National Defence / Défense nationale

B-GL-385-009/PT-001

WEAPONS

VOLUME 9

CARL GUSTAV—SHORT RANGE ANTI-ARMOUR WEAPON (MEDIUM)

(ENGLISH)

(Supersedes B-GL-317-006/PT-001 dated 1995-09-30.)

WARNING

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Issued on Authority of the Chief of the Land Staff

Canada

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OPI: Infantry School, Chief Standards **2005-01-06**

Canada

WEAPON SECURITY

THE SECURITY OF SMALL ARMS AND SMALL ARMS AMMUNITION IS YOUR RESPONSIBILITY. ENSURE THAT YOUR WEAPON(S) AND AMMUNITION ARE SECURED/PROTECTED IN ACCORDANCE WITH CURRENT ORDERS AND INSTRUCTIONS.

WARNING

SECTION 1
MISUSE OF WEAPONS, AMMUNITION AND EXPLOSIVES

PURPOSE

1. This order outlines Canadian Forces policy governing the use or misuse of weapons, ammunition and explosives.

WEAPONS

2. Firing or attempting to fire locally manufactured weapons, obsolete service or foreign weapons, or weapons used for display, ceremonial or trophy purposes in museums, messes, parade grounds, armouries or such like area is prohibited except when specifically authorized by NDHQ.

3. Attention is also drawn to the following references, which concern offences connected with the use or misuse of weapons:

a. Section 117 of the *National Defence Act*;

b. Sections 82 to 106 of the *Criminal Code of Canada*; and

c. Section 103.59 of Queen's Regulations and Orders for the Canadian Forces (QR&O).

AMMUNITION AND EXPLOSIVES

4. Tampering with or use of service and commercial ammunition or explosives for other than their designed purpose is prohibited.

5. Except as prescribed in paragraph 6, the modification, breakdown or sectioning of live ammunition for experimental, instructional or any other purpose, or manufacture of explosives is forbidden; this prohibition includes:

a. unauthorized interchange of fuses or primers or both;

b. experiments with blank ammunition to alter the powder charge or to introduce any other substance

into the cartridge case or into the weapon with the approved cartridge;

c. experiments involving the use of altered propelling charges or bursting charges with ammunition of any type;

d. the use of any non-service or obsolete ammunition;

e. the use of foreign ammunition other than that received through normal supply channels or supplied in accordance with NATO Standardization Agreements;

f. the manufacture and use of locally fabricated explosive training devices, battle simulators, saluting charges, etc.;

g. any alteration to the design of ammunition or explosive devices;

h. deviations from authorized drills for use of ammunition or explosive devices; and

i. rendering live ammunition inert for use as museum or instructional items.

6. The prohibition in paragraph 5 does not apply to:

a. authorized experiments, modifications, etc, carried out by experimental, research, proof or inspection establishments;

b. authorized breakdown, modification, repairs, proof-testing, etc., carried out as normal functions of a Canadian Forces ammunition depot or base ammunition facility;

c. personnel employed at Canadian Forces School of Aerospace and Ordnance Engineering as instructors or trainees under supervision, when breaking down is carried out as part of a course training standard and in accordance with an approved course training plan;

d. the use for its designated role of commercial pattern ammunition, which is obtained by local purchase as

specified in CFP 137 or as authorized by NDHQ in accordance with CFAO 36-19;

e. the use for its designed role of commercial pattern ammunition which is taken into service and catalogued;

f. hand-loading small arms ammunition in accordance with CFAO 50-18; and

g. other cases, when specifically authorized by NDHQ.

FOREWORD

1. B-GL-385-009/PT-001, *Weapons, Carl Gustav—Short Range Anti-armour Weapon (Medium)* (SRAAW [M]) is issued on authority of the Chief of the Land Staff.

2. This publication is effective upon receipt and supercedes B-GL-317-006/PT-001 dated 30 September 1995.

3. In order to avoid confusion in the weapons' generic titles, the 84 mm Carl Gustav was renamed “Short Range Anti-armour Weapon (Medium)” as a consequence of the introduction of the Eryx “Short Range Anti-armour Weapon (Heavy),” which carries a heavier explosive charge and has greater destructive capabilities.

4. Unless otherwise indicated, the masculine pronouns contained herein denote both the masculine and the feminine.

5. Comments and suggestions for changes should be forwarded through the normal channels to the Infantry School, attention the Chief Standards.

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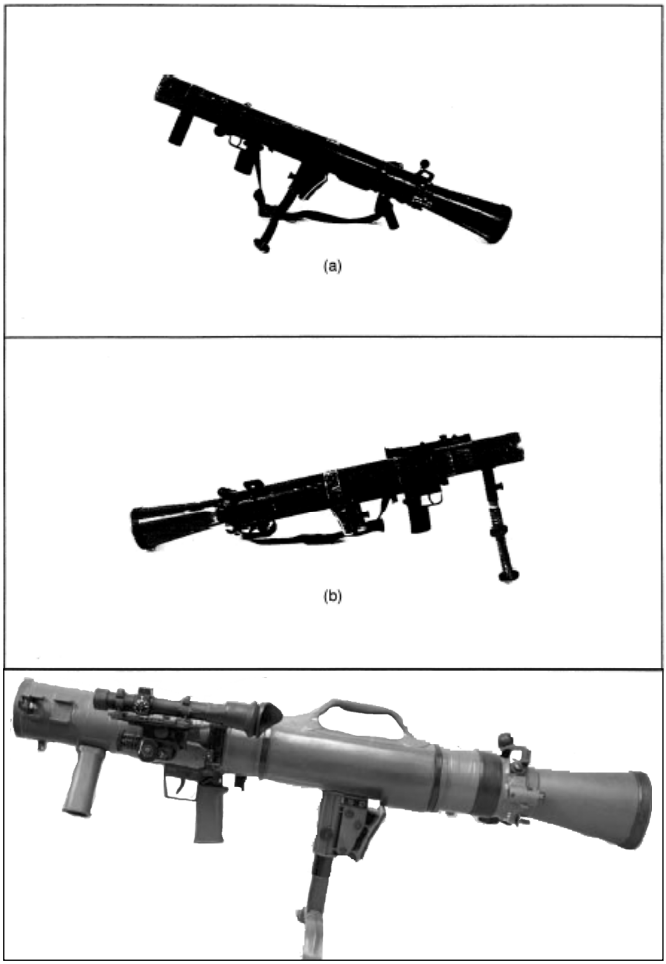


Figure 1-1: Carl Gustav M2 with Front Grip (a), Front Grip (b) and Model M3 Without Impact Protector (c).

AIM

1. This publication contains instructional material on the 84 mm Short Range Anti-armour Weapon (Medium) (SRAAW[M]) for use by section commanders and small arms instructors. It enables instructors to teach the maintenance, handling and firing skills necessary to achieve the operational standards required under all conditions.

FORMAT

2. The information in Chapters 2 and 3 is presented in lesson plan format. The manual is laid out as follows:

a. Chapter 1 contains general information about the 84 mm SRAAW(M) and teaching methods;

b. Chapter 2 contains the basic skills and the specific information required by soldiers to operate the SRAAW(M);

c. Chapter 3 consists of practice periods designed to further develop the skills and techniques taught in Chapter 2; and

d. Chapter 4 contains information for instructors.

TECHNICAL DATA

3. Calibre—84 mm.

4. Weight of gun:

a. with mount and telescopic sight—15.91 kg (M2) and 9.91 kg (M3);

b. with cleaning equipment, tools and container—29.5 kg (M2), 21.5 kg (M3).

5. Twist of Rifling—right hand.

6. Type of sight—telescopic sight M2, mounted iron sight and luminous sights.

7. Sight range—up to 1,300 m with the M2 telescopic sight.

8. System of operation—breech loaded, percussion fired.

9. Muzzle Velocity: FFV 751—210 m p/s; FFV 502—230 m/s; FFV 469B (smoke)—240 m/s; FFV 551—255 m/s; and FFV 545 (flare)—260 m/s.

ORGANIZATION OF INSTRUCTION

10. The lessons and practice periods are best taught and practiced in the sequence laid down in the pamphlet. Instructors are allowed latitude in the method adopted to teach individual lessons provided that they do not deviate from the information specified.

11. Practice periods can be repeated according to progress. Instructors should remember that constant instruction and practice without firing makes the subject dull. Every effort should be made to introduce live firing as soon as the soldier has mastered the basic skills.

PRACTICE PERIODS

12. **General**. All training must be progressive and avoid unnecessary repetition. A soldier learns skills and facts in the basic lessons which should be taught only once during his service. He then requires practice in order to quicken, improve and maintain his skills and to get the facts firmly fixed in his mind.

13. The sequence for each stage of a practice period is:

a. remind—by explanations;

b. assess weaknesses—by practice or test;

c. improve on weaknesses—by practice; and

d. progressive practice—by competitions.

14. The practice periods are intended as a guide to exercising soldiers during their training. The instructor should plan the period on an assessment of the soldier's weak points.

15. Faults should be immediately brought to the attention of the soldiers and corrected.

16. If it becomes obvious during a practice period that the soldiers have failed to grasp a particular skill, the instructor will have to teach that part of the basic lesson again.

17. Practice periods can be repeated according to the progress of the soldiers.

18. The incentive of competition will always help to make practice more interesting. An entire practice period can be based on competitions if the instructor so wishes. Some points on conducting competitions are:

a. Teams may be formed.

b. The instructor must ensure that the selected teams are all fairly equal in ability. The more advanced members of the team will help the weaker members.

c. Marks can be awarded up to a given total, or start with a total and deduct marks for mistakes as the competition progresses.

d. A chart drawn on a chalkboard or a sheet of paper on which to mark results should always be used.

e. Further interest can always be attained by making one team watch another to find faults, resulting in marks being awarded or deducted marks.

f. Above all, the instructor must make certain the competitions are simple and realistic. They must exercise the soldier's ability to perform a particular skill.

CLASSROOM ORGANIZATION

19. Prior to the start of all lessons, number the class into teams of two or three as necessary. Ideally, there should be no more than ten students per instructor. Each team and the instructor should have a weapon.

HEARING PROTECTION

20. The dangers resulting from non-compliance with the detailed rules for hearing protection cannot be too strongly emphasized. Unless the rules are observed, there is a significant danger that permanent hearing damage may occur.

ABBREVIATIONS

21. The following abbreviations are of particular importance to this manual:

a. AFV—armoured fighting vehicle.

b. APC—armoured personnel carrier;

c. FEBA—forward edge of the battle area;

d. FFV—Forenad Fabric Verken;

e. HMX—homocyclonite cyclotetramethylene tetranitramine (expolosive);

f. IA—immediate action;

g. kg—kilogram;

h. m/s—metres per second;

i. MBT—main battle tank;

j. mm—millimetre

k. MPI—mean point of impact;

l. RDS—cyclonite cyclotrimomthylene trinitramine (explosive);

m. SRAAW (M)—Short Range Anti-armour Weapon (Medium);

n. TETRYL—trinirophenyl methyl-nitramine (explosive); and

o. TNT—tri-nitro-toluene (explosive).

CHAPTER 2
LESSON PLANS, BASIC SKILLS

LESSON 1
INTRODUCTION, CHARACTERISTICS, DESCRIPTION, SAFETY PRECAUTIONS, AMMUNITION, STRIPPING, ASSEMBLING AND CLEANING

INSTRUCTOR'S NOTES

1. **Aim**. Describe the 84 mm recoilless gun and safe handling and maintenance of the weapon.

2. **Main Teaching Points**:

   a. introduction;

   b. characteristics;

   c. description;

   d. safety precautions;

   e. ammunition;

   f. sights and ancillary equipment;

   g. stripping and assembling; and

   h. cleaning.

3. **Time**. Three 40-minute lessons.

4. **Method**. Explanation, demonstration and practice.

5. **Stores**. Depending on the type of Carl Gustav used (M2 and/or M3):

   a. 84 mm recoilless gun complete, one per three soldiers;

   b. 84 mm display rounds, one per gun;

   c. FFV 553 SCTD, one per gun;

   d. 7.62 mm T/R FFV 553 and FFV 840;

   e. ammunition recognition diagram, one;

   f. duplex ammunition containers, one per gun;

   g. cleaning rags, as required;

h. tables (optional), one per gun;

i. optic sight M2, one per gun;

j. luminous sights, one per gun;

k. M3 Carl Gustav (light weight), one per three soldiers;

l. M3 Carl Gustav impact protector, one per gun;

m. M3 Carl Gustav case, one per gun;

n. explanatory drawing of the gun; and

o. one cleaning kit for .50 cal machine gun.

6. **Preparation**:

a. Place on each table one gun (M2 or M3) with the telescopic sight and mount fitted. Place alongside:

(1) the No. 1 bag;

(2) the No. 2 bag, tool roll removed and screwdrivers laid out;

(3) muzzle and venturi covers off and impact protectors in the case of M3 (removed from the gun); and

(4) cleaning materials.

b. Select one gun for demonstration and place alongside it:

(1) duplex ammunition container and display round;

(2) ammunition recognition diagrams; and

(3) No. 1 and No. 2 bag laid out as for the other guns.

c. Check that all guns are serviceable.

d. Prepare a chalkboard to illustrate the backblast danger area.

7. **Miscellaneous**:

a. Number the section in groups of three and allocated one group per gun prior to safety precautions.

b. Use initial order for the commencement of each practice stage, i.e. safety precautions: **NO. 1 and NO. 2s OUT AND CARRY OUT SAFETY PRECAUTIONS**, thereafter call out **CHANGE**. Explain this system of control prior to the first practice stage.

c. Ensure that as parts are stripped, they are put in a clean place.

d. When handling the various parts, the instructor is to name them and their purpose. However, at this stage, the soldier is not expected to memorize all the names.

e. Emphasize that stripping and assembling should be carried with reasonable care and never practiced against time.

f. Cleaning in adverse conditions can be taught by question and answer using prior knowledge of the personal weapon.

g. Live ammunition is not to be used under any circumstances.

CONDUCT OF THE LESSON

8. **Safety Precautions**. Inspect all guns, ammunition and sub-calibre devices.

9. **Review**. Nil.

10. **Introduction**. Explain that the 84 mm SRAAW(M) is breech loaded and percussion fired. There is no recoil as the gas pressure, escaping rearward through the venturi, equalizes the recoil forces. The gun barrel is equipped with an internal steel sleeve. This sleeve is surrounded by a layer of epoxy and carbon fibre in the case of the M3 (Figure 2-2). The weapon is shoulder controlled and can be fired from any of the normal rifle firing positions. It is capable of disabling or destroying any known armoured fighting vehicle (AFV), provided it is hit in a vulnerable area.

11. The M2/M3 Carl Gustav system is found in the infantry platoon command post (CP) and along with the Eryx constitutes the principle first-line anti-armour gun. Because of its light weight (M3), simple operation and manoeuvrability, the Carl Gustav can be used in all phases of war. The Carl Gustav also has the ability to withstand rigorous arctic, tropic and desert conditions (see Instructor's Notes).

