with rectangular cutouts which hold the front end of the trigger mechanism. Under the lugs there is a latch for the lug on the trigger mechanism housing and trigger guard and for the tooth on the support of the attachment for firing at targets in the air. The latch consists of the lever, shaft with tooth, spring and pin. On the rear of



the cradle frame there are round lugs for fitting the precision elevation mechanism and for attaching the attachment for firing at targets in the air to the cradle frame.

A line is stamped into the left round lug; the notch on the handle of the precision elevation mechanism is aligned with the line. On it there is a semi-circular rib which limits the movement of the handle of the precision elevation mechanism.



The attachment for firing at targets in the air (fig. 33) serves to establish a stable link between the cradle frame and the pintle of the cradle mount when the machine gun is set up for firing at targets on the ground and to enable the machine gun to be fired at targets in the air. It consists of the support and rest for firing at targets in the air.

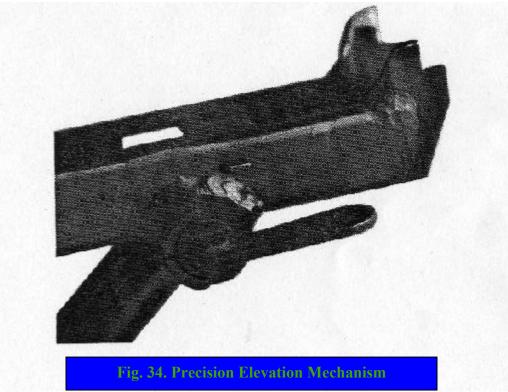
The support has on its upper end a housing with which it is joined with the cradle frame. In the middle of the support is a tooth used to fasten the machine gun when firing at targets in the air. The lower end of the support has a smaller profile, and has longitudinal ribs which allow

better fastening of the rest for firing at targets in the air. The elevation stop is slipped onto the support and fastened with a pin. The stop prevents the rest for firing at targets in the air from falling off the support.

The rest for firing at targets in the air serves to join the support with the cradle mount pintle and allow firing at targets in the air. It consists of two spring couplings (one large, one small), the mount, the rest latch and the locking device. The larger spring coupling joins the machine gun rest with the support, and the smaller spring coupling joins the machine gun rest with the cradle mount pintle. The upper end of the coupling consists of lugs with holes for joining it with the shaft of the rest latch. The lower end of the coupling is split for better expansion. The mount consists of the frame and two holders. The frame and the holders are joined together with shafts. The frame is joined with the rest latch shaft via the lugs with holes. The mount frame has two internal and two external lugs. The internal lugs fit onto the edge of the support stop and prevent the mount frame from slipping down when the machine gun is set up to fire at targets in the air. The external lugs limit the movement of the holders downward. On the inner right side of the rest mount there is a round stud which fastens the mount onto the larger flexible coupling when the machine gun is set up for firing at targets on the ground. The mount holders on the upper edge has semi-circular lugs with slots and fit onto the shoulders of the barrel socket when the machine gun is set up for firing at targets in the air. The rest latch joins all components of the rest for firing at targets in the air. It consists of the shaft, nut and handle. A washer and a spring washer fit under the nut and ensure that the nut will not come loose. The shaft screws into the handle. The locking device is slipped onto the latch and keeps the smaller flexible coupling from falling off the cradle mount pintle when the machine gun is set up for firing at targets on the ground. It consists of the lever with tooth and the spring.

The precision elevation mechanism (fig. 34) serves to join the aerial fire addition and the cradle frame, to allow accurate sighting with respect to elevation and firing at deep targets (the range of operation is

15 mils). It consists of the eccentric shaft, handle, nut washer and spring washer.



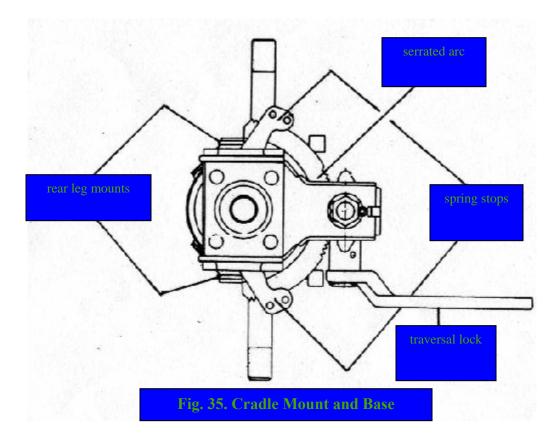
The handle is joined to the shaft with a pin. On the edge of the handle there is a notch which is aligned with the line on the round lug of the cradle frame. A locking device is built into the bottom of the shaft and moves along a groove in the round lug of the cradle frame.

28. The cradle mount (fig. 35) serves to join the cradle with the base and to allow the machine gun to be traversed. It consists of the pintle, the traversal mechanism, and the cradle latch.

The pintle in the upper part has two arms with holes for fastening it to the cradle frame. On the rear of the pintle there is a lug with a hole for fastening the traversal latch. On the top of the pintle is the housing for the cradle latch. The lower part of the pintle is threaded to receive the nut and there is a longitudinal groove for the tooth of the stop of the rest for firing at targets in the air. The pintle is fastened on the tripod base with a nut, a flexible serrated cap, a washer and a pin.

The traversal mechanism consists of the serrated arc, two spring stops (left and right), the locking device and nut. The components of the

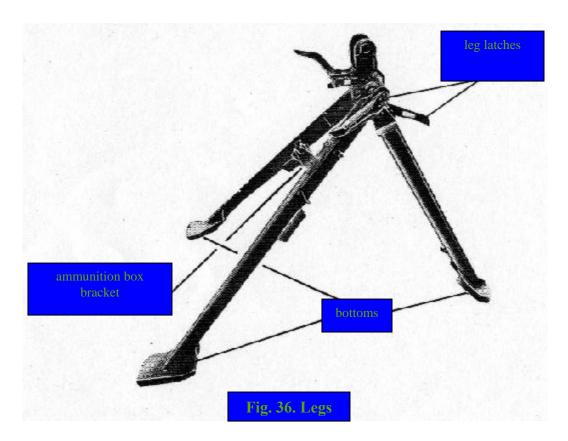
traversal mechanism are slipped onto the forward leg mount and fastened with a nut. The serrated arc has 58 teeth. The total value of the arc is 70° and the value of one tooth is 2° 52' and 12" (about 0–50). The spring stops have curved lugs and which prevent the stops from being passed in case they slip out of the serrated arc. On bottoms of the stop arms there are serrated plates fastened with two rivets. The locking device fastens the serrated arc and prohibits it from moving laterally. The transversal latch fastens the cradle in a given position. It consists of the offset handle, nut, washer, stop, clamp and cotter pin. The stop serves to catch against the spring stops with its edges when the machine gun is traversed. The cradle latch consists of the body, pin and spring.



29. The base (fig. 35) joins all components of the tripod. It consists of the two mounts of the left and right rear legs the front leg mount, the separation cap and four spring washers. The rear leg mounts are serrated on their exterior sides for a form fit with the legs when they are locked with the latches. On the back they have lugs which fix the upper- and

lowermost positions of the legs. On the bottom of each mount is a semicircular lug which limits the spread of the leg to the side. The front leg mount is serrated on each side; the separation cap, rear leg mounts, and the traversal mechanism components slip onto it. The serrated sides have lines stamped into them with which the lines on the legs are aligned. The aligned lines indicate the position of the front leg in the sitting position and when firing at targets in the air. The lug on the right serrated side limits the lower- and uppermost position of the leg. The separation cap with the spring washers fixes the positions of the leg mounts.

30. The legs (fig. 36) serve to ensure the stability of the machine gun when firing and taking up various positions. They are fastened to the base with latches. Each leg latch consists of the handle, shaft, nut and two flat washers. The nut screws onto the shaft and is secured with a cotter pin.



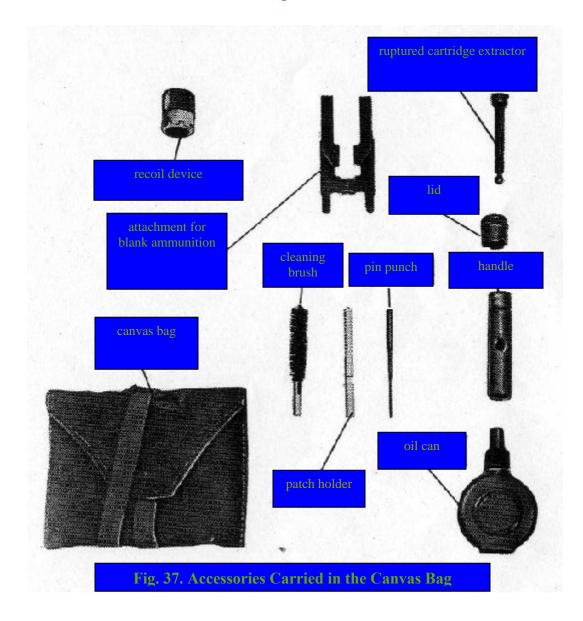
The leg bottoms ensure the stability of the tripod. The rear legs have carrying rests and each has two swivels for the slings when the tripod is carried. The right leg has the bracket for the ammunition box and two

stops. There are round holes on the leg bottoms through which the carabiners for the ammunition box straps are attached.

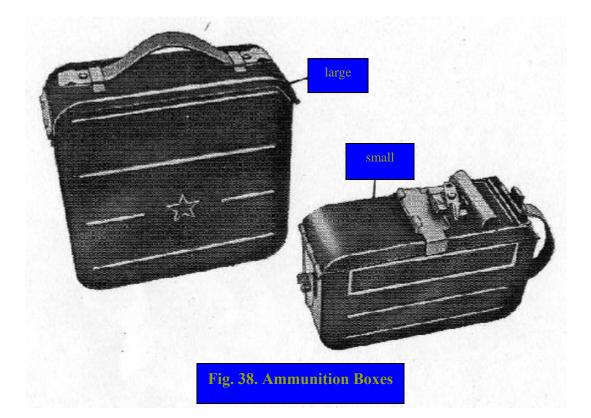
4. DESCRIPTION OF ACCESSORIES

1) Machine Gun Accessories

31. The machine gun accessories facilitate the carrying of the machine gun components and ammunition, the loading of machine gun, cleaning, lubrication, disassembly and assembly. The machine gun accessories consist of the following: five ammunition boxes (three large



and two small boxes), 19 link belts (five with tabs and 14 without), the cleaning rod, the carrying case, the sling, the strap for attaching the ammunition boxes to the tripod, two slings for carrying the tripod, the handle and cover, the punch, the cleaner, the cleaning brush, the oil cans, the ruptured cartridge extractor, recoil device and attachment for blank ammunition, the canvas bag for some accessories and for every three machine guns a belt loader. The accessories which are carried in the canvas bags are shown in fig. 37.

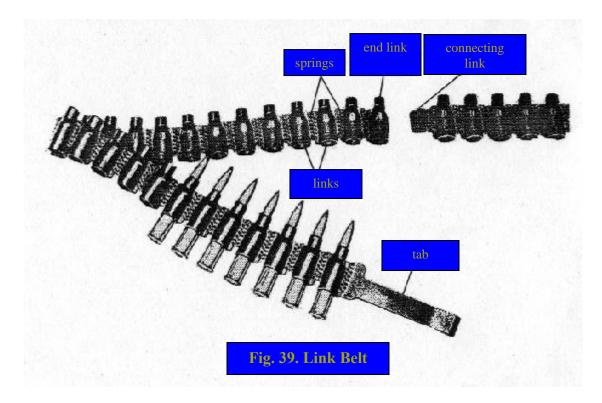


The large ammunition box (fig. 38) serves the storage and transport of a link belt holding 250 rounds. The lid is on the top of the box, and is fastened on the rear with lugs and a pin. Two brackets are riveted onto the top for fastening the carrying handle. The handle is made of linen and has rivets on the ends which fasten it to the brackets. The image of a cartridge is stamped into the lid, which indicates the direction the link belt is to be placed into the box. On the front of the lid there is a latch which is attached with lugs and a pin. On the bottom of the latch there is a profiled hole for the latch fastener. It keeps the latch shut, and

attaches the ammunition box to its bracket on the right rear leg. Two ribs are welded onto the inside of the lid, which fit onto the sides of the box.

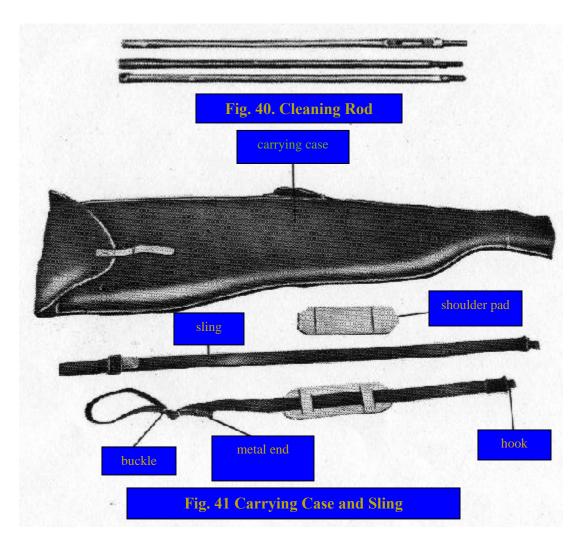
The small ammunition box (fig. 38) serves the storage and transport of a link belt holding 100 rounds. The lid and latch are fastened to the box with lugs and a pin. On the top of the lid is a shutter through which the link belt passes when the box is fastened to the ammunition box bracket on the receiver of the machine gun. When the shutter is closed, it is held in place by a round projection. In front of the round projection is the ammunition box fastener. It consists of the handle, shaft, pin, machine bolt, tooth and bracket, spring and grab. The fastener fastenes the box to the bracket on the receiver of the machine gun. The box is fastened to the tripod with the latch fastener.

The link belt (fig. 39) serves to hold 50 rounds for easy loading of the machine gun when firing. It consists of links which are held together with springs. The end link has a semi-circular notched lug so that

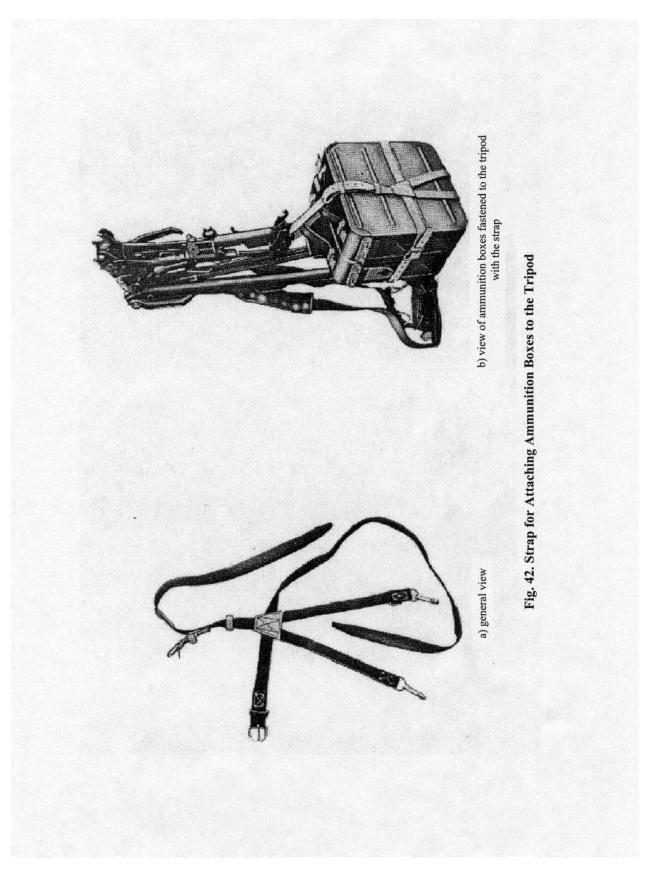


multiple link belts can be connected. The tab facilitates the feeding of the link belt into the feeding mechanism of the machine gun.

The cleaning rod (fig. 40) consists of three components and is used to clean and lubricate the barrel and to push out stuck cartridge cases from the breech. The rear end of the cleaning rod has a shoulder with a hole which holds the pin punch so the cleaning rod may be handled more easily during cleaning and lubrication of the barrel. The tip of the front end is threaded for attaching the cleaning brush and patch holder and a slot for holding patches. The components of the cleaning rod screw together.

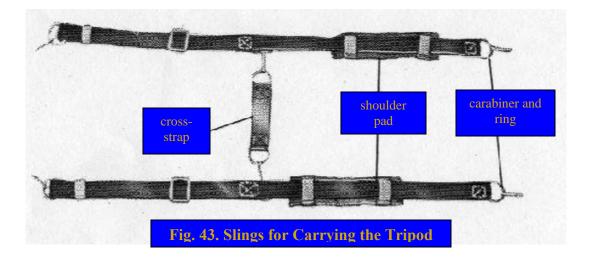


The carrying case (fig. 41) is made of tarpaulin canvas. The machine is transported in it. The handle and sling along with the leather shoulder pads allow the machine gun to be carried in various positions.



The sling (fig. 41) is a cotton strap and facilitates the carrying of the machine when encounters with the enemy are expected. On the top of the sling is a hook and the on the bottom a metal end and a buckle. The shoulder pad is slipped onto the sling so that the machine gun may be carried more comfortably.

The strap for attaching ammunition boxes to the tripod (fig. 42) is made of linen with leather extensions. The strap has two carabiners with rings which are fastened to the swivels on the rear legs, as well as two buckles for fastening the leather extensions.



The slings for carrying the tripod (fig. 43) are cotton straps and their length is adjustable. They are attached to the swivels on the tripod with the carabiners and rings. The straps have shoulder pads for comfortable carrying of the machine gun. The cross-strap and carabiners connects the slings and prevents them from falling off the wearer's shoulders.

The handle and lid serve to hold the cleaning brush, patch holder and pin punch.

The pin punch is used during disassembly and assembly of the machine gun.

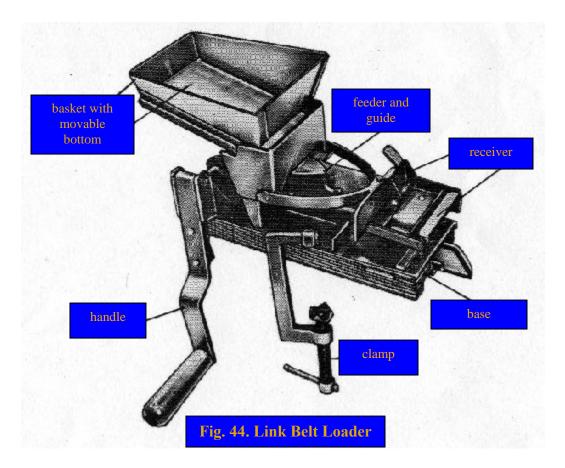
The patch holder serves to clean the barrel, and screws onto the cleaning rod. Tow or a rag is wrapped around the notched part.

The cleaning brush is used to clean and lubricate the bore of the barrel.

The oil can holds 30 cm^3 and serves to hold general-purpose protective oil (GPPO) for lubrication.

The ruptured cartridge extractor serves to extract a cartridge case whose head and rim have torn away and which has remained in the breech. It consists of the nut, flexible cap and shaft. The shaft screws into the nut.

The recoil device for blank ammunition allows proper functioning of the machine gun when firing blank ammunition. It screws onto the barrel when the flash suppressor is removed.



The attachment for blank ammunition serves to ensure proper functioning of the feed mechanism components, slide and piston, and bolt when firing blank ammunition. It fits into the longitudinal grooves on the bottom of the feed plate.

The canvas bag serves to hold the handle and lid, oil can, ruptured cartridge extractor, recoil device and blank ammunition attachment, cleaning brush, patch holder, and pin punch.

32. The link belt loader (fig. 44) serves to feed cartridges into the link belt. It consists of the loading mechanism, handle and clamp.

33. The link belt loader is packed, carried and stored in its original wooden box. It is taken from the wooden box and clamped to a table or inserted into the guide on the side of the box.

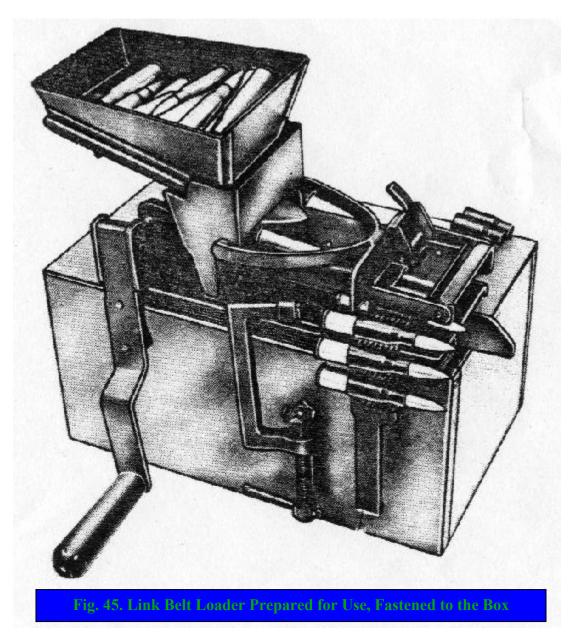
34. In order to prepare the link belt loader for use, it is necessary to do the following: remove the loader parts from the box, fasten the handle with the locking device, set up the base and fasten it to a table or to the side of the loader box, set up the link belt feed, fill the basket with cartridges so that they lie across the width of the basket, lift the lid of the receptacle and insert the link belt with the cutouts on the links facing downward, insert a cartridge into the first link by hand and place the link belt with the cartridge opposite the feed, and close the receptacle lid (fig. 45).

In order to load the link belt with cartridges turn the handle clockwise with your right hand at an even speed, and add ammunition to the basket with your left hand so that it lies across the width of the basket.

When loading the link belt, attention must be paid that the link belt does not twist.

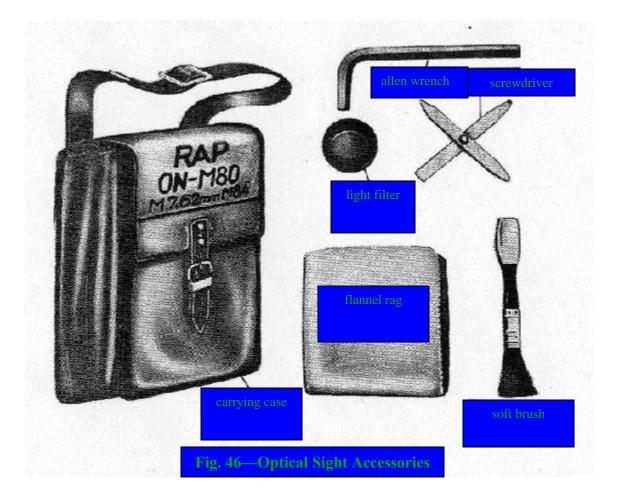
During loading the cartridges fall by their own weight into the narrow part of the conduit where the feed mechanism takes hold of them and pushes them out of the chute. The cartridge is passed forward along the conduit, and then falls onto the bottom from where the feed mechanism aligns it with the link when the handle is turned around again. When the feeder returns to the rear position, its lever moves the link belt feeder which presses it into the link belt and moves it by one link.

In order to pack the link belt loader into the wooden box, it is necessary to do the following: release the latch and move the handle along the length of the loader over the feed mechanism, raise the clamp and fasten it with the machine bolt, place the handle between the bifurcation and the clamp machine bolt, and place the components in the wooden box.



2) Optical sight accessories

35. Optical sight accessories (fig. 46) are intended for cleaning and maintenance of the instrument, carrying it on marches, setting the range mechanism drum and windage while testing the precision and accuracy, and to make the aiming in bright light more comfortable. The accessories include: carrying case, light filter, flannel rag, soft brush, screwdriver and wrench.



The carrying case is made of impregnated cotton fabric and is used for carrying the rest of the accessories.

The light filter is used in bright light to reduce reflection and to make the markings on the sight reticle more visible. The filter must be pressed onto the opening of the lens.

The flannel rag and the soft brush are to be used for wiping the outside surfaces of the lens and the eyepiece. The flannel rag must be clean at all times and kept in a polyvinyl bag.

The screwdriver and allen wrench are used to loosen and tighten the screws in order to adjust the optical sight.

3) Accessories of the 5 x 80 passive night sight

36. Accessories for the 5 x 80 passive night sight have the same purpose as the optical sight accessories. They include a packing box, a carrying case, a battery charger, a flannel rag, a soft brush, a hexagonal wrench and a screwdriver.

The packing box for the passive sight and some of the accessories is made of polyester and can be fully sealed. It contains polyurethane inserts into which the sight and certain accessories are placed. The inserts ensure that the sight and the accessories are protected during transportation and storage.

The battery charger is used to charge empty batteries.

The carrying case is made of waterproof material and used to carry the passive night sight and mount, when it is not attached to the machine gun.

The hexagonal wrench is used to rotate the screws to correct for elevation and windage while testing the accuracy and precision of the passive sight.

The screwdriver is used to loosen and tighten the screws on the passive sight base.

The flannel rag and soft brush are described in item 35.

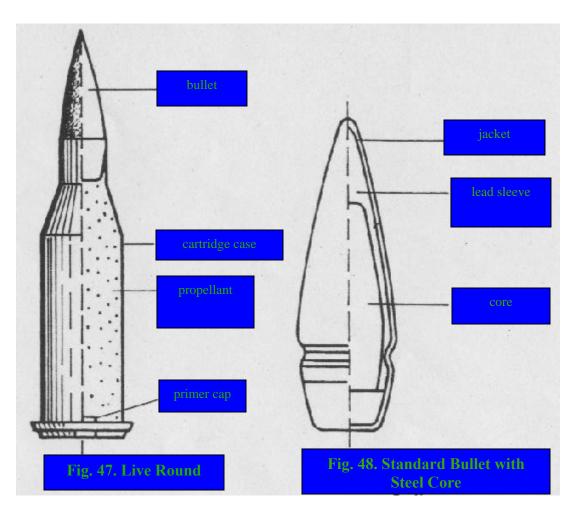
5. DESCRIPTION OF AMMUNITION

37. The machine gun uses live ammunition with a standard (steelball), heavy (lead), tracer, armor-piercing-incendiary and armor-piercingincendiary-tracer bullet. **38. Live ammunition** is designed to destroy enemy personnel and combat equipment positioned outside or behind a mask. Live ammunition (fig. 47) consists of the bullet, the cartridge case, the propellant and the primer cap.

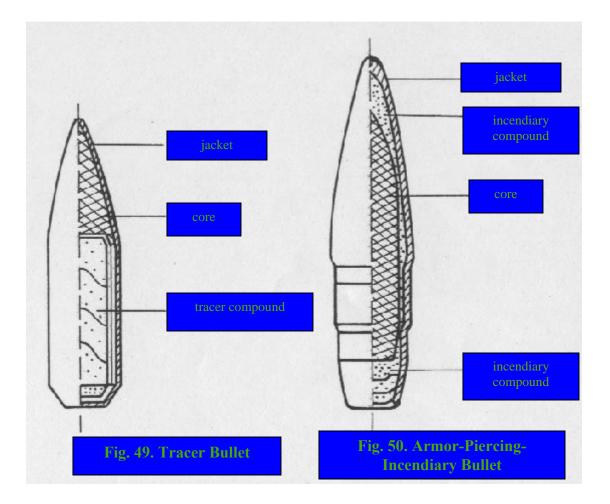
The cartridge case houses the propellant and links all the components into a whole. The cartridge case is narrow at the top and fastens the bullet. At the bottom of the cartridge case is a rim for the extractor or the extractor claw to hook into. At the bottom is a vent for the primer cap.

The primer cap ignites the propellant. It consists of the cup, the charge and the anvil. On the upper end of the anvil are two openings for the flame of the charge to pass through.

The standard (steel-ball) and the heavy (lead) bullet (fig. 48) are designed to destroy personnel and

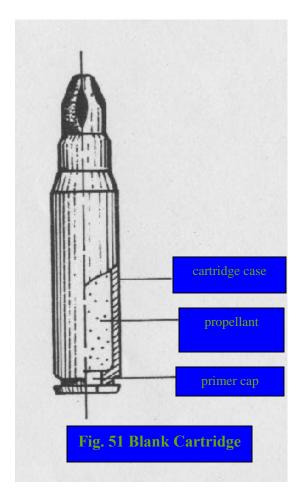


light technical equipment. They consist of a jacket and a core. The jacket is made of steel and covered with red brass. The standard bullet has a steel core and a sleeve of lead between the core and the jacket. The tip of the heavy bullet is painted yellow.



The tracer bullet (fig. 49) is designed to illuminate targets on the battlefield and correct fire at the ranges up to 1,000 meters. It consists of the jacket, the core, the cup and the tracer compound. It is less frequently used for live targets, as the burning of the tracer compound results in the bullet being lighter and having a less stable trajectory, which reduces the likelihood of it hitting the target. The tip of the bullet is painted green.

The armor-piercing-incendiary and armor-piercing-incendiarytracer bullets (fig. 50) are designed to ignite easily flammable liquid substances, and to destroy enemy personnel taking shelter behind light armor at the range of up to 500 meters. The bullet consists of the jacket, the lead envelope, the steel core, the cup and the incendiary mix. When the bullet hits the armor the incendiary mix ignites and the flame that



passes through the hole in the armor created by the lead core of the bullet ignites the flammable liquid. The tip of the bullet is painted black and it has a red ring. **The armor-piercing-incendiary-tracer bullet** has a tracer pressed into its bottom, which enables the bullet to be traced during firing. The tip of the bullet is painted violet and has a red ring.

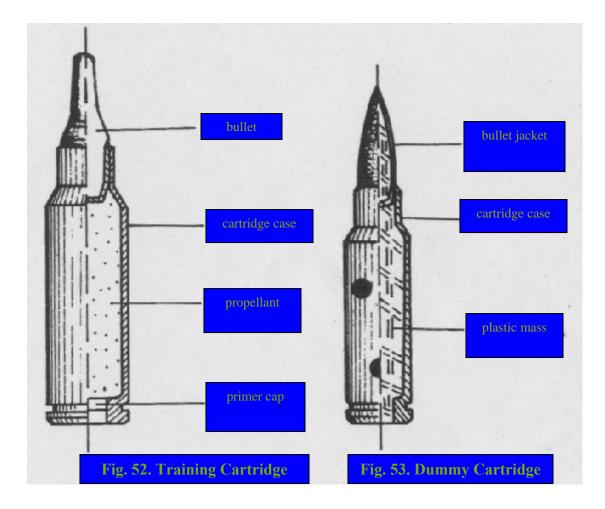
39. The blank cartridge (fig. 51) is designed for drill firing. It does not contain a bullet and its tip is crimped and protected from moisture. The cartridge case is about 10mm longer than that of a live round owing

to the crimping of the narrow part. The cartridge is hermetically sealed at the top. The powder charge is made of nitrocellulose powder (NC-1).

A safe distance for using 7.62 mm blank ammunition is 20 meters. Soldiers may be injured when firing at shorter distances.

40. The M85 training cartridge (fig. 52) is designed for practice at ranges up to 100 meters. Up to this range the training round bullet has the same characteristics as the live round bullet. Its maximum range is up to 600 meters.

41. The dummy cartridge (fig. 53) is designed for practicing loading and unloading of the machine gun. It consists of the cartridge case and the jacket. The cartridge case is filled with plastic. There are holes in the case and the jacket of the dummy to distinguish it from live rounds.



6. DISASSEMBLY AND ASSEMBLY OF THE MACHINE GUN

42. The machine gun is disassembled for the purposes of cleaning, lubrication, inspection and replacement of defective components. Frequent disassembly can be harmful, as it accelerates the wear of components.

The machine gun must be unloaded before disassembly, and if it is not loaded, make sure that it is empty.

Do not use force during disassembly and assembly. The disassembled components must be put aside and not mixed with the components of other weapons. The machine gun must be disassembled on a table, bench, blanket or pad.

43. When the machine gun is disassembled and assembled during training, it is important to insist on correct procedure before practicing speed.

During disassembly, make sure that the numbers on the box and on disassembled components match.

44. In order to unload or check whether the machine gun is empty, grasp the neck of the stock from the bottom with the fingers of your right hand, place your thumb on the serrated part of the cover latch and press the body of the latch forward and up. With your left hand open the cover. Use your right hand to remove the bandoleer from the feed plate and put it in the ammunition box, then lift the base of the feed plate up and pull the slide assembly with the piston back so that it remains in the rear position. Look and check with your finger whether the chamber is empty, and then while holding the lever of the slide assembly with the piston assembly pull the trigger with your left index finger and slowly lower the slide assembly with the piston assembly in its forward position.

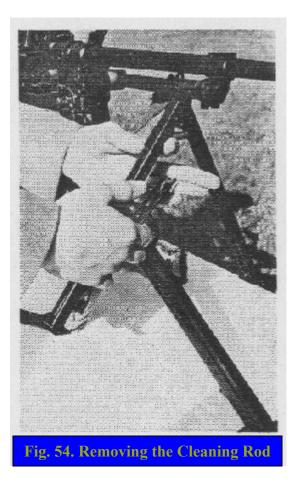
If a bullet or a casing has remained in the chamber, take out the cleaning rod from the right leg of the bipod, assemble it and remove the bullet or the casing with the wider end of the cleaning rod. The flash suppressor can be removed from the barrel while doing this.

The machine gun should not be pointed at personnel or installations during unloading, because they might be hurt or damaged by a bullet. **45.** Disassembly can begin once the ordnance has been set up and mounted on the tripod for firing at targets on the ground or when the machine gun has been taken off the tripod and placed on the bipod. When the machine gun is positioned on the tripod, it has to be fixed for windage and elevation.

When disassembling the machine gun in the unit, you can take out, disassemble and prepare the machine gun accessories, detach the optical or the 5 x 80 passive night sight, the operating rod assembly, the slide assembly with the piston assembly, the bolt, the barrel and the gas cylinder. Only expert personnel can disassemble other machine gun components.

46. Before starting disassembly, remove accessories from the pouch and line them up.

The machine gun is disassembled in the following order:



—removing the cleaning rod: if the machine gun is on the tripod, release the latch holding the bipod and extend the legs so that the machine gun can lean on them, stand on the right side of the machine gun, grasp the body of the cleaning rod fastener with the fingers of your left hand, and place the thumb on the pin head. Hold the leg with your right hand, press the pin to the right with your left thumb and pull the body of the fastener up with your fingers at the same time (fig. 54). With your right hand take out parts of the cleaning rod and assemble them;

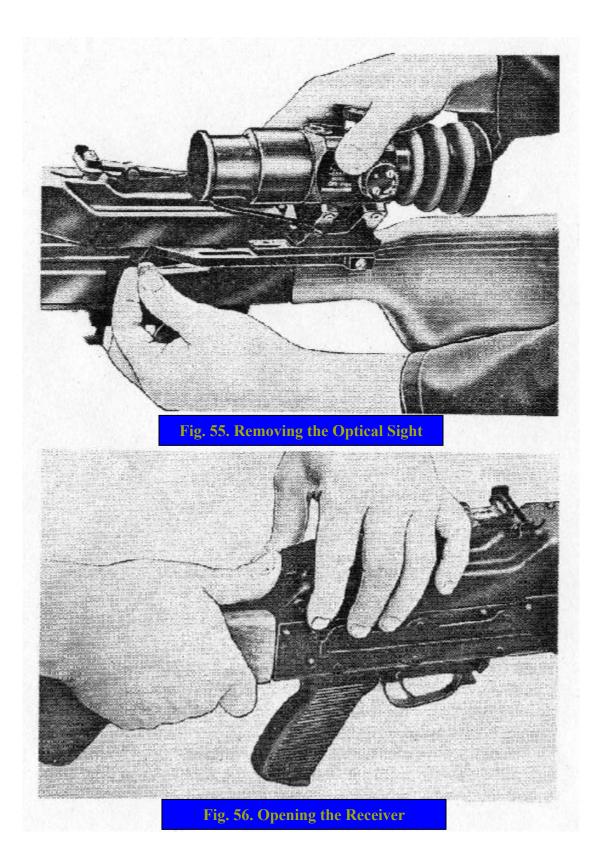
—removing the optical sight (5 x 80 passive night sight): with your right hand grasp the optical sight from above, grasp the lever of the mount latch with your index finger and your thumb and pull it rearward. The optical sight (passive night sight) and the mount need to be removed from the tripod by pulling rearward (fig. 55).

—opening the cover: with the fingers of your right hand grasp the neck of the stock and with your thumb press the body of the latch forward and up. With your left hand grasp the cover from above and lift it (Fig. 56);

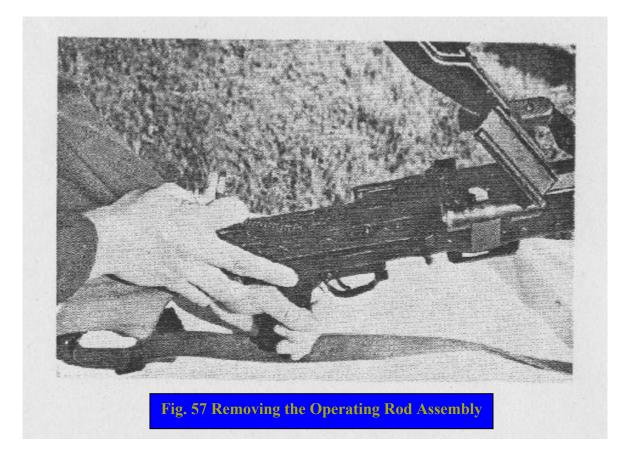
—removing the operating rod assembly: grasp the neck of the stock with the fingers of your right hand and lean your thumb against the support plate. Press the support plate forward until the lug at the rear end of the spring guide rod comes out of its housing in the gun stock bracket, and remove the operating rod assembly from the receiver by lifting it up and pulling it to the rear (fig. 57). When the machine gun is on the bipod, keep it in position by holding its grip with your left hand;

—removing the slide and piston assembly: keep the machine gun in position by holding its grip with your left hand. With the fingers of your right hand pull the slide assembly rearward until its grooves slide out of the curved sides of the receiver. Return the slide lever in its forward position, lift the slide assembly up (fig. 58) and pull it rearward;

—removing the bolt assembly: put the slide and piston assembly into the palm of your left hand so that the piston is further away from the body and the slide assembly turned upward; with your right hand pull the bolt rearward and turn it to the right until the profiled lug slides out of the grooves (fig. 59). Then turn the bolt to the right until the firing pin lug slides out of the semi-circular groove and pull the bolt rearward;



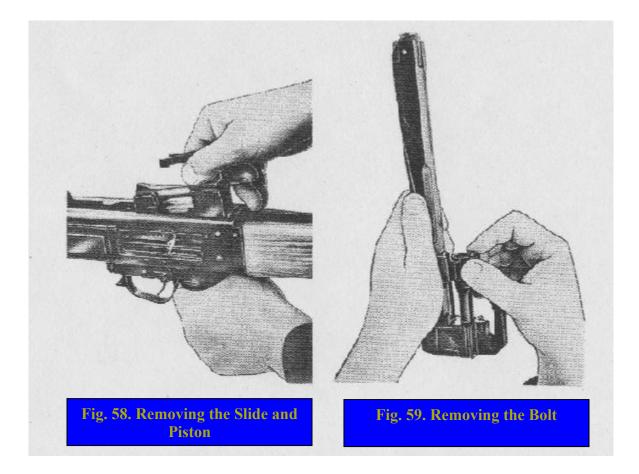
—**removing the firing pin:** take the bolt in your left hand with the groove for the firing pin facing down; with the fingers of your right hand grasp the lug of the firing pin and pull the pin forward until it is free of the guide, then take it out of the groove (fig. 60);



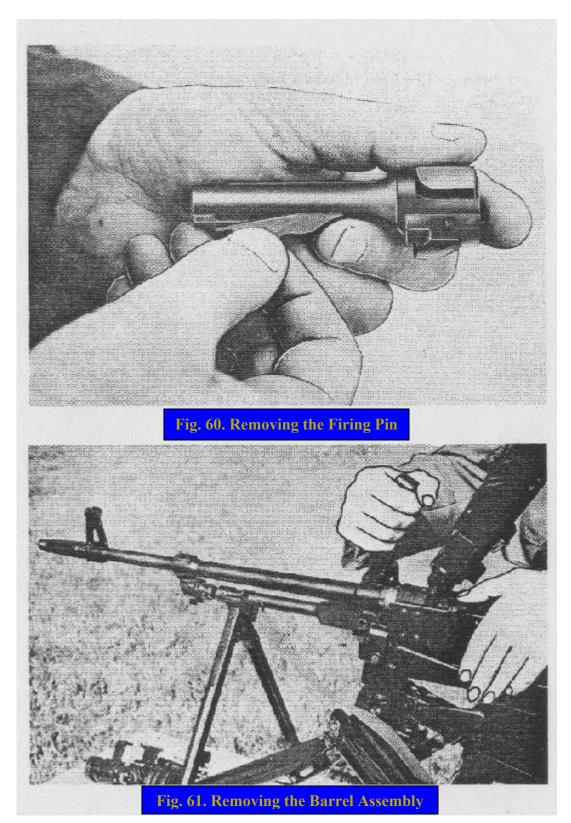
—removing the barrel: with your fingers press the lock all the way to the left, grasp the barrel handle with your left (right) hand and turn it right, pull it up and remove the barrel from the barrel socket (fig. 61). If the barrel lock cannot be moved to the left by pressing with your hand (the machine gun is dirty of rusty), push the slide assembly into the receiver, press the cartridge feed pawl with the thumb of your left hand towards the barrel lock and pull the slide assembly into its rear position;

—removing the gas cylinder: in order to remove the gas cylinder, remove the machine gun from the tripod, grasp the barrel socket with your left hand and the gas cylinder with your right hand, pressing with the thumb on the latch (fig. 62) until its guide ribs slide out of the

grooves on the barrel socket and the cylinder can be pulled forward together with the bipod and removed from the receiver.



47. The flash suppressor (Fig. 63) and the gas regulator can be removed from the barrel during weekly (periodic) inspections in order to be cleaned. Only an expert-rifle maintenance officer can remove the gas regulator. The gas regulator has to be put in position "3" to be removed, the barrel has to be placed in a vertical position and the regulator has to be removed from the gas block by knocking lightly with the hammer on the lugs of the gas regulator.



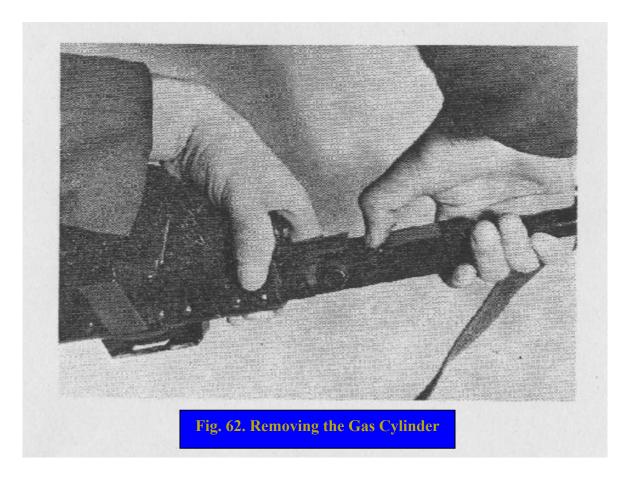
48. The machine gun is assembled in reverse order as follows: —when adjusting the gas regulator turn the muzzle downward;

—when adjusting the barrel move the gas block so that it fits into the gas cylinder;

—the slide assembly can be pressed in its forward-most position only after the trigger has been pulled rearward;

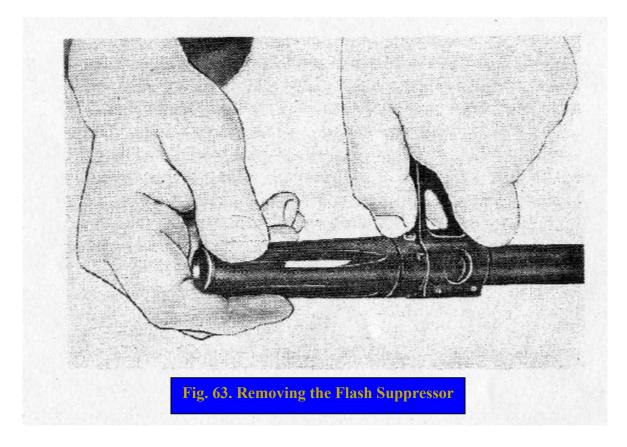
-the cleaning rod is disassembled and placed in the right leg, and

-after assembling the cleaning rod the legs are assembled and fastened.



In order to check whether the components are functioning properly after assembly, pull the slide assembly into its rear position, pull the trigger and release it into its forward position by holding the slide assembly back with the cocking lever.

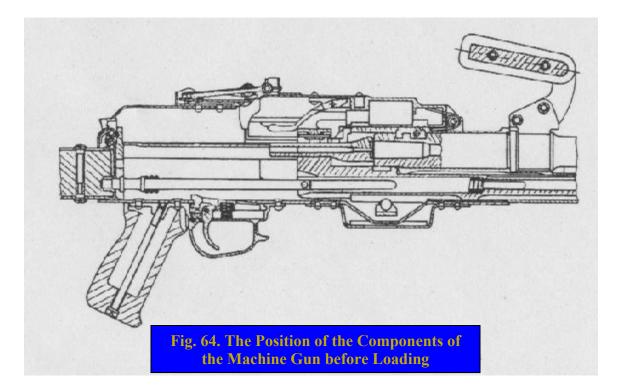
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7. THE CYCLE OF FUNCTIONING OF THE MACHINE GUN

1) The position of the components of the machine gun before loading

49. The slide along with the piston and bolt, under pressure from the driving spring, is in the forward position; the piston is at the opening of the gas cylinder and the rear of the barrel is sealed by the bolt. The bolt is turned along its longitudinal axis to the right, so that its lugs have entered into the grooves on the barrel socket. The firing pin is in the forward position and its tip protrudes through the hole in the bolt face (fig. 64). The driving spring is minimally compressed. The cocking lever is in the forward position.



The lug of the feed pawl is located in the groove in the right side of the slide, and the feed pawl is in the extreme rightward position. The claw of the feed pawl is raised upward by its spring. The cartridge retainer pawl and the cover lever in the receiver cover are pressed downward by their respective springs.

The trigger lever is in the forward position. The safe is moved forward in the "FIRE" position. Its recess is thereby facing upward and allows the trigger to be pulled down.

The shutter seals the ejection port (for unfired cartridges) on the receiver.

The receiver cover is closed and the feed shutter is pressed downward by its spring.

2) The position of the components of the machine gun during loading

50. The machine gun is loaded in as follows:

—open the ammunition box and fasten it to the right rear leg of the tripod;

—open the cover of the ammunition box;

—remove the end of the loaded link belt from the ammunition box and place it on the feed plate so that the rim of the first cartridge fits into the extractor claws;

—close the receiver cover;

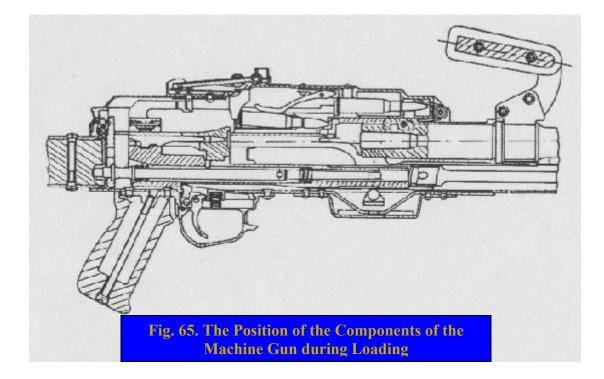
—pull the slide and piston all the way back and release it forward until the sear tooth catches it, and

—return the cocking lever to the forward position.

51. When the cocking lever is pulled to the rear, its tooth catches the perpendicular notch in the top right side of the slide and pulls the slide to the rear. As it moves backward, the slide simultaneously pulls the piston and compresses the driving spring. When the slide has passed 10–15 mm, the beveled surfaces of its spiraled groove press the profiled lug of the bolt and turn it to the left; the rectangular lug of the bolt is raised above the lug in the barrel socket, and the ejector tooth comes into line with the longitudinal groove of the bolt. The bolt is now unlocked and free to move to the rear.

As the slide moves backward, the roller and lug of the feed pawl assembly move along the grooves on the side of the slide, and the feed pawl assembly is pushed downward into the well on the bottom of the receiver, whereby the claw of the feed pawl is simultaneously moved to the left. The feed pawl claw catches a belt link with a cartridge and

presses the belt to the left until the cartridge rests against the stop lugs on the feed plate.



Given that the first cartridge was positioned between the claws of the cartridge extractor, when the slide moves to the rear the cartridge extractor catches the rim of the cartridge case the rectangular notches on its claws and extracts it from the belt link and carries it back to the vertical recesses on the guide grooves of the feed plate. At that moment the cartridge stop and the cover lever press the cartridge through the vertical slots and it falls out of the extractor arms (fig. 65).

When the slide and bolt reach the rearmost position and the cocking lever is released, the slide moves forward under pressure from the driving spring and its notched lug comes into contact with the sear tooth and remains cocked.

The machine gun is now ready to open fire.

3) The sequence of functioning of the machine gun during firing

52. When the trigger is pulled to the rear, it pivots around its pivot pin and its tooth catches the sear and pulls the sear tooth downward. As

this happens the sear compresses its spring and frees the slide which moves swiftly forward under pressure from the driving spring.

As the bolt moves forward its feed lug catches the cartridge and pushes it along the feed lugs of the feed plate and feeds it into the chamber. When the bolt head closes on the breech and the cartridge, the slide continues moving forward and the pressure of the beveled surface of the profiled groove on the profiled lug of the bolt turns the bolt to the right, whereby its rectangular lug falls behind rests against the locking lug in the barrel socket. The ejector tooth simultaneously enters the oval recess in the rear of the bolt. When the slide reaches the forward position, the extractor catches on the cartridge rim, and the cartridge extractor catches the next cartridge with its arms. Given that the firing pin is fitted in the semi-circular groove of the slide, it moves forward with the slide and strikes the primer cap, upon which the cartridge is fired.

As the slide moves forward the feed pawl claw moves to the right and slips behind the next belt link and cartridge.

The automatic action of the machine gun is based on the use of the energy of the propellant gases that are expelled from the bore through the gas block and against the slide. When the firing pin strikes the primer cap, the priming compound is ignited and the resulting flame passes through the vent in the cartridge head and ignites the propellant. The propellant gases force the bullet through the bore. As soon as the bullet passes the gas port, some of the propellant gases enter the gas block, create pressure and force the piston backward, which in turn moves the slide to the rear.

The bolt is unlocked just as when the slide is moved to the rear manually. Carried by the slide, the bolt extracts the cartridge case from the chamber and pulls it backward. The rear left side of the slide exerts pressure on the shutter lever, which opens the ejection shutter. At the moment when the shutter is completely open, the ejector tooth catches the cartridge case, frees it from the tooth of the extractor tooth and ejects it through the ejection port. Automatic fire lasts as long as pressure is exerted on the trigger or until all rounds in the link belt are fired. When the trigger is released, the shear is pressed upward by its spring and when the slide moves forward the sear tooth catches it.

4) Putting the machine gun on safe.

52. In order to switch the machine gun to safe, the blade of the safety must be turned backward (toward the stock), whereby the lug on the shank of the safety rotates upward and stops facing the lug on the trigger lever. With the safety in this position, the trigger cannot move back to the rear position, so that the sear tooth is always raised and prevents the slide from moving forward.

8. STOPPAGES DURING FIRING AND CORRECTIVE ACTIONS

54. When handled, maintained and stored properly, the machine gun is a safe weapons to use and functions without interruption.

After prolonged operation, owing to the wear or breakage of individual components, presence of dirt, use of faulty ammunition or negligent handling, defects may appear that cause stoppage. In order to prevent stoppage, soldiers and officers must strictly observe the rules on handling, disassembly, cleaning, assembly and inspection of weapons; prior to firing inspect the ammunition belt and ammunition; the machine gun should not be loaded with faulty or dirty ammunition; prior to loading, wipe the ammunition with a dry rag; during firing, while running or pausing in combat, take good care of the weapon; inspect, clean and lubricate the machine gun regularly, especially its movable components, the bore, the gas block, the gas regulator, the gas cylinder, the receiver, the feed mechanism and ammunition belt; prior to firing regularly clean the barrel and lightly lubricate the receiver and the bolt assembly; during uninterrupted firing do not exceed the limit of 250 rounds. If stoppage occurs, wait up to 5 seconds, pull the bolt rearward, eject the stuck round and continue to fire. If stoppage reoccurs, empty the machine gun, establish the cause of stoppage and clear it, if possible. If stoppage cannot be cleared, send the machine gun in for repair.

55. Types of stoppage, their causes and ways of elimination are described in Table 1.

9. TESTING THE ACCURACY AND PRECISION OF FIRING

1) General provisions

56. All machine guns used in the unit have to be able to fire accurately and precisely.

Accuracy and precision of a machine gun must be tested whenever the machine gun is received in the unit, if the blade moves, when the shots are not grouped around the aiming point, or when there are no data on the accuracy and precision of the machine gun.

57. The accuracy of weapons used in the unit is tested by the commission to be appointed by the commander of a brigade or regiment (independent battalion). The following members are appointed to the commission: company commander, regiment commander and rifle maintenance officer. Two or three marksmen are also assigned to the commission (soldiers, officers or marksmen, as well as civilians). The crew whose weapon is being tested also attends the testing.

IVE ACTIONS	CORRECTIVE ACTION	3	disengage safety and pull back cocking lever; press cover latch and open cover, if cover does not open, use tools to feed the first round properly.	pull bolt rearward and release it suddenly; empty machine gun; clean receiver and bolt; if the driving spring is broken or weak or the bolt face is worn, send the machine gun to the armorer for repair	remove barrel and lightly lubricate the chamber, gas port and receiver surfaces that rub against each other, or replace faulty round or link belt	eject the round from the machine gun and in the event of a weak indent from the firing pin, remove the bolt, clean and lightly lubricate it; clean and lightly lubricate the chamber, and if the firing pin is broken, send the machine gun to the armorer for repair
STOPPAGES, THEIR CAUSES AND CORRECTIVE ACTIONS	CAUSE OF STOPPAGE	2	 improper feeding, the first round did not reach cartridge stop; safety is on "S" - safe. 	 broken or weak driving spring, lubricant buildup or dirt in receiver assembly; worn bolt face . 	 dirty receiver and chamber or gas port, dirty and bent round, or belt links with rounds jammed in the feed tray 	 faulty round; faulty firing pin or dirty machine gun
STOPPAGES,	STOPPAGE	1	 Bolt fails to move to the rear and extract the round from the link belt, round jams under the bolt head. 	 Bolt fails to move to the rear and push the round out of the feed. The round jams between the bolt and the barrel or its tip hits against the breech. 	3. Bolt fails to lock.	4. Failure to fire.

TABLE 1

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OPPAGE		spring; .orn off; . or	between the face, or	surfaces, gas or block
CAUSE OF STOPPAGE	2	 faulty extractor or spring; dirty chamber; cartridge case rim torn off; dirty gas port or cylinder; faulty shutter lever, or faulty extractor 	 large headspace between breech and the bolt face, or faulty round 	 dirty receiver surfaces, port, gas cylinder or block
STOPPAGE	1	Cartridge case does not eject.	Ruptured cartridge case, so the next round does not fit into the chamber	Cartridge case does not eject from the receiver
		ý.	6. C II	7C f

cock the machine gun and if that ejects the front part of the

the

cartridge case of the fired round,

continue firing, and

gas

regulator to a lower position (to

tears off again, turn the

in the event of a faulty extractor

reduce the flow of gases);

send the machine gun to the

armorer for repair

if the rim of the cartridge case

receiver;

with the bottom intact from the barrel using cleaning rod, clean

and lubricate the chamber, the gas port, the gas cylinder and the

eject the stuck cartridge case

 \mathbf{c}

CORRECTIVE ACTION

have the headspace adjusted (at a

repair facility)

eject the cartridge case and

continue firing;

if the stoppage reoccurs, clean and lubricate the receiver, gas

port and extractor

if the same stoppage reoccurs,

	STOPPAGE	CAUSE OF STOPPAGE	CORRECTIVE ACTION
	1	2	e
×.	Slide does not return to the rear position.	 dirty receiver, feed mechanism, link belt or ammunition, or link belt stuck in the ammunition box or twisted in the feed mechanism 	with the cocking handle pull the slide back to the sear tooth and continue firing. If the stoppage reoccurs, disassemble the machine gun, check how the ammunition is packed in the box and whether the link belt is properly loaded. If the belt is properly folded, turn the gas regulator to a higher position. At the earliest possibility clean and lubricate the machine gun
.6	Uncontrolled fire/runaway machine gun.	 faulty trigger mechanism; worn notched lug at the bottom of the slide; lubricant buildup or presence of dirt inside the machine gun 	interrupt fire by pressing the belt towards the feed mechanism with your hand. Empty the machine gun, inspect the sear and the notched lug on the frame of the slide. If they are free of defects, switch gas regulator to a higher position and lubricate the interlocking parts
10.	10. Rounds fail to extract from the belt or fall out of cartridge extractor claws.	 faulty cartridge extractor claws; dirty or faulty feed pawl, or cartridge retainer pawl; bent belt links or rounds 	if the cartridge extractor and feed mechanism components are functioning properly and the belt and ammunition are free of defects, clean the machine gun and continue firing; if machine gun components are defective, send it to the armorer for repair

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58. Before the testing commences, the weapon must be cleaned and inspected. After this the front and the back sight, the bolt, the trigger mechanism, and the operating rob assembly are checked, as well as the corrosion and the proper functioning of the barrel.

Defective weapons cannot be used to check firing accuracy.

59. Accuracy and precision of a weapon are tested only in favorable weather conditions (nice and warm weather, with no precipitation or wind), in areas covered with a roof or parts of the range protected from the wind or the rain.

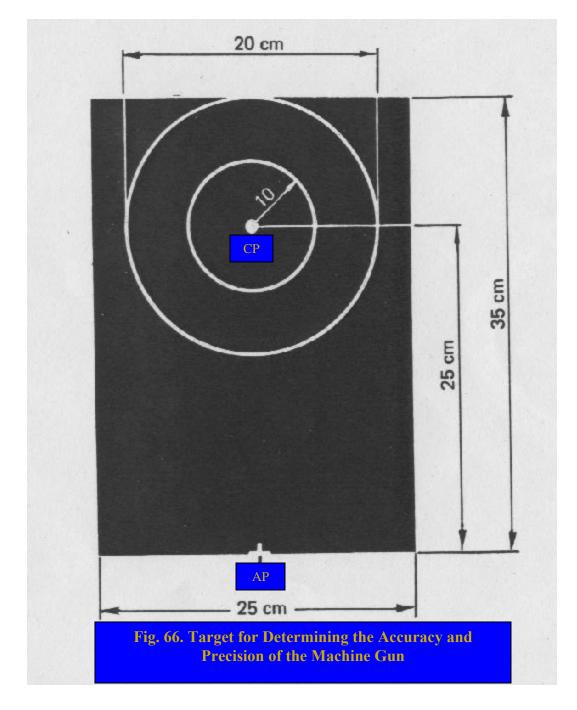
2) Testing the mechanical sights

60. The precision and accuracy of the machine gun are tested by opening semi-automatic or automatic fire from a bipod or only automatic fire from the mount. After the firing has been completed, group spread and position of the central shot in relation to the control point are determined separately for every type of fire.

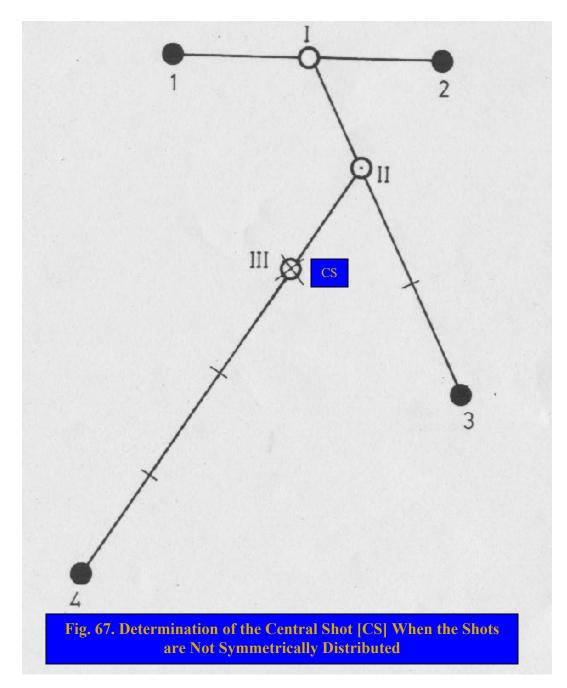
61. When opening semi-automatic fire, the precision and accuracy of the machine gun is tested by firing 4 live rounds with a standard bullet of the same series and from the same package. The firing is performed at the range of 100 meters with the sight set on "3," and the sight bar division set on basic (the notch on the sight bar with a white line is placed opposite the middle notch on the scale). The firing is performed from the prone position with a bipod by marksmen.

62. A 1 x 1 meter training target is used and a target for testing the accuracy and precision of a machine gun (fig. 66) is attached to it. The target is in the shape of a rectangular 35 cm high and 25 cm wide. The aiming point [AP] is at the center of the lower edge of a black rectangular and has to be level with the weapon. A different color is used to mark the point that represents the central shot (control point [CP]) 25 centimeters above the aiming point. 10 and 20 cm-radius rings are drawn around the control point.

When the firing has been completed, the target is checked and the group size (precision) is determined as well as the position of the center shot (accuracy).

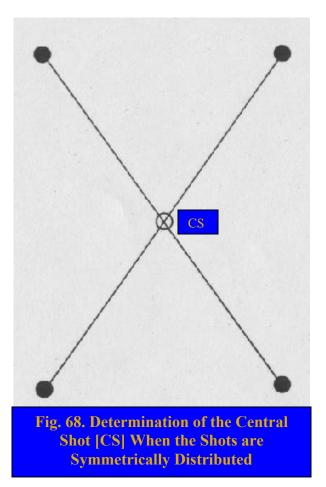


63. The machine gun is adequately precise and accurate if at least 3 out of 4 shots fall within a 15 cm-radius ring, and the group center is not outside the 5 cm-radius ring. (Shots that touch the ring on the outside are also considered valid.)



64. If precision is inadequate (loose spread), the commission will determine its causes. Once the cause has been established and the machine gun has been repaired, the same marksman fires again. In the event of another large dispersal, another marksman fires the same machine gun. If no desired precision is achieved, the firing is interrupted, and the machine gun is sent in for repair as imprecise. Three group pictures are sent along with the pistol.

65. Once satisfactory precision is achieved, the accuracy of the machine gun is determined by establishing the central shot in the group spread, determining its position and how much it deviates from the control point. The central shot (CS) for a group of four shots is determined in the following way (fig. 67):



—connect the two closest shots with a straight line and divide the distance between them in two equal parts (the point in the middle is their central shot);

—connect the central shot of the first two shots with the third one and divide the distance between them into three equal parts. The point closest to the central shot of the first two shots is the central shot of these three shots;

—connect the central shot of the three shots with a straight line with the fourth shot and divide it into four equal parts. The point closest

to the central shot of the first three shots is the central shot of the entire group.

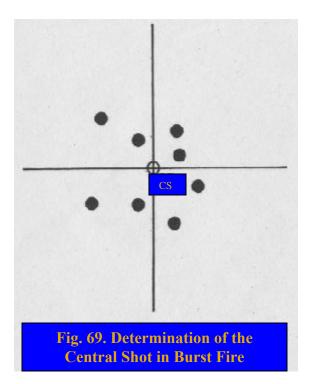
In order to determine the position and the deviation of the central shot from the control point (CP) more accurately, draw a vertical and a horizontal line through the control point and establish the position of the central shot (left, right, underneath or above). The horizontal and the vertical deviation of the central shot is measured with a ruler.

66. When the group spread is symmetrical, the central shot is determined according to fig. 68.

67. After the testing with semi-automatic fire has been completed, the firing with automatic fire is tested under the conditions described in items 61 to 64. A total of 10 bullets are fired in 3-4 short bursts.

When opening automatic fire, the machine gun is considered sufficiently precise and accurate if at least 7 out of 8 shots falls within a 20cm-radius ring, and the central shot does not deviate from the control point more than 5 cm to either side.

If adequate precision is not achieved with automatic fire, repeat the steps described in item 64.



68. When opening automatic fire the central shot is determined by counting half a number of shots up or down the vertical line (either above or down) and drawing a horizontal line, and then counting half a number of shots (from right to left) and drawing another vertical line (fig. 69).

The point where the vertical and the horizontal line cross is the position of the central shot when a number of rounds are fired in bursts.

69. The precision of the machine gun when firing automatic fire does not depend only on the proper functioning of the machine gun but also on the experience and the proficiency of the sight setter. In controversial cases, when the sight setter has influenced the precision, testing has to be repeated.

70. When the spread is satisfactory and the central shot deviates from the control point more than 5 cm, the following steps need to be taken: if the central shot deviates to the right, move the blade base to the right, if it deviates to the left, move the blade base to the left. If the central shot is underneath the control point, the blade is lowered down by rotation, if the central shot is above the control point, it is raised by rotation.

71. How much the blade base is moved, i.e. raised (or lowered), depends on how much the central shot deviates and the length of the aiming line as shown in tables 2 and 3.

										TA	ABLE 2
Central shot											
deviation (cm)											
	5	7.5	10	12.5	15	17.5	20	22	25	27.5	30
Blade moved horizontally	0.33	0.5	0.66	0 00	1	1.17	1.33	1.5	1.66	1.83	C
(mm)	0.33	0.5	0.00	0.88	1	1.17	1.55	1.5	1.00	1.65	Z

TABLE 3

Rotation of blade	1/4	1/2	3/4	1
(in full circles)				
Vertical deviation of	3	6	9	12
the central shot				
(cm)				

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TABLE 2

72. The way to calculate the deviation of the central shot if the blade moves 1mm to either side can be seen on the following example:

Example

The line of aim of the machine gun is 663 mm. The testing is carried out at the range of 100 meters or 100,000 millimeters. This can be expressed by the following equation:

663:1=100,000: x

 $x = \frac{100,000}{663} = 151 \text{mm} = 15 \text{cm}$

73. The rifle maintenance officer adjusts the blade base or the elevation on the spot. The blade base can be moved sidewise until it is aligned with the external surface of the front sight base.