CHARACTERISTICS

12. **Explain and Illustrate as Necessary the Following**:

a. **Accuracy**. Accuracy and penetration power are its main characteristics. The M2 telescopic sight, iron sight and night sight allow accuracy to be maintained under moderately adverse conditions of weather and light.

b. **Range**. The maximum range is 700 m. The maximum effective range against a stationary target is 500 m and against moving targets is 400 m. Unprotected troops can be engaged out to 1,000 m (HEDP FFV 502).

c. **Flexibility**. Although its primary role is as an anti-armour weapon, the gun can be employed against buildings, gun emplacements, field defences and unprotected troops.

d. **Portability**. The gun weighs 16.35 kg (M2) and 10 kg (M3). It can be carried and fired by one man, the No. 1. A No. 2 assists in the handling drills and carries ammunition.

e. **Sights**. Three types of sights are used with this gun:

(1) iron sights attached to the gun;

(2) M2 telescopic sight; and

(3) luminous sights, phosphorous painted.

f. **Backblast**. Because the Carl Gustav is recoilless, it produces, at the moment of firing, a distinct flash and blast rearwards. The danger area extends 60 m rearward at an angle of 800 mils to either flank of the line of fire. This area must be clear of any troops, equipment or obstruction at the moment of

firing. When siting the weapon, it must be realized that the arc of fire will determine the overall backblast area. The gun can be fired from wooded areas as long as there are no major obstacles in the backblast area.

g. **Sub-calibre Devices**. The weapon has two sub-calibre devices: FFV 553, which fires a 7.62 mm tracer round, and the L1A2, which fires 6.5 mm tracer. Refer to lessons 6 and 7.

h. **Rate of Fire**. The maximum rate of fire is five rounds per minute with the high explosive dual purpose (HEDP) ammo and six rounds per minute with the high explosive antitank rocket-assisted projectile (HEAT RAP) and target practice rocket-assisted projectile (TP RAP) round.

13. **Confirm by Questions**.

DESCRIPTION

14. The 84 mm recoilless gun consists of the following major components (see Figure 2-1 for the M2 Carl Gustav and Figure 2-2 for the M3 version):

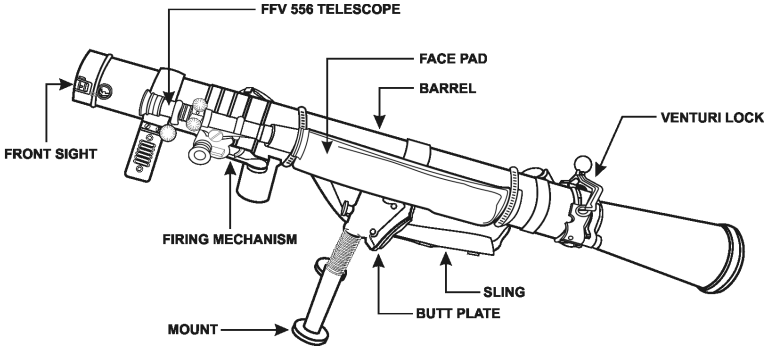


Figure 2-1: M2 Carl Gustav

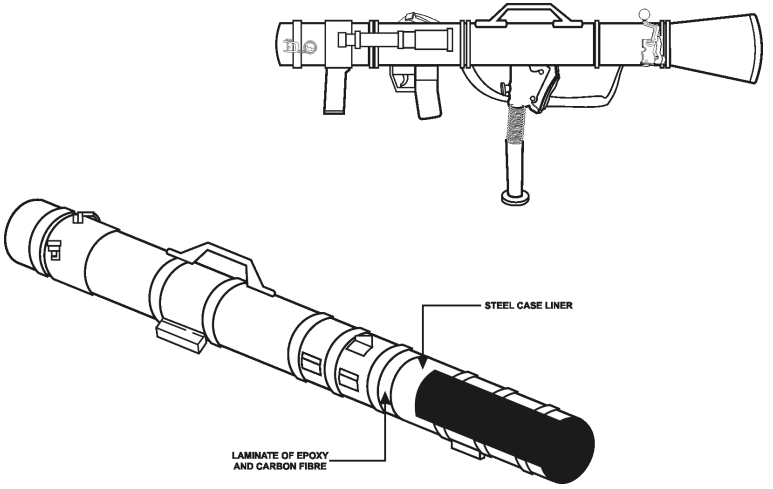


Figure 2-2: M3 Carl Gustav Without Impact Protector

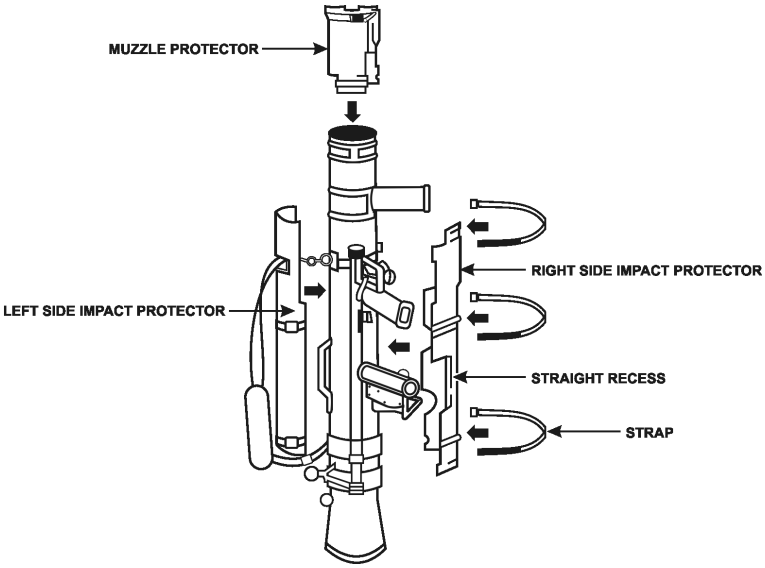


Figure 2-3: M3 Impact Protector

15. **Confirm by Questions**.

NORMAL SAFETY PRECAUTIONS

16. **Explain and Demonstrate**. The following drills are to be carried out at the beginning and end of every lesson, exercise, operational task and when handing over or taking possession of a gun. Normal safety precautions are performed as follows:

a. Cock the weapon by pushing the cocking lever forward towards the pistol grip.

b. Move the safety catch to "SAFE."

c. Push the venturi lock knob forward and raise the venturi lever thus opening the breech.

d. Visually inspect the chamber to ensure that it is clear; however, do not put your hand in the breech due to the possibility of burning propellant.

e. Visually inspect the venturi.

f. Ease springs by closing the breech. To do this press down on the venturi lever and tap the venturi lock

knob towards the rear to ensure that it is fully locked.

g. Move the safety catch to “FIRE” and operate the trigger mechanism.

17. **Confirm by Questions and Practice**.

AMMUNITION RECOGNITION

18. The 84 mm round consists of a projectile and a cased propellant charge. The Canadian Forces use only a small fraction—among the highest performing—of the wide range of available ammunition (Figures 2-4 and 2-5).

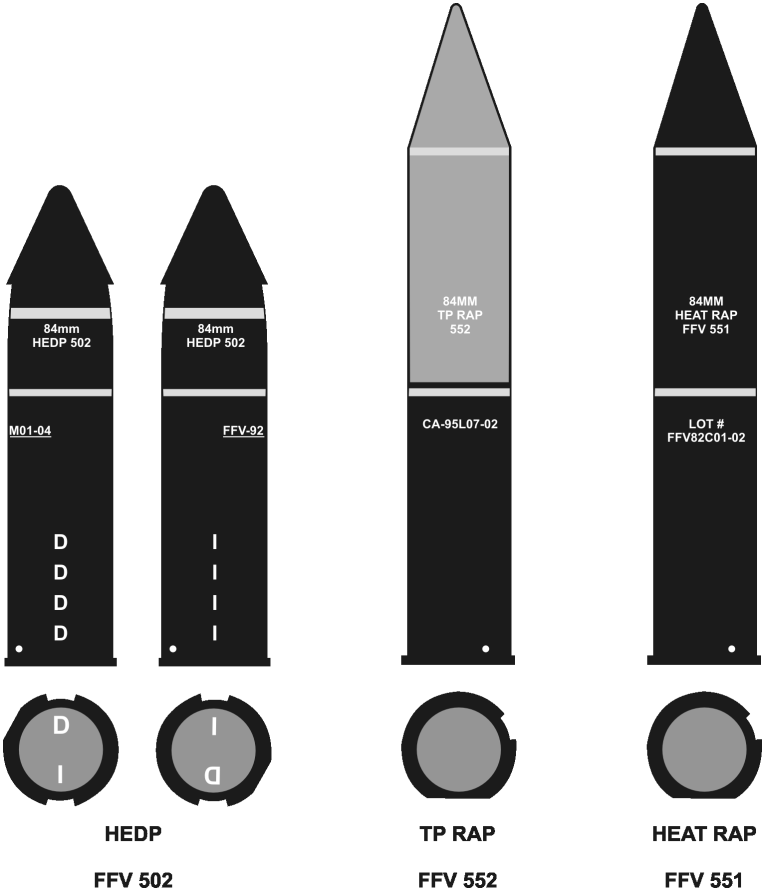


Figure 2-4: Live Ammunition

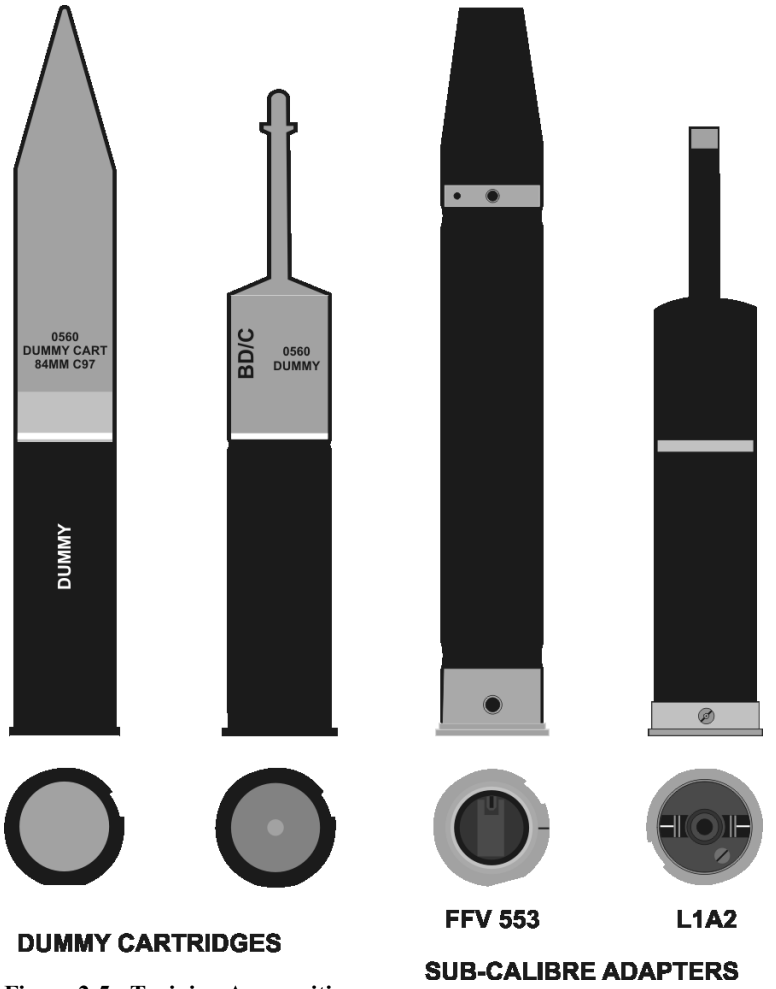


Figure 2-5: Training Ammunition

19. The following is the definition of the ammunition currently in service:

a. **High Explosive Antitank Rocket Assisted Projectile (HEAT RAP) FFV 551**. The FFV 551 round is black in colour and is marked with yellow stencilling. It is intended for use against all types of AFVs including those fitted with protective devices such as skirting plates. The rocket motor assist enables the shell to have a flat trajectory and a short

time of flight. It has an electric fusing system. It can penetrate armour 400 mm thick. The fuse becomes armed at 5 to 15 m from the muzzle of the gun. Figures 2-6 and 2-7 show the major components of the ammunition.

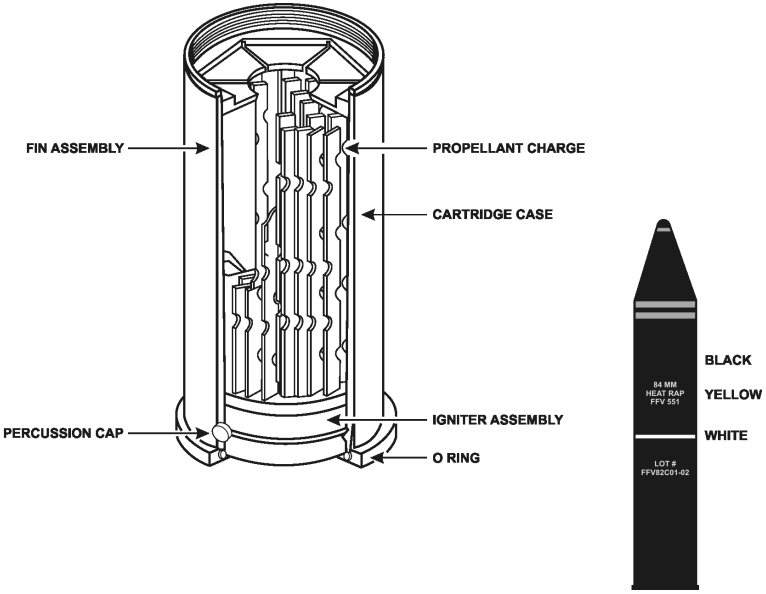


Figure 2-6: Cartridge Case Assembly FFV 551, With Colour Code

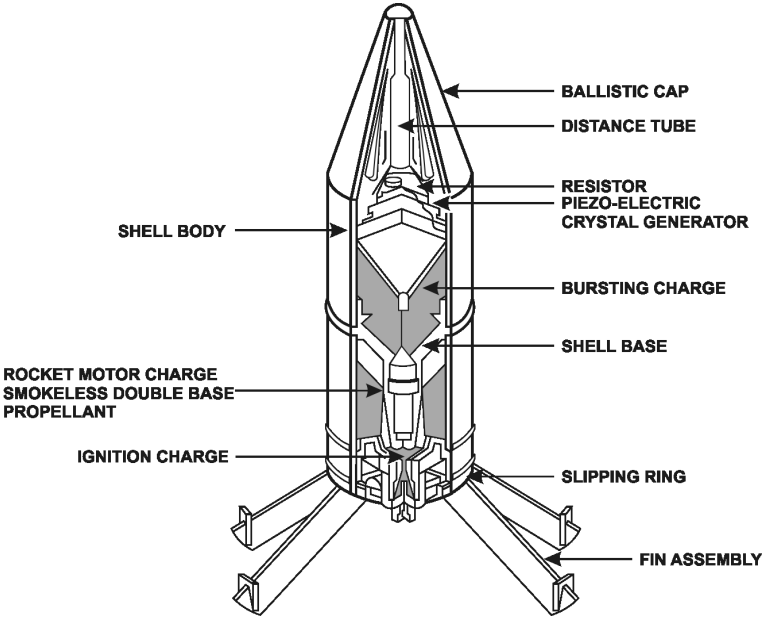


Figure 2-7: 84 mm HEAT RAP FFV 551 Shell

b. **Dummy Round, Target Practice Rocket-Assisted Projectile (TP RAP) FFV 552**. The FFV 552 practice projectile resembles the HEAT counterpart only in the area of the rocket motor and aft closure. The remaining components are largely made from aluminum alloy and contain no explosives. The round is coloured LIGHT BLUE and is marked with WHITE stencilling and a white band. The cartridge case assembly for 84 mm FFV 552 consists of the exact same parts as the HEAT RAP FFV 551. The shell assembly consists of the elements shown in Figure 2-8.