74. After the blade base is moved or its elevation adjusted by means of rotation, four single rounds are fired at the same target. The accuracy of the machine gun is determined as described in items 65 and 66. If this proves inadequate, further correction is carried out and the firing is repeated.

If owing to a significant deviation of the central shot the blade base needs to be moved to the right (or left) more than allowed, another marksman carries out the firing. If the results are the same, the testing is discontinued and the machine gun is sent in for repair as inaccurate.

75. The testing of accuracy and precision with automatic fire is carried out after the blade has been adjusted based on the results achieved with semi-automatic fire. If the central shot is more than 5 cm away from the control point, the proper functioning of the machine gun must be checked again in order to establish whether the error lies with the sight setter or the position of the machine gun in the firing emplacement. After this the firing is repeated.

If no satisfactory results are achieved, the machine gun is sent in for inspection and repair.

76. If the results achieved with automatic fire are satisfactory (central shot not more than 5 cm away), the pattern of shots is copied

from the target onto a piece of paper on the scale 1:5. The number of the machine gun, date, time, temperature and height above sea-level are recorded on the copy of the target, which is signed by the members of the commission.

This data is submitted along with the technical manual of the machine gun to be consulted whenever information on precision and accuracy is required.

77. After the precision of the machine gun has been tested with a bipod, the testing is carried out with 10 bursts of automatic fire fired from a tripod mount. The tripod is set for firing from a prone position, and the same aiming point is used. The traversal and elevation mechanism has to be set and the stock supported on the shoulder. The machine gun is precise enough if 8 out of 10 shots fall within the 20cm-radius ring and the central shot is not more than 5 cm away from the control point. The firing can be repeated two or three times, and if no satisfactory results are achieved, the machine gun is sent it for repair.

78. If the machine gun is not precise enough, and the central shot falls more than one mil (0-01) from the control point, the distance between the central shot and the control point is measured both horizontally and vertically. The resulting deviation in divisions of the rear sight and the deflection correction is recorded in the documentation and taken into consideration during tripod firing.

3) Testing the optical sight

79. In order to test the accuracy of the optical sight, the machine gun is placed on the tripod and with the mechanical sight set on "3" the machine gun is aimed at the base of the black rectangular. After aiming, the machine gun is set for windage and elevation and the optical sight is carefully (without moving the machine gun) fitted with settings "3" on the range knob and "0" on the direction knob.

Aiming (sighting) with the optical sight is designed to check where the tip of the central arrow (center of the optical sight) falls on the testing target. **80.** If the tip of the central arrow overlaps with the aiming point on the target, the optical sight is completely accurate.

81. If the tip of the central arrow and the aiming point on the target do not overlap, move the tip of the central arrow to the aiming point by slowly rotating the windage and elevation knobs.

After this, slowly loosen the screws on the optical sight windage and elevation knobs without moving the notched wheels. The range knob is rotated to the index position and the scale of the windage knob to "0." After tightening the screws, make sure that the reticle has not moved. If necessary, repeat the procedure.

82. After the optical sight has been inspected and adjusted, four single rounds are fired aiming at the same aiming point as when firing with mechanical sights. If all four shots fall within the 15cm-radius ring, and the central shot is more than 5cm away from the control point to either side, error values must be established and the range and windage knobs adjusted to achieve satisfactory accuracy during repeated firing with settings "3" and "0."

83. After each adjustment of the knobs four rounds must be fired. The testing of precision and accuracy of the optical sight is completed when all four shots fall into the 15cm-radius ring and the central shot is not more than 5 cm away from the control point.

CHAPTER II

STORAGE, MAINTENANCE, PACKAGING AND MARKING

1. STORAGE OF THE MACHINE GUN AND AMMUNITION

1) Storage of the machine gun

84. The machine gun must at all times be in good working order and ready for action. It is therefore the crew's duty to store, clean and maintain the machine gun components, handle them carefully and inspect them daily.

85. At the barracks the machine gun is stored in a carrying case (empty and with the bolt in the front position). The trigger must be pulled, the adjustment knob in the front position, the stock folded and the bipod folded backwards and fastened. Prepared in such a way, the machine gun is stored on a gun rack. The machine gun should be placed on and removed from a gun rack carefully and without knocking it around.

86. In a camp, the machine gun is stored on a gun rack as described in item 85, or positioned on a tripod. If the machine gun is stored on a tripod (without the carrying case), it has to be covered with a ground cloth or another kind of cover, especially at night and when it is raining. The legs of the tripod must be placed on a wooden plank or another kind of dry platform (woven switches) in order to protect them from moisture and dirt.

87. In settled areas the machine gun should be stored empty in convenient areas as described in item 86 and away from open flame or any kind of heating element. It is prohibited to lean the machine gun (with or without the carrying case) on the walls or other objects.

In exceptional cases, the machine gun can be stored without the carrying case positioned on the tripod.

88. In apartment buildings, tents or shelters, the sight setter should carry the machine gun in the hand at all times, making sure that it does not knock against the wall, staircase or any other kind of hard object.

89. On the march, the machine gun is carried on the right shoulder, on the back (across the chest), the hunter's style and on the shoulder. When it is likely that the enemy will be encountered, the machine gun should be carried without the carrying case.

The tripod is carried on the back (or at the chest). When there are no ammunition boxes on the tripod, it can also be carried on the side with one link belt on the shoulder.

While resting, the machine gun is put aside with the handle leaning on the ground or the bipod.

90. During transportation by train, car, plane or ship, the machine gun should be held in a vertical position between the legs (or in the hand

if standing), making sure that it does not fall down or get damaged. It can also be placed on the bipod.

91. The crew always carries the machine gun accessories together with the machine gun. The pin punch, brush and patch holder (located inside the handle and lid), oil can, ruptured cartridge case extractor, recoil device and attachment for blank ammunition are carried in the carrying case.

The link belt loader is transported in the company supply station vehicle.

The optical sight and accessories are carried by the gunner in the carrying case.

92. During maneuvers and in combat prevent the weapon from hitting hard objects, sand or dirt entering the receiver, the feed mechanism and the link belts, and any damage to the sights. Before use, remove lubricants from the machine gun, and inspect and clean the ammunition.

It is prohibited to place any obstruction in the barrel, for the barrel would expand or burst during firing. It is also prohibited to feed the machine gun link belts with faulty ammunition.

93. The gunner must immediately report all irregularities found on the machine gun to his superior officer, who is required to send such ordnance in for repair. Soldiers are prohibited from carrying out any kinds of repair on the machine gun, the tripod or the accessories.

94. During training and in all other situations the machine gun barrel must not be turned towards personnel or buildings in order to avoid accidents.

2) Storage of the ammunition

95. Ammunition is stored in dry, damp-proof areas, and stacked according to caliber, powder type and lab series. Ammunition must be stored in original ammunition boxes. It is prohibited to store live or training ammunition unpacked in ammunition depots.

96. In peacetime, after the completion of firing or target practice, any unused ammunition or misfires must be immediately returned to the depot envisaged for storing ammunition.

97. In combat, ammunition is either kept by the soldiers or stored at the company supply station. The ammunition kept by the soldiers is stored in link belts kept inside the ammunition boxes, which need to be protected from moisture.

At the company supply station, the ammunition is stored in original ammunition boxes. It is prohibited to keep different types of ammunition in one and the same box.

98. Training rounds used by the soldiers are also kept in link belts stored inside the ammunition boxes. Training rounds that are not being used are stored in ammunition depots in especially designated ammunition boxes.

2. BASIC MAINTENANCE

99. Basic maintenance serves the purpose of ensuring at all times the proper functioning of the machine gun and the ammunition that is being used or stored in ammunition depots.

Basic maintenance of the machine gun includes daily inspections, servicing and periodic (weekly) inspections.

100. Daily inspections are designed to ensure the proper functioning of the machine gun and its completeness. They are carried out by the squad commander and members of the crew.

Daily inspections include inspections prior to, during and after the use of the weapon. Inspections prior to and during use are carried out with the machine gun assembled; in order to conduct inspections after use the machine gun is disassembled and cleaned.

1) Inspection of the assembled machine gun

101. Inspection of the assembled machine gun is supposed to establish the following:

—whether the machine gun is empty;

—the presence of corrosion, scratches and dents on metal parts or cracks on the gun stock;

—the proper functioning of mechanical sights (whether the sight leaf folds over and the elevation knob rotates easily);

—whether the optical sight is securely fastened, whether the rubber eye shield and the cover are properly adjusted and in good working order, and whether the cover is fastened with a string;

—whether the cover pin securely fastens the cover;

—whether the entry and exit shutters close the openings for the passage of the link belt and whether the springs are working properly;

—whether the gas regulator is in the desired position;

—whether the bipod folds and locks in position easily;

—whether the flash suppressor is properly screwed on the barrel and fastened with a pin;

—whether the machine gun is properly positioned and fastened on the tripod;

—whether the machine gun can be easily moved for windage and elevation and locked in a specific position;

—whether the mechanism for precision adjustment of the machine gun for elevation functions properly;

—whether the ammunition box is properly fastened on the ammunition box bracket;

—whether the machine gun and the optical sight accessories are complete and in good working order.

After this, in order to check the good working order and proper functioning of machine gun component and the ordnance as a whole, the following must be done: open the cover and check that the feed assembly components (feed plate, feed pawl, guard and cartridge retainer pawl) are not damaged or broken; open the ammunition box cover and position the link belt filled with training rounds in the feed plate; close the cover and pull the slide with the bolt rearward before returning the cocking lever forward; pull the trigger; open the cover and remove the link belt from the feed plate; pull the slide with the bolt rearward and eject the round through the cartridge ejection port, then while holding the cocking lever with your fingers return the slide in the forward position.

2) Inspection of the disassembled machine gun

102. Inspection of a disassembled machine gun is intended to check the proper working order of individual components, such as:

—the barrel assembly: that there are no dents, scratches or dirt on the outside; that there are no cracks on the handle and that the tooth of the handle is not worn or broken; that the handle can be moved longitudinally and vertically; whether the flash suppressor screws onto the barrel easily and can be fastened with the pin; that there is no powder fouling, dirt, corrosion, scratches in the interior of the barrel, and that there are no bulges in the barrel;

—receiver assembly and grip: that they are free of dents, scratches, corrosion or dirt; that the cartridge ejector is not worn or broken; that cocking lever slides easily and its tooth is neither worn nor broken and that the spring and shaft of the lever are operating properly; that there is no corrosion or dirt and no scratches on the barrel lock, and that the lock is equipped with the machine bolt, the plug and the pin; whether the shutters on the opening for cartridge ejection function properly, whether the grip is properly fastened with the machine bolt and not cracked;

—receiver cover and feed mechanism assembly: that they are free of dents, scratches, dirt and corrosion; that the cover latch is in good working order and the tooth not worn or broken; that the spring holds the cover in the upright position; that the(entry and exit) shutter springs press the shutters towards the cover; that the traversal stop is not broken; that the cover lever is not broken and that the spring constantly pushes it downward; that there are no scratches, corrosion, dirt on the feed plate and that the latch holds the feed plate in the upright position; that the feed pawl assembly components are not broken or damaged, and that the cartridge retainer pawl is not damaged or broken;

—trigger mechanism: that there is no dirt, corrosion and no scratches on the trigger mechanism components; that the sear spring is not broken and the sear tooth is neither damaged nor worn; that the trigger tooth catches the sear tooth and pulls the sear downward; and that

the safety in the "safe" position prevents the trigger from being pulled rearward;

—gun stock assembly: that the stock fits well next to the receiver and has no cracks; that the sling swivel is properly and securely fastened; that the shoulder rest spring holds the shoulder rest in an extended or folded position;

—**mechanical sight:** that the sight blade guard is not deformed; that the notches on the blade housing and the sight base are aligned; that the springs of the rear sight leaf and elevation knob are working properly; that there are no dents or scratches on the leaf that could impede the proper functioning of the elevation knob; that the leaf is not bent and that there are no scratches or dents on the sight notch that could interfere with proper sighting;

—optical sight: that there are no scratches or dents and no dirt or corrosion on the parts of the optical device; whether the mount latch fastens the device well to the mounting rails of the receiver (so that the optical sight does not swing); whether the cover of the objective lens is connected to the mount; whether the eye shield is correctly fitted on the eye piece and functioning properly. With the optical sight aim at a point on the wall (white background) and rotate the elevation and then windage mechanism knob to check whether the basic mark—arrow deviates from the aiming point on the wall when the knob is turned, and whether the accessories are complete and functioning properly;

 -5×80 passive night sight: that there are no scratches, dents or dirt on the components; whether the bracket latch fastens the sight to the mounting rail on the receiver well; whether the rubber protective cap fits well (tight) on the objective, that the holes on the cap are not blocked by dirt; whether the focus ring moves easily clockwise; whether the power switch can be turned on and off easily; whether there is a lid on the battery housing; whether the diopter adjustment ring rotates easily and whether any sound effects are heard when moving from position to position; whether the mechanism with a movable stop on the rubber protective cap opens and closes, and whether the accessories are complete and in good working order;

—gas block and gas regulator: that the opening on the gas block and the openings on the gas regulator are not blocked and that there is no corrosion, dirt of powder fouling on them; that arms of the gas regulator are not broken or deformed; whether the many markings of the gas regulator position are visible; and that the profiled lug of the gas regulator is not damaged, dirty or corroded;

—gas cylinder assembly: that the opening inside the gas cylinder is not blocked and that there is no corrosion, dirt or powder fouling; that the cylinder fits easily onto the gas block rim, and that there are no scratches, dirt or corrosion on the spring latch;

—operating rod assembly: that there is no corrosion, dirt or powder fouling on individual components; whether the operating rod spring is functioning properly; and whether the support plate and guide rod are not broken or deformed;

—slide and piston assembly: that there is no corrosion, dirt, no scratches or powder fouling on the individual components; that the protrusion on which the cocking level tooth catches is not worn; and that the claws of the bullet extractor are not broken or deformed, and that the teeth on them are not worn;

—bolt assembly: that there are no dents, scratches, corrosion and dirt on the grooves, protrusions and openings, that the bolt face is not worn or damaged; that the extractor claw is not damaged and whether the spring holds is properly in the housing, and whether the tip of the firing pin is not broken;

—**bipod assembly:** that there is no corrosion, dirt, dents or scratches on the individual components; whether the bipod mounting bracket easily moves inside the gas cylinder groove; whether the coupling limits the bipod from extending sideways; whether the latch fastens the bipod in a folded position; and whether the cleaning rod fastener functions properly;

—tripod assembly: that there is no dirt and corrosion, and no scratches, dents and deformed (bent) or broken components; whether the nuts on the cradle mount shafts are screwed on tight and fastened with a cotter pin; that the tooth, the lever or the spring of the latch on the machine gun trigger guard are not broken or damaged; whether the

mechanism for precision adjustment of the machine gun for elevation moves the cradle vertically; that there are no scratches or dents on the components of the attachment for firing targets in the air, whether the large coupling slides easily along the support, and the small one can be easily fitted onto the pintle and fastened with a latch; whether the windage mechanism latch fastens the machine gun cradle in the designated position; that there are no broken teeth on the serrated arc and that the spring stops are not broken or deformed; and whether the bipod latches securely lock the bipod in the designated position;

—machine gun accessories—that there is no dirt or corrosion on them; that the linen and leather components are not damaged or torn; whether the ammunition boxes can be shut easily and fastened on the rear right leg of the tripod; that the link belts are clean and that there are no deformed links; by installing the link belt loader check whether it properly feeds the rounds into the link belt and establish whether the cleaning rod, ruptured cartridge extractor and the attachment for blank ammunition are working properly.

3) Inspection of the ammunition

103. Live ammunition is inspected by the superior officer and the soldier who receives it for use. The inspection is supposed to make sure that the ammunition is clean and not defective.

The inspection of rounds is supposed to establish the following: whether the markings at the bottom of the cartridge match the markings on the box in which the rounds are packed; that there is no dirt, corrosion or white oxide on the round; that there are no dents or scratches on the cartridge; that the cartridge is not cracked, and that the round is not jammed inside the cartridge, scratched, deformed or loose.

After inspecting the rounds, the soldier is required to clean them with a dry cloth, place them into the magazines/link belts and preserve them carefully. **The use of defective rounds is prohibited.**

104. Blanks and dummy rounds are inspected in keeping with item 103, with special attention being paid to the fact that no live rounds are mixed in with the blanks and the dummy rounds.

3. SERVICING

1) General provisions

105. The machine gun is serviced by a crew, which handles the machine gun directly under the supervision of the superior officer, and, if necessary, with the relevant assistance of expert personnel.

Servicing of the machine gun includes cleaning, lubrication, repair and replenishment (resupply) of accessories.

106. The machine gun being used in the unit is exposed to a constant and harmful influence of powder burning products, moisture, temperature changes and other dirt that causes corrosion and damage. In order to prevent harmful influences, the machine gun needs to be regularly maintained and kept in good working order.

107. The goal of cleaning and maintaining the machine gun is to remove all dirt and old lubricant layers and to protect it from corrosion by lubricating it again.

The machine gun is cleaned and lubricated on a daily basis, after each use. If the machine gun is not being used, but stored in a company depot, it is cleaned and lubricated only during the periodic (weekly) inspection.

In combat, on marches and during maneuvers, the machine gun must be cleaned and lubricated daily, during lulls in combat or breaks in maneuvers.

108. In order to clean the machine gun, the squad commander is required to do the following: order the disassembly and cleaning; check the working order of the soldiers' cleaning kit and the quality of cleaning products and lubricants, and after checking whether the cleaning has been completed properly and in full, order that the machine gun be lubricated, check how the machine gun has been lubricated, and then order the machine gun to be reassembled and place in a gun rack.

109. The machine gun must be cleaned and lubricated on a table, bench or a clean spread. The cleaning kit must be in good working order, and the cleaning products and lubricants clean and of good quality. The

machine gun is cleaned with the detergent-based powder solvent (DBPS) and brushes, cloths, tow and small soft-wood rods.

110. In winter-time, when the outside temperature is low, the machine gun is cleaned in the room where the temperature is similar or the same as the temperature of the room where the machine gun will be stored to prevent sweating (exudation).

If there is a considerable difference between the outside temperature and the inside temperature, after the machine gun has been brought inside the room where the cleaning is to take place, it has to be left to sweat, and cleaned immediately, without waiting for it to dry.

2) Cleaning products and lubricants

111. The following products are used to clean and lubricate the machine gun:

The detergent-based powder solvent (DBPS) is made on the basis of petroleum products with the addition of detergents and anti-corrosion additives. It is used to remove powder fouling and grease from the metal components. Because of its detergent- and anti-corrosion content, DBPS cleans well and removes grease from metal components as well as protecting the cleaned surfaces. Once the cleaned surfaces have been lubricated with a fresh solvent, the protection from corrosion lasts about 20 days.

It is prohibited to use DBPS near an open flame.

When using DBPS, only pour the necessary amount into a container, because the solvent gets dirty and evaporates quickly. After using up the said amount, wipe the container with a cloth or some tow, before pouring in a new amount of the solvent.

A Linen cloth is used for cleaning and lubrication. It needs to be clean, free of dust and sand, and have no edges.

Tow is used for cleaning all parts of the machine gun. It has to be clean and free of dust and sand.

Small rods made of soft wood (fir, linden tree, poplar tree) are wrapped with patches or tow and used to clean the chamber, the inside of

the receiver, the trigger mechanism, the bolt assembly, the sights, the gas block, etc.

General purpose preservation oil (GPPO) is used to lubricate machine gun components that are being used. It consists of mineral oils and anti-corrosion additives. When stored in closed areas, the machine gun components that have been lubricated with GPPO are protected up to 6 months.

112. The following products are used to clean the optical sight and the 5x80 passive night sight:

The flannel rag, which is used to clean dust from external surfaces. Avoid cleaning optical glass with a flannel rag, because invisible particles of dust, carbon and other foreign objects can gather on the cloth over time, and affect the glass surface. If there are no other means, shake the flannel rag well prior to use, and clean the sight without pressing on it.

Lens paper (cigarette paper) is the safest means for mechanical cleaning of optics. Lens paper has the same consistency as cigarette paper, so if the first is missing the latter can be used.

The soft brush (marten, otter, badger) is used to remove dust from the glass surfaces of the sight.

Soft wood rods 4-5mm in diameter and about 150mm long are used with flannel patches, lens paper or tow wrapped around them to clean glass surfaces.

Denatured ethyl alcohol (DEA) or ether is used to remove grease stains from glass surfaces.

3) Cleaning and lubrication

113. In order to remove powder fouling, old lubricant layers and mechanical dirt, the soldier brings the ordnance barrel close to the container into which DBPS has been poured and submerges the muzzle. The squad commander passes the cleaning rod with the brush (or the patch holder with tow wrapped around it) soaked in DBPS through the barrel 10-15 times. After this the soldier lets the barrel stand in horizontal position for 10-15 minutes.

The soldier then cleans the barrel with the cleaning rod and the brush or the patch holder with tow wrapped around it. After the interior of the barrel has been rubbed with DBPS, it is dried with dry tow. If traces of powder fouling or dirt are found on the rag, the cleaning with DBPS and tow needs is repeated until all the dirt has been removed.

Whenever the barrel cannot be cleaned immediately, it can remain submerged in DBPS up to 24 hours.

114. When two soldiers are cleaning the ordnance barrel with a pull cord and a patch (or tow), the following steps need to be taken:

-the gunner holds the reinforced section of the barrel underneath the carrying handle with his left hand and turns the muzzle towards the ground; with his right hand he grabs one end of the cord with a rag fastened inside the loop, pulls the lead weight into the chamber and pushes the cord through the barrel until the lead weight comes out through the muzzle, and;

—when the lead weight comes out, the assistant gunner (ammunition bearer) holds the muzzle with the left hand and the cord with the right hand, he then pulls the cord towards himself.

During the cleaning with the cord, the barrel must be parallel with the axis of the cord, so that the cord does not rub against the muzzle or the chamber, even with the flash suppressor screwed on. The patch or the tow are replaced five to six times and passed through the barrel until they come out clean. If the barrel has not been lubricated with DBPS prior to cleaning, it has to be soaked in the solvent every time the patch is replaced.

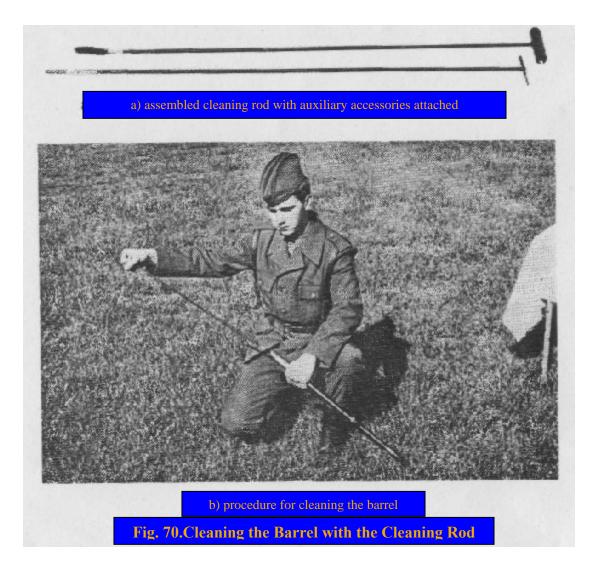
If the patch/tow gets stuck during cleaning, send the barrel to a repair facility to have it removed.

115. When a single soldier cleans the barrel with the cord and the patch/tow, the pulling cord is inserted into the barrel as described in item 114. Once the end of the cord with the lead weight comes out, the muzzle it turned upwards (vertically) and the cord is pulled straight upwards, after this the muzzle is again turned downwards and the same procedure is repeated with a new patch/tow, until they come out clean.

116. When the barrel has been cleaned with a cleaning rod, it is important to prevent any damage to the barrel. Before using the cleaning

rod, the brush or the patch holder are screwed onto the tip of the cleaning rod, the pin punch is passed through the opening in the widened section, or the grip is pulled on (fig. 70). It is only allowed to pull the cleaning rod with the patch holder through the barrel once the tow has been wrapped around it. It is prohibited to insert the patch holder without the tow into the barrel.

117. Other metal components that have been exposed to powder gases or have corroded are cleaned by lubricating the components using a patch or a brush soaked in DBPS (or by submerging them in a container filled with DBPS), after which they are left standing for 10 to 15 minutes.



Afterwards the components are cleaned with a clean patch/tow until all the powder fouling has been removed. It is prohibited to use metal parts to clean powder fouling from weapon components. Blued components (surfaces) are cleaned with a clean and dry rag and not rubbed too much, to prevent the bluing from being removed.

The stock is cleaned with a dry rag or tow only.

118. The accessories are cleaned at the same time as the machine gun. First the powder fouling is dissolved by soaking in DBPS, and then the accessories are wiped with a rag. The pouch and the linen straps are cleaned of mud and dust with a brush or a dry rag. The pouch must not come into contact with the cleaning products or lubricants.

119. The unprotected metal components of the ordnance are lubricated with a thin layer of oil applied with a rag or a brush. The blued components and the stock are not lubricated. After the cleaning, the machine gun is lubricated with DBPS if it is used every day, or with GPPO if stored in the company depot.

120. The optical sight and 5 x 80 passive night sight are cleaned inside a room. Cleaning in unfavorable weather conditions (dust, rain, snow, smoke, etc) will not be successful and is in fact harmful.

121. Dust is removed with the soft-hair brush in small circular movements from the center to the periphery. During cleaning, the brush must not be pressed against glass surfaces. Dust can also be successfully removed from glass surfaces with a blow-pipe with a rubber ball attached to it.

Once the dust has been removed, fold a flannel patch to form a sharp point at one end (or make a swab by rolling lens paper or cotton wool around the wooden stick), breathe some vapor onto the surface of the glass, and without pressing the glass make circular movements from the center to the periphery with the sharp point of the flannel patch/swab made of lens paper (cotton wool). Repeat the procedure until the glass surface is clean.

122. Chemicals (denatured ethyl alcohol or ether) are used only when the glass surface is covered with grease or so dirty that it cannot be cleaned with any other means. The ratio of ether and alcohol depends on the temperature at which the cleaning is done. If the temperature is

normal, 10 volume parts of alcohol are poured into the ether; in the event of increasing temperature the amount of alcohol can be increased up to 20 volume parts.

Cleaning solvents will even dissolve the resin used to seal the optical or the passive night sight. Because of this, glass surfaces can be cleaned with chemicals only by expert personnel in repair facilities.

4. PERIODIC (WEEKLY) INSPECTIONS

123. Periodic (weekly) inspections form an integral part of the training and education of units and installations, and must be planned within the work schedule. In principal, inspections of all equipment and materiel currently in use within the mother unit or installation are carried out once a week.

124. During the periodic inspection the technical status and completeness of the machine gun are checked as is the up-to-date status of the weapon logbook. At the same time, the crew's knowledge of the ordnance and their ability to maintain it is checked.

At the request of a senior officer from the mother unit, expert personnel from the technical maintenance units can be assigned to carry out expert procedures during the periodic inspection.

5. PACKING AND MARKING

1) Packing

125. The machine gun is packed in the original box. The accessories are packed in the box along with the machine gun.

126. Live ammunition is packed as follows: 15 rounds in a cardboard box, 80 cardboard boxes in a box made of galvanized sheet, which can be hermetically sealed. A metal sheet box is placed in a wooden box the size of 460x300x140mm. The weight of the packed box is 30 kilos.

127. Blank rounds are packed 15 in each cardboard box. 60 cardboard boxes are packed in a box made of corrugated cardboard the

size of 280x280x130mm. The weight of a box containing 900 rounds is 12 kilos.

128. Dummies are packed 15 in each cardboard box, 10 boxes in a corrugated cardboard box.

2) Marking

129. Ordnance numbers are engraved or pressed into the gun stock, receiver, bolt, slide with piston and the barrel.

130. Live rounds have a stamp at the bottom of the cartridge. Manufacturer's initials are on one side and the year of manufacture on the opposite side.

131. Packages of live ammunition are marked as follows:

Cardboard boxes with 15 rounds carry a label stating the following:

—15 items	number of rounds			
—M87 7.62mm round,	caliber, round model and type of round			
	with a steel ball			
—for M84 7.62mm machine	gun type and model of ordnance			
—IK 8402-10	manufacturer's code, year, lab series			
	and rate of round manufacture			
—NC-80	powder type and dimensions			
—MBL 8428	manufacturer's code, year and series of			
	powder manufacture			

Lid of the metal sheet box has the following data written in black paint:

—1,200 items of M87	
7.62mm steel ball round	Number of rounds, round model and
	type
—IK 8402-10	Manufacturer's code, year, lab series
	and rate of round manufacture
—Brut 20 kilos	Weight of metal sheet box packed with
	rounds

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On the wooden box:	
a) Front:	
—120 M87 7.62mm	
rounds, steel ball	Number of rounds, model and type of round
—IK 8402-10	Manufacturer's code, year, lab series and rate of round manufacture
—30 kilos gross	Weight of wooden box packed with ammunition
b) Lid:	
—M87 7.62mm	Caliber and model of bullet
—IK 8402-10	Manufacturer's code, year, lab series and rate of round manufacture
c) Right side:	
NC-08	Powder type and specifications
—MBL 8415	Manufacturer's code, year, and series of powder manufacturing.

On the left flank side of the box there is a label with the name of the weapon from which the round can be fired.

132. Blank rounds are marked in the same way as live rounds (item 130).

133. Blank round boxes are marked as follows:

On cardboard boxes containing 15 rounds, the following label is attached:

DANGEROUS IF FIRED AT RANGES UP TO 50 METERS 15 items

M85 7.62mm BLANK ROUNDfor the M84 7.62mm machine gunlab. seriesPowderPPU8501NC-0.1, MBLPeriod of use: 5 years7058

On cardboard boxes containing 900 rounds, the following label is attached:

900 rounds M85 7.62mm x 54mm BLANK ROUNDS for the M84 7.62mm machine gun Powder lab. series NC-01 PPU 8102-02 MBL 8058 12 kilos gross

Labels are glued on the front side and the lid of the box, and also on the inside of the lid should the outside labels be destroyed.

134. Dummy rounds have not special markings. The stamp at the bottom of the cartridge does not refer to the dummy round, only to the cartridge used for the production of the dummy.

A label stating the following is attached to the front and the lid of the cardboard box containing 150 rounds:

150 rounds

M85 7.62mm dummy round For the M84 7.62mm machine gun

6. DECONTAMINATION OF THE MACHINE GUN AND THE AMMUNITION

135. Decontamination of ordnance and ammunition, depending on the type of contamination can be radiological, chemical and biological.

Radiological decontamination is carried out by washing the contaminated parts with a 0.5-1% detergent or ethylene solution with a brush, sponge or tampon made from a rag, tow, newspaper and the like.

Washing is primarily done with water that drains away or is poured from a container. If there is no water, decontamination can be carried out by wiping the parts with damp (dry) tampons or hay balls. Tampons must be moved in one direction at all times, and turned to a clean side after each move.

Chemical decontamination is carried out by lubrication with the decontamination solution taken from the personal decontamination kit (PDK). If there is no kit, decontamination is carried out by wiping the parts with tampons soaked in the decontamination solution (chloride lime—sodium hypochlorite 1:10, detergents—soaps 0.5-1%, petroleum, gasoline).

Chemical decontamination is carried out immediately after the personal decontamination.

Biological decontamination is carried out by lubrication (wiping) with tampons soaked in a Lysol water solution (3-5%) or a formalin solution (4%).

During decontamination it is important that the decontamination solution does not enter the barrel.

After 5-10 minutes (30 minutes at the latest), the machine gun and ammunition need to be cleaned and lubricated to prevent the corrosive effects of decontamination substances.

Chapter III

FIRING

1. GENERAL PROVISIONS

136. Machine gun range firing includes firing preparation (assuming firing position, loading, observation of the battlefield and spotting—selecting the target, determining distance to target, selecting sight division and aiming point); opening fire (aiming and firing); ceasing fire and ending range firing.

137. Depending on the conditions of the ground, the task and the enemy fire, the machine gun is fired from various positions, from the tripod, the bipod and from bench rest, from any location from which the target or the part of the ground where the enemy is expected to appear

are visible. During transportation (by armored carriers, motor vehicles or water craft) and while skiing, the gunner takes the most comfortable position for opening fire, while at the same time ensuring his safety and the safety of the soldiers around him.

138. The location (platform) for firing the machine gun has to be level and sufficiently hard to ensure stability during firing.

If the ground is hard, the bipod needs to be dug in a little bit, and if the ground is soft, a clump of earth needs to be placed underneath the legs or the soil needs to be stamped down so that the bipod will not sink in during firing.

139. Firing can be opened on command, signal or independently, depending on the task and the combat situation.

140. When preparing for firing, it is necessary to check the possibility of firing within the assigned zone or line of fire, for which purpose the gunner especially aims at different local objects and identifies dead spaces in the line of fire.

141. The start of firing is determined with the command "FIRE." When fire is opened independently, the gunner determines the start of firing. Fire should be opened at the most convenient moment, such as: when the target can be destroyed with sudden fire, when the target is easy to spot and forms a group, when its flank is exposed or when the target is rising up following action.

2. APPLYING MACHINE GUN FIRE DURING COMBAT

142. Various classes of fire can be opened from the machine gun, depending on the task, the line of fire and the type of range firing, the type of fire and the tactical purpose of fire.

143. With respect to the target, machine gun fire can be frontal, oblique, flanking, cross fire and fire from the rear (fig. 71).

Frontal fire is delivered directly into the front of a target. It is suitable for firing at deep targets (columns) because it makes maximum use of the beaten zone.

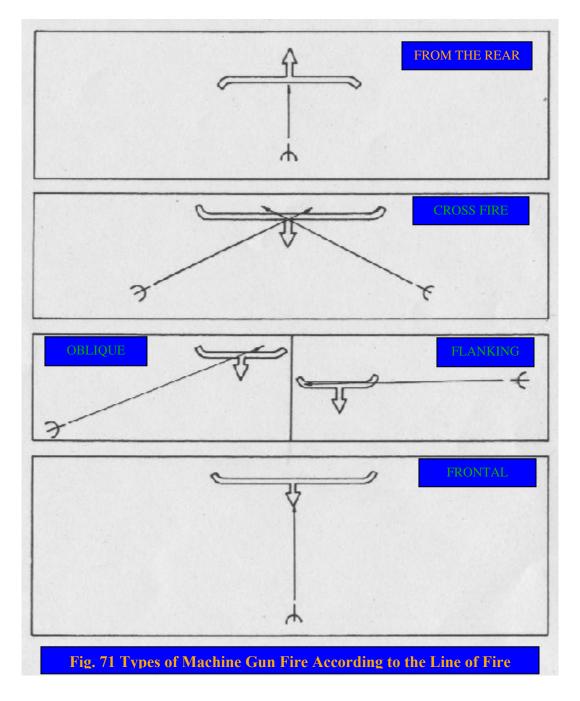
Oblique fire is delivered obliquely at the front of the target. When targeting small group targets better use is made of the beaten zone and

the fire-swept zone than during frontal fire. When delivering oblique fire, the machine gun is normally positioned on the sides and the flanks of friendly units.

Flanking fire is delivered directly against enemy flanks. It makes maximum use of the beaten zone and has a great moral and material effect. It requires a convenient position of the ordnance, primarily to protect avenues of approach towards obstacles and target other significant objects—targets ahead of the front line of defense and in depth of defense.

Cross fire is delivered with two or more machine guns firing at the same target from multiple directions.

Fire from the rear is delivered into the rear of the enemy. It has a strong moral and material effect. It is most efficient when delivered suddenly from a number of machine guns.



For maximum impact, classes of fire should be combined whenever the combat situation allows it.

144. With respect to the type of firing, machine gun fire can be fixed, traversing, searching, and simultaneously traversing and searching.

Fixed fire is delivered against small targets with the machine gun fixed for direction and elevation. During fixed fire the values of the group spread approximates that in the tables.

Traversing fire is used for targeting wide targets, targets in the air and targets moving sideways, with the machine gun fixed for elevation. During traversing fire the dispersal of shot groups with respect to range approximates those in the tables and the dispersal with respect to direction artificially increases, corresponding to the width of the traversal.

Searching fire is used to target deep targets, with the machine gun fixed for direction. When delivering searching fire the dispersal of shot groups with respect to range approximates those in the tables, and the dispersal with respect to direction artificially increases, corresponding to the depth of the sweep.

Traversing and searching fire is used to engage area targets (with both width and depth). The machine gun is neither fixed for elevation nor direction. When delivering traversing and searching fire, the dispersal of shot groups artificially increases with respect to direction and elevation. This class of fire is not economical when the target is behind cover because of its limited effects in relation to the ammunition used.

145. With respect to type of firing, bursts of fire (short or long) and sustained fire can be fired from the machine gun (item 213).

146. With respect to the tactical purpose, concentrated, protective (frontal and flanking) and ambush fire can be fired from the machine gun.

Concentrated fire (CF) is delivered simultaneously by a number of ordnance pieces at a single target or area. It is used at ranges up to 1,500 meters.

Frontal protective fire is prepared in advance in order to prevent the advance (movement) of the enemy along a certain axis, his exit from an area or approach to a certain object. At least two machine guns deliver the fire.

Frontal protective fire is delivered at ranged up to 1,000 meters. The protective fire sector width is 80 meters at ranges up to 500 meters, and 50 meters at ranges beyond 500 meters. The width of the protective fire sector is determined by the squad commander using binoculars, rear side bar or optical sight. Borders of the protective fire sector for each piece of

ordnance have to be clearly marked with visible and easy-to-observe objects on the ground.

While preparing frontal protective fire, the company commander is required to determine the sector, readiness time, signal for commencing fire and the position of the machine gun for opening frontal protective fire.

The sector of frontal protective fire carries the name of the object where it has been prepared, such as "grove," "saddle," "path," and the like. Before carrying out this task, machine guns in principle shouldn't be engaged in carrying out other tasks. If ordnance is used for other tasks before delivering frontal protective fire, the gunner makes a record of protective fire elements (Table 4).

TABLE 4

NAME OF FRONTAL PROTECTIVE FIRE	MACHINE GUN POSITION— COVER	RANGE OF FIRE IN METERS	FIRE SECTOR BORDERS			
			LEFT	RIGHT	NUMBER OF ROUNDS	FIRING SIGNAL
"Grove"	Reserve cover number 1 at the basic firing position	900	Telephone pole	Bush	100	Command "FIRE" or 2 green signal rounds

RECORD OF ELEMENTS OF FRONTAL PROTECTIVE FIRE

In order for the gunner to prepare the ordnance for opening frontal protective fire the following needs to be done: put the safety on and load the machine gun (ammunition belts are linked); set the required range on the mechanical or optical sight; aim at the left (right) fire sector border and limit the movement of the machine gun to the left (right) with the right spring stop, then do the same on the right sector border; return the machine gun to the left fire sector border, fix the elevation of the machine gun and aim at the selected aiming point.

When the command "FIRE" or the signal for commencing protective fire is given, the gunner checks the sight alignment (and makes any necessary adjustments), disengages the safety and commences fire. In the event of adverse meteorological conditions (rain, snow, etc), the machine gun prepared for protective fire can be protected with a cover until the moment fire is commenced.

Frontal protective fire is usually delivered by applying direction changes starting from both flanks of the target; if three pieces of ordnance are firing at the same time frontal protective fire is also delivered from the center of mass. Firing ceases when the task has been completed (all rounds have been fired), when the target disappears or crosses the line of frontal protective fire, and at the command "CEASE FIRE."

Flanking protective fire is prearranged defensive fire intended to prevent the enemy from carrying out an assault and approaching the defended object. It is used to cover important avenues of approach in front of, on the flanks or within large interspaces, and in depth of the defense. In order to deliver flanking protective fire, one or two pieces of ordnance fire in the same direction from the same firing position.

Flanking protective fire is delivered from a firing position on the side of the axis of movement of enemy combat formation, which is well camouflaged against spotting from the ground or the air. Flanking protective fire is prepared and delivered at ranges of up to 400 meters at targets the height of an upper torso silhouette, and at ranges up to 700 meters at targets the height of a standing figure (1.75 meters), while making maximum use of the beaten zone.

When flanking protective fire is prepared and delivered on level terrain or a gentle slope, the machine gun is fixed for direction and elevation, the sight division is set on 4 or 7 (depending on the height of the target) while the aiming point is on the far end of the determined line. In this way the fire-swept zone for each target is ensured up to the furthermost range of flanking protective fire preparation. If the ground is slightly intersected, flanking protective fire is delivered with the machine gun fixed for direction and depth or by searching for depth, and the mechanism for precision adjustment of the machine gun for elevation is used. If there are dead spaces on the line envisaged for flanking protective fire, the squad commander reports it to the superior officer, who is required to determine other methods for targeting these spaces or a more suitable position of the machine gun.

Flanking protective fire is organized by the company (squad) commander, who determines the following: firing position, how to make the cover for ordnance, line of fire, time of readiness, range for fire preparation and type of target, as well as the signal for commencing fire.

Flanking protective fire is mostly prepared by the squad commander, who, from the designated position of the machine gun measures the maximum firing range (400 or 700 meters) on the designated firing line and determines the aiming point. From a prone position, he then views the selected aiming point with the binoculars to assess how much at certain ranges the ground descends in relation to the aiming line. If fire is prepared for targets up to the height of an upper torso silhouette, at the range of 100 meters, the slope of the ground cannot be more than 5 mils (0—05), and at ranges higher than 100 meters 3 mils (0—03). If fire is being prepared at targets the height of 300 meters, the downward slope of the ground must not be more than 10 mils; at ranges 400 meters and above 2 mils at the most. If the slope of the ground is higher, find another (lower) location for the machine gun or select a lower aiming point.

When flanking protective fire is being prepared in advance, the squad commander orders one of the crew members to move along the fire line up to the designated aiming point, stopping every 100 meters.

In order to know when to stop, the crew member measures the distance in even paces. If necessary, he also stops at the lowest points on the axis of movement. The squad commander lies down at the spot designated for the machine gun, directs the cross hairs of the binoculars at the aiming point and check which part of the soldier's body is covered by the sighting line. This action can also be completed by aiming through the machine gun's mechanical or optical sight, but **the machine gun must be empty.**

Firing along the designated line has been adequately prepared if the sighting—aiming line intersects the soldier's figure approximately at the level of his head or chest.

If the sighting—aiming line intersects the soldier's figure above the limits stated, elements for traversing the designated line in depth must be prepared or a lower position must be found for the ordnance.

If the sighting—aiming line intersects the soldier's figure below the limits stated, fire is delivered with the machine gun fixed.

At the machine gun designated for delivering flanking protective fire two crew members are on duty at all times—waiting at the ready to open fire at any moment. A large and a small ammunition box (350 rounds) with filled and previously linked ammunition belts need to be at the side of each piece of ordnance.

Flanking protective fire is delivered at the command or signal of the company or squad commander, or independently by the gunner, depending on the task received. Sustained fire is delivered until the task has been completed and 250 rounds at the most have been fired or until the command "CEASE FIRE" has been given. When two machine guns are delivering flanking protective fire long bursts can also be fired, interchangeably, so that sustained fire is achieved on the designated line of fire.

Ambush fire is organized and prepared in order to destroy important targets whose, which are expected to appear on the previously designated line. Ambush fire is delivered by opening sudden fire at ranges up to 400 meters.

Depending on the direction, ambush fire can be frontal, flanking and oblique. Whenever possible, flanking or oblique ambush fire should be prepared.

Ambush fire is normally organized by the company commander or a senior officer, and prepared by the squad commander in the same way as the flanking protective fire.

The firing emplacement of ordnance designated to deliver ambush fire is established on the spot from which it is possible to reach all types of targets on a certain line of fire with sweeping trajectories. That spot is carefully camouflaged.

Until the moment of delivering ambush fire ambush ordnance does not carry out any other tasks. When the ordnance is positioned in the firing emplacement, it has to be loaded with a 250-round ammunition belt and another ammunition box with filled ammunition belts needs to

be placed next to it. The gunner and his assistant need to be at the ordnance at all times and ready to open fire. Crew members are allowed to abandon the firing emplacement only at the approval of the officer who has organized the ambush fire, that is, only after they have completed their task.

The gunner opens fire independently as soon as the target appears on the designated line of fire. Depending on the characteristics of the target and the ground, machine gun ambush fire is delivered in the form of sustained fire. Fire is ceased after the task has been completed or at the command "CEASE FIRE."

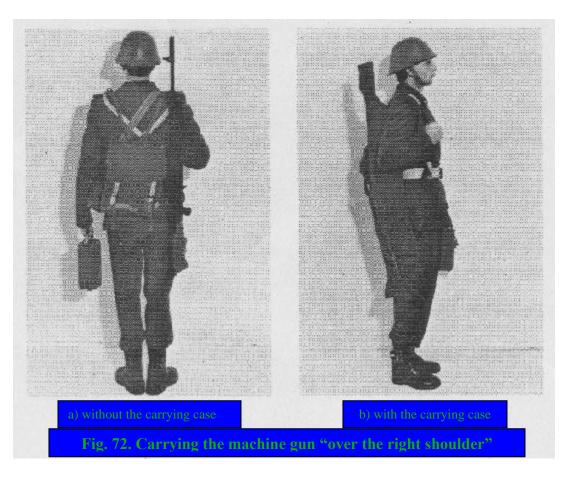
The success of ambush fire depends on the secrecy, training and courage of crew members.

3. CREW MEMBERS AND THEIR DUTIES

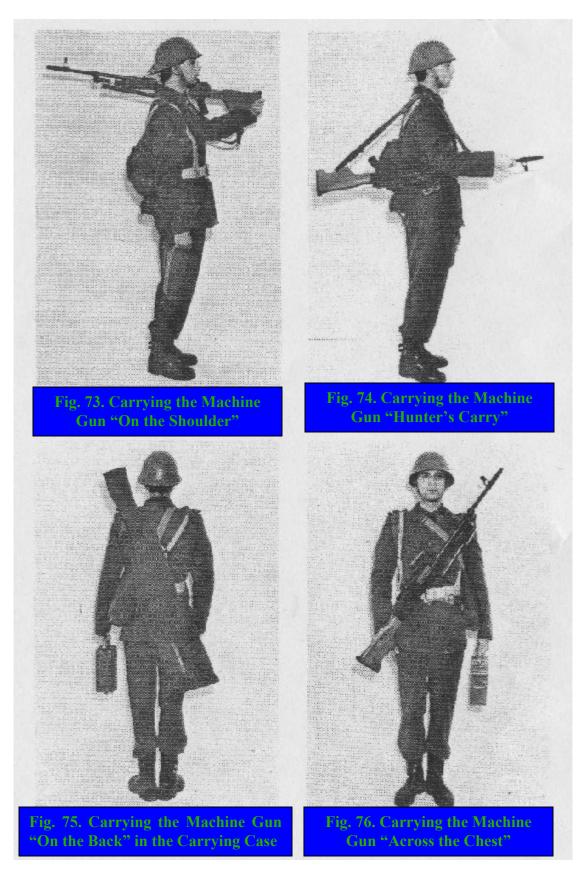
147. The machine gun squad consists of the squad commander, crew members, a designated number of machine guns and means of transportation (motor vehicles, two-wheeled horse-drawn carts or pack animals).

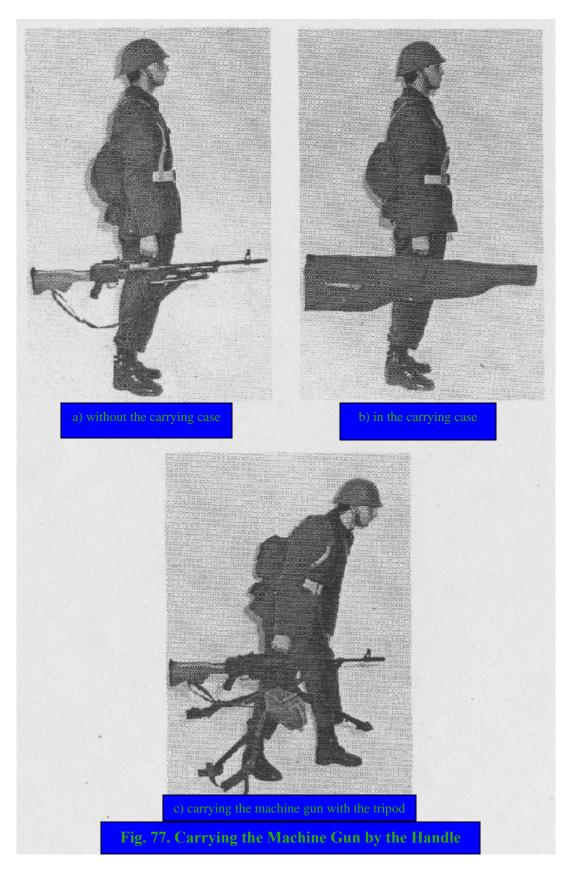
148. The squad commander commands the squad in all situations and is responsible for constant combat readiness, the training of the crew and keeping the machine gun in good working order. He is fully responsible for carrying out combat tasks, for which purpose he selects the firing emplacement (if not predetermined), the degree of organization, the direction of covert occupation and the degree of camouflage of the firing emplacement; he directs squad fire, maintains constant communication with the squad commander or the senior officer he is subordinated to; ensures timely replenishment with ammunition and other material. The gunner of the first ordnance is the squad commander's replacement.

149. The machine gun **crew** consists of the gunner, the assistant gunner and the ammunition supply officer. Every crew member needs to be trained to perform all duties of a machine gun crew member.

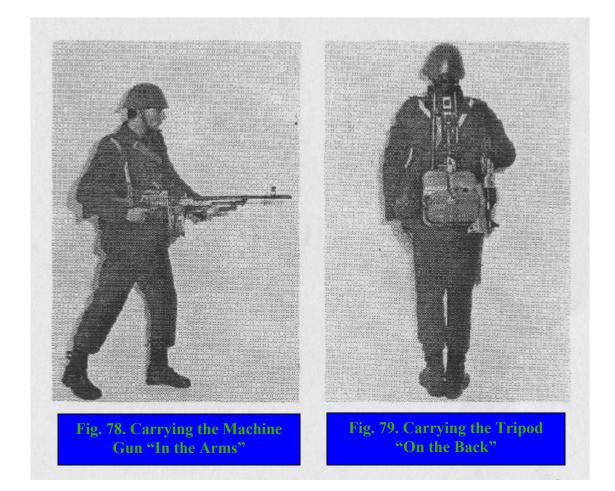


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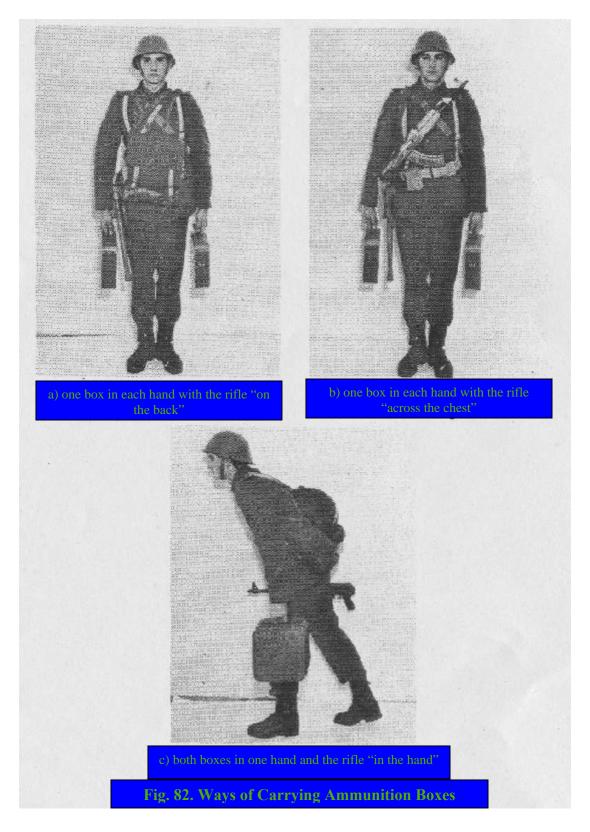
150. The gunner handles the machine gun, is responsible for keeping it in good working order, stores and maintains it and carries out firing tasks. Together with the assistant gunner he clears stoppages and cleans and lubricates the machine gun. In combat the machine gun gunner carries the machine gun in a carrier bag with some accessories, a small ammunition box filled with a 100 rounds and the optical sight. The machine gun is carried in the carrier bag or without it in one of the following ways: "over the right shoulder" (fig. 72), "on the shoulder"—left or right (fig. 73), "hunter's carry"—on either the right or the left shoulder (fig. 74), "on the back" (fig. 75) or "across the chest" (fig. 76), by the handle (fig. 77) and "in the arms," holding the grip with the right hand and the bipod with the left hand, with the optical sight removed from the machine gun and packed in its pouch (fig. 78).



151. Assistant gunner assists the gunner in loading and unloading the machine gun, eliminating stoppages, cleaning, lubricating and observing the battlefield. He is armed with an automatic rifle. Before loading the machine gun, he has to check whether the belt is folded properly, and when half of the approved ammunition amount is used up, he needs to orally inform the gunner or the squad commander about it. The assistant gunner positions the tripod on the spot designated for firing, sets up the platform (as needed), and is responsible for cleaning and keeping the tripod in good working order. In combat the assistant gunner carries the tripod and two ammunition boxes, one large and another small, filled with ammunition, in one of the following ways: "at the back" with the base turned upwards and the boxes tied to the tripod (fig. 79), while carrying the rifle "on the right shoulder!" or "across the chest!"(if not carrying the backpack in the front). When the combat situation requires it, the crew can swiftly change the firing position, and,



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at shorter distances, ammunition boxes can also be carried in the hands; "across the chest" (fig. 80) while carrying the rifle in the hand or "over the right shoulder;" on the hip (left or right) while carrying the rifle "at the back" or "across the chest" (fig. 81).

152. The ammunition supply officer is required to bring ammunition and other combat supplies to the firing emplacement, using a camouflaged axis of movement. He is armed with the automatic rifle. In combat he carries two large ammunition boxes in his hands (Fig. 82).

At the company station the ammunition supply officer feeds the bullets into the link belt with the link belt loader.

4. FIRING EMPLACEMENTS

1) Concept and types of the firing emplacements and the conditions they must fulfill

153. The machine squad combat formation consists of the squad firing emplacement, the squad commander's observation point and the location of the means of transportation.

The firing emplacement is the place (ground area) where machine guns are positioned and crews are distributed in order to carry out combat tasks and because of ammunition. According to their purpose firing emplacements can be basic, reserve, temporary and false.

The basic firing emplacement of a squad is the firing emplacement from which the basic combat task is carried out. At each basic firing emplacement 2-3 shields are designated and constructed for each machine gun.

The reserve firing emplacement of a squad is occupied in time or by force, at the command of the squad commander, when the enemy is endangering the basic position. When there is enough time, 2-3 shields are also constructed and arranged at the reserve position.

The squad or the machine gun crew occupies **the temporary** firing emplacement in order to carry out special (temporary) tasks.

The false firing emplacement is constructed in order to fool the enemy and position machine gun models and manikins on it.

154. In combat machine guns open fire from cover (artificially constructed or natural). One basic and 2–3 reserve covers are selected and constructed for each machine gun in the firing emplacement.

The basic cover (location) for the machine gun is the one from which the basic task is carried out.

Position in the machine gun **reserve cover** (location) is taken up in the event of forcible abandonment of basic cover (location) or for targeting targets on the line of fire that cannot be targeted from the basic cover. The reserve cover must be distanced from the basic cover enough so that the fire of enemy ordnance for direct or indirect firing directed at the basic cover does not encompass the reserve position at the same time. That distance is 30—50 meters.

155. The cover (location) of the machine gun has to fulfill the following conditions: good visibility and the largest possible beaten zone in the designated zone of fire; possibility of opening flanking or oblique fire along the most important axes; distance to visible objects, possibility of opening fire through interspaces and across friendly units; covered avenues of approach from the rear for the purposes of ammunition supply; possibility of approaching reserve covers in a covert way, and the possibility of enabling a loose distribution of crew members.

156. The squad commander determines the firing emplacement for the machine gun. In addition to the conditions described in item 155, the firing emplacement must ensure the following: select the observation point for the machine gun commander and the location of the means of transportation; organization of flanking, oblique and cross fire, and firing at the targets in the air.

157. The squad commander's observation point has to fulfill the following conditions: being part of the squad combat disposition and enabling observation of the enemy, friendly units and direction of fire in the designated zone; enabling secure voice and sight communication with machine gun crews and the squad commander; and the presence of covert avenues of approach to covers of individual ordnance pieces.

158. The squad commander selects the **location of the means of transportation.** It depends on the ground and is selected as close as possible to the firing emplacement (backwards or sideways). The driver

(horse drivers), means of transportation and ammunition are deployed at the location. It has to be well sheltered, camouflaged and easy to reach by means of transportation or pack animals. Also, it has to fulfill the following conditions: enable covert approach to firing emplacements, provide good conditions for observation and protection from attack from the ground and from the air; if possible, ensure feeding and watering of animals and easy and unimpeded supply of ammunition and other supply needs of the squad.

2) Moving into position, taking up position in the firing emplacement and deployment of crew members

159. The machine gun squad takes up position in the firing emplacement at the same time or ordnance by ordnance, which depends on the actual combat position, the conditions on the ground and other factors.

The entire squad moves into position at once only when access to the firing emplacement is camouflaged, in conditions of no contact with the enemy and when there is no possibility for the squad to be detected before taking up position. In all other situations, the squad moves into position in the firing emplacement ordnance by ordnance. In favorable conditions, the squad can also move into position using different means of transportation.

160. In order to take up position with the machine gun squad (or a single piece of ordnance), the commander brings the squad (ordnance) to the cover in the vicinity of the firing emplacement and leaves it there. He goes to the firing emplacement alone or with the gunner, observers the terrain and the enemy, and, depending on the task received, selects the location for ordnance (multiple pieces of ordnance) or if the location is predetermined, he shows it to the gunners, determines the machine gun zone of fire and the main line of fire in the designated zone.

The squad takes up position at the command or the prearranged signal. The command for taking up position is: "INTO POSITION," and after moving into position: "First piece of ordnance at..., second

(third) piece of ordnance at..., position..., line of fire...,—READY FOR FIRE."

Whenever possible, the machine gun cover needs to be arranged before taking up position. After moving into the firing position (if the cover is not prearranged), the gunner places the machine gun on the tripod or the bipod, loads it and prepares it for opening fire, after which the cover is constructed.

161. After the cover has been constructed, the machine gun is set up for firing at the platform, which has to be level and hard enough in order to ensure the stability of ordnance during firing. On a soft platform (loose soil or swamp terrain, deep snow, etc), support plates are placed underneath the bipod, or the soil (snow) are stamped. When setting up ordnance in a bunker, a building or on rocky ground, the platform has to be made out of stamped soil or support plates need to be placed underneath the legs.

When the tripod is set up on an even platform, the back legs remain in the same position at all times, whereas on an uneven platform they can be positioned differently.

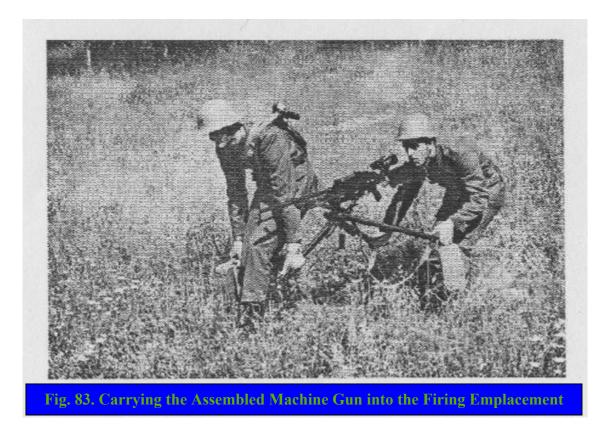
From the cover, the machine gun can be fired from a prone, sitting, kneeling and standing position, depending on the height of the cover and its structure. When firing outside the cover, the main position is the prone position.

162. The machine gun can be fired from an even platform at an angle of -10° up to $+22^{\circ}$. It is impossible to fire the machine gun at bigger or smaller angles. In such cases the machine gun is taken off the tripod and fired from the bipod, or else the cover location alternates.

When firing at positive and negative local angles, the link belt needs to be held so that the links with the bullets are fed directly into the feed plate.

163. The crew moves into the firing emplacement (cover location) in the most convenient way (walking straight, bent down or crawling), with the machine gun disassembled or assembled, depending on the combat situation.

164. After assembling the machine gun in a sheltered position, the crew carries it to the firing emplacement (cover location), as follows (fig. 83):



—the assistant gunner grasps the front tripod leg with his left hand and carries ammunition boxes in his right hand. During that time the machine gun bipod can be folded forward or backward, fixed or unfastened;

—the gunner carries machine gun accessories and grasps the back legs of the tripod with both hands, while the gun stock is folded;

—the ammunition supply officer carries two large ammunition boxes.

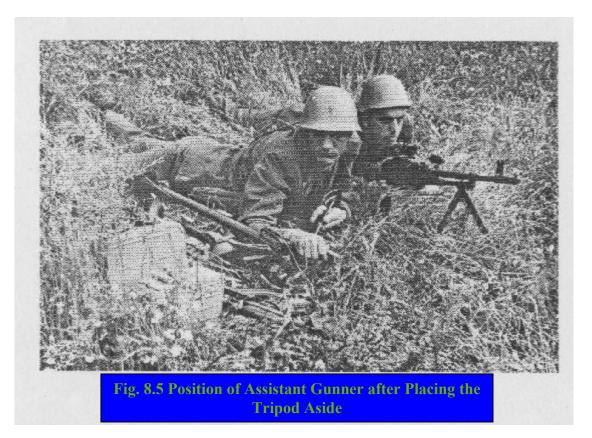
After moving into the firing emplacement, the crew loads the machine gun (as described in items 165, page 142), and the gunner sets the optical sight.

165. Actions of the crew while carrying a disassembled machine gun to the firing emplacement (cover location) are as follows:

—the gunner carries the machine gun by the handle, the machine gun is loaded with the ammunition from the small ammunition box. After arriving at the cover, he steps forward with the left foot and puts the machine gun down on the bipod, while leaning onto the ground with his hands and at the same time stepping back with both feet, he then adjusts the optical sight and lies down, extends the shoulder rest, grasps the grip with the right hand while removing the finger from the trigger and leans on the left forearm with the hand turned towards the ground. In this position he observes the ground (Fig. 84);



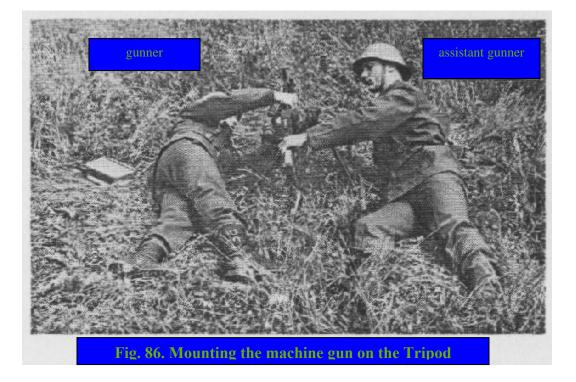
Fig. 84. Position of the Gunner after Taking Position in the Firing Emplacement—Prior to Assembling the Machine Gun



—the assistant gunner moves into position in the cover to the right of the gunner, he steps forward with his left foot and places the rifle in front of him with the handle turned towards the ground. He then removes and puts the tripod aside, with the ends of the legs turned backward and the front leg turned to the left. Throughout this time he leans with his hands on the ground, puts his feet forward and lies down to the left of the tripod (Fig. 85), unfastens straps for tying together ammunition boxes (if they were carried on the tripod), removes ammunition boxes and places them on the ground to the right of the rifle, with his right hand he grasps the front leg and pulls it forward and up, fastens the pin, leans the tripod on the front leg and at the same time spreads the back legs apart making sure that the lugs lean on the upper stops (prone position), he then raises the latch handle, grasps the frame of the cradle with his left hand, moves the latch handle forward with the fingers of his right hand and releases the attachment for firing at targets in the air, moves forward the latch handle of the support of the attachment for firing at targets in the air and releases the support, folds it and fits the small spring coupling on the

lower part of the pintle, depresses the delimiter lever and slips the smaller spring coupling on the pintle, and pulls tight latch handle of rest for firing at targets in the air. When the spring coupling is being fit onto the pintle, if necessary the right hand can press the tripod downward. After linking the rest for firing at targets in the air with pintle, assistant gunner pulls tight the handle of the traversal lock, turns onto the right side and moves the assembled tripod towards the gunner:

—after visually making sure that the assistant gunner has fastened the cradle with the attachment for firing at targets in the air, the gunner opens the cover and unloads the machine gun, removes the ammunition box from the machine gun, crawls forward lying on his left side and with his right hand grasps the upper side of the machine gun barrel, raises the barrel, folds the bipod and fastens it in forward position. At the same time with his left hand the gunner grasps the bipod from below at the level the gas port, and the assistant gunner grasps the gun stock neck from above with his left hand. They then both lift the machine gun (fig. 86), fit the studs of the barrel support into the semicircular cutouts in the frame of the cradle. The assistant gunner then pulls the latch handle of the support and fixes the machine gun to the cradle.