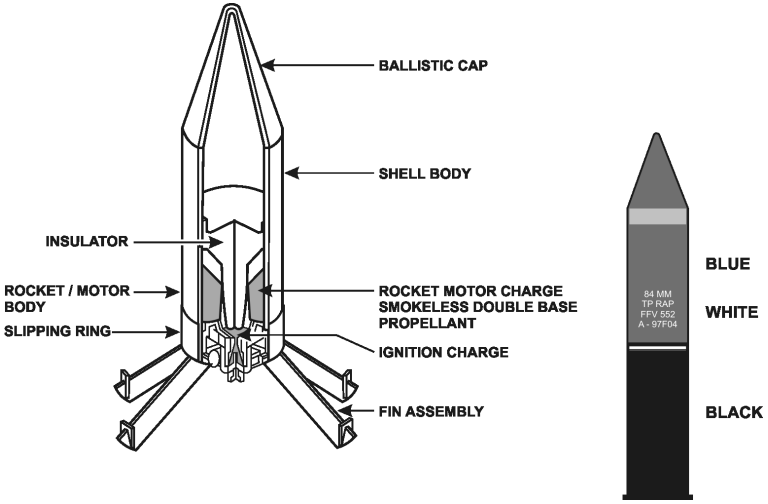


Figure 2-8: Shell 84 mm TP RAP FFV 552 w/Colour Code

c. **High Explosive Dual Purpose (HEDP) FFV 502**. See Figure 2-9 and 2-10. The HEDP FFV 502, often called the bunker buster, is a dual purpose round that can be set for instantaneous (I) or delay (D). When set for delay, the round will penetrate before exploding. The body of the shell is steel and is designed for optimal fragmentation. The markings are shown at Figure 2-4. The shell arms between 15 and 40 m, will penetrate over 150 mm of armour and can engage targets at the following distances:

(1) reinforced moving targets—300 m;

(2) field fortifications—500 m; and

(3) unprotected troops—1,000 m.

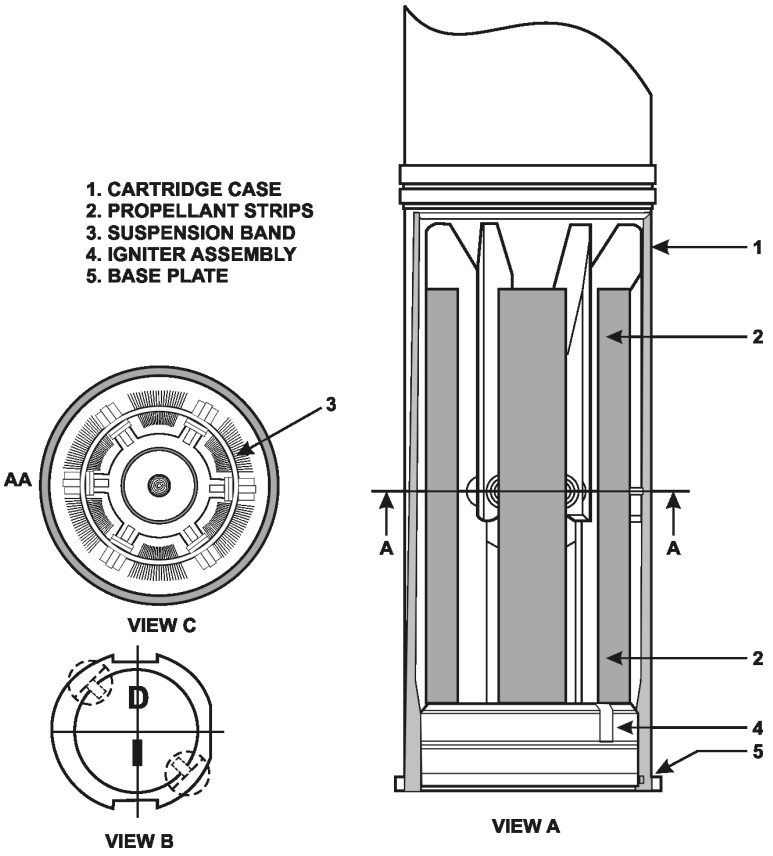


Figure 2-9: HEDP FFV 502 Cartridge Case

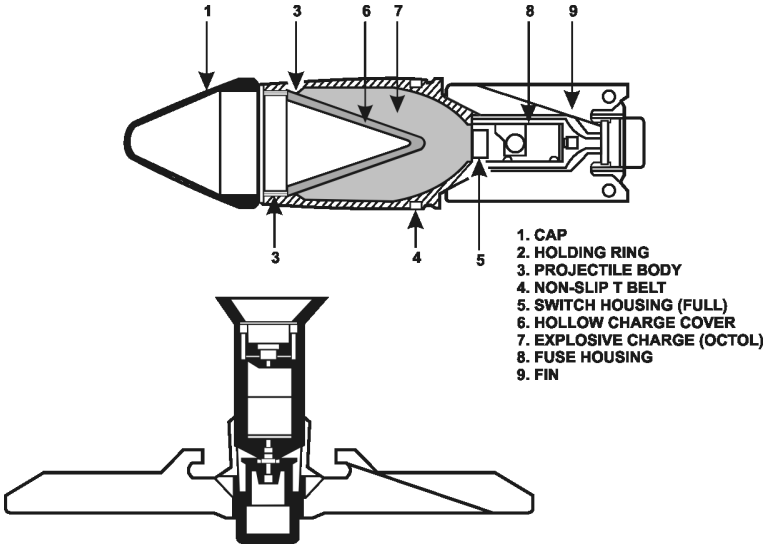


Figure 2-10: Shell HEDP FFV 502

d. **Dummy Round**. The dummy round does not contain explosives. It is the training counterpart of the live round. It is an inert round used in training to practice handling and loading drills. The round is coloured bronze and is marked with the word "DUMMY" in black stencilling (Figure 2-5).

e. **Sub-calibre FFV 553**. See Figure 2-5. The 7.62 mm T/R sub-calibre adapter FFV 553 is a training aid for firing the 84 mm RCL Carl Gustav M2/M3. The loading, aiming and firing drills with the parent weapons are the same as when firing the FFV 551 ammo. The body of the FFV 553 is light grey colour and similar in shape to the HEAT RAP Round. Detailed information on the FFV 553 is found in Lesson 6 of this chapter.

f. **Sub-calibre Device 6.5 mm**. See Figure 2-5. The 6.5 mm sub-calibre device is also used in training to practice loading, aiming and firing. Details on the 6.5 mm sub-calibre device are found in Lesson 7 of this chapter.

20. **Confirm by Questions**.

SIGHTS AND ADDITIONAL EQUIPMENT

21. **Removing and Fitting the Telescope**. Explain and demonstrate:

a. **To Fit**. Ensure that the iron sights are screwed fully down and folded to the gun. With the rubber guard of the telescope to the rear, fit the trunnions on the gun bracket. Holding the sight firmly, press down on the spring plunger, rotate the sight towards the gun and secure the sight to the gun bracket.

b. **To Remove**. Press down firmly on the spring plunger and rotate the sight away from the gun bracket. Place the sight in the No. 1 bag.

22. **Additional Equipment**. See Figure 2-11 and explain the following:

a. the No. 1 bag carried by the No. 1 contains (Figure 2-11):

(1) one telescopic sight unit;

(2) one luminous sight, with case;

(3) one lens cloth (kalarinal); and

(4) one lens brush.

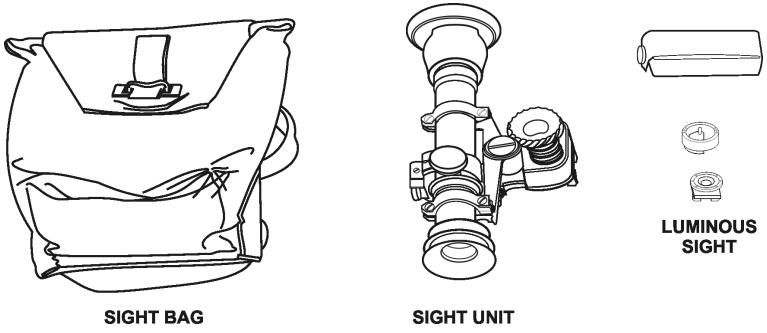


Figure 2-11: Sight Bag Carried by No. 1

b. The No. 2 bag carried by the No. 2 contains (Figure 2-12):

(1) one boresight front and rear;

(2) one tool and spare parts roll;

(3) two drift pins, parallel, steel;

(4) one spare firing rod spring;

(5) one spare front sight;

(6) three screwdrivers (flat point 15 mm, 9.5 mm point and a reversible 6 mm and 5 mm point);

(7) one sight adjusting tool; and

(8) one metal spare parts box, which contains an assortment of small spare parts.

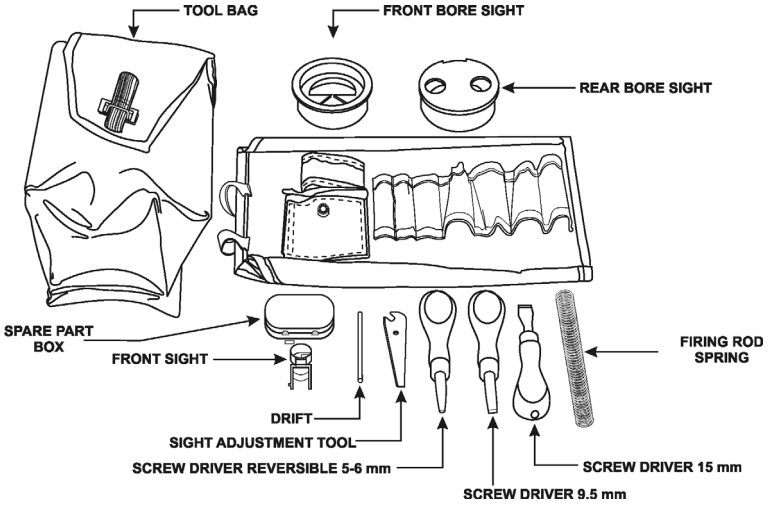


Figure 2-12: Tools and Spare Parts w/Bag Carried by No. 2

c. The No. 3 bag is normally carried in the parent vehicle of the weapon's crew—if necessary, the No. 2 will carry it—and it contains (Figure 2-13):

(1) one cleaning brush in black box;

(2) one oiling brush in clear box;

(3) one cleaning rod head;

(4) one cleaning rod, three sections; and

(5) one oil bottle, expendable.

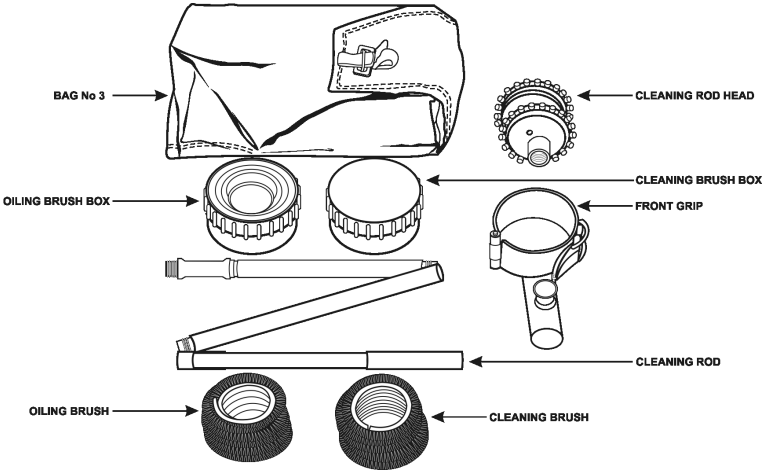


Figure 2-13: Cleaning Tools w/Bag Carried by No. 3

NOTE

Cleaning swabs for the .50 calibre machine gun are to be included in the cleaning kit to clean the firing mechanism.

23. **Confirm by Questions and Practice**.

STRIPPING AND ASSEMBLING

24. **Explain and Demonstrate**. The firing mechanism must be stripped to clean or replace a worn or broken firing pin.

a. **To Strip**:

(1) Remove the muzzle and venturi covers and sight unit, if fitted.

(2) Carry out the safety precautions.

(3) Pull out the mount catch and remove the mount from its housing. Lay the gun down with the pistol grip up.

(4) Maintaining a firm hand hold on the front end cap, use the large screwdriver to unscrew it and remove the main spring.

(5) Move the cocking lever as far forward as possible. Remove the rear end cap and, using a screwdriver, lift the firing pin straight out. If the firing pin washer comes out, it is to be replaced carefully.

(6) For cleaning, unscrew the two retaining screws of the cocking lever and remove the lever. Swing the front mount housing to one side so that when the trigger is pressed the cocking rod can be withdrawn from the front of the firing mechanism tube.

b. **To Assemble**. Replace the parts in reverse order.

c. **Test After Assembly**. After assembly a brief test should be conducted as follows:

(1) Cock gun, place safety catch to "SAFE," press trigger. The gun should not fire.

(2) Place safety catch to "FIRE" and press the trigger. The action should fire.

25. **Confirm by Practice**.

CLEANING

26. **Daily Cleaning**. Explain and demonstrate the following:

a. Assemble the cleaning rod and attach a lightly oiled bristle brush. Open the breech, insert the brush from the breech end and clean the barrel. Insert cotton waste in the eyelet of the cleaning rod, dry and inspect the barrel.

b. If fouling is present, use the dry nylon brush on the cleaning rod until all fouling is removed.

c. Similarly clean the venturi with an oily cloth, dry and inspect it.

d. Leave the barrel and inside of the venturi slightly oiled.

e. Clean and oil the exterior surfaces.

f. Check and pack the cleaning materials.

g. Under no circumstances is the telescope to be stripped. The metal parts are to be wiped clean and lightly oiled. Dust is to be removed from the lens by lightly dusting with the small brush provided, then gently polishing with the issued cloth. Check that the rubber eye guard is serviceable.

h. For cleaning under normal conditions, use only the oil issued.

27. **Confirm by Practice**.

28. **Cleaning Before, During and After Firing**. Explain and demonstrate as necessary:

a. **Before Firing**. Thoroughly dry out the barrel and venturi from the breech end and wipe all surplus oil from the interior.

b. **During Firing**. During firing, clean the venturi and chamber quickly with a pad of cotton waste or rag. This is particularly important if unburnt propellant is present in the chamber.

c. **After Firing**. Do the following:

(1) Remove fouling from the breech and barrel using the dry nylon brush.

(2) Clean and oil the weapon as for daily cleaning.

(3) If it is not possible to clean immediately, oil the barrel and inner surface of the venturi. This will loosen the fouling and assist in cleaning later.

(4) Clean the firing mechanism tube using the cleaning rod and brush from the .50 calibre machine gun cleaning equipment.

(5) Pay special attention to daily cleaning for three days following firing.

29. **Confirm by Questions**.

30. **Cleaning in Adverse Conditions**. Use leading questions:

a. **Hot, Sandy or Extremely Dusty Areas**:

(1) all oil must be removed from the weapon to prevent the accumulation of sand or dirt; and

(2) care must be taken to prevent the formation of rust.

b. **Arctic Conditions**. All oil must be removed and moving parts lubricated with graphite or special oil for the cold.

c. **Extreme Dampness**:

(1) the entire weapon should be covered with a heavy film of oil; and

(2) the weapon should be closely checked for rust.

31. **Confirm by Questions**.

CONCLUSION

32. **Before concluding the lesson**:

a. Answer questions from the class on the entire lesson.

b. Confirm by questions and practice.

c. Reinforce normal safety precautions.

d. Summarize the lesson, emphasizing the following points:

(1) the importance of safe handling, regular and correct maintenance; and

(2) the need to identify the different types of ammunition.

e. Provide a preview of the next lesson in this subject.

f. Pack kit.

LESSON 2
FIRING POSITIONS—LOADING AND UNLOADING

INSTRUCTOR'S NOTES

1. **Aim**. To teach firing drills.

2. **Main Teaching Points**:

   a. adjusting the mount;

   b. firing positions; and

   c. loading and unloading.

3. **Time**. Two 40-minute periods.

4. **Method**. Explanation, demonstration and practice. This lesson can be given indoors or outdoors.