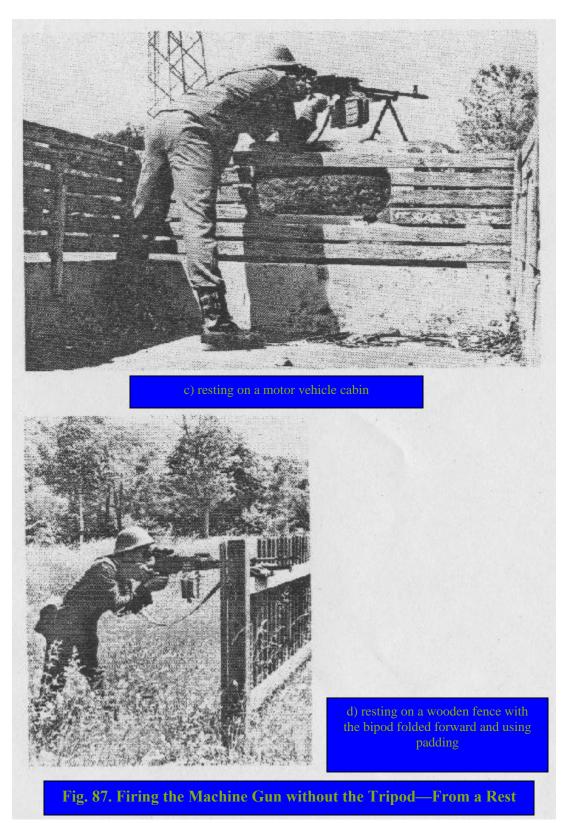
The gunner withdraws behind the machine gun and opens the cover in order to load the machine gun. The assistant gunner removes the lid of the large ammunition box, fits and fastens it on the right leg of the bipod and pulls out the link belt, which he hands to the gunner. The gunner fits link belt into the feed plate with his left hand and with his right hand shuts the cover, pulls the receiver rearward, returns the handle into the forward position and extends the shoulder rest. The assistant gunner takes the rifle and assumes the position "ready;"

—the ammunition bearer brings the ammunition boxes and places them to the right of the assistant gunner, he then retreats 5–6 paces to the left (or right) and back, behind the machine gun, where he assumes the position "ready" with the machine gun. The cover for the ammunition bearer must ensure covert approach to the location of the means of transportation or the company supply station in order to supply the machine gun with ammunition and other combat supplies.

166. The machine gun is adjusted for firing from a sitting (kneeling) position or brought into the horizontal position by lowering the front (rear) legs.



b) resting on a wall with the bipod folded rearward and using padding



167. Before opening fire, the machine gun has to remain in the basic position; the sights have to be in the basic position; the cradle in the horizontal position; the handle of the precision elevating mechanism has to be in the horizontal position with the lines aligned; the machine gun has to be position in the middle of the serrated arc of the traversal mechanism and with the spring stops spread apart; all latch handles need to be tightened and the trigger mechanism placed on "safe."

168. The sitting, kneeling and prone position for firing from the machine gun (with or without the tripod) is used during firing from a constructed cover or when the height of the natural cover (camouflage) prevents the use of the prone position.

169. When firing the machine gun without the tripod, the height of the bipod support has to enable the gunner to keep his body in a natural position and feel comfortable when aiming.

170. The machine gun can also be fired from a rest (fence, wall, etc), which lessens the stability. In this case, the bipod (if the width of the rest allows it) can either be on a rest or folded (to the rear or the front) and if the rest is hard (fig. 87), support is placed underneath the bipod. For firing above a small cover, the bipod has to be dug in behind the cover, so that gas block does not lean on the ground.

If the cover for the standing position is somewhat low, firing stability is achieved by standing astride in a comfortable position rather than bending the body (fig. 88).



171. A tree, tree trunk, large rock or the like are used for cover, and the machine gun (with or without the tripod) is set up to the right of the cover. When firing from cover that only protects the gunner from being spotted by the enemy, the lowest position that ensures effective firing is used.

172. For firing at targets in the air, the command "For AA [anti-aircraft] firing ordnance at...." When this command is given, the crew runs to a designated location and acts as follows:

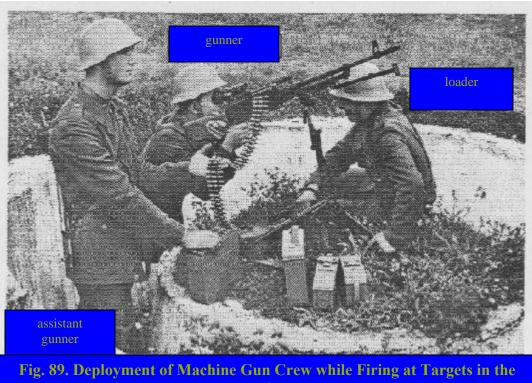
—the assistant gunner lays the machine gun and the tripod on the ground, unfastens the straps, removes and lays down the ammunition boxes, releases the front leg latch handle and aligns the indexes (white lines) on the leg and the mount and tightens the latch handle, releases the rear legs handle, spreads the legs of the bipod and presses the bipod down until the lugs slide into the lower delimiters and fasten them,

extends the attachment for firing at targets in the air and fastens it with the cradle latch, lifts up the body of the machine gun support for firing targets in the air and leans its interior supports on the edge of the safety delimiter, releases the support latch, prepares the large ammunition box for loading the machine gun (without placing it on the right tripod leg) and closes the cover;

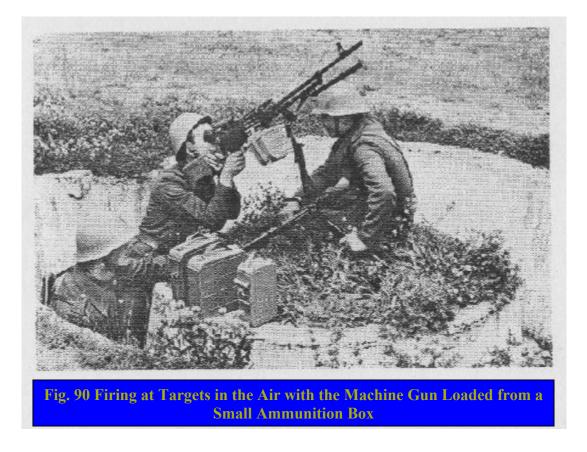
—the gunner removes the small ammunition box, sets the mechanical sight on "4" (or "0"), moves in front of the front leg of the tripod and places the machine gun into the support for firing at targets in the air, then opens the cover and loads the machine gun;

—the ammunition bearer brings ammunition boxes and puts them down next to the assistant gunner;

During firing loader's assistant holds the legs of the bipod and the assistant gunner moves the ammunition box and holds the link belt. The deployment of the crew at the machine gun during firing is shown in fig. 89.

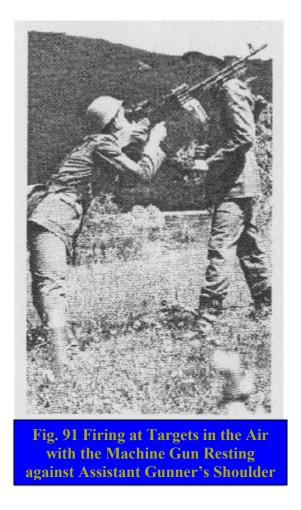


173. In exceptional cases, when there is not enough time to load from the large ammunition box, or if firing at targets that require lower barrel elevation, the gunner does not remove the small ammunition box (fig. 90).



174. On the march and while moving on the battlefield, if low-flying aircraft or helicopters appear suddenly, at the command "For anti-aircraft fire without the tripod," the gunner assistant puts the tripod aside and turns towards the gunner. The gunner loads the machine gun using a small ammunition box and puts it on the assistant gunner's shoulder, who grasps the strap and pulls it down to tighten it (Fig. 91). In this position the assistant gunner has to have cotton wool or antiphon in his ears and have his back turned towards the target at all times. The bipod is folded (to the front or the rear) and fastened. If aircraft or helicopters are approaching from the right, the machine gun is supported against the assistant's left shoulder and the other way around.

During firing the assistant gunner follows the gunner's movements and makes sure that during each move his shoulders are parallel with the gunner's shoulders. When the machine gun is resting against his right shoulder, the assistant steps forward with his right leg and vice versa.



175. At the command "CEASE UNLOAD... READY TO FIRE," the crew changes the firing position from the position for firing at targets in the air into the position for firing at targets on the ground. At this command, the gunner unloads the machine gun and removes it from the tripod, while the assistant gunner prepares it for firing at targets on the ground, as described in item 165. He makes sure to press the cradle latch downward in order to release the cradle with the attachment for firing at targets in the air.

176. In order for the crew to move from the position for firing on the ground into the position for firing at targets in the air, the following

command is given: **"FOR ANTI-AIRCRAFT FIRE."** At this command the gunner unloads the machine gun and takes it off the tripod. The assistant gunner first adjusts the front and the rear legs, detaches the support for firing at targets in the air from the pintle, links the attachment to the cradle and fastens the cradle. Other crew actions as described in item 172.

177. On skies, the crew carries machine gun components across the chest or on the back. The ammunition bearer carries ammunition boxes on the shoulder, because his hands need to be free to use skiing poles.

178. Machine gun firing from the tripod is possible when there is not much snow and when the snow is wet (it can be stamped) or frozen. In this case the crew removes skies from their feet and act as described in items 163–166.

179. All positions for machine gun firing when standing or moving on skies and without the tripod (during training) are assumed from the position "TO ATTENTION" with the skies on. The assistant gunner and the ammunition bearer put down the machine gun components and assume firing positions.

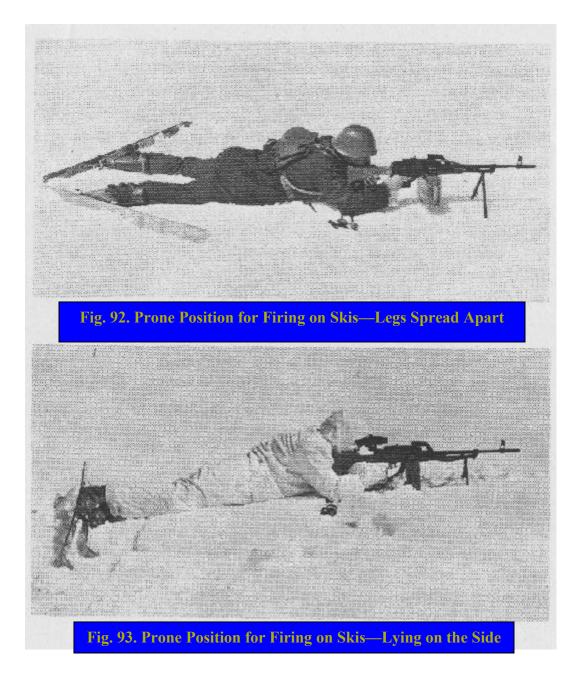
In all positions, the poles can be used as rests, and in prone position the assembled poles are used as rests for the elbows or, when the snow is soft, as rests for bipod legs.

180. The use of different positions depends on the depth and amount of snow, firing range, camouflage height, the terrain, visibility and available amount of time. To ensure proper taking of position (during training), relevant commands are given; for firing from rests made of skiing poles, additional commands are given.

181. When firing the machine gun standing on skies (without the tripod), a prone, kneeling, and standing position can be used and the machine gun can be fired while moving.

182. The prone position with the skies on is assumed at the command: "Step astride and lie down—READY." At this command the gunner takes the poles into his left (right) hand and holds the machine gun in his right (left) hand. He places the machine gun to his right (left) on the bipod (if the snow is deep and loose he sticks the gun stock into the snow); he then sticks the poles one step in front of him and without

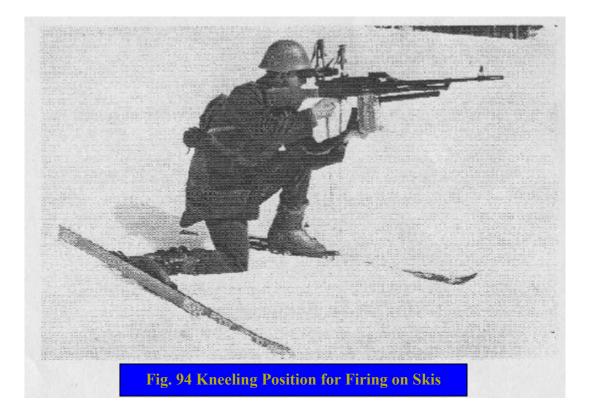
moving the rear end of the skies lowers himself on his knees and assumes the prone position; he then links the poles together and lays them down in front of him, with baskets on the left, so that he can use them as rests for elbows or the legs of the bipod; he then takes the machine gun and assumes the position "READY" (fig. 92).



Alternatively, after laying down the machine gun, the gunner, while supporting himself on the poles, does the high jump, and turns to the right (or the left) and while supporting himself on his left (right) knee and elbow, he lies down and acts as described in the previous paragraph (fig. 93).

To fire in deep snow, the poles and skies or makeshift means are used as support for bipod legs and elbows. When a ski is used as support for the elbows, the bottom part has to be up.

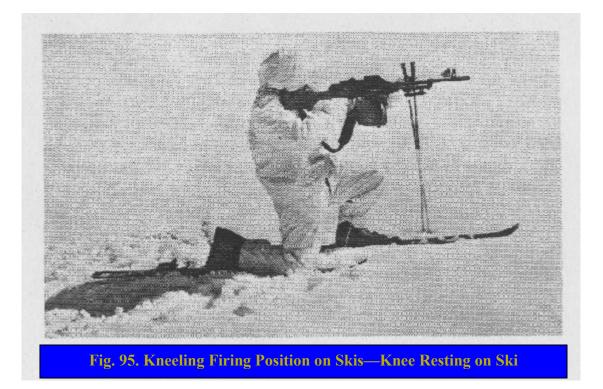
At the command "RAISE" the gunner raises himself up on the knees or sits down, takes the machine gun on his back (chest); takes the poles apart, sticks them into the snow in front of him or on his side, leans on them and lifts himself up; if his position is such that his skies are parallel with each other, he turns on his left side (or his right side) and stands "to attention." If he has taken off one of his skies, before assuming the position "to attention," he puts it back on.



183. The kneeling position for firing the machine gun is assumed in two ways:

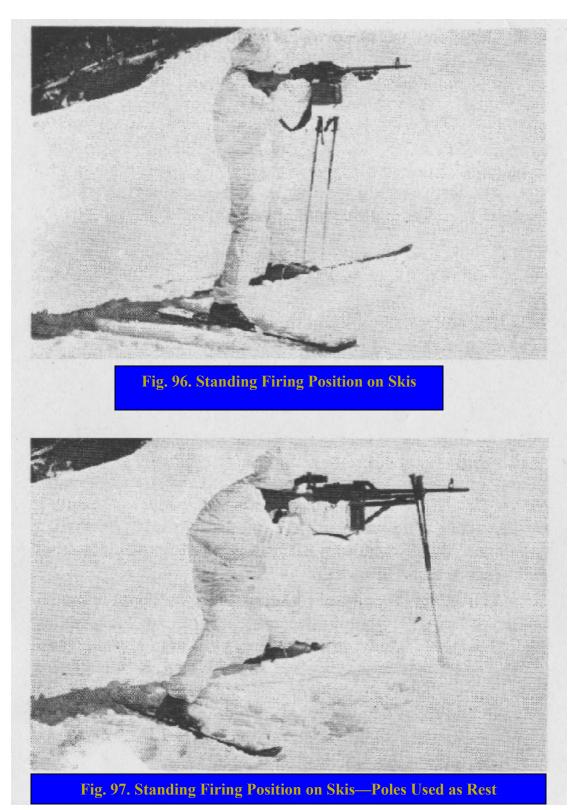
—at the command "Kneel—READY," the gunner holds the baskets of the poles above the snow, raises the right (or left) ski above and to the side enough to kneel on the right or the left knee between the skies, removes the poles and sticks them into the snow half a pace to the left (or the right); removes the machine gun from the back (chest) and assumes the position "ready" (fig. 94).

At the command **"Kneel on a ski—READY,"** the gunner sticks the poles into the snow half a pace on his left (or right) side, slides half a pace forward on his left (right) ski, releases the right ski binding and kneels with his right (left) knee on the ski; he then removes the machine gun and assumes the position "at the ready" (fig. 95).



In both kneeling positions poles can be used as rests, and the commands given are: "KNEEL—READY skies functioning as rest" or "Kneel on the ski—READY, skies functioning as rest."

In both cases the procedure is the same as when taking the described positions, the difference being that the gunner sticks the poles into the snow and ties the ski pole loops together in front of his body in order to achieve the required height of the machine gun rest.



At the command **"STAND UP"** the same procedure is carried out in reverse.

184. The standing position for firing on skies is assumed at the command "READY." At this command the gunner removes the poles and sticks them in to the snow half a pace from the left (or the right) side, or he pulls them up on his forearm, steps half a pace back and to the side with his right (or left) foot in order to find the most comfortable firing position. He then takes the weapon off his chest (or back) and holds it in the position "ready" (fig. 96).

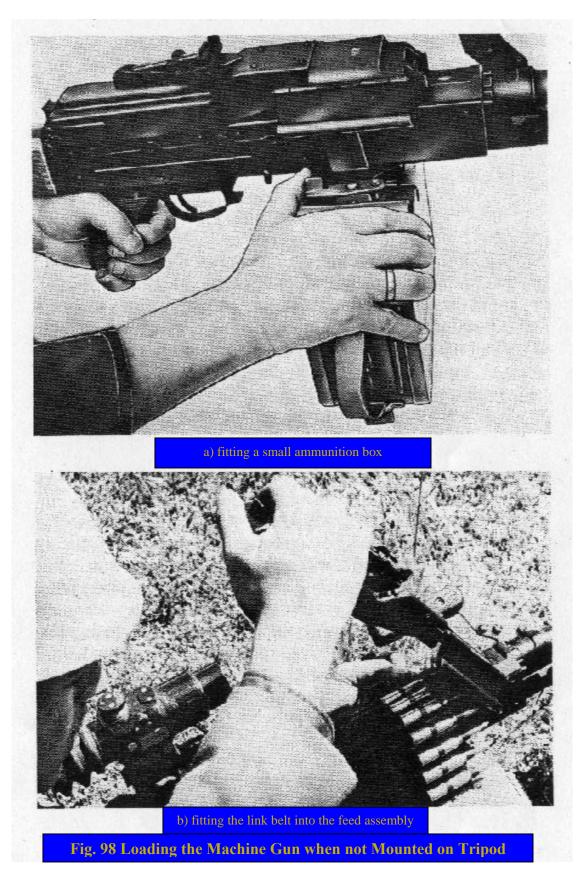
At the command "**READY**—**poles as rest**," the gunner drives the poles into the snow in front of his body and ties the ski pole loops together adjusting them to function as a rest for the machine gun. The height of the rest is adjusted by spreading out or putting the poles all together when driving them into the snow (fig. 97). The height of the rest is adjusted by putting the feet apart.

The position "at attention" is assumed at the command "AT ATTENTION," with the gunner acting in reverse order.

3) Loading the machine gun

185. The machine gun is loaded right after being set up for firing, as described in item 165.

186. When the machine gun is not on the tripod, it is loaded with the link belt from the small ammunition box. If the link belt does not have tabs, the gunner opens the machine gun cover and pulls the link belt from the ammunition box through the shutters. He then grasps the box with his right hand across the shutters, so that his thumb is on the latch handle, grasps the grip of the machine gun with his left hand and lifts the machine gun up (Fig. 98). He then fits the box onto the ammunition box bracket and fastens it with a latch, lowers the machine gun, fits the link belt into the feed place, closes the cover with his right hand and pulls the slide into its rear position.



If the machine gun is loaded with the link belt with tabs, the gunner (without opening the machine gun cover) pulls the tab through the feed plate with his right hand, holds the tab with his left hand, while his right hand pulls the slide in its rear position, about 10mm, until his left hand pulls the link belt left to the cartridge stop lugs and suddenly releases the bold forward, so that the cartridge extractor can catch the bullet, and then pulls the bolt into its rear position.

187. After loading, if no rounds have been fired, the machine gun is put on safe by pulling the safety wing to the rear.

5. PREPARING FIRING ELEMENTS

188. To ensure success during firing, prior to giving the command for commencing fire, the squad commander or the gunner (if opening fire independently) has to prepare elements of fire (set the range, aiming point, class of fire, type of firing, etc) starting with the types and characteristics of targets, features of the ground, combat situation and meteorological conditions.

All crew members have to be trained and able to prepare elements of fire quickly and accurately, so that they could independently deliver efficient fire in certain situations (i.e., when repelling an attack or counterattack, firing at important short-term targets, during ambush fire, when firing at targets in the air, when firing while moving, etc).

1) Observation, spotting, pointing and selecting the target

189. Observation of the battlefield includes observation of the ground and the enemy, observation of the effects of own fire and the movement of friendly units. In order to detect the target in good time, the battlefield has to be observed carefully and constantly, with special attention being paid to the avenues of approach and locations suitable for deployment of enemy weapons and observation points. The goal of observation is to spot the seemingly insignificant things (such as the bending or swinging of branches, the appearance of new objects, changes in position or shape of objects, reflection of metal components and glass,

flashes of weapons, smoke, dust etc), which can facilitate enemy detection. It is also necessary to listen carefully for any shots, engine noise and any other kind of noise, and use them as a basis for establishing the location of the target.

190. In principle, the observation zone matches the zone of operation of the unit within which the machine guns are active. The zone is observed gradually, from right to left and from the position of the observation officer towards the enemy. Certain objects and areas of the ground are observed with binoculars or optical sights, while making sure that the reflection of the lens does not reveal the location of the observation officer.

191. The 5 x 80 passive night sight is a reliable and most convenient means of observing the battlefield and firing at various types of targets at night, especially in areas where there is no light. The passive night sight cannot be detected with any kind of equipment for night observation, and can be used to detect all types of living targets, enemy combat equipment or objects, and all active means of IR equipment for observation (firing) or the movement of enemy combat and non-combat vehicles.

When observing the battlefield and firing with the passive night sight at night, the lens should not be directed towards sources of strong light (street lighting, headlights), because they might, owing to their bright flash, damage the device and blind the soldier, who will lose the necessary sensitivity for quick spotting and firing at targets. If the enemy illuminates the ground often in order to neutralize the passive night sight, the crew can use the optical sight or their own vision for observation.

192. The zone of fire (in order to detect targets at night) is observed with the passive night sight, as described in item 190, keeping in mind the fact that long observation causes eye strain and wastes the energy source used to charge the device. The use of the passive night sight for observation has to be temporary and as short as possible, which depends on the situation and enemy activity. At night the soldier supplements observation with his own senses (vision, hearing, smell) and personal instincts. As soon as he spots or senses some enemy activity, he continues observation with the passive night sight.

193. When the squad (crew) is in the firing emplacement, all crew members are required to carry out observation, and if the squad is behind cover, the squad commander appoints an observation officer. All crew members rotate in this duty. When the enemy appears, the observation officer on duty reports it to the squad commander orally or with a prearranged signal.

To ensure successful machine gun firing it is important to monitor and observe the movement of friendly units during combat in order to efficiently support their operations and at the same time avoid the possibility of losses from own machine gun fire.

Careful and constant observation of the movements of friendly units, as well as of enemy activity is especially important when machine guns are opening fire independently—on the basis of a received task, and if firing next to the flanks, through interspaces and across friendly units is envisaged.

194. The target for the machine gun is selected by the squad commander or the gunner when they are completing the task independently. Machine gun fire is used for targeting enemy crews, ordnance, groups of marksmen, cars, motorcycles, loopholes on the bunkers and important individual targets (senior officers, messengers, observation officers). All these targets can be stationary, moving and instantaneous.

When the gunner fires independently, he primarily fires at targets that are important and dangerous and at locations where he can cause significant losses. When the targets are equally important, the soldier who is nearer or more likely to hit the target is the one to fire.

If a more important or dangerous target appears during firing, the gunner is required to shift fire to that target.

195. The squad commander (observation officer) points the target to the gunner in one of the following ways:

—if the target is near and clearly visible, he determines only the direction and the name of the target, for instance: "Straight ahead—firing squad;"

—if the target is far away and difficult to spot, he also determines the position of the target in relation to an easily identifiable point on the ground or an orientation point, for instance: "Straight ahead, wide bush—machine gun" or "Orientation point 1, to the right 50 machine gun;"

—if the area of the target and the rear are difficult to spot, the target is pointed by gradually listing objects and objects in the direction of the target, for instance: "Orientation point 3, further 200, tree, to the right 60, grove, on the right edge of the grove—observation officer."

After the squad commander points to the target, the gunner (when he has spotted it) reports: "I see." If the gunner does not see the target pointed by the squad commander, the squad commander has to point it out again or aim the machine gun at the target.

2) **Determining distance to target—objects**

196. The most important condition for efficient firing is accurately determining distance to the target. Distance to the target can be determined by rough estimation, indirect measuring, by means of the angle at which the object can be seen and with an optical sight.

(1) Determining distance to target by rough estimation

197. The basic method of determining distance to the target is by rough estimation: depending on the appearance, visibility and color of the target or object; by carrying over the familiar base on the ground or by combining the two.

198. In order to determine distance according to appearance, visibility and color of the target or object, the soldier makes a personal reminder sheet, into which he enters his observations on how he sees the objects or targets at various distances. The possibility of recognizing targets at different distances by a person with normal vision and under favorable conditions (nice weather, strong light, etc) is shown in Table 5.

In addition to the sharpness of one's vision, the accuracy of determining distance also depends on the size and clear appearance of the object, its color, surroundings, etc.

TABLE 5

AT VARIOUS DISTANCES						
Distance in meters	What can be seen					
1,000	People walking are hard to distinguish from					
	people on horses					
800 to 700	Movement of the legs of those walking or					
	running can be seen					
400 to 300	Colors of face, clothes and footwear can be					
	detected					
200	Contours of people's head and shoulders are					
	discernible					
150	Hands and parts of weapons and clothes can					
	be seen					

POSSIBILITIES OF RECOGNIZING TARGETS AT VARIOUS DISTANCES

Factors that make distance appear smaller: large objects (forest, hill, settled area); light color objects (white, orange and the like); single color, uniform background (meadow, snow, plowed fields; light, sunny day and clean air; sunrays falling in the direction of the object; taller objects; objects that can be observed across water, ravine or small valley, and objects whose distance can be determined from prone position.

Factors that make distance appear larger: small objects (rocks, shrubs); dark-color objects (blue, black, gray); multicolored background that serves as camouflage for the objects; cloudy and rainy weather; slant sunrays from the direction of the object; objects lower than the place from which distance is measured and objects to which distance is determined from a kneeling or prone position.

In conditions of diminished visibility (nighttime, fog, smoke), the distance to the target or object is difficult to determine. See Table 6 for information on how to determine distance in conditions of diminished visibility.

TABLE 6 SIGNS FOR DETERMINING DISTANCE IN CONDITIONS OF DIMINISHED VISIBILITY

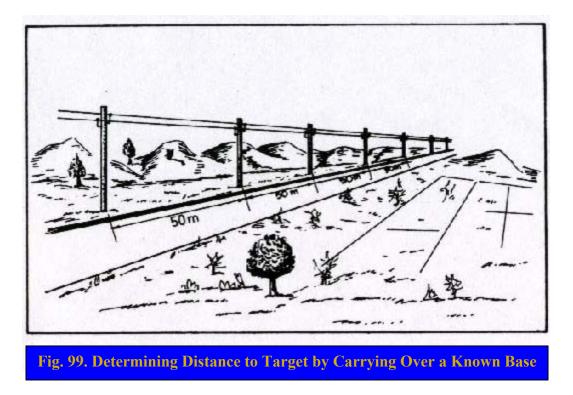
Can be seen at night	Distance in meters	Can be heard at night	Distance in meters
Flash of machine gun fire	2,000	Rifle shot	3,000
Lantern light	2,000	Movement of tanks	1,500 to 800
Dust illuminated by headlights	1,000	Movement of artillery with animal-drawn carts	600 to 500
Flame of a match	300	Movement of vehicles	500 to 300
Group of soldiers in the moonlight	300 to 200	Negligent handling of a bolt on the weapon	400
Lit cigarette	100 to 50	Clicking of equipment	300

This table is made by an individual soldier who uses it to determine distance.

In conditions of diminished visibility distance to targets can also be determined on the basis of sound speed (330 m/s). In that case, sound speed is multiplied with the time (in seconds) that it takes for the sound to disperse (330m/s x 2s = 660 meters).

199. Distance can be determined by means of a known, wellremembered distance which is then carried over as a known base. This method of determining distance is used on level terrain. Any known distance the soldier has been observing for a long time and has remembered, can be used as the base, i.e. soccer field (100 meters), distance between telephone poles or power-line poles (50 meters).

When determining distance, the base is carried over as many times as is necessary to cover the distance that needs to be determined (fig. 99), while keeping in mind the following: the known base appears longer when near and vice versa, and valleys, ditches, springs etc. that intersect the direction on which the distance is estimated (if invisible or difficult to see) make the distance appear smaller.



For greater accuracy and easier rough estimates, a certain distance has to be compared with other known or measured distances. On the basis of distances determined by several soldiers, the average distance is calculated, for instance: if one soldier estimates the distance at 800 meters, another at 700 meters, the average distance is 750 meters (800 + 700 = 1,500 : 2 = 750m).

The ability to make rough estimates of distance quickly and accurately can only be achieved by constant practice during training.

(2) Determining distance to target by direct measuring

200. Distance can be determined by direct measuring with the meter, the picket, an elastic rubber band, cord, marking cord and even paces.

In order to determine the distance with even paces the soldier must know the length of his even pace, which is determined by crossing the distance of 200 meters on level terrain in three paces. The even pace includes stepping out with the left foot followed by the right foot and is always counted on a single foot. The amounts of three measurements are added up and divided by three, and the result is the average amount of

even paces for the distance of 200 meters, for instance: first count was 130 even paces, second 134 and third 132, $132, \left(\frac{130 + 134 + 132}{3} = 132\right)$ so the average is 132 even paces.

The length of an even pace is calculated by dividing the distance of 200 meters by the average amount of even paces (200 : 132 = 1.51 meters).

The distance to the object is measured by multiplying the number of even paces with the length of a single even pace.

Example: A soldier has counted 325 even paces to the orientation point marked by a tree. The distance is 491 meter ($325 \times 1.51 = 490.75$ meters).

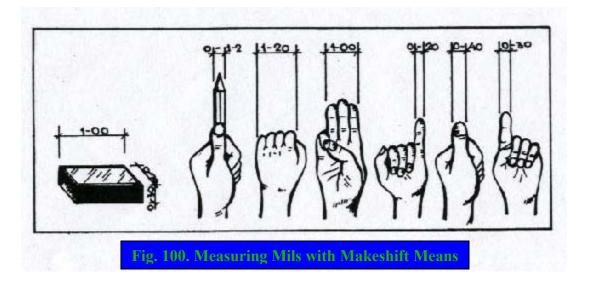
(3) Determining distance to target by means of an angle at which the object is visible

201. In order to determine distance in this way it is necessary for the exact height and width of the object (target) to which distance is determined to be known. The angular size of the object is measured in mils, before distance is calculated by means of the following formula:

$$D = \frac{V(\check{S}) \times 1000}{U},$$

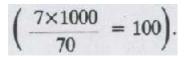
where D—distance, $V(\check{S})$ —height (width) of object, 1,000—constant coefficient, U—angular size of the object in mils.

The angular sizes of the object are measured with the sight bar, binoculars, fingers and other objects whose dimensions in millimeters are known (Fig. 100).



Some objects in nature have standard dimensions: a telephone pole is 8 meters high, a power-line pole is 20–25 meters high, a one-floor village house is about 7–8 meters high, doors on the house are around 2 meters high, average height of a soldier is 1.75 meters, a tank is about 6 meters long and about 3 meters wide, etc.

Example: The height of a one-floor house is covered with the edge of a matchbox (70 mils). Distance to the house is 100 meters.



When determining distance with binoculars, the angular size is read directly on the reticle. In order to determine the angular size with the fingers, the average corner size of fingers is measured. Each soldier and officer must determine the corner size of his fingers by comparing measurements done with binoculars, the ruler or a sight bar. This can be done standing, kneeling or sitting down, and fingers need to be held 50 centimeters away from the eyes.

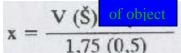
(4) Determining distance to target with the optical sight

202. Determining distance by means of a measurement scale on the optical sight reticle is done on the basis of a known height (1.75m) or

width (0.5m) to the target. When determining distance, enemy soldiers (targets) have to be clearly visible.

In order to determine distance based on the height of the target, the following needs to be done: lower line of the scale must be aligned with the base (feet) of the target; move the scale to the left (or right) until one of the lines on the uneven line is completely aligned with the width of the target; read the number above the line that marks distance to the target. When determining distance, the measuring is repeated two to three times to avoid possible mistakes in conclusion.

When the target silhouette is not clearly visible but the target is close to a visible object of a larger (or smaller) size than the 1.75 or 0.5 meter target, the distance to the target can be determined with the scale for measuring distance or by calculation. First the relation (x) between the constant height (1.75m) and width (0.5m) of the target must be calculated, according to the following formula:



 $\mathbf{x} = \frac{\mathbf{V}(\mathbf{\check{S}})}{1,75(0,5)}$. The established relation is then multiplied with the beight or the width of the number above the line which expresses the height or the width of the object.

Example 1: Machine gun fire is coming from a bunker in the immediate vicinity of the house that serves as an orientation point. The width of the front door of the house (usual width 1 meter) is covered by the line on the uneven line marked with number 5 (500 meters).

The relation between the door width (1m) and the constant coefficient

 $x = \frac{1}{0.5} \frac{m}{m} = 2$. The door is covered with the line marked with (0.5) is number 5 (500 m), so that the actual distance to the target amounts to $500 \ge 2 = 1,000$ meters.

Example 2: The machine gun gunner has the task of destroying the crew of a recoilless piece of ordnance firing from cover from a firing position on the line of a stationary tank. The tank is 2.5m high, covered by a line (on a dotted line) marked with number 6.

The relation between the tank height (2.5m) and the constant coefficient (1.75m) is 1.48. The target is covered with the line marked with number 6 (marks the distance of 600 meters), so the actual distance is around 900 meters (600 x 1.48 = 888 meters).

Because of this, in order to accurately determine the distance with the scale for measuring distance on the optical sight reticle, the height or width of the target or the object in the immediate vicinity of the target to which distance is determined must be known.

3) Eliminating external influences on firing

(1) Eliminating the influence of the wind

203. When firing from the machine gun, lateral, slanting and longitudinal wind influences the trajectory of the bullet. The direction and speed of the wind can be gleaned from meteorological data or roughly estimated by the squad commander (or gunner). The direction can be determined based on the approximate angle of the wind (Fig. 101), and the speed by observing the influence of the wind on the trees (moderate wind blowing at the speed of 4m/s moves thin branches on the trees, strong wind with the speed of 10m/s makes thin trees swing).

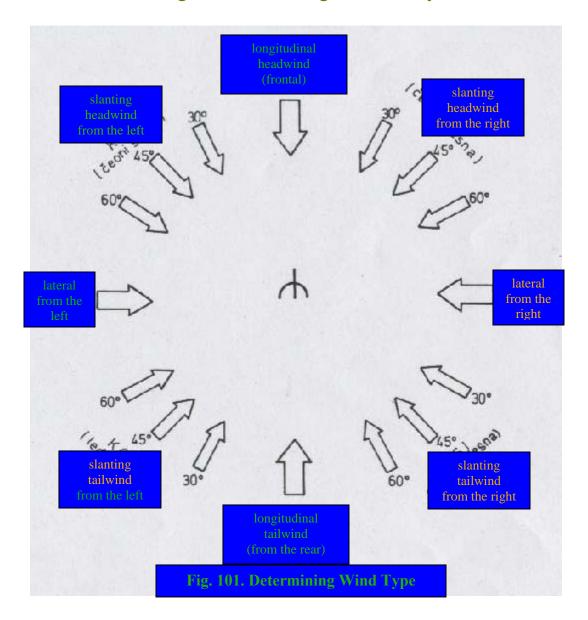
Lateral wind blows at an angle of 60-90° in relation to the firing plane (from the left or the right flank) and moves the cone of machine gun fire for direction. Adjustments for eliminating the influence of lateral wind can be made by rotating the windage mechanism knob (amount of one division 0-05) or the sight bar of the mechanical sight (amount of one division 0-02). If the sight bar cannot be used, the adjustment is made by leading the aiming point (human silhouettes) to the side from which the wind blows.

Corrections for moderate wind (4m/s) and how to make them is described in table 7.

Example: Firing is carried out at the range of 1,000 meters and a moderate lateral wind blows from the right.

Solution: According to Table 7, corrections for the range of 1,000 meters are as follows: for the optical sight 4 divisions (or 1 for lead

scale), for the sight bar 2 divisions and 7 for lead in silhouettes. Since the wind blows from the right, the following is necessary:



—if optical sight is used for aiming, set the elevation scale on 10, and move the reticle to the left by rotating the windage mechanism knob for 4 divisions (if using lead scale use the first line on the left of the central arrow to aim), aim at the target and fire;

—if using the mechanical sight and the sight bar, set the knob on the leaf to 10, move the notch on the sight bar to the right by 2 divisions, aim at the center of the target and fire;

—if using the mechanical sight but not the sight bar, after setting the sight knob to 10, move the aiming point to the right by 7 silhouettes and fire.

Slanting wind blows at the angle of 30-60° to the firing lane and can be frontal slanting wind (from the right and the left) and rear slanting wind (from the right and the left). Slanting wind moves the cone of machine gun fire at the same time for windage and elevation. Movement of the cone of machine gun fire for windage is eliminated in the same say as the influence of lateral wind, except that the corrections are smaller, depending on the angle at which the wind blows (table 7). Movement of the cone for distance must be eliminated by moving the aiming point for elevation (lowering it in the case of rear wind, and raising it in case of frontal wind) or with fire corrections.

Longitudinal wind blows along the fire lanes and can either be frontal (in the opposite direction) or rear (in the same direction). In practice, longitudinal wind is the wind that blows at the angle smaller than 30°. Frontal longitudinal wind diminishes the range of the cone while the rear wind increases it. The influence of moderate wind (4m/s) on the cone of machine gun fire is limited and eliminated by fire correction. The influence of strong wind (8-12m/s) can be eliminated by moving the aiming point as described in Table 8 (upward in the event of frontal wind, downward in the event of rear wind).

TABLE 7

CORRECTIONS OWING TO THE INFLUENCE OF LATERAL AND SLANTING WIND

	Moderate lateral wind (4m/s)								
		corrections							
				livisions					
Distance	In meters	In human	In mils	On optical s					
(m)		silhouettes		On windage	On lead	On sight			
200	0.10	0.5	0.01	mechanism knob	scale	bar			
200	0.13	0.5	0-01	1	-	-			
300	0.26	0.5	0-01	1	-	-			
400	0.48	1	0-01	1	-	-			
500	0.72	1.5	0-01	1	-	-			
600	1.1	2	0-02	2	0.5	1			
700	1.6	3	0-02	2	0.5	1			
800	2.2	4	0-03	3	0.5	1			
900	2.9	6	0-03	3	0.5	2			
1,000	3.7	7	0-04	4	1	2			
1,100	4.6	9	0-04	4	1	2			
1,200	5.5	11	0-05	5	1	2			
1,300	6.6	13	0-05	5	1	3			
1,400	7.7	15	0-06	6	1	3			
1,500	8.9	18	0-06	6	1	3			
For slanting wind, corrections from the table have to be multiplied: —for slanting wind blowing at the angle of 30° by 0.5 —for slanting wind blowing at the angle of 45° by 0.7 —for slanting wind blowing at the angle of 60° by 0.9 When the wind is weaker or stronger than 4m/s, the number from the table has to be multiplied									
with the w	vind speed,	and the resu	It divided by	4.		_			
		unt of correc	ction.						
			ection of the wi		From the left	From the right			
On optical sight How to do		ical sight		nechanism knob	+ On the right	-			
corrections			On lead scale		On the right side	On the left side			
	On mecha	anical sight	On sight bar		On the left	On the right			
			In silhouettes		side To the left	side To the right			

Distance (m)	Strong longitudinal wind 10m/s Moving the aiming point for elevation (m)	Distance (m)	Strong longitudinal wind 10m/s Moving the aiming point for elevation (m)
100	-	900	0.27
200	-	1,000	0.42
300	-	1,100	0.66
400	0.01	1,200	0.90
500	0.03	1,300	1.30
600	0.06	1,400	1.75
700	0.10	1,500	2.50
800	0.16		

TABLE 8 CORRECTIONS DUE TO THE INFLUENCE OF LONGITUDINAL WIND

(2) Eliminating the influence of temperature

204. Temperatures different than normal (15°C) increase or diminish the bullet range. For instance, at high temperatures the same elements of fire cause overshooting (above 15°C), while low temperatures (below 15°C) cause shortfall.

At ranges up to 500 meters the influence of temperature on the bullet trajectory is small, and no corrections are made when aiming. At longer ranges the influence is eliminated by increasing or diminishing the sight division according to table 9.

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TABLE 9

ELIMINATING THE INFLUENCE OF TEMPERATURE

Firing	Air temperatures in degrees Celsius									Firing	
range	+45	+35	+25	+15	+5	-5	-15	-25	-35	-45	range
(m)	Corrections in divisions on optical or mechanical sight										(m)
	Lo	ower sig	ht divisi	on		Hi	gher sig	ht divisi	on		
500	-	-	-	-	-	-	-	-	-	1	500
600	-	-	-	-	-	-	-	-	1	1	600
700	-	-	-	-	-	-	-	1	1	1	700
800	1	-	-	-	-	-	1	1	1	1	800
900	1	-	-	-	-	-	1	1	1	2	900
1,000	1	-	-	-	-	-	1	1	1	2	1,000
1,100	1	-	-	-	-	-	1	1	2	2	1,100
1,200	1	1	-	-	-	1	1	1	2	2	1,200
1,300	1	1	-	-	-	1	1	2	2	2	1,300
1,400	1	1	-	-	-	1	1	2	2	2	1,400
1,500	1	1	-	-	-	1	1	2	2	3	1,500

(3) Eliminating the influence of height above sea level

205. The higher one goes above sea level the smaller the thickness of the air, including air pressure, which makes it easier for the bullet to overcome the resistance of the air and increases its range.

At heights above sea level up to 500 meters, the influence is small and no corrections are necessary. At higher elevations, the increase in range is eliminated by selecting a lower division on the optical sight (mechanical sight), as shown in table 10.

TABLE 10

Distance		Distance					
(m)	500	1,000	1,500	2,000	2,500	3,000	(m)
		Selecti	ng lower di	vision on th	ne sight		
500	-	-	-	1	1	1	500
600	-	-	1	1	1	1	600
700	-	-	1	1	1	1	700
800	-	-	1	1	1	2	800
900	-	1	1	1	2	2	900
1,000	-	1	1	2	2	2	1,000
1,100	-	1	1	2	2	3	1,100
1,200	-	1	1	2	3	4	1,200
1,300	-	1	2	2	3	4	1,300
1,400	-	1	2	2	3	4	1,400
1,500	1	1	2	2	3	4	1,500

ELIMINATING THE INFLUENCE OF HEIGHT ABOVE SEA LEVEL

(4) Eliminating the influence of site angle

206. The position of the target in relation to the azimuth of the ordnance also influences the precision of machine gun firing. In practice,

in a large number of cases the target will be above or below the azimuth of the ordnance, that is the site angle will be positive or negative.

When firing with a positive or negative site angle, a longer distance to the target is achieved (slanting distance), since the aiming angle with the sight division set a certain way remains the same as when the target is in the azimuth of ordnance.

If the site angle of the target does not exceed 20° does not influence the precision of the fire significantly, and no sighting corrections are necessary. A site angle of more than 20° causes significant overshooting, which needs to be eliminated by moving the aiming point downward or selecting a lower division on the optical or mechanical sight, as shown in Table 11.

TABLE 11

Distance		Sit	te angle o	f the targe	et (in degr	ees)	Site angle of the target (in degrees)								
(m)	50	40	30	20	-20	-30	-40	(m)							
Selecting lower sight division															
200	1	1	-	-	-	1	1	200							
300	1	1	-	-	-	1	1	300							
400	2	1	-	-	-	1	1	400							
500	2	1	1	-	-	1	1	500							
600	2	1	1	-	-	1	2	600							
700	2	1	1	-	1	1	2	700							
800	2	1	1	-	1	1	2	800							
900	3	2	1	-	1	1	2	900							
1,000	3	2	1	-	1	1	2	1,000							
1,100	3	2	1	-	1	2	2	1,100							
1,200	3	2	1	-	1	2	3	1,200							
1,300	3	2	1	-	1	2	3	1,300							
1,400	4	2	1	-	1	2	4	1,400							
1,500	4	3	2	-	1	2	4	1,500							

ELIMINATING THE INFLUENCE OF SITE ANGLE

4) Determining sight and aiming point, adjusting range mechanism on the optical sight, setting the knob on the mechanical sight

207. Sight division is determined on the basis of estimated distance to the target and the corrections made owing to the influence of longitudinal and slanting wind, temperature, height above the sea level and the site angle of the target.

Example: The division of the mechanical sight for firing a machine gun in the following conditions must be determined: distance to the target is 800 meters, air temperature is -15° C, height above the sea level is 2,000 meters, and the site angle is S=30°.

Solution: Basic division for 800 meters is 8, but that has to be lowered by one owing to external influences, as follows: height above the sea level (Table 10) and site angle (Table 11) lowered by two divisions, and temperature (Table 9) increased by one, (-2 + 1 = -1). Based on this calculation the firing division is 7 (8 – 1 = 7).

208. When the optical or mechanical sight with the sight bar are used, the aiming point is always on the target, and if the sight bar cannot be used (owing to a large "lead" or because it is not functioning properly), aiming point can also be outside the target.

The location of the aiming point depends on the type of the target: on small targets (individual targets and weapons with two crew members) at the center or in the middle of the base (in a standing position); on deep targets (columns) at the head or the rear of the column; on wide targets (firing squad) on either flank or in the middle.

209. When eliminating the influence of lateral or slanting wind, after making corrections with the elevation mechanism of the optical sight, the aiming point is at the center of the target marked with the central arrow. When corrections are made on the lead scale, the aiming point is at the center of the target but the selected division is on the left or the right side of the lead scale. When using the mechanical sight, the aiming point is

the center of the target if correction is made on the sight bar; when the sight bar is not used and correction is made in human silhouettes (0.50), the aiming point is outside the target.

210. When firing at moving targets, the aiming point is at the center of the target with the division set on the left or the right side of the lead scale. When mechanical sight is used and correction is made on the sight bar, the aiming point is at the center of the target. When the sight bar cannot be used, the aiming point is outside the target and the lead is set in silhouettes.

211. All divisions on the optical sight are set by the gunner. When the mechanical sight is used, the gunner sets the sight bar and the assistant gunner sets the sight knob to the division determined according to the distance to the target.

When the machine gun is fired without the bipod (or tripod), divisions on the optical or the mechanical sight are set by the gunner.

5) Determining classes of fire

212. Which class of fire will be used, whether bursts (short or long) or sustained fire depends on the type and importance of the target; firing range; options for observing fire and time period during which the target will be exposed to fire. The squad commander determines the class of fire and informs the gunner in the command for commencing fire or when issuing firing tasks. When the gunner opens fire at new targets independently, he determines the class of fire by himself.

213. Short bursts (up to 10 rounds) are used for firing at small individual and group targets.

Long bursts (11–25 rounds) are used to target large group targets whose width (depth) is smaller than ten mils (0-10). Long bursts can also be used for small targets at ranges beyond 600 meters, if the observation of the cone is difficult.

Sustained fire (up to 250 rounds) is used in all combat situations when a single machine gun must keep targets under fire for up to 24 seconds, as well as when repelling assaults and counterattacks by the

enemy, in ambush, when firing at wide and deep targets—traversing and searching, and when firing at targets in the air.

214. When the machine gun is fired from the bipod, only bursts can be fired in keeping with the provisions contained in the first paragraph of item 213.

6. FIRING

215. Firing includes controlling and directing fire, commencing fire, observing the cone and effects of fire, correcting fire, ceasing, continuing and ending fire.

1) Fire control

216. Controlling fire delivered by a machine gun squad includes passing on tasks (as part of a combat order) and issuing firing tasks or commands during combat.

The command for commencing fire includes information on who will carry out the firing (squad, first, second, third), the target, the sight division, corrections (for moving targets, lateral or slanting wind), method of firing (machine gun fixed, traversing for windage, searching for depth), aiming point (as needed), classes of fire (short bursts, sustained) and the action to be undertaken ("FIRE").

When the target appears suddenly and fire has to be opened rapidly, the firing task is given in the form of a short order: **"First machine gun, orientation point tree, light machine gun—NEUTRALIZE."**

If the number of bursts is not mentioned in the command and during sustained fire, the gunner continues fire until the target is destroyed or disappears or until the command: "CEASE FIRE" is given (a maximum of 250 rounds can be fired during sustained fire).

217. When the gunner acts independently, he has to open fire at the most convenient moment: when the target forms a group, has its flank exposed or is rising up; when the target can be easily seen; when the target has come to a halt after moving, etc.

218. In each combat situation fire should be opened suddenly. A short command: "On infantry at the edge of the forest—COMMENCE" or only "COMMENCE" (if the target can be easily seen) is given. The gunner determines all elements that are not mentioned in the command, including the moment of commencing fire.

2) Commencing fire

219. Opening fire from a machine gun consists of aiming and firing.

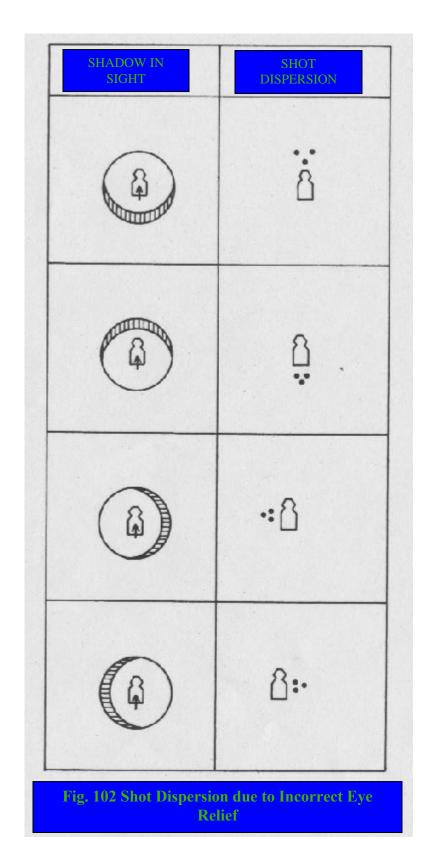
220. Aiming is an action by which the gunner brings the machine gun barrel into a position which will ensure that the cluster of trajectories hits the target. Bringing the axis of the barrel in the necessary position within the vertical lane (setting the gradient) is called **aiming for elevation**, and within the horizontal lane (setting the direction) **aiming for windage**.

For aiming, the gunner uses the windage mechanism and the elevation mechanism by simultaneously adjusting the position of the machine gun for windage and roughly for elevation with his shoulder and the gun stock. At the end, he brings the machine gun in the final position by using the precision elevating mechanism.

221. In order to aim the machine gun mounted on a bipod (without the tripod), the gunner raises the gun stock to his shoulder and presses forward in order for the machine gun to lean firmly on the bipod. With his right hand he grasps the grip (index finger is not on the trigger but extended), while his left hand grasps the gun stock from below. In this position, by moving his shoulder, the gunner simultaneously aims for windage and elevation using the gun stock.

222. When aiming with the optical sight, the shape of the target is seen within the same lane (focus lane) where the lead scale is located, and only the central arrow (or divisions to the left or the right of it—if making corrections) needs to be brought on the aiming point at the target, which is easier and simpler to do than aiming with the mechanical sight.

While aiming, lean the face lightly on the eye shield (do not press), so that the eye overlaps with the axis of the device. If the eye is closer



(because of pressing forward) or further (if the face moves away from eye shield), dark circular shadows will appear, reducing the field of vision and impeding observation and aiming. When the eye is positioned outside the optical axis of the device (moved to the side and up or down), shades in the form of a new moon appear during aiming, which results in shots on the opposite side of the one where the shadow can be found (fig. 102).

223. Aiming with a mechanical sight means that the gunner will bring into a straight line the eye, the rear sight, the blade and the aiming point (target). The blade must be brought into the center of the aiming notch, and its tip aligned with the upper edge of the notch (fig. 103).

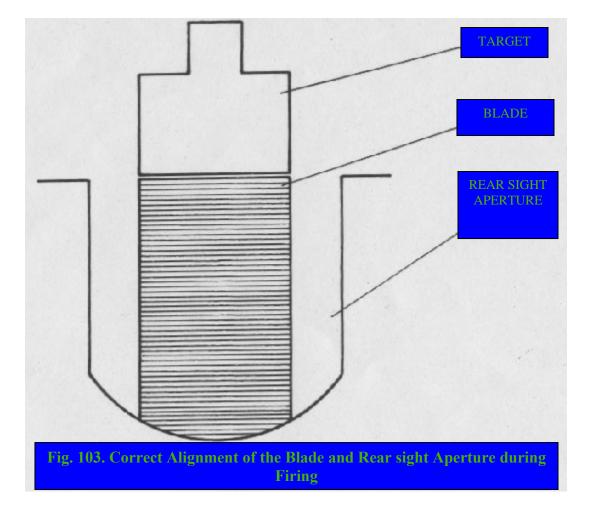
If one of the actions from the basic rules of aiming is performed incorrectly, shot dispersion will occur (fig. 104).

Different light intensity during the day, the position of the Sun and the weather can also influence aiming. Strong light makes objects appear bigger, so the gunner instinctively draws the blade into the notch, and the illumination of the notch or the blade when there is a lot of sunshine causes reflection of the light, owing to which their real shape is lost and they appear bigger (fig. 105). The gunner eliminates these errors by focusing observation on the spot where the reflection occurred, which will make the real position of the component (notch, blade or target) visible, owing to the accommodation of the eye (adjustment of the lens in the eye to various sight distances).

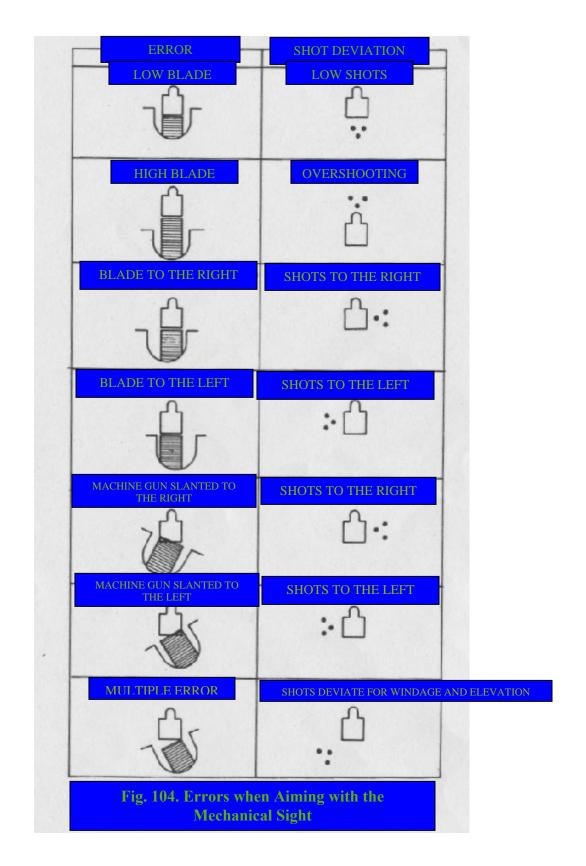
224. During aiming one eye can be closed, depending on the habit of the individual soldier. If the gunner uses both eyes during aiming, the possibilities of observation are better, there is less strain and the sharpness of vision is not reduced. It is important that the gunner uses his stronger (direction) eye for aiming, and decides during training whether or not to close one eye while aiming.

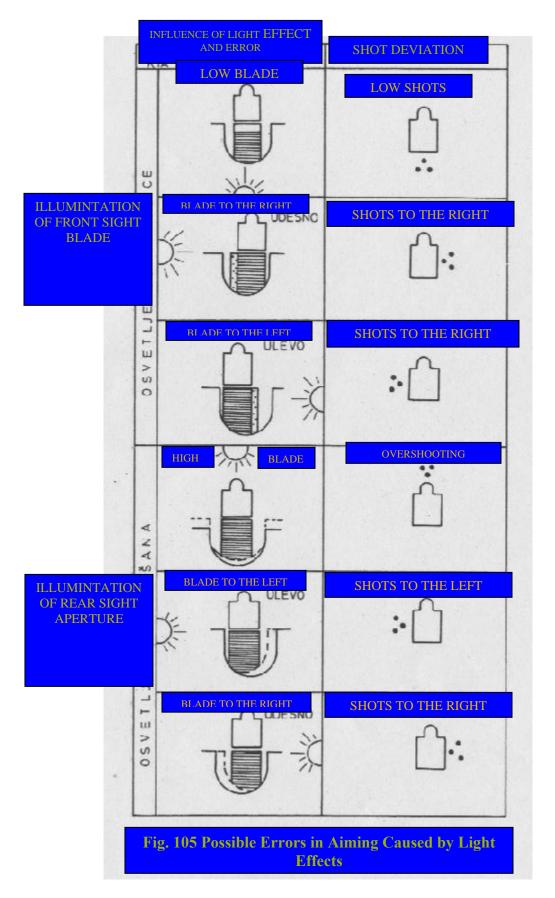
225. In order to fire, the gunner, while keeping the alignment in place, slowly and with even strength pulls the trigger until firing occurs. The gunner's breathing rhythm significantly influences the shooting result, especially when the machine gun is not fixed during firing and when no bipod is used. The breathing follows the movement of the rib cage, the stomach and the entire shoulder belt, which causes ordnance to

move. Because of this, the gunner breathes out and holds his breath before firing. The gunner must practice firing 7 to 10 seconds after he stops breathing.



226. The gunner must pull the trigger with a steady motion of his index finger, while holding the grip with his hand in order to create sufficient support for overcoming trigger resistance. The grip must be held firmly but not too tense, because muscle strain can cause the weapon to move. Pull the trigger with the first knuckle of the index finger straight to the rear and gradually increase pressure. The time from starting to pull the trigger until firing should not be longer than 1.5 or 2.5 seconds.





3) Engaging various targets

(1) Engaging small, stationary targets

227. A small target can be an individual or a small group target (ordnance crew) that is deployed in an area covered by the beaten zone at a certain distance. The size of beaten zone is shown in Table 12. A single machine gun must be used to fire at a small target.

TABLE 12 SIZE OF THE BEATEN ZONE WHEN FIRING WITH THE MACHINE GUN FIXED

Distance	beaten z	one (cm)	Distance	beaten zone (cm)		
(m)	For windage	For elevation	(m)	For windage	For elevation	
100	10	12	700	68	82	
200	20	24	800	76	94	
300	30	36	900	88	110	
400	40	46	1,000	98	126	
500	50	58	1,100	108	141	
600	58	70	1,200	114	160	

When firing at a small target in a prone or sitting position, the aiming point is at the center of the base. If the target is kneeling or standing, the gunner aims at the center of the target.

228. The command for firing at small targets is: "First machine gun, orientation point tree, further 100 machine gun—6, at the base, short bursts—FIRE." At this command the crew acts as follows:

—at the part of the command "First machine gun, orientation point tree, further 100 machine gun" the gunner spots the target and reports orally: "I see," or the assistant gives the prearranged signal, removes the safety and unfastens the machine gun (if fixed) for windage and elevation; the assistant gunner checks whether the link belt sits correctly in the feed plate; —at the part of the command "6," the gunner sets the optical sight range mechanism to "6" and repeats the sight mentioned in the command (if using the mechanical sight the assistant gunner sets the division and repeats the command);

—the gunner then aims at the foot of the target, sets the machine gun for windage and elevation, checks the alignment and says: "Ready" (or the assistant gunner gives the prearranged signal), and subsequently they prepare for firing;

—at the part of the command "Short burst—FIRE" the gunner fires short bursts until the command "CEASE FIRE" is given or until the target is destroyed.

229. During training, the gunner must be trained to determine the burst of fire. Best results when firing at small targets with the machine gun fixed are achieved if the length of the burst is 3–5 rounds (which lasts about 0.5 seconds), so the gunner has to cease pressure on the trigger according to his feeling and sense of hearing. During a short break between two bursts of fire the gunner and assistant gunner observe the cone of fire (if using tracer bullets the assistant is better positioned to see the beaten zone) and the gunner adjusts his aiming as necessary.

230. When the machine gun is fired from the bipod (without the tripod), the action at the command is the same except that the gunner does not report "Ready" after completion of aiming, but instead opens fire immediately.

(2) Engaging wide targets

231. A wide target is a target made out of several individual targets distributed along the frontline. A wide target is also a small group target that spreads from the width of the beaten zone (see table 12) at a certain distance. A wide target should be targeted by shifting the machine gun for windage while firing—traversing fire, and calculating at least two rounds per each meter of the width. Because of this, before commencing fire the gunner also has to determine the time period for traversing fire.

The approximate time of traversing fire is determined with the help of the formula: T = W : 6, where T is traversing time in seconds, W is the

width of the target in meters and 6 is the coefficient (calculated on the basis of a known machine gun firing velocity per second and demands at least two rounds to be fired per each meter of the length).

Example: The target is 60 meters wide, determine the time of traversing fire. Solution: T = 60 : 6, T = 10s. This means that while firing at the target wider than 60 meters, the machine gun should be shifted for windage (from one end of the target to the other) in 10 seconds.

232. Traversing for windage should begin at one end of the target. Traversing can start from the center only if the target forms a clear group on that spot. Targets with a width of up to 15 meters are targeted with long bursts, and those wider than 15 meters with sustained fire. A single machine gun can be used to fire sustained fire at the target with the width up to 130 meters (owing to the number of rounds being limited to 250). If the target is wider, two machine guns or a squad are used and the boundaries of fire shifting are determined on the ground for each piece of ordnance. Traversing width can also be set in mils, and gunners use divisions on the lead scale to determined target boundaries in their part of the terrain.

233. The command for firing at wide targets is as follows: "First machine gun, straight at the infantry, 5, from the left (right, the middle) traversing for the width of the target (from the bush to the beginning of the fence or from 1–20), sustained—FIRE" or "Squad, orientation point tree, firing squad, 5, first from the bush to the tree, second from the tree to the rock, third from the rock to the turn in the road (from 0–50), from the left (first left, second from the right), traversing, sustained—FIRE."

At this command the crew performs the following actions:

—at the part of the command "First (squad), straight at the infantry" the gunner spots the target, reports orally "I see" (or the assistant gunner gives the prearranged signal), removes safety on the machine gun and unfixes it (if fixed);

—at the part of the command "5" the gunner sets the optical sight range mechanism on "5" and repeats the command (if using mechanical sight—the assistant gunner sets the sight and repeats the command); —at the part of the command "From the left (from the right or the middle) for the width of the target (from the bush to the beginning of the fence or from 1–20)," the gunner aims at the opposite end of the target (if starting from the middle—he decides personally how to aim), moves closer the fire delimiter of the opposite side he was targeting, aims at the other end of the target, moves closer the other delimiter and fixes the machine gun for elevation. He determines traversing time according to the width of the target (for instance, 60 : 6 = 10s), order the assistant gunner to check whether he has at least three link belts linked together (in 10 seconds the machine gun fill fire about 110–120 rounds), and, if he received a positive answer he reports and prepares to fire. If he does not have a sufficient number of link belts linked together, before reporting readiness the assistant gunner is required to link them. If there are enough linked link belts, the assistant gunner checks whether the link belt fits properly into the feed plate.

If the gunner received traversing width in mils, he is required prior to aiming, to use the lead scale to determine the width on the ground, the boundaries of fire shifting (on the left and on the right) and search for the aiming points;

—at the part of the command "Sustained—FIRE," the gunner pulls the trigger and while firing moves the machine along the arc by pushing the stock with his shoulder, so that within a certain time (10s according to a calculation for this target), the target is fired at along its entire width.

234. When the squad carries out the firing, and the boundaries of fire shifting are not explicitly mentioned in the command, but the width of the target is expressed in mils (**Example:** "From 0–50"), the gunner acts as follows:

—the gunner who is on the left flank measures 0–50 from the left end of the target with the lead scale, identifies aiming points on the ground and further prepares the machine gun for firing;

—the gunner who is in the middle, measures 0-50 from the end of the target (since this is the part of the target that is on the left flank for the gunner), measures 0-50 once again, identifies aiming points on the ground and further prepares the machine gun for firing;

—the gunner who is on the right flank acts in the same way as the gunner on the left flank, except that he also measures the width of traversing (0-50) from the right end of the target.

235. If parts of the wide target are above or below the aiming line (owing to the ground), it needs to be checked whether the length of the beaten zone will cover them (table 12), and determined the aiming point in relation to that. If large sections of the target cannot be covered by the length of the beaten zone, traversing and searching fire should be used at the same time.

(3) Engaging deep targets

236. The target whose depth is greater than the length of the beaten zone (table 12), the deep target is fired at with searching fire at a certain distance. Searching fire can be used when firing at deep targets up to 15 mils (0-15), which is the field of fire of the precision elevating mechanism. Since the movement of the mechanism cannot be limited according to depth, traversing is carried out on the basis of cone observation. For better observation, live tracer bullets should be loaded into link belts so that every third bullet is a tracer bullet. When traversing for depth, the machine gun must be fixed for windage and elevation.

237. Fire delivered at moving deep targets must move away from the emplacement when the target is moving towards the gunner, or towards the emplacement when the target is moving away, and the technique of waiting for the enemy to reach a preselected target is used at all times. If the target is not moving, the aiming point for the start of traversing is determined according to the location where the target is most grouped. Delivering traversing fire at a deep target as part of delivering flanking protective fire is described in item 146.

238. A deep target can be fired at command or independently. When a firing command is issued, it is: "At the column, five, traversing in depth of the column with long bursts (sustained)—FIRE."

When this command is given the crew performs the following actions:

—at the part of the command "At the column" the gunner identifies the target and orally reports "I see" (or the assistant gunner gives the prearranged signal), unlocks traversal and elevation locks, and sets the precision elevating mechanism in the upper (if traversing away from himself) or lower position (if traversing towards himself);

—at the part of the command "5," the gunner selects division five on the optical sight elevation mechanism (if a mechanical sight is used for aiming, it is set by assistant gunner) who repeats "five" out loud;

—at the command "traversing in depth of the column with long bursts" the gunner identifies a suitable aiming point on the ground, on the line of movement of the target, and aims at it with the central arrow before fixing the machine gun for windage and elevation. When aiming for elevation, if the depth of the column is less than 0–15, exceptionally the precision elevating mechanism can also be used. After completing aiming, the gunner reports: "Ready" (or the assistant gunner gives the prearranged signal) and removes the safety;

—at the command "FIRE" the gunner waits for the front of the column to reach the aiming point and opens fire. While firing he uses the left hand to evenly press the handle of the precision elevating mechanism downward or upward and based on the observed cone of fire, after completing firing at the whole column, he ceases fire. In exceptional situations, if the effect of fire is limited, without ceasing fire, the gunner presses the mechanism to the opposite side keeping the entire column under fire once again.