5. **Stores**. Depending on the type of Carl Gustav used:

   a. 84 mm recoilless gun complete, one per three soldiers;

   b. 84 mm dummy rounds, two per gun; and

   c. 84 mm duplex ammunition containers, one per gun.

6. **Preparation**:

   a. Lay out the classroom with dummy rounds, containers and Nos. 1 and 2 bags alongside each gun.

   b. Check that all dummy rounds are serviceable and chamber tested.

   c. Check that the mount will fit into the front and rear housings and is adjustable.

7. **Miscellaneous**:

   a. Number the section in groups of three and allocate one group per gun prior to normal safety precautions.

   b. Remind students that, during the practice stage, when a number is called out, that number is to act as No. 1 on the gun and the next number called is to act

as the No 2. Use the command **CHANGE AROUND** and explain the system of change around.

c. During demonstrations that require a crew of two, select a student to assist.

d. Do not fit telescopes during this lesson.

e. Before instructing loading drills, point out the "cartridge guide" on the gun and ammunition.

CONDUCT OF THE LESSON

8. **Safety Precautions**. Normal.

9. **Review**. Question the class on ammunition recognition.

10. **Introduction**. Explain: to be effective in battle, the gun team has to be capable of selecting a good fire position and able to load and unload the gun correctly.

ADJUSTING THE MOUNT

11. **Explain and Demonstrate the Following**:

a. There are no housings for the mount. It may be set in the high, low or offset position in each housing.

b. The mount is adjusted by pulling out the catch on the housing and rotating the mount.

c. This is normally done by the No. 2.

12. **Confirm by Practice**. Leave the mount fitted in the rear housing.

FIRING POSITIONS

13. **Selection of Firing Position**. Explain. The gun can be fired from any of the normal rifle firing positions. The selection and adoption of a steady fire position is essential to successful engagement with the gun. The No. 1 should consider whether:

a. the ground provides adequate cover and a clear backblast area;

b. the target can be clearly seen;

c. the target is moving; and

d. the arc of fire can be adequately covered.

14. **Kneeling Position**. Explain and demonstrate the following:

a. The No. 1 is to:

(1) Offset the mount in the rear housing and adopt the normal kneeling position.

(2) Hold the pistol grip with the right hand, forefinger along the trigger guard. The left hand grips the front grip.

(3) Pull the gun firmly into the shoulder and rest the left elbow on the left knee. The mount will then be against the chest.

(4) To engage a moving target, raise the body until the upper part of the right leg is vertical, hold the left arm close to the chest and swing from the waist.

b. The No. 2 is to kneel opposite the No. 1's right shoulder and conform to any change in position made by him. Sometimes, depending on the cover, he may need to be on the same side as the No. 1.

Figure 2-14: Kneeling Position, Stationary Target

Figure 2-15: Kneeling Position, Moving Target

Figure 2-16: Kneeling Position, No. 2 on the Same Side as No. 1

15. **Confirm by Practice**.

16. **Sitting Position**. Explain and demonstrate the following:

    a. The No. 1 must place the gun against his right shoulder and offset the mount in its rear housing.

    b. Adopt the sitting position facing half right to the target. The right hand holds the pistol grip, forefinger along the trigger guard. The left hand grips the front grip.

    c. Hold the gun firmly with the mount against the chest and pull the shoulder pad of the gun into the right shoulder.

    d. Rest both elbows forward of or inside the knees.

    e. To follow a moving target, keep the body erect with the elbows close into the chest and swing from the waist.

    f. The No. 2 is to kneel opposite the No. 1's right shoulder. He is to conform to any change in position by the No. 1.

17. **Confirm by Practice**.

Figure 2-17: Sitting Position, Moving Target

Figure 2-18: Sitting Position, Stationary Target

18. **Standing Position**. Explain and demonstrate the following:

a. The standing position may be used when firing from high cover, a fire trench or a gun emplacement.

b. Stand half right to the target, body evenly balanced on both feet about half a metre apart, with the left hand holding the front grip.

c. In the open, the gun may be steadied with the left hand supporting the right hand instead of holding the front mount housing.

d. The No. 2 is to stand close to the No. 1.

Figure 2-19: Standing Position

19. **Confirm by Practice**.

20. **The Prone Position**. Explain and demonstrate. The prone position may be used to engage stationary targets but not moving targets, unless they are distant ones requiring a minimum swing and no other position is practical:

a. **The No. 1's Position**.

(1) The No. 1 will lie down with his body as near as possible at right angles to the gun. Bring the right leg over the left. It is important that no part of the body be behind the gun. The mount may be put in either mount housing.

Figure 2-20: Prone Position

(2) Position the right shoulder as far under the gun as possible and move it firmly up against the shoulder pad.

b. **The No. 2's Position**:

(1) The No. 2 will lie opposite the No. 1 and at right angles to the gun.

(2) Move close enough to the gun to operate the breech mechanism properly.

(3) Cross the left leg over the right. Check that no part of the body is behind the venturi and that the ammunition he is carrying is not forward of the muzzle or in the backblast area.

21. **Confirm by Practice**.

LOADING AND UNLOADING: *Explain and Demonstrate (with imitation)*

22. The following table includes the movements in connection with the FFV 551/552 and FFV 502 ammunition:

a. On the order **LOAD**, the Carl Gustav crew will carry out the following movements:

No. 1 (firer)	No. 2 (loader)
LOADING WITH FFV 551 AND 552 AMMUNITION	
Cock the gun and put the safety catch to "SAFE."	
Return both hands to the gun with the forefinger along the trigger guard and order **LOAD**.	Repeat the order **LOAD**, open the breech and remove any dirt or unburnt propellant.
	Remove a round from its container, hold it with the nose forward.
	Place one finger in the recess in the rim of the round and partially insert the round into the chamber.
	Ensuring that the recess and cartridge guide are aligned, push the round fully into the chamber.
	Close the breech, firmly tap back the venturi lock knob towards the venturi, ensuring it is correctly positioned.
Repeat the order **LOAD**	Check that the backblast area is clear and report **READY**.
Repeat the order **STOP**, put the safety catch to "SAFE" and stop the engagement until the backblast area is clear.	Frequently check the backblast area and if it is not clear at any time when the gun is loaded, order **STOP**.

No. 1 (firer)	No. 2 (loader)
REVISED LOADING FOR FFV 502 AMMUNITION	
Order **LOAD IMPACT** or **LOAD DELAY**. **See note below.**	Repeat the order and load the projectile with the letter "I" or "D" upwards, as appropriate.
	Grasp the round and place a finger in the recess in the rim of the round opposite the appropriate letter. The recess will line up with the cartridge guide.
Repeat the order **IMPACT READY** or **DELAY READY** as appropriate.	After closing the breech and checking that the breech is locked and that the backblast area is clear, No. 2 will announce **IMPACT READY** or **DELAY READY** as appropriate.

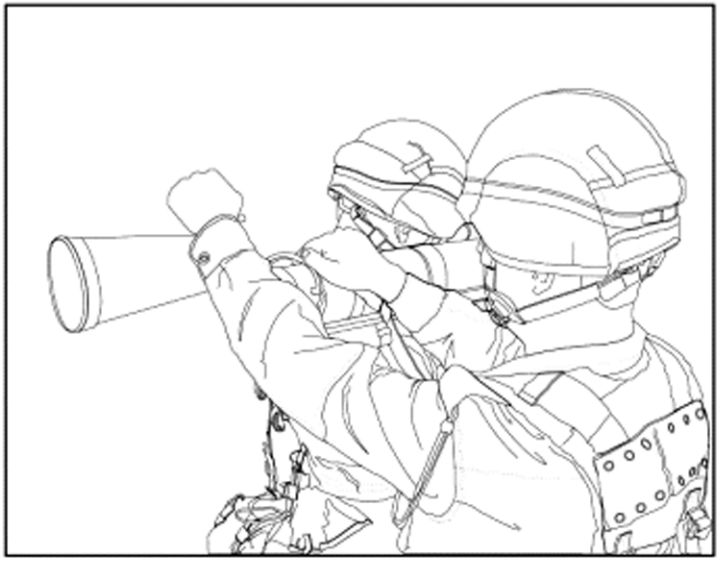
NOTE

1. **Choice of Operating Mode**. Explain the choices based on the type of target:

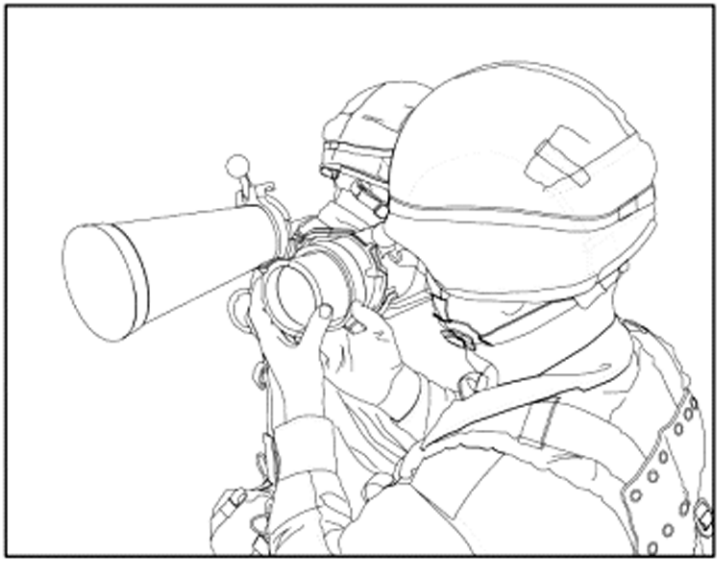
   a. For **lightly armoured vehicles**, set the fuse to "I" (instantaneous).

   b. Against **fortified defensive positions**, set the fuse to "D" for delay—this means that the shell will penetrate the target before bursting.

   c. If there is **high** risk of **ricochet**, use the "I" setting.

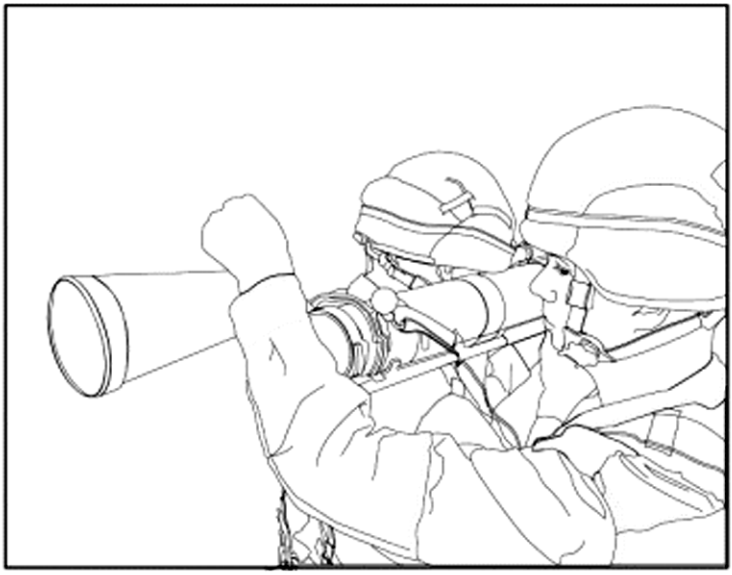


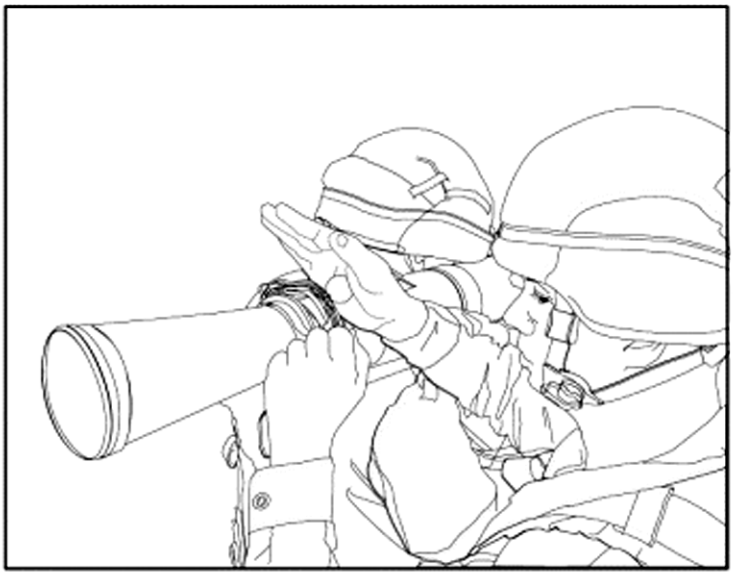
Opening the Venturi



Inserting the Round in the Gun

Figure 2-21a: Loading





Closing the Venturi

Figure 2-21b: Loading

b. For all types of ammunition, on the order **UNLOAD**, the Carl Gustav crew will carry out the following:

No. 1 (firer)	No. 2 (loader)
Hold the gun as for loading, pointing the muzzle in the area of the target, check that the safety catch is on "SAFE" and order **UNLOAD**.	Repeat the order **UNLOAD** and open the venturi.
	Tap the venturi locking handle forward, grasp the round with the left hand and withdraw it fully from the chamber.
Repeat **CLEAR**.	Close the venturi, tap the venturi locking handle to the rear and report **CLEAR**.
Place the safety catch on "FIRE" and pull the trigger.	
Turn the range knob to zero and lower the sights.	

c. **Explain**. Regardless of the firing position adopted, loading and unloading are always carried out in the same way (as in the kneeling position).

23. **Action with Defective Ammunition**. Explain. If a round will not fit into the chamber, it is to be removed and another round loaded. During a lull in the firing, the defective round is to be cleaned and chamber tested. **If it still will not fit, it is to be marked "overgauged" and returned**.

24. **Confirm by Questions and Practice**.

CONCLUSION

25. **Before concluding the lesson**:

a. Answer questions from the class on the entire lesson.

b. Confirm all the teaching points by questions and practice on loading and unloading in all positions with all types of ammunition.

c. Reinforce normal safety precautions.

d. Summarize the lesson, emphasizing the following points:

(1) the factors which influence the choice of a good firing position;

(2) the importance of always considering the backblast area of the gun;

(3) regardless of the firing position adopted, loading and unloading are always carried out in the same way;

(4) know the differences between loading the FFV 502 and the FFV 551 and 552.

e. Provide a preview of the next lesson in this subject.

f. Pack kit.

LESSON 3
USE OF SIGHTS AND AIMING AT STATIONARY AND MOVING TARGETS

INSTRUCTOR'S NOTES

1. **Aim**. To teach the policy on points of aim applicable to the SRAAW(M) Carl Gustav.

2. **Main Teaching Points**:

   a. the points of aim on various types of AFV; and

   b. how to aim at stationary and moving targets with:

      (1) the M2 telescopic sight; and

      (2) iron sights (elevating screw).

3. **Time**. One 40-minute lesson.

4. **Method**. Explanation, demonstration and practice.

5. **Stores**. Depending on the type of Carl Gustav used:

   a. 84 mm gun complete with sights, one per 3 soldiers;

   b. set of aiming aids, one per soldier; and

   c. AFV board targets.

6. **Preparation**:

   a. Check the telescopes for serviceability.

   b. Ensure that the telescope bracket is centred.

   c. Check iron sights for serviceability.

   d. Position AFV representative targets on wall in front of the guns one metre above floor level.

   e. Prepare chalkboard/posters to illustrate the vulnerable areas of a main battle tank (MBT), armoured personnel carrier (APC) and recce vehicles.

   f. Place out a set of aiming aids for each man.

   g. Draw a sight pattern for both telescopic and iron sights on the chalkboard.

7. **Miscellaneous**:.

a. Ideally, representative targets should be photographs of likely enemy AFVs and depict different directions of movement. Confirmation can take place outdoors.

b. Number the section in groups of three and allocate one gun to each group prior to safety precautions.

c. Explain the change around procedure.