(4) Engaging wide and deep targets

239. The target whose width and depth is larger than length and width of the beaten zone (spread over a large area) and wide (or deep) targets that are positioned obliquely on the direction of firing are targeted with one-time traversing for windage and depth. When that kind of fire is used, the machine gun is fixed for elevation and the movement of the machine gun is adjusted with spring stops on the serrated arc in keeping with the width of the area.

240. If the area is large and the fire needs to be delivered quickly and cover the entire surface of the area, two machine guns or a squad may be used.

241. The command for squad firing is: "Squad orientation point one, infantry in the orchard, five, from the left traversing for windage for 0–30 and in depth for the depth of the target, sustained—FIRE." When one or two machine guns are being fired, the command is the same, except that the following is stressed at the beginning: "First and second machine gun" or "First machine gun." If the beginning of traversing for windage is not the same for all machine guns, that must be emphasized in the command: "... first from the left, second to the middle, third from the right..." etc.

The actions of the crew to parts of the command are the same as when traversing for windage and depth, except that the gunner, when firing also shifts the machine gun for windage with his right shoulder, and with his left hand moves the precision shifting mechanism for depth.

242. When the target is divided into groups in the area and there are interspaces that are larger up to beaten zone (Table 12), they should not be targeted as one, but the fire should be divided among pieces of ordnance with especially designated elements for traversing.

-			par.	1											
		sions	On the side	•	•	I	ſ	I	I	۰	٩	L	I	Ľ	<u>I</u>
	40 km/h	In divisions	эдврліч пІ тгіпвдээт	3	e.	3	ю	3.5	3.5	4	4	4	4.5	5	2
	40 k		elim aI	0-14	0-14	0-15	0-16	0-17	0-18	0-19	0-21	0-22	0-23	0-25	0-26
			In meters	1.4	2.9	4.6	6.5	8.6	11	13.5	16.5	20	23.5	27	31
Soldier walking Motor vehicle		Darke side Di Randage Di Ai Ci		ε	ŝ	4	4	4	5	5	5	ı	P	I	ı
	ų	In div	əzabniw al meinedəəm	L	7	œ	×	6	6	10	10	1	ı	ĩ	,
	20 km/h	slim al		0-07	0-07	0-08	0-08	60-0	60-0	0-10	0-10	0-11	0-11	T	ı
			In meters	0.7	1.4	2.3	3.2	4.3	5.5	6.8	8.3	10	1.5	ĩ	ł
	10 km/h	ions	On the side Dar		7	2	2	7	ε	ŝ	m	ŝ	£	Э	4
		In divisions	əgsbaiw al meiasdəəm	3	4	4	4	4	5	5	5	9	9	9	7
			slim al	0-03	0-04	0-04	0-04	0-04	0-05	0-05	0-05	0-06	90-0	90-0	0-07
			In meters	0.35	0.72	1.1	1.6	2.1	2.7	3.4	4.2	5.0	5.9	6.8	7.8
	(e)	In divisions	Оп the side Dяг	2	7	2	2	3	ť	ŝ	3	ß	3	4	4
	3 m/s (double time)	In div	эзвраіw а1 тгіпвдээт	4	4	4	4	4	5	S	9	9	6	7	7
oldier	iop) s/a		slim nI	0-04	0-04	0-04	0-05	0-05	0-05	0-05	90-0	90-0	90-0	0-07	0-07
92	3 п	(1	nsmud al a 7.0) esttsuodlie	1	1.5	2.5	3.5	4.5	9	7	6	П	· 13	15	17
Range of fire (m)				100	200	300	400	500	600	700	800	900	1,000	1,100	1,200

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FOT LATGELS IN(oving obliquely multiply the	For targets moving obliquely multiply the correction from the table as follows:	llows:	
- for targets m	- for targets moving at an angle of 30° by 0.5	.5		
- for targets m	- for targets moving at an angle of 45° by 0.7	7.0		
- for targets m	- for targets moving at an angle of 60° by 0.9	61		
	DIRECTION OF TA	DIRECTION OF TARGET MOVEMENT	TO THE LEFT	TO THE RIGHT
	on optical sight	on the drum of the windage mechanism	+	•
How to make corrections		on the lead scale	right of the central arrow	left of the central arrow
	on mechanical sight	on the sight bar	on the left side	on the right side
		in silhouettes	to the left	to the right

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(5) Engaging moving targets

243. The target moving within the firing lane at ranges up to 500 meters must be fired at in the same way as a stationary target for the distance covered during trajectory of the bullet is so small it can be ignored. For instance, a target at a distance of 500 meters moving at the speed of 3m/s, can pass only 2 to 3 meters during the trajectory of the bullet (0.79s) towards the gunner or away from him. In the same conditions the ordinate of the trajectory vertex (highest point on the trajectory) is 77cm and the length of the beaten zone is 58 cm, so all conditions for the target to be hit are fulfilled.

Targets at longer distances, especially if moving quickly (running at the speed of 6m/s or driving a motor vehicle), need to be fired at with the aiming point corrected upward (if the target is moving away) or downward (if moving closer), and in exceptional situations (if the target is moving quickly and on an incline, by adjusting the sight one up (if the target is moving away) or one down (if the target is moving closer).

244. The target moving laterally (obliquely) in relation to the lane of fire must be targeted with correction—lead. Corrections are taken according to a calculation according to which the target and the cone of machine gun trajectories meet at a certain distance. The gunner makes corrections using the windage mechanism knob (value of division 0-01) or the lead scale (value of division 0-05) if using the optical sight or the sight bar (value of division 0-02) or in human silhouettes (motor vehicles) if using a mechanical sight. The amount of corrections is calculated according to table 13. Corrections in the tables are made for the target moving at the angle of 90° , and for certain velocities of movement. Before giving the command, the squad commander (of the gunner if firing independently) has to determine, for every individual case, the velocity and angle at which the target is moving, and use them as the basis for determining corrections.

245. The target moving laterally can be targeted by using a preselected target (the gunner determines the aiming point on the line on which the target is moving and aims at it with the elements determined for his, when the target reaches that point he opens fire) or by

surveillance (aiming at the target he moves the machine gun continuously maintaining alignment and opens fire at the most convenient moment).

When firing from the bipod, a moving target must always be targeted by using preselected targets.

246. The command for firing at a moving target is: "First machine gun, at the care, 4 one silhouette at the front (four divisions on windage mechanism, two divisions on the sight bar) preselected target (tracking)—FIRE."

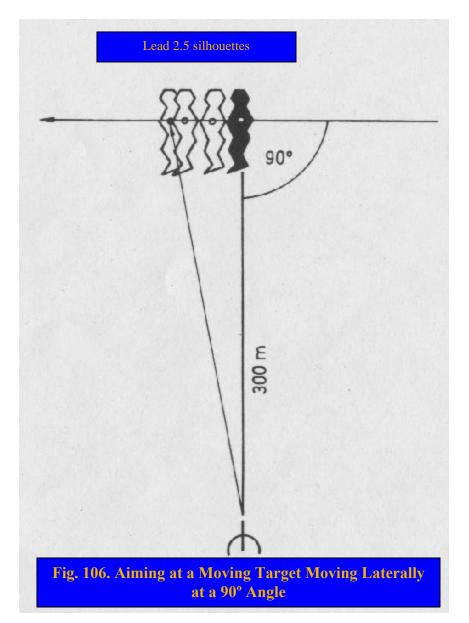
Actions to be taken by the crew at parts of the command are described in item 228, except that in addition to the other elements the gunner also has to make corrections included in the command.

247. Lead in silhouettes is used only when the optical sight and the sight bar cannot be used. The aiming point is outside the target, and shifted for a certain number of silhouettes to that side to which the target is moving. The silhouette is calculated from the center of the target (Fig. 106).

248. Amount of lead can exceptionally be determined by firing a short burst of tracer bullets with the aiming point at the center of the target. After determining the beaten zone, its change has to be determined and turned into the relevant correction (depending on whether using the optical or the mechanical sight).

(6) Engaging targets in the air

249. Aircraft, helicopters, gliders and parachutists are targeted at ranges up to 1,000 meters (without the tripod up to 500 meters). Aircraft and helicopters are targeted only at command, and gliders and parachutists at command or independently. All targets in the air at ranges up to 500 meters must be targeted with the sight division "4" (division "4" on mechanical sight or basic division "0"), owing to a positive site angle or the appearance of a larger "oblique range" from the one achieved when firing at targets in the ordnance azimuth.



For targeting targets in the air two to three linked link belts always need to be prepared in advance and filled with a combination of regular and tracer bullets for easier observation of the cone of fire while firing. Long bursts or sustained fire are used, except for individual parachutists, who have to be targeted with short bursts.

250. Machine guns designated for combat with targets it the air can be prepared in advance (set up on the attachment for firing at targets in the air) or if after the announcement of the attack from the air (or a sudden appearance of aircraft) the crew can set them up quickly as described in items 172 and 173. If there is no time to set the machine gun

up on the attachment for firing at targets in the air, the gunner opens fire by leaning the machine gun on a suitable rest (fence, tree or the like) or the shoulder of the assistant gunner.

251. An aircraft diving towards the firing emplacement or leaving is targeted without lead, by aiming at the cockpit (if diving) or the tail (if leaving). Owing to the high speed of the diving aircraft, fire must be opened as soon as the aircraft is spotted in the zone of fire (at the latest at around 600 to 700 meters). The initial bullet velocity (around 825 m/s) and the firing velocity of the machine gun (10–12 rounds) ensure that a single round is in the air at every six or seven meters, so there is a greater possibility that the aircraft will fly into the cone of fire and be hit (given that the gunner aims well for windage).

252. Aircraft moving horizontally (at different trajectory angles must be targeted by tracking them with a fixed lead. Lead is determined and applied based on the velocity of the target and the distance to the target measured in silhouettes, meters or divisions on the optical sight lead scale.

Lead amounts for certain types of aircraft and their average velocities (at 90° angle) are shown in table 14.

253. When firing at aircraft flying at speeds over 100 m/s (over 360 km/h), application of lead is complicated because it amounts to several hundred meters. Because of this targets have to be engaged with protective fire delivered by a machine gun squad or tracking the paths of the tracer bullets. Tracer bullet trajectories are directed in the direction of the target's flight until the aircraft reaches the cone of fire.

Protective fire is delivered at the line of flight of the aircraft without a lead. The moment of commencing fire is determined by the machine gun squad commander based on the height, course and speed of the aircraft and the time it takes the round to reach the target on the designated line.

Example: An aircraft flies at the speed of about 500 km/h (about 140 m/s), range is 400 meters, the aircraft flies laterally to the line of fire at an angle of 90°.

AIRCRAFT	s/m	lead scale	- 13	- 43	- 79	- 126	- 183	- 219	TO THE RIGHT	left of the central arrow	TO THE RIGHT	
	Aircraft 100 m/s	In divisions on the	1-30	1-43	1-58	1-80	2-03	2-19	TO THE	left of the c	TO THI	
	Ai	slim al	1.5 1.	4.5 1.	8	12.5 1.	18.5 2.	22 2.				
		In meters In silhouettes (10m)	9	21	39	63	32	108	LEFT	ntral arrow	TO THE LEFT	
	Helicopter 50 m/s	In divisions on the lead scale	1	,	,	1	9	ı	TO THE LEFT	right of the central arrow		
	Helicopt	slim nl	09-0	0-70	0-78	0-90	1-02	1-08		. E		
		(m7) estteuodliz nI	-	3	Ś	6	13	15				
		ln meters	e	11	20	31	46	54		on the lead scale	in silhouettes	in meters
	Glider 25 m/s	ln divisions on the lead scale	9	7	80	6	10	11	ier	on the l		
	Glider	alim ol	0-30	0-36	0-40	0-44	0-51	0-54	DIRECTION OF TARGET			
		(m01) zəttənodliz nl		-	3	£	4.5	5.5	RECTION		E	ĮĮ
ts ,	d of 6 m/s	slim al	21 m nl slim	0-12 0-12	0-12		on the optical sight	on the mechanical sight				
Parachutists Descending at speed of 6 m		In meters	0.8	2.4	s	7	10.8	12		on the op	on the mech	
		(m2.f) səttənodliz nl	0.5	1.5	3.5	4.5	7	80				_
		Range of fire (m)		300	500	700	006	1,000		How to make	corrections	

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Solution: The machine gun round crosses the distance of 400 meters approx. in 0.60s (see appendix 1), so with aircraft flying at the speed of about 140 m/s, firing needs to start when the aircraft is about 200 meters away from the line of fire, so that it would reach protective fire in about 1s.

Fire is delivered in the form of sustained fire. When the target reaches the cone of fire, it has to be followed until it flies out of the zone of fire.

254. When firing at parachutists, the aiming point is shifted in the direction of descent. The lead is applied in the size of the parachutist's figure (1.5m) and calculated from the feet or in mils, using the upper part of the scale for measuring vertical angles (amount of one division 0–05). When it is windy, the parachutist is carried a certain distance by the wind, which has to be taken into account during aiming—by making adjustments for windage (fig. 107).

Lead amounts for firing at parachutists are shown in Table 14.

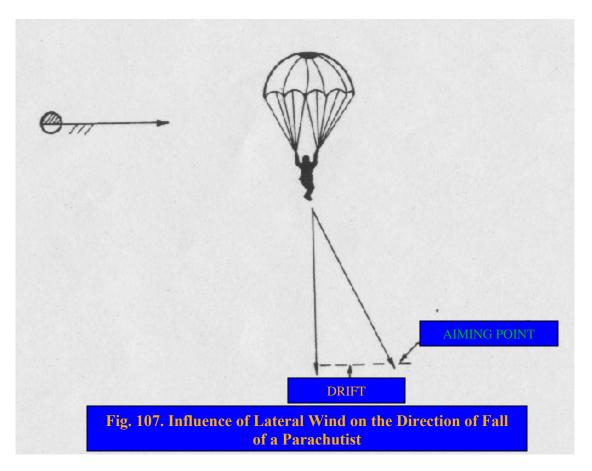
255. For firing at targets in the air at heights above 500 meters, the sight division is determined based on the distance to the target.

256. Firing commands are as described in item 245, except that the designated target is emphasized: "At the aircraft, at parachutists" etc.

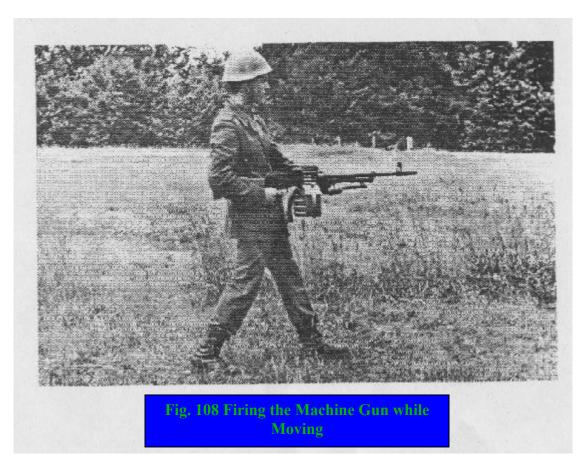
(7) Firing while moving

257. Firing while moving is applied when the machine gun is detached from the tripod, most often during changes of firing emplacement with the machine gun disassembled, as part of the attack during assault and during sudden encounters with the enemy.

258. In order to prepare the machine gun for firing while moving, the gunner and the assistant gunner unload the machine gun, take it off the tripod (as described in item 293), load it from the small ammunition box and put it on safe. Before moving, the gunner grasps the grip with his right hand, while his left hand grasps the bipod from below (the bipod has to be folded back).



When the machine gun is fired from the bipod, and needs to be prepared for firing while moving, the gunner puts the safety on, moves forward a little bit, folds his right leg under his body, leans on his left elbow, grasps the handle of the barrel with his right hand, lifts the front end of the machine gun and with his left hand folds the bipod back and fastens it. When he wants to start moving, he grasps the grip with his right hand, lifts the upper part of his body, swiftly steps out with his left foot, stands up and starts moving forward (fig. 108).



259. Fire is delivered intermittently (short bursts are fired when the left foot is forward) or with a short pause during which the left foot is forward. Two to three short bursts are fired. When firing intermittently, the gunner may also assume a kneeling position (he kneels on his right knee and leans his left elbow on his left thigh), which allow for more precise fire.

During firing, the gunner uses his left and to direct the machine gun at the target and his right hand to press the gun stock against his right hip. During firing the machine gun will try to move upward and to the right, so this has to be taken into account because of aiming and ensuring safety of other soldiers on the gunner's right side.

260. In order to assume a prone position after firing while moving, the gunner kneels on his right knee, releases the bipod and leans the machine gun on the ground. He then pulls his left leg rearwards, leans on the ground with his palms (at the level of the stock) and pushes his body rearward.

261. If stoppage occurs during firing, the gunner continues to move and reports stoppage to the squad commander.

(8) Firing at sudden and camouflaged targets

262. Sudden targets appear suddenly, pause for a brief period and than disappear in order to appear again (often in a different place). Before firing at such a target, the target has to be carefully observed and it has to be determined whether the target appears more frequently in some places and at which intervals. Once this is determined, elements of fire need to be prepared and preselected targets are used to engage the target with short bursts.

263. Camouflaged targets (grass, bushes, wooden fence), whose width does not exceed the width of the beaten zone, has to be engaged by aiming at the center of camouflage with short bursts and the machine gun fixed.

If camouflage is wider than the beaten zone the gunner traverses for windage, and if it is deeper than the beaten zone, the gunner searches for elevations.

When firing from the bipod, wide and deep targets behind camouflage are engaged with short bursts while adjusting the aiming point according to the changes in the width (length) of the beaten zone.

4) Firing under specific conditions

(1) Firing through interspaces and along the flanks of friendly units

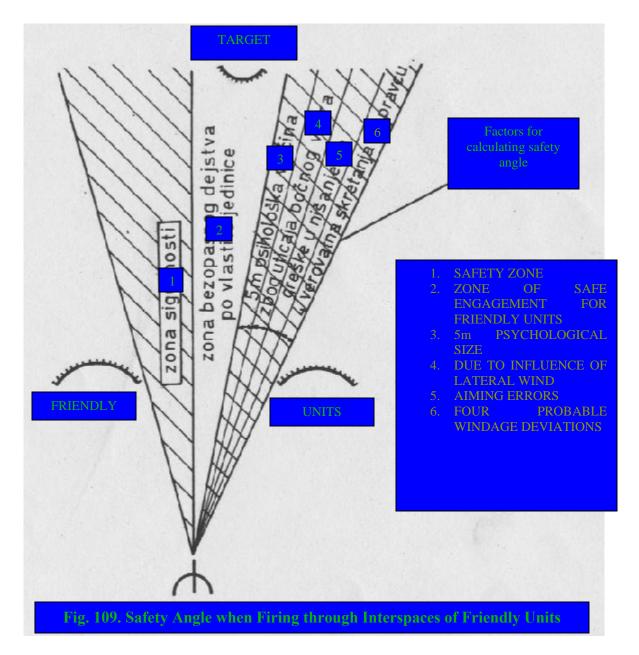
264. Depending on the position of the machine gun squad in the combat formation, the crew will often be required to fire through interspaces and next to the flanks of friendly units. Although the tripod ensures good stability, in such conditions only a fully trained crew can do the firing without danger to friendly units, provided that certain technical and ballistic requirements are fulfilled.

Full safety is ensured if the following conditions are fulfilled:

—all ordnance and tripod components must be functioning properly;

—ammunition must come from hermetically sealed ammunition packages that have not been opened prior to firing;

—the surface on which the tripod legs are placed must not be too soft (so that they don't fall through during firing) or too hard (so that the tripod slides or jumps), that is to prevent uncontrolled changes in elevation and windage during firing;



—distance to the target and to friendly units has to be determined as precisely and possible;

—there should be no objects in the line of fire that may cause the round to turn in an unwanted direction (branches, bushes and the like);

—a safety angle must exist between the direction of fire and the flanks of friendly units (Fig. 109);

-flanks of friendly units, which form the interspace and next to which fire is delivered and their possible movements need to be constantly monitored;

—after the firing has been completed, the machine gun must be fixed for windage, or if engaging a wide target, the width of traversing has to be limited;

—during a break in firing, the safety angle must be checked as well as whether the machine gun is functioning properly.

265. The safety angle is measured with binoculars or the lead scale on the reticle of the optical sight. The smallest angle that has to exist between the line of fire and the flanks of friendly units next to which fire is delivered, is prescribed by this manual (table 15).

TABLE 15

SMALLEST SAFETY ANGLES WHEN FIRING THROUGH INTERSPACES AND NEXT TO FLANKS OF FRIENDLY UNITS

Distance to friendly units	Safety angles on eac fir	In divisions on optical sight lead scale	
	In mils		
100	0-80	8	16
200	0-50	10	10
300	0-40	12	8
400	0-40	16	8
500 and more	0-40	20	8

266. Firing through interspaces and next to flanks must be prepared by the squad commander. Before issuing a command, he performs the following actions:

—estimates the distance to the interspaces (flanks) of friendly units through which fire has to be delivered;

—using the table of safety angles, he finds the appropriate angle for the distance he has determined;

—using binoculars (or the lead scale if he is in the vicinity of a firing emplacement) he measures the angle between the line of fire and each flank separately. If firing at a wide target, he measures the angle between the left end and the flank closest to him and the right end and the flank of friendly units closest to him;

—he then compares the angle measured with the safety angle in the table; if the measured angle is smaller than the safety angle firing is impossible, if it is greater, the squad commander issues the firing command.

267. When preparing firing through interspaces and next to flanks, when the interspace is small, owing to various conditions for each machine gun and if firing at multiple targets, the squad commander can order as part of the command that each gunner checks the possibilities for firing at his target with the optical sight.

Example: "First, orientation point the machine gun, 6; second, straight at a group of marksmen, 5; third, light machine gun next to the bush, 5, safety angle: 0–50—check the possibility of firing through the interspace."

At this command the gunners perform the following actions:

—aim the central arrow at the target and fix machine guns;

—lower the reticle by turning the knobs on the range mechanism on the optical sight so that the lead scale is at the height of friendly units;

—check whether the angle between central arrows (firing direction) and flanks is greater or smaller than the angle of the command (0-50) on both sides. If the angle is greater, they report: "Firing is possible," and set the sight as required by the command, aim at the target and wait for the next command. If the angle is smaller, they report: "Firing not possible."

When all gunners have reported to the squad commander, he gives the rest of the command: "...short burst—FIRE!"

If one machine gun cannot fire and the other two can, the commander commands: "... First, wait, second and third, short bursts—FIRE."

268. When the safety angle is 0–80, the gunner first lowers the lead scale to the flanks of the friendly units, and then unfixes the machine gun for windage, identifies the spot on the ground at which the central arrow is pointing, moves the machine gun for windage so that the fourth division right of the central arrow covers that spot and checks where the last division on the left side of the lead scale ends, then repeats all these steps on the opposite side.

269. When firing at a wide target—traversing for windage, safety angles must be measured between the right and the left end of the target and the flanks of friendly units.

270. During firing the gunner and assistant gunner carefully observe the beaten zone and the movement of friendly units. If they notice that the interspace has been reduced to dangerous limits or that the beaten zone is close to the flanks, they have to cease fire immediately and report to the squad commander.

271. If the size of the interspace does not change (in defense, at starting position, etc), safety angles need to be measured from the flanks of friendly units and limited on the serrated arc of the tripod with spring stops, and fire within that zone without checking specially for each target.

272. Firing next to the flanks of friendly units is carried out in the same way as firing through interspaces, except that the safety angle is measured only for one side.

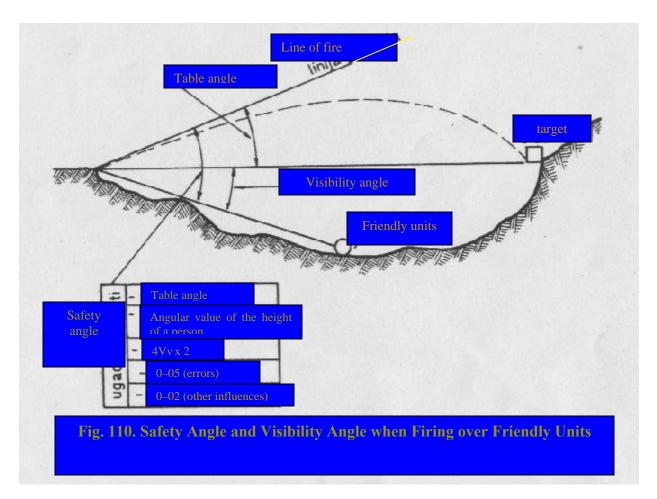
(2) Overhead fire

273. In addition to the conditions stated in item 264, the following steps must be taken when firing over friendly units:

—ensure the vertical angle between the target and friendly units (safety angle or visibility angle) (fig. 110), according to tables 16 and 17;

—before firing fire one long burst with a higher elevation of the machine gun in order to check stability of the tripod;

-prevent searching for depth.



274. Firing across friendly units must be prepared by the squad commander. Before giving the command, he has to determine distance to the target and to his friendly units, find the safety angle in Table 16 and then issue the command.

Example: Distance to target is 800 meters, own forces at 300 meters.

Solution: Safety angle in Table 16 for distance to our forces (300 m) is 14.

The command is: "First (second, squad), straight, machine gun, 8, safety sight 14, check firing possibility across friendly units."

When this command is given the gunner performs the following actions:

—aims at the target with sight set on "8," fixes the machine gun for windage and elevation and sets the safety sight on 14 (on mechanical sight);

—checks across the notch of the rear sight and the blade where the aiming line ends;

—if aiming line is in front of own forces, he reports: "Firing possible," returns the knob of the mechanical sight to its previous position and waits for the next element of command;

—if the aiming line is at the height or behind friendly units, he reports: "Firing not possible."

If firing is possible the commander issues the rest of the command: "... short burst—FIRE," and if it is not possible, he commands: "Repeat" and takes measures (if the situation allows it) for the machine gun to find a new firing emplacement.

TABLE 16

Distance to friendly units (m)	Safety angle in mils	Safety sight
100	67	-
200	42	15
300	35	14
400	31	13
500	31	13
600	30	12
700	31	13
800	33	14
900	34	14
1,000	36	14

ANGLES AND SAFETY SIGHTS FOR CHECKING THE POSSIBILITY OF FIRING OVER FRIENDLY UNITS

275. When the machine gun is not in the firing emplacement and when the squad commander is on the ground at the same height as the machine gun that is supposed to fire across friendly units—instead of the

safety angle the visibility angle, as expressed in table 17, is used to check the possibility of firing.

In order to check the possibility of firing under these conditions, the squad commander determines distance to the target and to friendly units, measures the vertical angle between the target and friendly units with binoculars and compares it to the angle in table 17. If the angle between the target and friendly units is bigger than the angle in the table, firing is possible, and if it is smaller or the same, firing is not possible.

TABLE 17

Distance				DIST	ANCE 1	TO TAR	GET (m)				
to	200	300	400	500	600	700	800	900	1,000	1,100		
friendly	Smallest visibility angle in mils											
units (m)												
100	62	61	60	58	57	55	53	49	48	47		
200	-	36	35	33	32	30	28	26	23	20		
300	-	-	28	26	25	23	21	19	16	13		
400	-	-	-	22	21	19	17	15	12	9		
500	-	-	-	-	21	19	17	15	12	9		
600	-	-	-	-	-	18	16	14	11	8		
700	-	-	-	-	-	-	16	14	12	9		
800	-	-	-	-	-	-	-	17	14	11		

TABLE OF VISIBILITY ANGLES FOR CHECKING THE POSSIBILITY OF FIRING OVER FRIENDLY UNITS

Example: Distance to target is 400 meters, and to friendly units 200 meters. The measured angle is 0-40 (40 mils). From table 17 it can be seen that the smallest visibility angle for these conditions is 0-35, so firing across friendly units is possible from this firing emplacement.

(3) Firing in conditions of diminished visibility

276. When the battlefield is illuminated, the machine gun is fired in the same way as during daylight. Distance to certain lines and objects must be determined during the day in order to shorten the time of firing

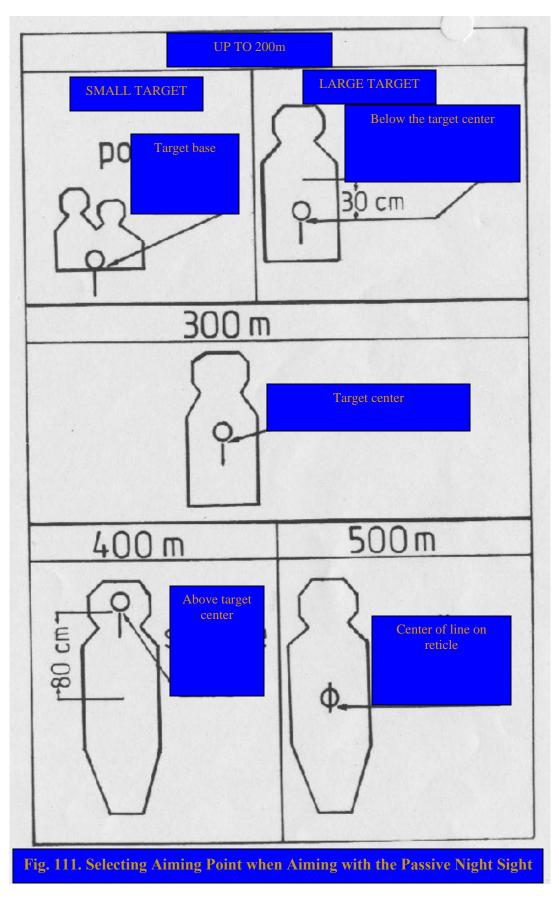
elements preparation. Since the reticle is illuminated with tritium light source, all divisions can be easily seen and used. The appearance of shadows, which increase as the illuminating torch goes down, make the spotting of target and aiming difficult, which is why firing should be carried out when the torch is at a higher level.

277. In exceptional cases, without any firing preparation for diminished visibility, targets that are illuminated with the bullet flash can also be engaged. The spot where such a target disappears must be identified, the source of light (flash) aimed at and short bursts fired.

278. Non-illuminated targets can be best engaged with the 5x80 passive night sight. In order to prepare the passive night sight, the following actions need to be taken: place the generator battery in its place; place the passive night sight on the mount, turn the device on by turning the switch wheel clockwise, move the rubber sight lid to the side by one step; look through the eyepiece and adjust light intensity of the reticle, and then set the sharpness by rotating the diopter ring.

279. Aiming with the 5x80 passive night sight is performed as follows: tip of the reticle line is aligned with the base of the aiming point. Since the tip of the reticle line is brought into the sight position "3" by means of rectification (7.62mm Rifles and Light Machine Gun Manuals—items 126–128), the aiming point has to be selected according to the following factors: at ranges up to 200 meters, small targets need to be targeted with the aiming point at the base and large about 30cm below the center; at ranges of around 300 meters, the aiming point is the same as in normal conditions; at ranges of 400 meters the aiming point is about 80cm above the center of the target; at ranges of 500 meters aiming should be done with the middle of the reticle line (fig. 111).

When the passive night sight is used, firing with tracer bullets should be avoided because tracers can blind the gunner.



280. When neither type of firing described in items 275 to 278 can be used, during the day the machine gun has to be prepared for action at several important points at which (or in whose vicinity) enemy weapons are expected to appear.

The machine gun is prepared with a lath (stick) on which the light aiming point is set up (torch light, phosphorous aiming point, blind lantern). Since these means are not included in the accessories, they need to be acquired in due time.

Firing elements are prepared as follows:

—suitable division is selected on the range scale and the machine gun is aimed at the objects (line) and fixed for windage and elevation;

—the ammunition bearer walks up to 10–15m in front of the machine gun and the gunner guides him to stick the lath with the illuminated aiming point (turned towards the machine gun) on the line of the final left division on the lead scale;

—without moving the machine gun aim at the illuminated aiming point by rotating the wheels of the range scale;

—record the name of the object and the division on the range scale in a notebook.

In this way the machine gun is connected to the auxiliary aiming point. If a target appears at that place during the night (which has to be estimated), set the division on the range scale, aim at the illuminated aiming point with the end left division on the lead scale and open fire.

In this way fire can be prepared for several targets (depending on how many illuminated aiming points one has), but they have to be separately marked for each object.

281. When firing from the bipod, the machine gun can be prepared for action in conditions of diminished visibility by sticking a forked stick under the stock or using a wooden board that is cut out gradually on the upper end.

282. If the machine gun has not been prepared in time, and no other method of firing described in items 275–278 can be used, non-illuminated targets whose presence is detected are engaged at random.

Such targets at long ranges need to be engaged with short bursts, and at close ranges (when repelling an assault) with long bursts and sustained fire.

(4) Firing with a protective mask

283. A protective mask influences the method of firing with the optical sight because the gunner's eye is positioned between 2.5 and 3 cm away from the eyepiece and as a result a circular shade appears within his field of vision. Since the field of vision needs to be completely clear during aiming, without any shadows, it is necessary to bring the eye closer to the eyepiece by pressing on the protective rubber eye shield until the circular shadow disappears.

When aiming across the mechanical sight the gunner acts in the same way as when firing without the protective mask.

When firing from the bipod, after moving the machine gun, the organism settles down slower if the mask is in a protective position, so before firing the gunner has to take a deep breath 3 to 4 times.

(5) Observation of the beaten zone and correction of fire

284. When preparing firing elements, everything must be done to ensure that they are determined as accurately as possible, so that fire from the machine gun would be precise and the impact on the target as massive as possible. But despite the measures taken, the beaten zone can still deviate for windage or elevation, due to changes in external influences (wind, temperature) or aiming errors. Because of this, the beaten zone must also be observed and the fire ceased if there is considerable deviation of the beaten zone. When the ground in the target area is dry or rocky (sandy) the beaten zone can be determined on the basis of dust that has been raised. If the ground is soft and covered in snow, in order to ensure better observation, the link belts need to be filled with a number of tracer bullets distributed evenly (the best ratio is 2: 1—every third round is tracer round).

285. The engagement of the machine gun along the direction is good if most trajectories from the cone fall in the direction of the target, and it is good along the elevation if around half of the trajectories fall in front and the other half behind the target.

Engaging wide and deep targets is successful if 2/3 of trajectories in the cone fall within the area of the target.

Fire efficiency can also be determined on the basis of enemy behavior. If fire is precise, the enemy stops (lies down), changes his movement (deploys units, crosses over, crawls), changes his position or starts withdrawing.

286. The squad commander observes the beaten zone, and at the level of the crew, the gunner and assistant gunner perform this task.

If the squad commander notices that the crew has not noticed that the fire is not precise, he commands: "First (second, third)—CEASE" and orders the firing errors to be corrected and the fire to be continued. The gunner observes the beaten zone through the optical sight except when searching for windage or depth. When he notices that the beaten zone deviates for windage or elevation, he independently ceases fire.

The assistant gunner observes the beaten zone with his naked eye and reports to the gunner; "good" or "shortfall (overshooting) 50m" or "to the right (left) 30m" etc.

Based on the deviation observed, the gunner corrects elements of fire (or the squad commander orders him to do so) and continues firing.

287. When the combat situation allows it and based on the squad commander's estimation, correction is possible for certain targets (objects, lines). For correction, link belts are filled with a combination of regular and tracer bullets (2:1) and short bursts are fired.

288. The squad commander directs correction of fire. For the start of correction, he prepares firing elements according to the estimated distance to orientation point (object, line) and the corrections taken owing to external influences and issues the command, for instance: **"Orientation point tree, six, one short burst—FIRE."** Fire is delivered with the machine gun fixed. The squad commander observes the beaten zone, and if necessary changes the sight division, the size of correction or the aiming point and issues a command to fire another

control burst with new elements, then analyzes the result and records exact elements.

6) Ceasing, continuing and ending fire

289. Firing ceases, continues or ends completely at the command of the squad commander or independently.

Fire ceases when the target has been destroyed, the designated number of bursts has been fired, if the beaten zone moves outside of target or at the command (signal) "CEASE."

In order to cease fire the gunner removes his finger from the trigger. Depending on the reason for ceasing fire, the error can be removed and the firing continued, or the gunner can prepare for another target or put the machine gun on safe. The gunner places the machine gun on safe independently, if he estimates the new command for commencing fire will not be given immediately or if the squad commander gives the command "PUT ON SAFE."

During a break in firing, the crew inspects ordnance and link belts (ammunition), observes and acts further according to the command or order of the squad commander. If the situation allows it, the crew can be given a break in the firing emplacement. At the command "AT EASE" the crew stops working on the ordnance but does not leave the firing emplacement.

290. In order to continue firing the machine gun, the command (or signal) **"READY TO FIRE"** is given. The crew quickly assumes position and awaits the command to commence firing.

291. In order to end firing, the command "CEASE—UNLOAD" is given. At this command, the gunner and assistant gunner unload the machine gun and after a test trigger pull the gunner reports "EMPTY" (or the assistant gunner gives the prearranged signal).

7. CHANGING THE FIRING EMPLACEMENT

292. The squad (crew) changes the firing emplacement at the command or order of the squad commander or senior officer of the unit

to which is has been assigned. In certain situations, at the gunner's initiative—in keeping with the task received, the firing emplacement can also be changed independently.

Before any movement, the new firing emplacement has to be selected (if it is not determined or mentioned in the command) and the direction of movement decided upon.

293. The machine gun squad can change the firing emplacement at once or one piece of ordnance after another—with the machine guns assembled or disassembled. At long ranges, if the combat situation allows it, the squad can move using its own means of transportation.

—For moving the squad at once the command is: "Squad in the firing emplacement at the level of the road, disassembled (assembled)—FORWARD (DOUBLE-QUICK, DOUBLE TIME)."

When issuing the command, after emphasizing the way in which the crew needs to carry the machine gun ("assembled" or "disassembled"), the squad commander pauses and monitors the actions of the crew. When he satisfies himself that the crews have prepared the ordnance, he issues the last part of the command (for execution).

The crew takes the following actions at individual parts of command:

—at the part of the command "Squad in the firing emplacement at the level of the road" all crew members identify the line of the new firing emplacement and the gunners determine the location and the direction of overshooting;

—at the part of the command "Assembled" the crew unloads the machine gun and prepares it as described in item 164 (Fig. 83).

If the command "Disassembled" was given, after unloading the machine gun, the crew prepares the machine gun as follows: the gunner crawls forward on his left flank and grasps the machine gun barrel from above with his right hand (or the barrel handle if the barrel is hot). The assistant gunner at the same time grasps gun stock neck from below with his left hand while his right hand presses support latch handle on the tripod and lifts the machine gun up; the gunner takes the machine gun, places it on the bipod and loads it from the small ammunition box, while the assistant gunner folds the tripod, closes the ammunition box and

prepares for movement; the ammunition bearer covertly approaches and takes two ammunition boxes;

—at the part of the command "FORWARD (DOUBLE-QUICK, DOUBLE TIME)," all crews simultaneously move into the position from the command.

When the machine gun has been disassembled, the gunner carries it over holding it by the handle (Fig. 77), the assistant gunner carries the tripod as described in item 151 (Fig. 79–81) and the ammunition bearer as described in item 152 (Fig. 82).

When the crews reach the area of new firing emplacements, they take position from movement, as described in items 164 and 165.

294. The command for moving squad according to ordnance is: "With the first (second, third), to the firing emplacement at the level of the tree, assembled (disassembled)—FORWARD (DOUBLE-QUICK, DOUBLE TIME, MARCH)."

Ordnance that leaves first is prepared immediately and leaves at the final part of command (execution), the rest protect with fire as needed. When the first crew approaches the new firing emplacement, the second and third piece of ordnance are prepared and set out.

295. Movement to a new firing emplacement with assembled ordnance must be applied at short distances and when forced to abandon the position.

The machine gun that has been set up for firing targets in the air is always moved disassembled.

If fire needs to be opened during the move, the gunner fires while moving or from the bipod and the assistant gunner and ammunition bearer engage in combat with their personal weapons.

8. SUPPLYING MACHINE GUN SQUAD WITH AMMUNITION

296. Ammunition and other combat needs of the machine gun squad are received at the company supply station in amounts designated by the task received. When preparing for combat, ammunition bearers fill the link belts with link belt loader at the company station and carry them to the firing emplacement in ammunition boxes. The remaining ammunition

can be stored at the company station or the location of means of transportation. During the lull in combat, when ammunition can be loaded with the link belt loader, and if a combination of regular and tracer bullets is required, the ammunition bearers fill the link belts manually.

297. Ammunition expenditure is regulated by the commander of the machine gun squad as part of the combat order or when issuing commands for firing. When the gunners open fire independently, they have to use ammunition sparingly, which can be achieved by strict appliance with the provisions of this Manual (related to the types of firing at certain types of targets).

After half the ammunition has been used, the gunner reports it to the squad commander, who immediately takes measures, and issues the order for resupply to the ammunition bearers.

Chapter IV

FORMATIONS AND BASIC MILITARY ACTIONS OF THE MACHINE GUN SQUAD

1. GENERAL PROVISIONS

298. When the machine gun squad has no ordnance, means of transportation or pack animals, it lines up and performs other basic military skills in the same way as a firing squad.

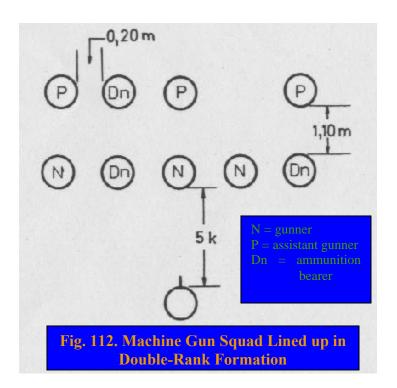
All actions concerning reigning in, harnessing, saddling the packs, removing the packsaddle, hitching, unhitching and unsaddling are performed in keeping with the provisions of the Manual on Pack Animals, Animal-Drawn Vehicles and Riding Equipment, UP-120, published in 1985.

2. FORMATIONS AND BASIC MILITARY ACTIONS WITH UNLOADED ORDNANCE

299. Assembly formations of the squad without any means of transportation are double-rank formation, single-rank formation, single-file column and double-file column.

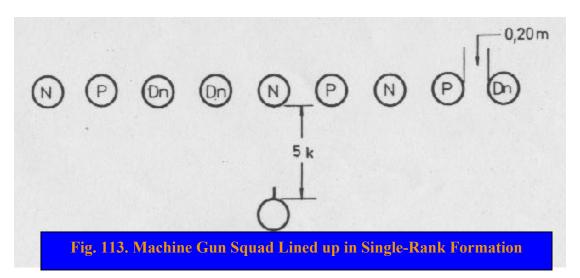
300. In order for the squad to line up in a two rank formation, the squad commander commands: "Squad in two ranks—ASSEMBLY."

At this command the crew quickly lines up with the gunner of the second machine gun pausing at five paces in front of the squad commander, facing him, while his assistant stand at his back and the ammunition bearer on the right side of the assistant gunner. The first crew lines up to the right and the third to the left of the second crew (fig. 112).



301. In order for the squad to line up in a single-rank formation, the squad commander commands: **"Squad in rank—ASSEMBLY."**

At this command, the gunner of the second piece of ordnance stops five paces away from the squad commander, and the rest of the crew lines up to the left and the right of him, as shown in .



302. In order for the squad to line up in single-file or double-file column the squad commander gives the following command: **"Squad in single-file (or double-file) column**—**ASSEMBLY."**

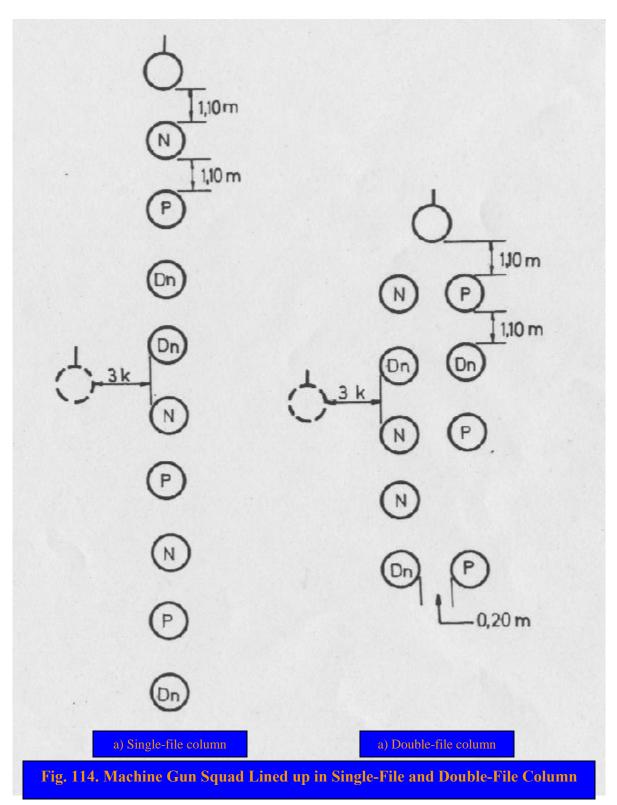
At this command the squad lines up at a distance of 1.10 meters behind the squad commander (fig. 114).

When the squad moves in a single-file (or double-file) column, the squad commander stands 1.10 meters to the left of the center of the column.

303. If the squad does not leave immediately, ordnance is assembled or put aside in front of the formation.

304. For the crews to assemble ordnance, after the squad has lined up in double- or single-file columns, the squad commander commands: **"Machine guns—assemble."**

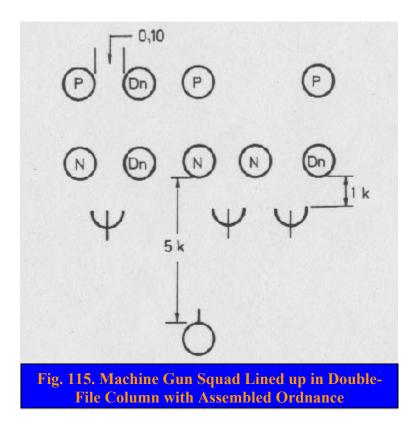
At this command the crew assembles machine guns (in a kneeling position) one pace in front of the first rank to the left of the gunner. Ammunition boxes and the machine gun carrier bag are put aside on the left side (fig. 115).



305. For the crews of prepare ordnance for movement, the squad commander commands: **"Ready for MARCH."**

At this command the crew disassembles the machine gun, collects accessories, the gunners put machine guns "over the shoulder" and assistant gunners "on the back" (or "at the chest") and line up.

306. In order for the crew to put down the machine gun components, the squad commanders gives the following command: **"Machine guns— lay aside."**



At this command the gunners make one pace forward, release the bipod and lay machine guns on the ground (so that the gun stock is aligned with the tip of the footwear worn on the right foot). Assistant gunners remove the tripods and put them aside to the left of the machine gun and then place ammunition boxes on the left side of the tripod (first ammunition bearers and then assistant gunners and gunners). After the equipment has been stacked up, the crew lines up. If the machine gun is in the carrier bag, it is laid down with the right side on the ground.

307. If the squad was "at ease," in order for them to line up next to ordnance, the squad commander commands: "At the machine gun—ASSEMBLY."

At this command the squad lines up behind the ordnance at the level of the gun stock.

308. For the crew to pick up the ordnance they have laid down, the squad commander commands: **"Machine guns—PICK UP."**

At this command the crew first picks up the ammunition boxes, and the gunner then picks up the machine gun while the assistant gunner picks up the tripod holding is as described in item 305, and then they line up.

309. When the squad is lining up in assemblies, assistant gunners hold rifles "across the chest," and ammunition bearers "on the back."

310. The squad dresses along the frontline and in depth, moves, turns around in place and while moving, salutes in place and while moving, goes around and lays down ordnance at command in the same way as a firing squad.

3. FORMATIONS AND BASIC MILITARY ACTIONS WITH ORDNANCE LOADED ON MEANS OF TRANSPORTATION

1) Formations and basic military actions with ordnance loaded on motor vehicles

311. During transportation, the machine gun squad occupies one vehicle with two other firing squads. If the vehicle has benches lined up across one behind another, the squad sits on the first and the second bench. If the vehicle has three benches positioned alongside the vehicle, the squad sits on the left side.

If the body of the vehicle is open, the first piece of ordnance can be set up for firing from the roof of the cabin at the targets on the ground, and the third piece of ordnance at the rear of the vehicle, for engaging targets in the air.

312. Before mounting a vehicle, the squad lines up behind the vehicle, at the command **"Behind the vehicle—ASSEMBLY."** At this

command the squad lines up in a single-file column one pace away behind the vehicle, on the left side.

At the command **"Take stations"** the crew climbs into the vehicle one by one, places ammunition boxes and tripods under the seats and sits down. Machine guns and personal weapons are kept between the legs with the gun stock leaning on the ground.

If the body of the vehicle is open (or at command) the first and the third piece of ordnance are set up as described in item 311 (second paragraph).

313. For the squad to disembark from the vehicle, and unload the ordnance, the command **"DISEMBARK"** or **"UNLOAD"** is given.

At this command, the crew takes the weapon components in their hands and disembarks one by one (before leaving the vehicle they hand the components to the first crew member behind them, and take them back once they are out). They then position the components on their body (as described in item 305) and perform further actions according to command.

2) Formations and basic military actions with ordnance transported by pack animals

314. Assembly formations of the squad with pack animals are rank, squad column and mountain column.

315. For the squad to line up in a rank, the squad commander commands: "Squad in rank—ASSEMBLY."

At this command the squad lines up: if the crew carries all pieces of ordnance, as shown on Fig. 116a; if ordnance is carried by pack animals, as shown on Fig. 116b.

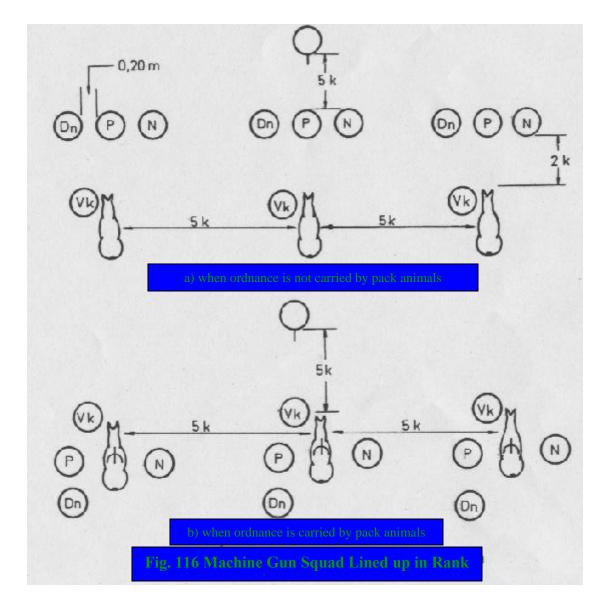
316. For the squad to line up in a squad or a mountain column, the squad commander commands **"Squad in squad (mountain) column**—**ASSEMBLY."**

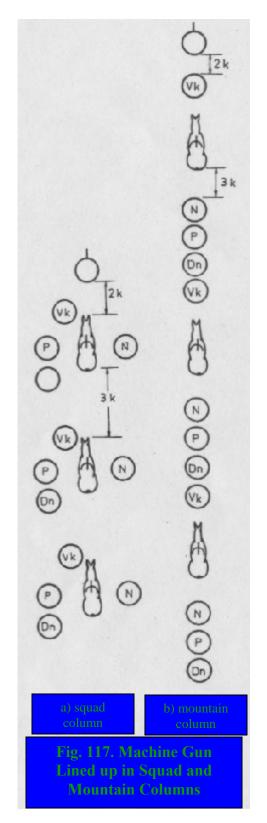
At this command, the squad lines up as shown on Fig. 117.

317. Loading and unloading ordnance on pack animals is performed as described in items 109 and 110 of the Manual on Pack Animals, Animal-Drawn Vehicles and Riding Equipment, 1985 edition.

318. The machine gun squad with pack animals dresses and salutes in the same way as the firing squad, except that horse drivers stand in front of the horses to line them up, grasp the iron rings on the curb grip and pull (or push) the horses to the right side.

319. When standing "to attention," horse drivers hold the horse by the leading reins (10 cm from the curb bit), allowing the horse to hold its head up in a natural position. They hold the end of the leading reins and the handle of the whip in their left hand (with the thumb turned forward and the whip rearward).





After the command "at ease," horse drivers turn "right, face," grasp the leading reins with their left hand (10 cm from the curb grip, and then, when the order to carry out the command is given, they lightly hit the horse three times on the neck with the right hand, turn "left, face," and stand "at ease." They hold the leading reins and the whip in any way that is most convenient for them.

When the squad receives the command "at ease," horse drivers do not salute with their hand, but only turn around facing the senior officer.

320. The machine gun squad with pack animals either walks (horses stride) or walks in double time, march (horses at a trot). Double time, march, is used at short distances.

321. For the squad to move forward, the command **"Squad FORWARD** (double time, MARCH!) is given. The starts walking forward (or double time, march) and the speed at which the horses are moving is adjusted to the crew.

322. For the squad to come to a stop, the squad commander commands "Squad—HALT!"

At this command horse drivers gradually bring horses to a halt (the animals stop at about three paces behind the crew).

323. For the squad to turn left (about, face!) or right in place (or while moving) the squad commander commands: "Squad left (right), face FORWARD" or "Squad left (right) about face FORWARD!"

At this command, horse drivers turn horses in three paces along a semi-circular arc (first three paces straight) and then stop (if the turning occurs during movement they do not stop).

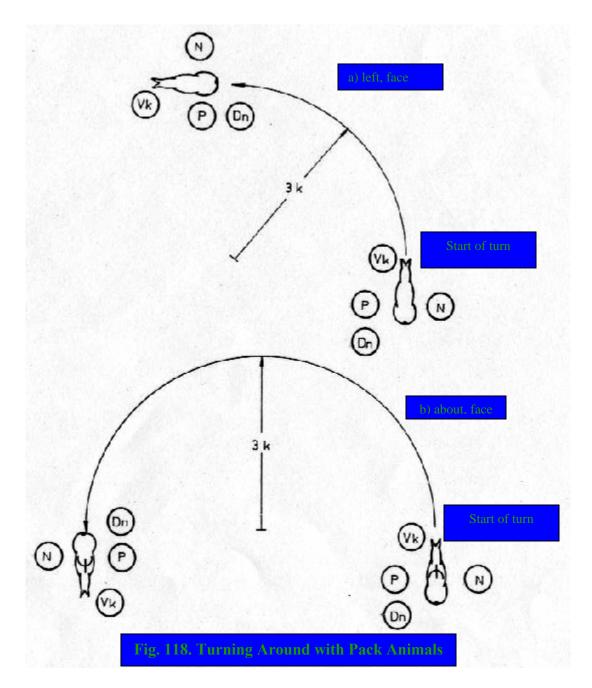
The position of the crew, the horse drivers and the animals during turning is as shown on fig. 118.

Saluting in place or while moving is the same as without pack animals, except that the horse drivers look straight ahead when saluting while moving.

324. Realignment in place from rank to squad column in the same direction is performed at the command **"Squad direction... to the right in squad column FORWARD."**

At this command the first crew moves in the designated direction, and the rest of the crews, as soon as they have room, come dress front of the first crew by moving obliquely and continue moving.

325. For the squad to realign from squad to mountain column while moving, the squad commander commands **"In mountain column re-ALIGN!"**



At this command, the driver of the first horse continues to move while the drivers of the second and the third horse slow down the horses until there is enough room for the crew. The crew line up in a single-file column behind their horses moving obliquely. When the mountain column has been formed, they continue to move at full speed.

326. For the squad to realign from mountain to squad column while moving, the squad commander commands: **"In squad column re-ALIGN!"**

At this command, the driver of the first horse stops, and the other two walk up to the designated distance. The crew takes stations by moving obliquely and come to a halt.

For the squad to realign without coming to a halt the squad commander commands "In squad column, at double time, re-ALIGN!"

At this command the crew quickly realign while moving as described in paragraph two of this item.

327. For the squad to realign while moving from squad column to rank in the same direction, the squad commander commands **"To rank re-ALIGN!"**

At this command, the driver of the first horse and the crew come to a halt, while the rest move obliquely and come to the left side of the first horse driver and stop.

3) Formations and basic military actions with ordnance mounted on a two-wheeled cart

328. The ordnance of the entire machine gun squad is mounted on a single M84 two-wheeled cart.

Loading and unloading ordnance on a two-wheeled cart is performed as described in items 214 and 215 of the Manual on Pack Animals, Animal-Drawn Vehicles and Riding Equipment—1985 edition.

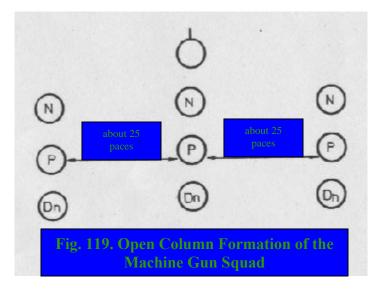
329. Once the ordnance is on the two-wheeled cart, all formation actions are performed in the same way as prescribed for the firing squad.

330. A two-wheeled cart can be pulled by pack animals, all kinds of trucks and all-terrain vehicles with a hook or tractors.

4) Open column and combat formation of the machine gun squad

331. The machine gun squad takes position according to open column formation at the command "Direction... in line for COMBAT."

At this command the gunners command **"FOLLOW ME"** and lead the crews away at double-quick. The first crew moves to the right and the third to the left for about 25 paces, while the second crew keeps the line from the command (fig. 119).



When the first and the third crew align themselves with the second, movement continue at a foot step.

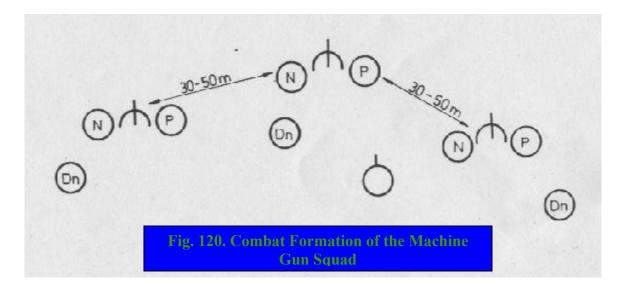
332. The squad moving in open column comes to a halt at the command (signal) **"Squad—HALT."**

At this command the crews take combat position (Fig. 120) and come to a halt at a convenient location, using natural shields found on the ground for cover.

In order to continue movement the command "FORWARD" or a signal are given.

At this command the crews form columns and continue moving in open column formation.

333. Change in the direction of movement in open column formation is performed at the command **"Squad, right (left) direction... MARCH."**



At this command, the second crew changes direction, and other crews run out or halt until they are able to align.

334. In order to round up the squad from open column formation the command "Squad, direction... at... ordnance in single-file column (double-file)—MARCH."

The crew used to round up the squad moves at foot pace in the direction of the command, and the rest of the crew approach at double time and take their position in the formation.

At the command **"Squad, in single-file (double-file) column FOLLOW ME,"** the crews are rounded up following the squad commander at double time and taking their position in the formation.

APPENDIX 1

BASIC BALLISTIC DATA AND ELEMENTS OF THE BULLET TRAJECTORY

Dist-ance	Table angle			Drop angle			Ordinate of traject-ory vertex	Distance from barrel to trajec-tory	Time of flight	Final bullet veloc-ity	Bullet ener-gy at drop point	Dist-ance
m	deg.	min.	mil	deg.	min.	mil	m	m	S	m/s	kgm	m
100	0	17	5	0	3	1	0.02	51	0.13	746	272	100
200	0	19	5	0	7	2	0.09	103	0.27	675	223	200
300	0	22	6	0	11	3	0.22	157	0.43	608	182	300
400	0	26	7	0	17	5	0.43	213	0.60	545	146	400
500	0	31	9	0	25	7	0.77	271	0.79	486	116	500
600	0	36	10	0	36	10	1.3	331	1.01	432	91	600
700	0	42	12	0	50	14	2.0	394	1.26	384	72	700
800	0	50	14	1	7	19	3.0	459	1.53	343	57	800
900	0	59	16	1	28	24	4.3	525	1.83	316	49	900
1,000	1	09	19	1	53	31	6	591	2.15	299	43	1,000
1,100	1	21	22	2	21	39	8	656	2.49	284	39	1,100
1,200	1	35	26	2	22	48	11	719	2.85	270	35	1,200
1,300	1	50	30	3	26	57	14	779	3.23	257	32	1,300
1,400	2	06	35	4	03	67	18	837	3.63	245	29	1,400
1,500	2	24	40	4	79	44	22.5	893	4.06	233	26	1,500

Note: Muzzle velocity 825 m/s; deviation angle minus 12 min, bullet energy 329 kgm; bullet weight 9.60g.

Range				100	200	300	400	500	600	700	800	006	1,000	1,100	1 200
xed		Vp		0.05	0.10	0.15	0.20	0.25	0.29	0.34	0.39	0.44	0.49	0.54	0 59
ine gun fi	Total	VV		0.06	0.12	0.18	0.23	0.29	0.35	0.41	0.47	0.55	0.63	0.71	0.80
the mach		P A							34	28	24	21	19	17	16
ount with	impact	Vp		0.02	0.05	0.07	0.09	0.12	0.14	0.16	0.18	0.21	0.23	0.25	0.78
Firing bursts and sustained fire from the mount with the machine gun fixed Shot disnersion	Average point of impact	VV		0.03	0.06	0.09	0.12	0.15	0.18	0.21	0.24	0.27	0.30	0.33	036
ined fire f	Averag	Vd							17	14	12	10	6	8	7
and susta	urst	Vp		0.04	0.09	0.13	0.17	0.22	0.26	0.30	0.34	0.39	0.44	0.48	050
ng bursts	Rounds per burst	VV	Meters	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.41	0.48	0.55	0.63	077
Firi	Rou	ρΛ							29	24	21	19	17	15	A
	Total	Vp		0.10	0.20	0.31	0.41	0.51	0.61	0.72	0.83	0.93	1.03		
e bipod	To	VV		0.07	0.15	0.22	0.29	0.37	0.44	0.52	0.60	0.68	0.77	•	
Firing short bursts from the bipod Initial deviation	Average point of impact	Vp		0.06	0.12	0.19	0.25	0.31	0.37	0.43	0.50	0.56	0.62		
hort burs Initial d	1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1	VV .		0.04	0.09	0.13	0.17	0.22	0.26	0.30	0.34	0.39	0.43	•	
Firing	Rounds per burst	Vp		0.08	0.16	0.25	0.33	0.41	0.49	0.58	0.66	0.74	0.82		
	Rounds	VV		0.06	0.12	0.18	0.24	0.30	0.36	0.42	0.49	0.56	0.64		
Range				100	200	300	400	500	009	700	800	006	1,000	1,100	1 200

m	2		
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	tachine g	aug ənidəsM	mmm 4 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
S	Firing bursts from the tripod with the machine gun	Moving target- Materally	к к к 4 5 9 7 8 1 1 1 1 8 1 1 1 1 8 1 1 1 1 1 8 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
OUNTS OF AMMUNITION NECESSARY FOR DESTROVING SINGLE TARGETS	the tripod	terret guivoM	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
SINGL	sts from	Torso target	m m m 4 4 v v 2 2 2 2 2 2
ROYING	iring bur	Upper torso target	с с 4 м м м м м м м м м м м м м м м м м
OR DEST	H	ettendiz breH	21 21 21
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ON NECE		Іялпсиег. Напсиег	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
ILINUMM	bursts from the bipod	nug aninasM	3033 8 6 4 3 3 3 303 8 6 4 3 3 3 303 8 6 6 4 3 3 3
TS OF A	rsts from	.Моving target- ІаtегаЦу	23 8 12 0 7 5 4 3 3 3 23 8 12 12 0 7 5 4 3 3
AMMOUN		tegrat gaivoM	うう キャット ※ 0 ご 2
4	Firing shor	Тогзо ғагуеt	ю та чо та о о с т С та о с та о с С та о с та о
		Upper torso target	€ 4 9 8 I S 8
		Head silhouette	3 12 19 26 26
		Kange (m)	100 200 300 500 500 600 700 1,000 1,100 1,200

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Range (m)		Firin	ng long burst	g long bursts from the bipod	pod			Firin	t long burst	Firing long bursts from the tripod	ipod	
,)	Upper tors	Upper torso silhouette	Torso si	Torso silhouette	2010-001	Moving targets	Upper torse	Upper torso silhouettes	Torso silhouettes	houettes	Moving	Moving targets
	Destr	Destruction	Destru	Destruction	Destri	Destruction	Destr	Destruction	Destruction	action	Destr	Destruction
	S0%	80%	50%	80%	50%	80%	50%	80%	50%	80%	50%	80%
100	21	48	17	39	18	41	19	4	91	37	16	37
200	31	71	19	4	18	41	25	57	17	39	17	39
300	43	66	22	50	19	44	33	76	19	44	18	41
400	56	128	27	62	22	50	42	96	22	50	19	4
500	69	158	33	76	25	57	52	119	26	60	21	48
009	82	188	38	87	28	64	62	142	30	69	33	23
700									34	78	25	57
800									38	87	27	62
006								× .			30	69
1,000											33	76

APPENDIX 5

TECHNICAL DATA

a) For ordnance	
a) For ordnance—Weight of machine gun with tripod	15kg
	U U
—Weight of barrel Weight of link halt loaded with 100 rounds	2.6 kg
—Weight of link belt loaded with 100 rounds	3.8 kg
—Weight of link belt loaded with 250 rounds	9.4 kg
—Weight of tripod	5 kg
—Length of machine gun	1,175 mm
—Length aiming line	663 mm
—Initial bullet velocity	825 m/s
—Theoretical firing velocity	700 rounds/min
—Practical firing velocity	250 rounds/min
—Maximum killing range of the bullet	3,800 m
b) For optical sight	
b) For optical sight—Enlargement	3 X
	3 X 12°
Enlargement	-
—Enlargement —Field of vision	-
 Enlargement Field of vision Value of scale divisions: for measuring distance 	12°
 Enlargement Field of vision Value of scale divisions: for measuring distance for setting distance division 	12° 100 m
 Enlargement Field of vision Value of scale divisions: for measuring distance 	12° 100 m 100 m
 Enlargement Field of vision Value of scale divisions: for measuring distance for setting distance division on the windage machanism on the lead scale 	12° 100 m 100 m 0-01
 Enlargement Field of vision Value of scale divisions: for measuring distance for setting distance division on the windage machanism on the lead scale Source of light for illuminating reticle 	12° 100 m 100 m 0-01 0-05 Tritium
 Enlargement Field of vision Value of scale divisions: for measuring distance for setting distance division on the windage machanism on the lead scale 	12° 100 m 100 m 0-01 0-05