CONDUCT OF THE LESSON

8. **Safety Precautions**. Normal.

9. **Review**. Question the section on the characteristics of the gun, practice adopting the fire positions for moving targets.

10. **Introduction**. Explain. The 84 mm RAP round FFV 551 is capable of disabling or destroying any known light armoured vehicle (LAV) as well as considerably reducing the battle capability of a wide range of AFVs. However, it is essential that the round hit a vulnerable part of the AFV in order to do so. The 84 mm gun team needs to know the vulnerable areas on enemy AFVs and be able to estimate the range and speed of the vehicle accurately and select the correct point of aim quickly using either of the sighting systems.

APPLICABLE POINT OF AIM FOR VARIOUS TYPES OF ARMOURED FIGHTING VEHICLES

11. **Types of Target**. Explain. An AFV target is described in one of the following ways:

a. **Head on or Withdrawing**. The whole of the front or rear and little or nothing of the sides of the vehicle is visible.

b. **Direct Crosser**. All or nearly all of either side and little or none of the front or rear of the vehicle is visible.

c. **Diagonal Crosser**. An equal amount of the side and front or rear of the vehicle is visible.

12. **Vulnerable Areas of AFVs**. Explain using diagrams if available. There are three main groups of AFVs:

a. **Main Battle Tank (MBT)**. Main battle tanks are particularly vulnerable near the turret ring, the sides and rear of the hull. Ammunition is usually located within the fighting compartment and to the sides of the driver. A frontal shot will probably not destroy an MBT.

Figure 2-22: MBT Vulnerable Spots

b. **Armoured Personnel Carrier (APC)**. These vehicles are designed to carry personnel and at the same time provide a great deal of fire support. Engines are generally located at one side and to the front. Good points of aim are the side, the central area below the turret or cupola and the rear of the vehicle, which may be surrounded by fuel storage areas.

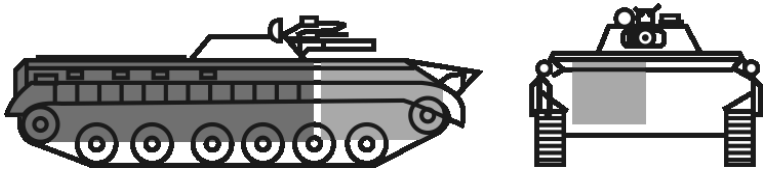


Figure 2-23: APC Vulnerable Spots

c. **Reconnaissance Vehicles**. The most vulnerable areas are the sides and rear as these normally house the crew and ammunition. Engines are less critical as there are often two, located on either side. This type of vehicle is generally only lightly armoured.

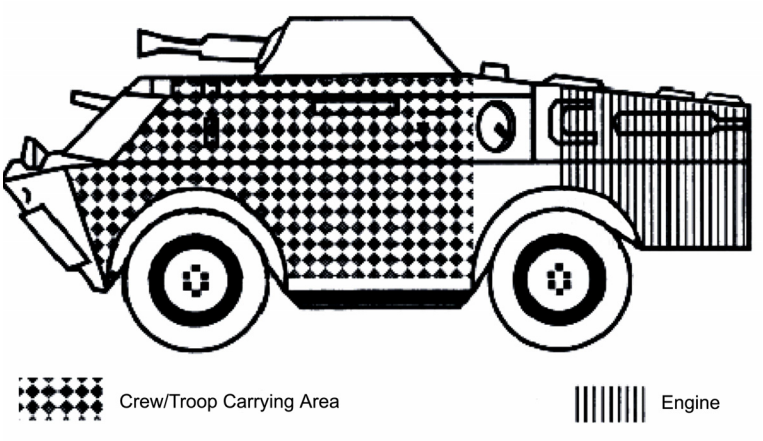


Figure 2-24: Reconnaissance Vehicle Vulnerable Spots

13. Should a target be indistinct, the centre of the visible mass should be selected as the point of aim. The gun, aerials and spare fuel tanks should be disregarded when determining the visible mass.

14. Firing down onto the top or towards the underside of an AFV, particularly in the area of the fighting compartment, should destroy the vehicle.

15. **Confirm by Questions**.

HOW TO AIM AT STATIONARY AND MOVING TARGETS

16. **The Telescopic Sight**. Explain and demonstrate, using diagrams as necessary (see Figures 2-25 and 2-26):

a. The 84 mm M2/M3 telescopic sight is the primary sighting system of the gun.

b. On the left of the bracket is a range knob with two sets of figures:

(1) **White Figures**. The left or outer figures range from 0 to 900 m (9) marked every hundred. Above the 200 m (2) mark there is also a mark every 50 m (.5). These figures are used for the HEAT RAP FFV 551, TP RAP FFV 552 and the sub-calibre.

(2) **Light Green Figures**. The right or inner figures range from zero (0) to 1,300 m (13), marked every hundred, in divisions of 50 m (.5). These figures are used for NATO country HE and SMOKE ammunition.

c. Two parallel grooves around the circumference of the knob have a number of dimples in which a spring loaded detent plunger can engage to lock the knob at the required range.

d. The sight pattern consists of a vertical pointer, the tip of which is used to aim at stationary, head on or withdrawing targets. On either side of the pointer are lead marks: lead one a small square, lead two a short vertical line, lead three between two long vertical lines and lead four the far long vertical line. The inverted small line is used for aiming at vehicles moving faster than 50 km/h. Leads will vary for diagonal crossings. The horizontal lines are used to assist in maintaining elevation when aiming.

e. On the top and on the left of the telescope, there is an elevation and horizontal drum scale respectively. These allow the telescopic sight pattern to be adjusted during boresighting and zeroing and are locked into position by locking screws.

f. After adjustment of the drums, the scale is read against index lines which are colour coded as follows:

(1) **White Dot**. It is used to zero the scale when boresighting at all temperatures and is the drum zero index at all temperatures from -10°C to 30°C.

(2) **Red Dot**. It is used as the drum zero index at temperatures above 30°C.

(3) **Blue Dot**. It is used as the drum zero index at ammunition temperatures below -10°C.

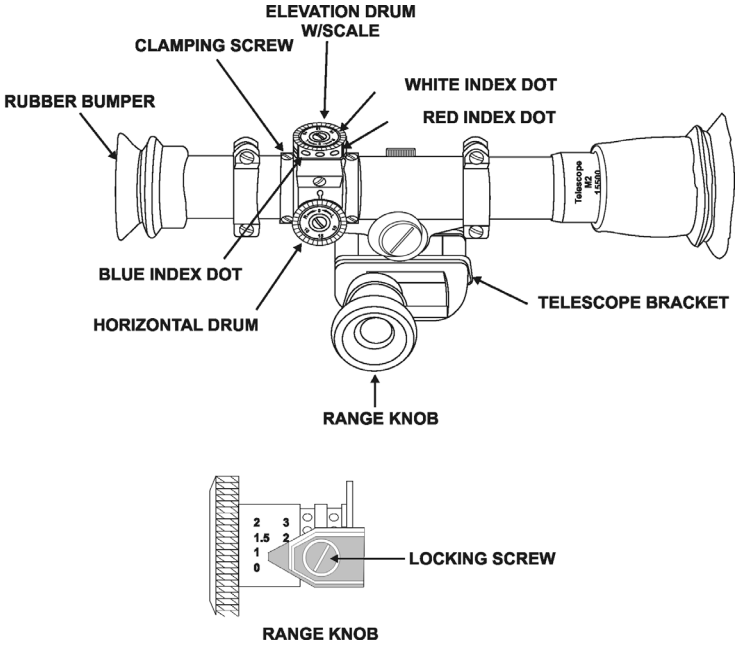


Figure 2-25: M2 Telescopic Sight w/Range Knob

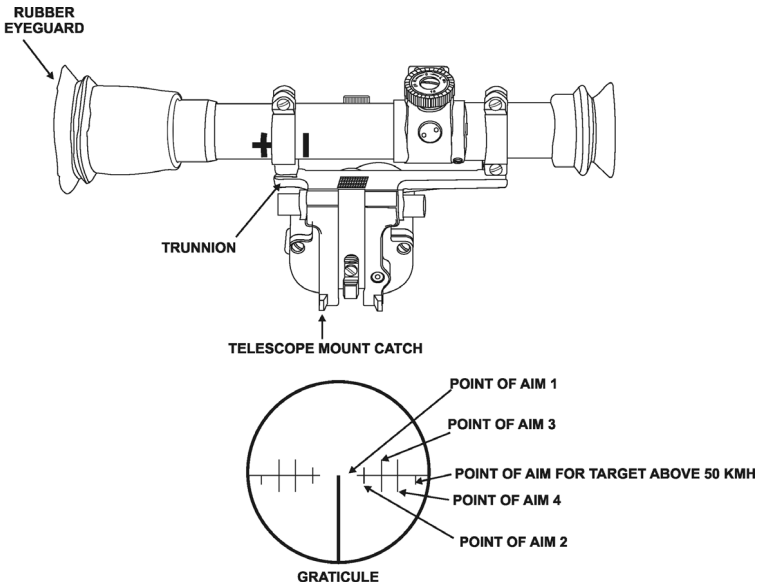


Figure 2-26: Telescopic Sight w/Graticule Pattern

17. **Confirm by Questions**.

18. **Telescopic Sight/Aiming at Stationary Targets**. Explain and demonstrate how to aim at a stationary target:

a. Estimate the range to the target to the nearest 50 m and set it on the range drum.

b. Position the right eye up against the eyepiece and move the head back until a full view or proper eye relief is obtained through the telescope.

c. Aim the top of the pointer on the selected point of aim (this should be the most vulnerable area exposed).

NOTE

The range drum should be set at zero when not in use.

19. **Confirm by Practice**.

20. **Telescopic Sight / Aiming at Moving Targets**. Explain and demonstrate. To aim at a moving target, its range, direction of movement and speed have to be determined:

a. Head on or withdrawing:

(1) Set the range knob to the range at which the target is to be engaged.

(2) Aim as for a stationary target.

(3) The target is engaged when the aim is correct and the target is at the selected range.

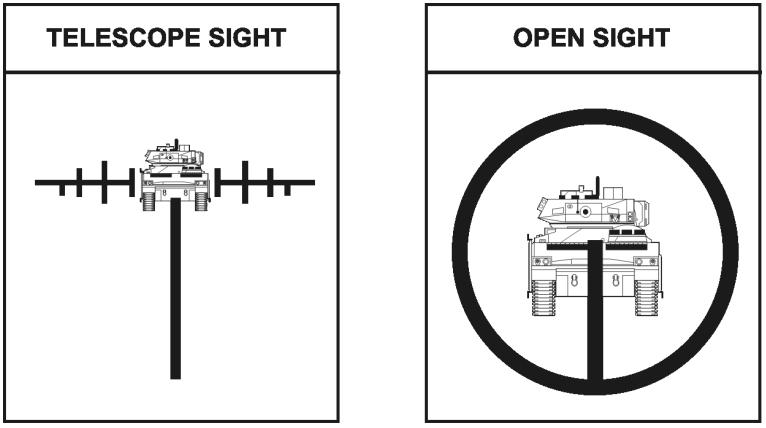


Figure 2-27: Telescopic Sights Pattern—Head On/Withdrawing Targets

b. Direct and diagonal crossing:

(1) Set the range knob to the range at which the target is to be engaged.

(2) Ensure correct lead is taken.

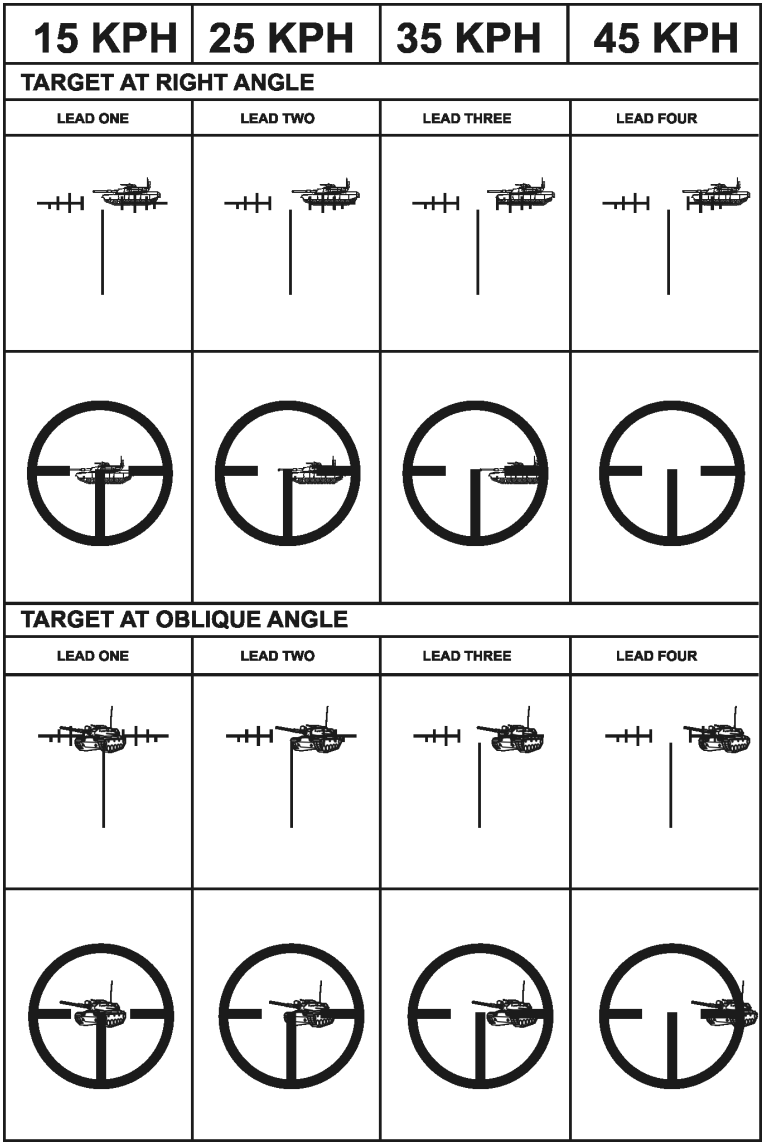


Figure 2-28: Correct Lead

21. **Method of Engagement**. The No. 1 is to decide whether to aim and swing with the target, or to aim in front of the target and allow it to move onto the lead. Care must be taken to establish the correct elevation when employing the latter method.

22. **Confirm by Practice**.

23. **Iron Sights**. Explain and demonstrate:

    a. The iron sights are used when the telescope is unavailable.

    b. The backsight is hinged to the gun and consists of an aperture, range scale and range indicator. The aperture and the range scale indicator are adjustable for boresighting purposes.

    c. The foresight is also hinged to the gun and consists of a vertical pointer and two small horizontal bars.

24. **Care of the Sight**. To minimize the chances of damage to the iron sights during carriage, the back sight is to be screwed down fully and both sights folded into the side of the gun after use.

25. **Aiming**. With open sights explain and demonstrate:

    a. **Stationary Targets**. Estimate the range, set the sights, select the point of aim and focus the foresight within the aperture as for the rifle.

    b. **Moving Targets**. Additionally estimate the speed of the target and decide on the method of engagement. Lead is applied as for Figure 2-28.

26. **Confirm by Practice**.

27. **Corrections**. Explain as a result of the observation of strike, corrections are made as follows:

    a. **Elevation**. Quickly add or drop the setting on the range scale and engage. For a target between range settings (i.e., a range of 275 m), set the drum at the next highest setting (in this case 300 m) and aim slightly lower on the target.

    b. **Wind**. Strong crosswinds must be considered when firing, particularly at longer ranges. As a guide, in a strong wind at a range of approximately 300 m, aim at the upwind side of the turret or cupola as opposed to the centre of the visible mass.

28. **Confirm by Questions and Practice**.

CONCLUSION

29. **Before concluding the lesson**:

a. Answer questions from the class on the entire lesson.

b. Confirm all the teaching points by questions and practice on engaging moving and stationary targets with the M2 sight and the iron sights, in all firing positions.

c. Reinforce normal safety precautions.

d. Summarize the lesson, emphasizing the following points:

(1) the importance of AFV recognition and knowledge of the vulnerable areas; and

(2) the need to practice judging distance.

e. Provide a preview of the next lesson in this subject.

f. Pack kit.

LESSON 4
BASIC MECHANISM, FIRING AND MISFIRE DRILLS

INSTRUCTOR'S NOTES

1. **Aim**. Describe the operation of the 84 mm gun to maximize its use in firing and misfires.

2. **Main Teaching Points**:

   a. the action of the firing mechanism;

   b. how to fire the gun; and

   c. action on misfire.

3. **Time**. Two 40-minute lessons.

4. **Method**. Explanation, demonstration and practice.

5. **Stores**. Depending on the type of Carl Gustav used (M2 and/or M3):

   a. 84 mm complete, 1 per 3 soldiers;

   b. 84 mm dummy rounds, 2 per gun;

   c. 84 mm mechanism board, 1 per class;

   d. 84 mm duplex ammunition container, 1 set per gun; and

   e. armour representative targets, 1 per gun.

6. **Preparation**:

   a. lay out the section room;

   b. fit the telescope to each gun;

   c. position representative targets on the wall in front of the guns and one metre above floor level;

   d. chamber test each dummy round; and

   e. check that all front and rear end caps are removable.

7. **Miscellaneous**:

   a. Number the section in groups of three and allocate each group to a gun prior to the safety precautions.

b. Explain that during the practice stage, when a number is called out, that man is to act as No. 1 on the gun and the second number called is to act as No. 2. Use the command **CHANGE AROUND** and explain the system of change around.

c. During the practice stage of misfire and further action drills, use the commands **WEAPON FAILS TO FIRE, MISFIRE**, **PRIMER STRUCK, PRIMER NOT STRUCK**, **60 SECONDS ARE UP**.

CONDUCT OF THE LESSON

8. **Safety Precautions**. Inspect the guns, the dummy rounds and the ammunition containers.

9. **Review**. Loading and unloading.

10. **Introduction**. Explain that in battle, the Nos. 1 and 2 must work as a team to load quickly and fire accurately. Any misfire must be dealt with quickly in order to prevent armour breaking through the defended position. A high standard of training in these skills is required of the team. Knowledge of the firing mechanism will assist the team in determining the cause of the misfire and its remedy.

BASIC FIRING MECHANISM

11. The stages of the firing mechanism are described as follows:

a. When the gun is cocked, the firing rod spring is compressed against the front end cap. The cocking rod notch on the cocking rod head engages with the hook on the sear.

b. When the trigger is pressed, the sear is disengaged and the spring drives the firing rod to the rear.

c. The firing pin cam bears against the inner part of the firing pin, which is forced inwards on to the primer cap of the round.

d. The safety catch can be applied only when the cocking rod is forward in the cocked position.

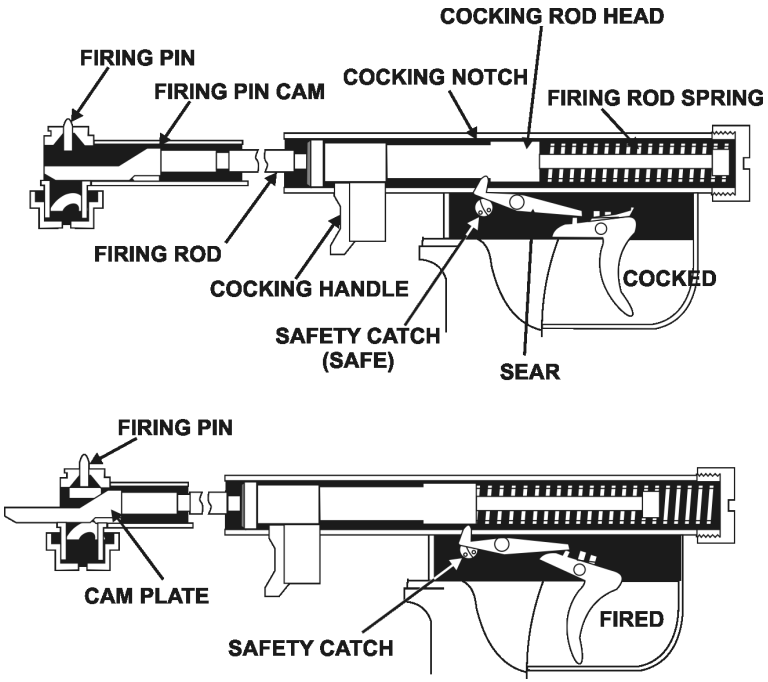


Figure 2-29: Firing Mechanism

12. **Confirm by Questions**.

FIRING

13. **Action on the Order TARGET**. Explain and demonstrate (with imitation). On the order **TARGET**, followed by the target indication, the Carl Gustav team will:

No. 1 (firer)	No. 2 (loader)
Set the sights and put the safety catch to "FIRE."	
When the hold and aim are correct, the No. 1 orders **STAND BY**, takes the first trigger pressure, fires and follows through as taught.	On the **order STAND BY**, the No. 2, having ensured that the backblast area is clear, is to face forward in order to reduce the likelihood of hearing damage. He is then to observe the target area and assist the No. 1 in observing the strike of the round. To reduce the amount of discomfort caused by the over pressure around the gun at the moment of firing, he should stay mid-way between the muzzle and the breech.
When the trigger has been operated, the No. 1 is to open his left eye, observe the strike, immediately cock the gun, put the safety catch to "SAFE" and order **LOAD**.	Repeat the order **LOAD** and open the breech.
	Remove the empty case and throw it off to a flank well clear of the backblast area.
	Examine the chamber for unburnt propellant, remove it if necessary and load again as taught.
Before firing again, the No. 1 is to make any corrections to range, lead or point of aim depending on the observation of strike of the previous round.	Should the backblast area not be clear at any time, the No. 2 is to call out **STOP**.

14. **Confirm by Practice**.

MISFIRE DRILLS

15. **Hangfire and Misfire**. Explain the following:

a. A **hangfire** is an abnormal time lag between the trigger being operated and the round being fired. As the delay is caused by slow burning propellant, the round could fire without warning and therefore the gun is to be kept pointed at the target while the correct drill is carried out.

b. A **misfire** is caused by either a faulty firing mechanism or a faulty round.

16. **Misfire drills**. Explain and demonstrate the following:

No. 1 (firer)	No. 2 (loader)
If the weapon fails to fire.	
Maintains his point of aim, recocks the weapon, puts the safety catch to "SAFE" and orders No. 2 to **CHECK VENTURI**.	Repeats **CHECK VENTURI**, taps the venturi lock knob to the rear and reports to the No. 1 **VENTURI LOCK CHECKED**.
Repeats **VENTURI LOCK CHECKED**, places the safety catch to "FIRE," aims and carries out the proper firing drills.	
If the weapon fails to fire a second time.	
Reports **MISFIRE**.	Repeats **MISFIRE**.
Waits one minute and maintains the aim in the event of a possible hangfire.	Waits one minute.
If the gun has not fired after one minute.	
Recocks the weapon, places the safety catch to "SAFE" and orders **MISFIRE UNLOAD**.	Repeats **MISFIRE UNLOAD** and proceeds to unload.
AFTER UNLOADING THE GUN, ONE OF THE FOLLOWING DRILLS SHALL BE CARRIED OUT	
Primer struck.	
Repeats **PRIMER STRUCK**.	After removing the misfired round, No. 2 inspects the primer. If the primer is fully struck, he reports **PRIMER STRUCK**.
	The No. 2 then lays the misfired round aside for disposal. If the target is still in view, the team reloads and carries on firing.
Mechanical breakdown.	
Repeats **MECHANICAL BREAKDOWN**.	If, on examination of the primer, the No. 2 finds that it has been lightly struck or not struck at all, he will

No. 1 (firer)	No. 2 (loader)
	report **MECHANICAL BREAKDOWN**.
Repeats **GUN CLEAR** and completes the unloading drill. The firing mechanism must then be stripped and damaged parts replaced.	Closes the venturi and repeats **GUN CLEAR**

17. **Confirm by Practice**.

18. **Other Conditions**. Explain. At night, if there is a misfire, the No. 1 is to carry out the same drill as in daylight. As it may not be possible to see if the primer cap has been struck, **the No. 2 is to unload and immediately load with another round.** If that round is also a misfire, the gun team is to unload and inspect the firing mechanism.

19. **Confirm by Questions**.

CONCLUSION

20. **Before concluding the lesson**:

a. Answer questions from the class on the entire lesson.

b. Confirm all the teaching points by questions and practice.

c. Reinforce normal safety precautions.

d. Summarize the lesson, emphasizing the following points:

(1) the importance of practice is to promote good team work and instinctive handling;

(2) the safety pause of one minute must be observed if a misfire occurs.

e. Provide a preview of the next lesson in this subject.

f. Pack kit.

LESSON 5
BORESIGHTING THE TELESCOPE AND IRON SIGHTS

INSTRUCTOR'S NOTES

1. **Aim**. To teach how to boresight the weapon to ensure that the axis of the bore and the line of sight meet at a common distance.

2. **Main Teaching Points**:

   a. boresight the weapon;

   b. set the elevation and deflection scales of the M2 telescopic sight; and

   c. set the elevation and deflection scales of the iron sight.

3. **Time**. One 40-minute lesson.

4. **Method**. Explanation, demonstration and outdoor practice.

5. **Stores**. Depending on the type of Carl Gustav used:

   a. 84 mm gun complete, 1 per 3 soldiers;

   b. aim diagram of the boresight, 2; and

   c. boresighting stand, 1 per gun, if available.

6. **Preparation**:

   a. Prepare a boresight aim diagram.

   b. Select an aiming target at least 400 m away.

   c. Lay out the equipment, telescopic sights are not to be fitted. Unpack the boresights, small screwdrivers and combination tools.

   d. Ensure that both sights are offset from their true boresight settings.

7. **Miscellaneous**:

   a. If a fire trench is available, the weapon can be steadied during boresighting by the No 1 using sandbags to steady the mount. The No. 2 is to lie behind the weapon, elbows rested and both hands steadying the venturi.

b. If there are no fire trenches available, the prone position is to be used.

c. If available, an extra telescopic sight for the instructor is a useful aid.

d. Due to the rifling, the front boresight can be levelled by pulling out the iron foresight and checking it against the horizontal bars.

e. The ideal situation is to have the detachment commander act as the No. 3 to adjust the telescopic sight.

CONDUCT OF THE LESSON

8. **Safety Precautions**. Normal.

9. **Review**. Telescopic sight.

10. **Introduction**. The aim of boresighting is to ensure that, with the range drum set at zero, the axis of the bore and the line of sight meet at a common distance. That aiming point must be at least 400 m away. Confirmation of boresighting is achieved by live firing either HEAT RAP or TP RAP ammunition. The boresighting procedure should be carried out with both the telescopic and iron sights:

a. prior to all live firing; and

b. whenever the accuracy of the weapon is in doubt.

11. Live firing is the method used to confirm the alignment of the line of sight with the axis of the barrel and the actual ranges being set on the sight.

BORESIGHTING

12. **Fitting the Boresights**. Explain and demonstrate:

a. **Rear Boresight**. This has a small aperture and is shaped like the base of the round, including a recess for the cartridge guide. It is fitted by opening the venturi, inserting the boresight with the thumb and finger, and closing the venturi.

b. **Front Boresight**. This is inserted into the muzzle so that the straight edges of the boresight are horizontal and uppermost.

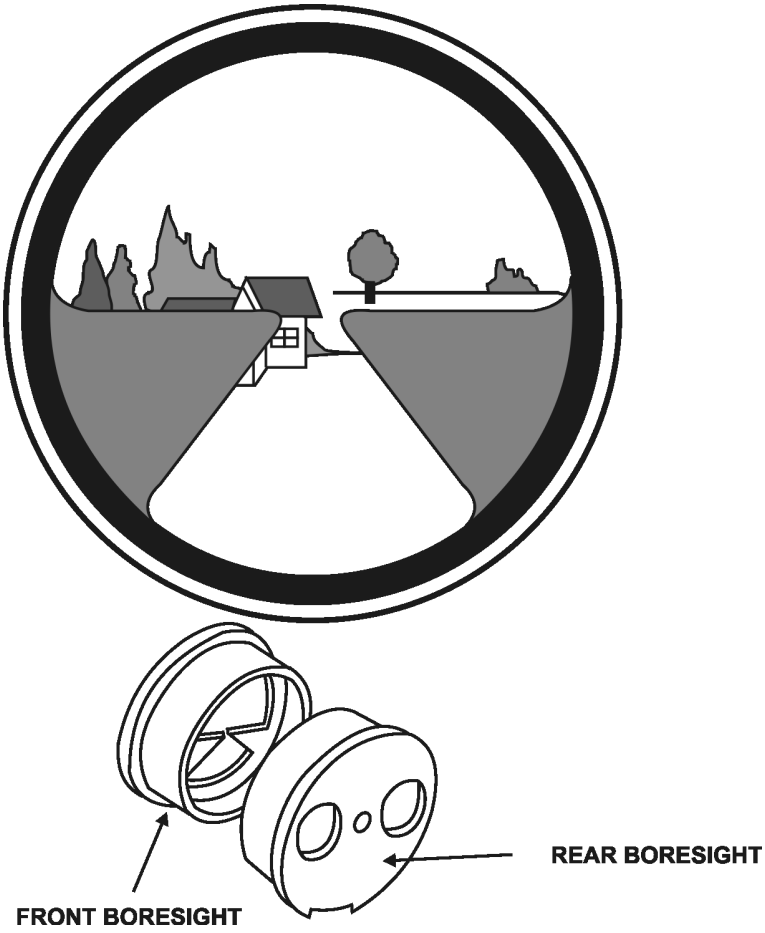


Figure 2-30: Boresight Fitted—Carl Gustav M2/M3

13. **Confirm by Questions and Practice (leave boresights fitted)**.

ADJUSTING THE M2 TELESCOPIC SIGHT FOR ELEVATION AND DEFLECTION

14. **Telescopic Sight Adjustments**. Explain and demonstrate the following:

a. The elevation drum is locked firmly in position by a lock screw. When the lock screw is loosened and the drum turned, the sight pattern inside the telescope can be moved up and down.

b. The deflection drum on the left side of the sight is also held in position by a lock screw. When the lock screw is loosened and the drum turned, the sight pattern inside the telescope can be moved left and right. The letters "R" and "L" on the top plate of the drum indicate the direction of movement of the sight pattern.

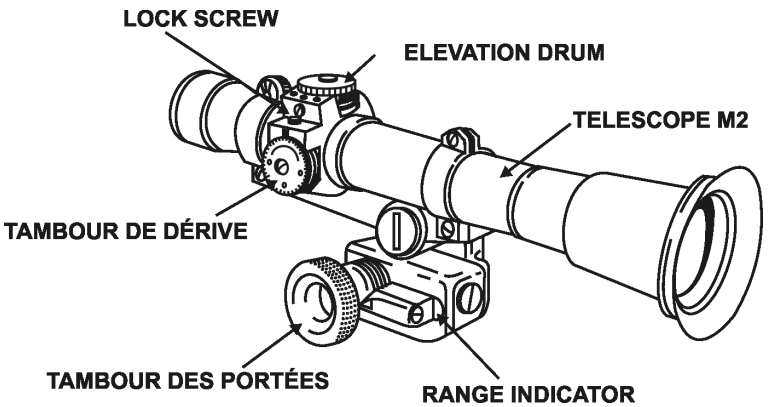


Figure 2-31: M2 Telescopic Sight—Adjustment Components

c. Movement of the lock screw is to be carried out carefully to avoid risk of damage to the head of the screw.

d. On the top of the elevation drum is a plate which is marked in mils both plus and minus. By loosening the central screw on the plate it can be rotated, independently of the elevation drum. When an adjustment has been made, the plate is to be reset by loosening the central screw and turning the plate until the zero mark is opposite the white index dot

on the body of the telescope. Finally, the central screw is tightened.

e. The deflection drum has a similar plate held by a central screw and is also marked in mils. After adjustment for direction, the plate is to be similarly reset so that the zero is opposite its white index dot on the body of the telescope. See Figure 2-31.

15. **Confirm by Practice**. Fit the telescopic sight to each gun.

16. **Boresighting the Telescopic Sight**. Explain and demonstrate:

a. Select a target not less than 400 m away and indicate it to the No. 2.

b. Set the range drum at zero, slacken the elevation and direction drum lock screws.

c. Ensure that the gun is firmly mounted on the boresighting stand. If the stand is not available, both No. 1 and No. 2 adopt the prone position, with No. 2 lying directly in the rear of the gun looking through the bore.

d. The No. 2 is to aim the boresights at the target and report **ON** when a correct aim is laid.

e. If the top of the pointer in the telescope is not pointing at the target, the No. 1 will loosen the lock screws and rotate the elevation and deflection drums as taught until the aim pictures through the boresight and telescope coincide.

f. The team then changes places and agrees on the accuracy of the boresighting.

g. Tighten both lock screws, relay the bore and check that the telescope is still on. Reset both the elevation and deflection plates to zero.

h. The axis of the bore now coincides with the line of sight through the telescope with zero range applied.

i. If, at any stage, the cross check by the No. 1 and No. 2 shows an error, then the bore must be re-laid and the procedure carried out again.

17. **Confirm by Practice**. Ensure that the telescopic sight is correctly boresighted at the end of the practice stage. (Remove telescopic sights at end of practice.)

ADJUSTING THE IRON SIGHTS FOR ELEVATION AND DEFLECTION

18. **The Iron Sights**. See Figures 2-32 and 2-33 depending on whether the Carl Gustav is M2 or M3. Explain and demonstrate the following:

a. Point out the nut on the right and the screw on the left for adjusting the **M2** backsight aperture (Figure 2-32) and/or the deflection drum for the **M3** (Figure 2-33).

b. To correct an elevation error during boresighting, turn the range drum as for sight setting. To reset the scale, loosen the screw on the range indicator and position the centre of the white line at zero on the range scale. Tighten the screw.

c. Errors in direction are corrected by moving the backsight aperture laterally. For the **M2**, when it is to be corrected to the left, loosen the screw on the left of the sight block and tighten the nut, thus moving the aperture to the left. If the error is to the right, the nut must first be loosened and the screw tightened. For the **M3**, loosen the direction adjustment screw underneath the backsight aperture in order to slide the backsight aperture to the left or right. Then, retighten the direction adjustment screw.

d. or the **M2**, the backsight aperture scale is graduated in mils, plus or minus, from a central point. After final adjustment for elevation, the reading is to be noted.

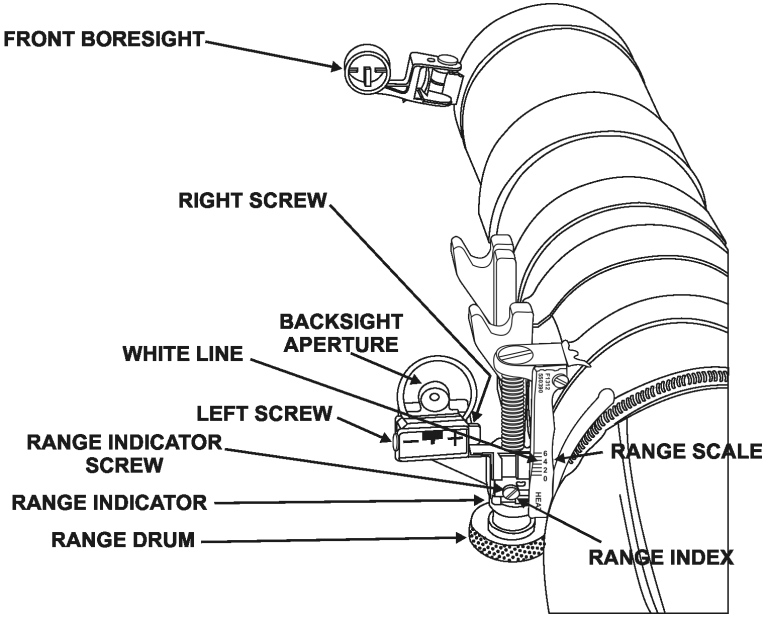


Figure 2-32: Carl Gustav M2 Iron Sights

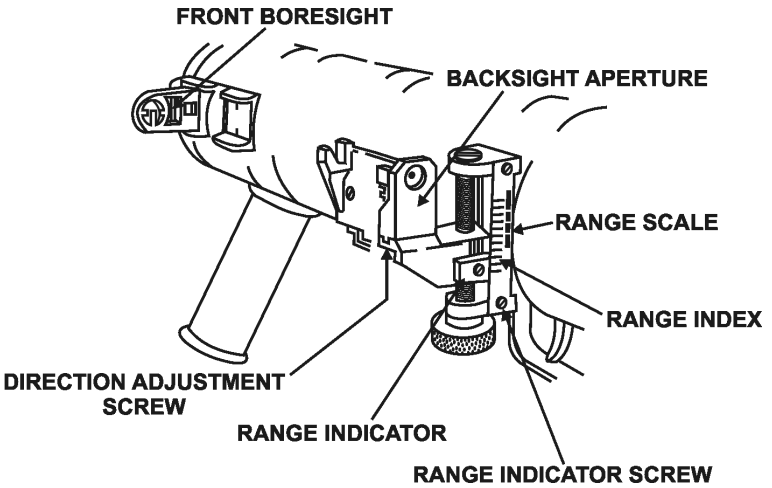


Figure 2-33: Carl Gustav M3 Iron Sights

19. **Boresighting the Iron Sights**. Explain and demonstrate the following (use the same target used by the No. 1 and No. 2 before):

a. Set the range to zero.

b. Lay the bore onto the target and report **ON**.

c. Adjust the open sights onto the target.

d. Confirm by changing around.

e. Reset the range scale indicator.

f. Note the backsight scale reading.

g. If the cross check by the No. 1 and No. 2 shows an error, then the boresighting procedure must be carried out again.

20. **Confirm by Practice**.

CONCLUSION

21. **Before concluding the lesson**:

a. Answer questions from the class on the entire lesson.

b. Confirm all the teaching points by questions and practice.

c. Reinforce normal safety precautions.

d. Summarize the lesson, emphasizing the following points:

(1) the importance of choosing an aiming target not less than 400 m away; and

(2) the importance of care in using the elevation and deflection drum lock screws.

e. Provide a preview of the next lesson in this subject.

f. Pack kit.

LESSON 6
THE SUB-CALIBRE TRAINING DEVICE—FFV 553

INSTRUCTOR'S NOTES

1. **Aim**. To teach the characteristics of the FFV 553, S/C, 7.62mm.

2. **Main Teaching Points**:

   a. characteristics;

   b. description;

   c. ammunition;

   d. priming the device;

   e. load/fire/unload;

   f. misfire drill; and

   g. care and cleaning.

3. **Time**. Two 40-minute lessons.

4. **Method**. Explanation, demonstration and practice.

5. **Stores**. Depending on the type of Carl Gustav used:

   a. 84 mm complete, 1 per 3 soldiers;

   b. FFV 553 S/C, 1 per 3 soldiers;

   c. 7.62mm T/R FFV 553 (dummy); 3 per gun;

   d. FFV 840 (dummy), 3 per gun; and

   e. FFV 551 (dummy), 1 per gun.

6. **Preparation**:

   a. Organize the classroom and ensure that all guns are serviceable.

   b. Check that the sub-calibre training devices (SCTDs) are serviceable.

7. **Miscellaneous:**

   a. Number the section in groups of three and allocate one group per gun prior to safety precautions.

b. Remind students that during the practice stage, when a number is called out, that number is to act as No. 1 on the gun and the next number is to act as No. 2. Use the command **CHANGE AROUND** and explain the system of change around.

c. It must be kept in mind that the absence of backblast tends to induce carelessness and loose holding. These points must be checked at all times.

d. Functioning of the sub-calibre device is found in the Instructor's Notes of Lesson 4 in this chapter.

CONDUCT OF THE LESSON

8. **Safety Precautions**. Normal.

9. **Review**. Load, unload and misfire drills.

10. **Introduction**. Explain. In order to obtain a high degree of effectiveness when firing, it is necessary to fire often with the gun and hence to use a lot of ammunition. The use of a sub-calibre training device allows for both effective training and economic expenditure of 84 mm rounds. The sub-calibre training device FFV 553 7.62 mm enables soldiers to practice all the weapon handling drills and to engage non-reinforced targets.

CHARACTERISTICS

11. Discuss the following elements:

a. The 7.62 mm sub-calibre device FFV 553 is a training device used in conjunction with the 84 mm SRAAW(M).

b. The device weighs 3.3 kg and is externally similar in shape to the 84 mm HEAT round FFV 551.

c. The loading, aiming and firing operation with the 84 mm is the same as when firing the FFV 551 ammo.

d. The adapter mechanism is set to F (FIRE) when the device is fully inserted in the gun chamber.

e. Using the sub-calibre zeroing device, it can be boresighted by inserting it into the weapon and using

the foresight. Obviously, the gun must have been previously zeroed.

f. The 7.62 mm tracer round FFV 553 is intended for use when firing at ranges up to 700 m. The device is fired by the shock wave from a cap.

12. **Confirm by Questions**.

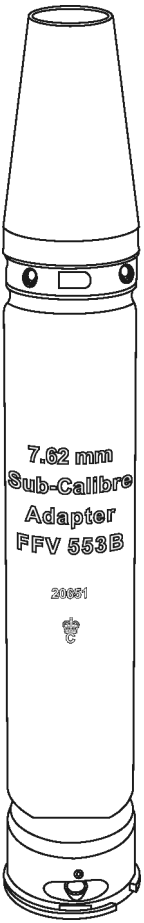


Figure 2-34: Sub-calibre Training Device FFV 553

DESCRIPTION

13. **Explain and Demonstrate**. The SCTD consists of three main parts:

a. **Body**:

(1) The body consists of a casing with front and rear barrel mountings. The front barrel mounting houses four zeroing screws with locking screws, spaced an equal distance around the body. The rear barrel mounting has a seat for the cap with holder and an aperture to the hammer of the firing mechanism.

(2) To the rear, the body is fitted with an interchangeable rim. On the rim, a line is engraved to which the notch shall point when inserting the adapter into the body. Also engraved are the letters F (FIRE) and S (SAFE).

b. **Barrel**. The barrel has a calibre of 7.62 mm and is fitted in the barrel nut of the rear barrel mounting by a weapons tech or specialist.

c. **Adapter**:

(1) The adapter has a seat for the 7.62 mm round, hammer, firing pin with firing pin spring, firing pin catch and bolt catch.

(2) The firing pin catch prevents the firing pin from striking until the adapter has been set to F (FIRE).

(3) The adapter is retained in the position S and F by the engagement of the bolt catch with the grooves in the left locking shoulder of the barrel nut.

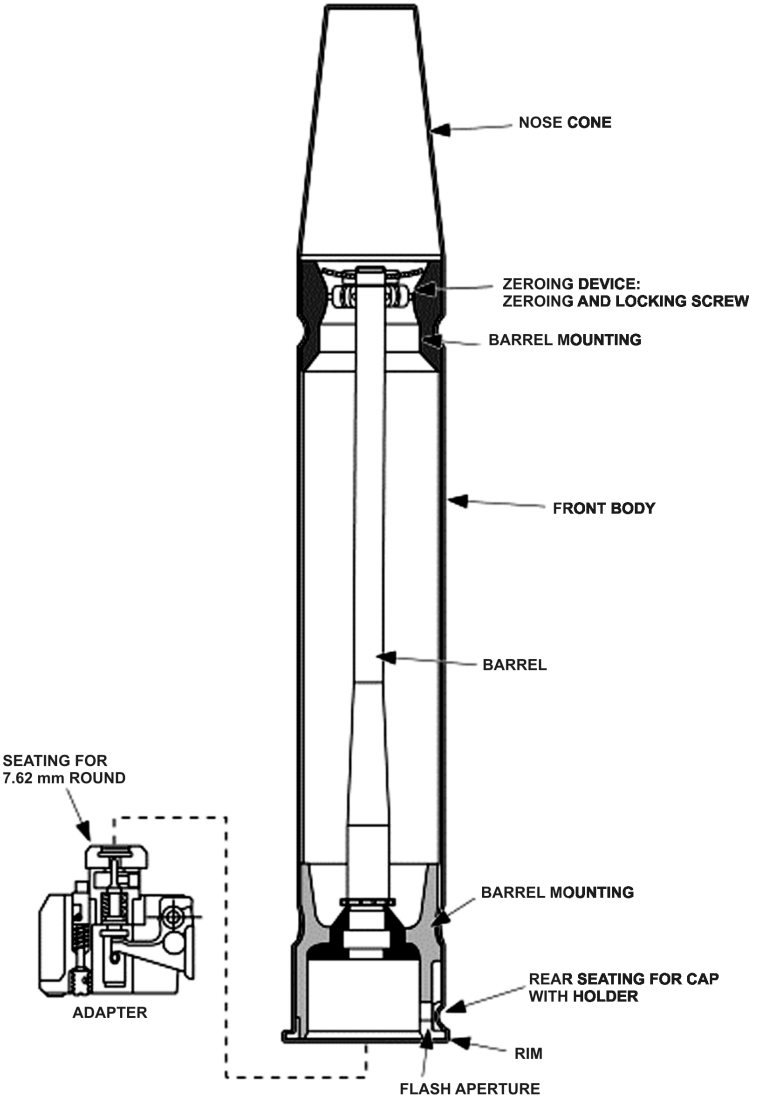


Figure 2-35: Description of the sub-calibre training device FFV 553.

14. **Confirm by Questions**.

AMMUNITION

15. **Explain and Demonstrate**:

a. The 7.62 mm tracer round FFV 553 only is used. The nose of the bullet is white, half the rear surface of the cartridge case is black.

b. When making the sub-calibre adapter ready for firing, the cap with holder FFV 840 is inserted into its seating.

NOTE

Do not try to fire normal 7.62 mm tracer ball ammunition in the sub-calibre training device.

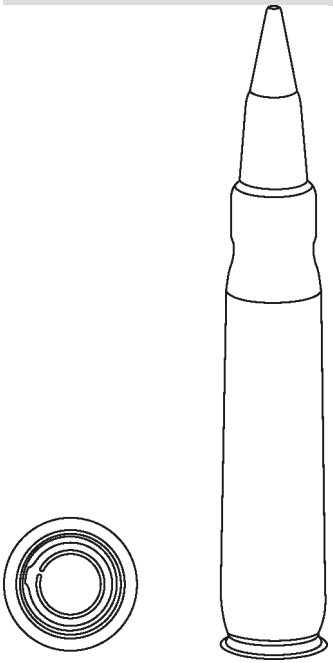


Figure 2-36: The 7.62 mm Tracer Round FFV 553 with Holder FFV 840

16. **Confirm by Questions**.

PRIMING THE DEVICE

17. **Explain and Demonstrate the Following**:

    a. Turn the adapter counter-clockwise until the notch on the adapter points to the line on the rim and remove the adapter from the sub-calibre device.

    b. Place a FFV 553 7.62 mm round into the seating of the adapter.

    c. Insert the adapter into the sub-calibre device with the arrow pointing to the line and turn the adapter to the safe position (arrow pointing to S).

    d. Press down the cap with holder into its seating.

18. **Unload**. Done in reverse.

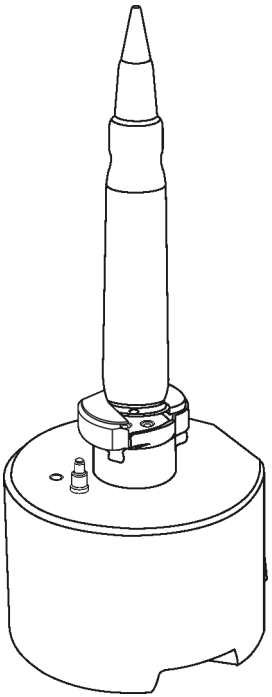


Figure 2-37: The 7.62 mm Tracer Round FFV 553 (Placed into the Adapter)

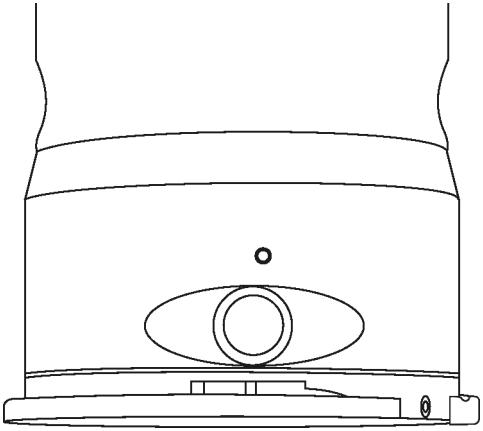


Figure 2-38: Loading the FFV 840 Cap with Holder into the SCTD

19. **Confirm by Practice**.

LOAD, FIRING AND UNLOAD OF THE 84 mm

20. **Explain and demonstrate the following**:

    a. **Load**:

        (1) Insert the sub-calibre device (arrow set to "S") completely into the chamber of the gun.

        (2) Turn the adapter of the sub-calibre device to the right (arrow pointing to "F").

        (3) Close the venturi of the gun.

Figure 2-39: Loading and Setting the SCTD into the Gun

b. **Firing**. The operation of the gun is the same as when firing the FFV 551 ammo.

c. **Unload**:

(1) Cock the gun, place the safety catch at "SAFE" and keep the gun pointed in a safe direction.

(2) Open the venturi.

(3) Set the adapter to "S."

(4) Remove the sub-calibre device from the gun by pushing forward the venturi locking knob.

(5) When reloading the 84 mm, do the normal load as described above.

21. **Confirm by Practice**.

MISFIRE DRILLS

22. **Explain and Demonstrate the Following**:

a. Initially the drills are as listed in Lesson 4.

b. **Misfire Unload**. The No. 2 is to repeat **MISFIRE—UNLOAD**, unseat the device and check the adapter:

(1) If the adapter is at "S," check the primer FFV 840 (it will have been struck unless the gun is defective). Unload completely and pass the SCTD to the No. 3. The primer FFV 840 must be replaced. Then reload the SCTD into the gun, set the adapter to "F" and continue the shoot.

(2) If the adapter is set at "F," unload the SCTD and check the FFV 840.

(a) If the primer has been struck, the SCTD is faulty. Unload completely and pass the SCTD to the No. 3. If another SCTD is available, load it and continue the shoot. In the meantime, the No. 3 will unload the FFV 553 and determine whether the misfire occurred in the SCTD or in the primer in the round.

(b) If the primer has not been struck, the gun striker is faulty. Unload and strip the weapon to replace the defective part.

c. **Disposal**. Any misfired round should be set aside and marked for return to the ammo compound.

d. **Suspect Device**. If it is suspected that a sub-calibre device is faulty, then it should not be used again until examined by a weapons tech.

e. **Jammed Device**. If a device becomes jammed in the chamber, seek the assistance of a weapons tech.

23. **Confirm by Questions and Practice**.

CARE AND CLEANING

24. **Explain and demonstrate**. After firing, considerable fouling will be left in the barrel of the gun.

a. Clean the 84 mm barrel as taught.

b. Remove the adapter from the device, clean the barrel using the nylon pull through and flannelette swab size 100 mm x 50 mm and oil the barrel using 100 mm x 25 mm.

c. Clean the adapter, leave slightly oiled and screw back into the device.

d. Report to the weapons tech any burrs set on the body or rim that cause difficulty in loading and do not use until rectified.

e. Return the device to its container.

25. **Confirm by Questions and Practice**.

CONCLUSION

26. **Before concluding the lesson**:

a. Answer questions from the class on the entire lesson.

b. Confirm all the teaching points by questions and practice.

c. Reinforce safety precautions on gun and sub-calibre device.

d. Summarize the lesson, emphasizing the following points:

(1) the importance of regarding the sub-calibre training device as a weapon and handling it as such;

(2) the requirement to call in the weapons tech in the event of a jammed or suspect device; and

(3) the need to ensure the device is in a "FIRED" condition before storage.

e. Provide a preview of the next lesson in this subject.

f. Pack kit.

LESSON 7
SUB-CALIBRE TRAINING DEVICE L1A2—6.5MM

INSTRUCTOR'S NOTES

1. **Aim**. To teach the characteristics and use of the sub-calibre training device (SCTD) L1A2, 6.5mm.

2. **Main Teaching Points**:

   a. description;

   b. operation;

   c. load/unload;

   d. misfire drills; and

   e. care and cleaning.

3. **Time**. One 40-minute lesson.

4. **Method**. Explanation, demonstration and practice.

5. **Stores**. Depending on the type of Carl Gustav used:

   a. 84 mm complete, 1 per 3 soldiers;

   b. 6.5 mm L1A2 S/C, 3 per gun; and

   c. FFV 551 (dummy), 1 per gun.

6. **Preparation**:

   a. ensure that the serial numbers on the packing and the adaptor are the same;

   b. lay out the classroom and ensure that all guns are serviceable; and

   c. ensure that the sub-calibre devices are serviceable.

7. **Miscellaneous**:

   a. number the class in threes and assign a gun to each group before the safety precautions;

   b. demonstrate with drills with two-man teams; ask a trainee to act as No. 1; and

   c. the boresighting aiming mounts are installed on the outside.

CONDUCT OF THE LESSON

8. **Safety Precautions**. Normal.

9. **Review**. Load, unload and misfire drills.

10. **Introduction**. The SCTD is used in the initial phases of instruction so that the crew can practice loading, unloading and firing at stationary and moving targets. The SCTD is equipped with a barrel for firing a 6.5 mm round.

DESCRIPTION

11. **Explain the following**:

a. **General**:

(1) the 84 mm gun can be equipped with a 6.5 mm L1A2 SCTD;

(2) the device weighs 4 kg and is externally similar in shape to the 84 mm HEAT-T round FFV 65;

(3) the loading, aiming and firing operation is the same as with the FFV 551 and 552 84 mm ammunition;

(4) the ammunition used with the SCTD is a 6.5 mm tracer practice round; and

(5) the SCTD comprises three basic parts: a body, barrel and adapter.

b. **Parts**:

(1) **Body**. The body is similar to that of the HEAT-T FFC 65 84 mm tracer round. The rim at the base is brass and is shaped the same as the rim on the body of the old FFV 65 rocket. Single and double lines are engraved on the base with the letters “S” (Safe) and “F” (Fire), designating the safety and fire positions for the adapter. The throat of the brass rim aligns with the gun body guide. The body consists of a conical sleeve which fits between the rim and the

sleeve to prevent the sub-calibre rounds and dirt from getting inside the body.

(2) **Barrel**. A sleeved barrel, to which the firing mechanism is attached, is mounted in the barrel and is held in place by a barrel mounting screw. The barrel protrudes through a hole at the front end of the body. To prevent dust from getting inside, a rubber cap covers the space between the barrel and the body. Four equidistant zeroing screws are used to align the barrel to the gun when zeroing. The barrel is equipped with a brass tip, which prevents damage to the 84 mm gun sight during loading.

NOTE

The sleeved barrel and the barrel sleeve can be removed from the body only by a weapons tech. The barrel and its sleeve can be mounted in the body 180 degrees off centre, which is liable to cause malfunctioning and damage.

(3) **Adapter**. The striker mechanism is mounted in the base of the body. It must be cocked before it can be withdrawn from or inserted into the body. This is because the two conical sleeve grooves contain safety and cocking sears. When these are in the firing position, i.e., outside their respective cocking notch, any rotation is impossible.

12. **Confirm by Questions**.

OPERATION

13. **Explain and Demonstrate the Following**:

a. **General**. The SCTD is armed with a 6.5 mm round while outside the weapon. It is thus possible to use the complete device as a normal round for the purposes of instruction on loading and live firing.

b. **Cocking the SCTD**. To cock the SCTD, the adapter must be inserted into the body, ensuring that the SCTD is aimed at the target:

(1) cock the mechanism using the tool provided for the purpose (Figure 2-40);

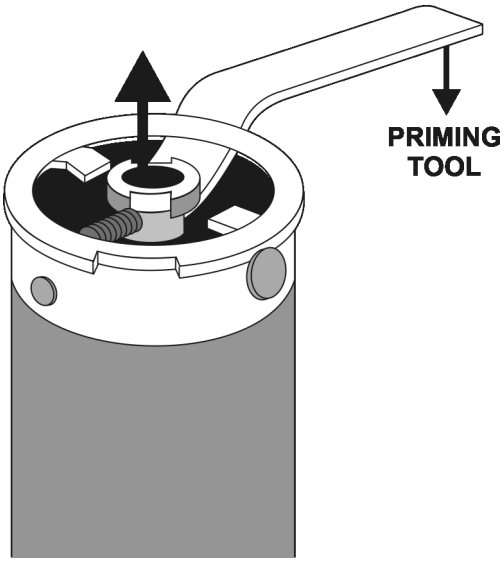


Figure 2-40: Priming the 6.5mm L1A2 SCTD with a tool

(2) turn the adaptor counter-clockwise;

(3) remove the adapter;

(4) place the base of the 6.5 mm round into the notch in front of the locking bolt; and

(5) replace the adapter in the base of the body, turning it clockwise until the mark is opposite the letter “S.”

c. **Disarming the SCTD**:

(1) ensure that the SCTD is aimed at the target;

(2) unscrew the adapter counter-clockwise;

(3) withdraw the round from the notch in the front of the adapter; and

(4) replace the adapter in the base of the body.

14. **Confirm by Practice**. Leave the device primed.

LOADING AND UNLOADING THE WEAPON

15. **Explain and Demonstrate the Following**:

a. **Load**. On the order **LOAD**, the No. 2 will:

(1) Load the sub-calibre (S/C) using the techniques learned for loading a standard calibre round, except that he must stop when 50 mm of the S/C remains outside the chamber.

(2) Set the adapter to "F" and push the S/C all the way in.

b. **Unload** (after firing). On the order **UNLOAD**, the No. 2 will carry out the movements learned for unloading a Carl Gustav round, then prime the mechanism using the tool to extract the adapter from the body.

c. **Unload** (if no rounds have been fired):

(1) on the order **UNLOAD**, the No. 2 will tap the venturi locking knob backwards and partially withdraw the S/C;

(2) set the adapter to "S" and withdraw the S/C from the weapon; and

(3) pass the S/C to the crew No. 3, who will place it on the ground, pointing it towards the target and/or disarm it.

16. **S/C Jam**. If the S/C jams in the chamber and remains jammed despite normal unload action, put the weapon down and point it towards the target. A weapons tech is required to remove the S/C.

17. **Confirm by Practice**.

MISFIRE DRILLS

18. **Explain and Demonstrate the Following**:

a. Initially, the drills are as listed in Lesson 4 up to the order **MISFIRE—UNLOAD** given by the No. 1.

b. When he receives the order, the No. 2 is to repeat **MISFIRE—UNLOAD**, unseat the device and check the adapter:

(1) If not set at "F," set it to "F," reload and continue the shoot.

(2) If set at "F," the No. 2 will remove the device and pass it to the No. 3; he will then reload with a fresh device and continue the shoot. The No. 3 will unload the device to define the defect (ammunition or trigger mechanism).

c. Any ammunition that causes a misfire should be put aside and returned to the ammunition depot for destruction.

d. If the adapter trigger mechanism is defective, it must not be re-used until it has been examined by a weapons tech.

19. **Confirm by Questions and Practice**.

CARE AND CLEANING.

20. **SCTD Tool Kit**. Explain and describe the contents of the SCTD tool kit.

21. **Care and Cleaning**. Explain and demonstrate the following:

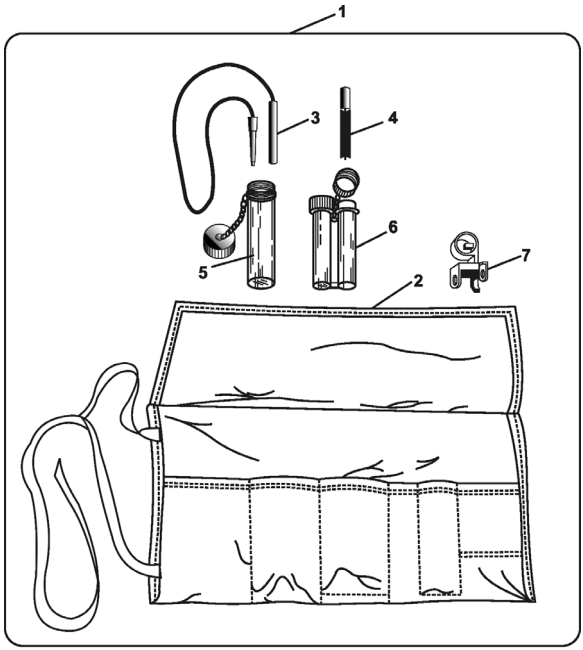
a. After firing exercises, the SCTD adapter must be cleaned. The tools shown at figure 2-41 are provided for this purpose.

b. Remove the adapter and clean the trigger mechanism and breech. Clean the barrel with the bristle brush and the pull through, using a flannelette swab size 100 x 38 mm.

c. After cleaning, leave the SCTD slightly oiled, screw it back into the weapon and action the trigger mechanism. **The adaptor must never remain cocked, as this reduces the spring tension and can cause misfires**.

d. Unload the device and replace it with the cleaning tools in their case.

22. **Confirm by Practice**.



1. Bag with contents
2. Bag
3. Pull through
4. Oiling brush
5. Plastic tube
6. Oil tube
7. Extra sight

Figure 2-41: SCTD Tool Kit

CONCLUSION

23. **Before concluding the lesson**:

a. Answer questions from the class on the entire lesson.

b. Confirm all the teaching points by questions and practice.

c. Reinforce normal safety precautions.

d. Summarize the lesson, emphasizing the following points:

(1) the importance of regarding the SCTD as a weapon and handling it accordingly;

(2) the requirement to call in the weapons tech in the event of a jammed or suspect device; and

(3) the need to ensure the device is in a fired condition before storage.

e. Provide a preview of the next lesson in this subject.

f. Pack kit.

LESSON 8
HANDLING

INSTRUCTOR'S NOTES

1. **Aim**. To teach the basic principles governing the use of the SRAAW(M) Carl Gustav in the field.

2. **Main Teaching Points**:

   a. composition and functions of a SRAAW(M) team; and

   b. selection of antitank fire positions.

3. **Time**. Two 40-minute lessons.

4. **Method**. Explanation, demonstration and practice.

5. **Stores**. Depending to the type of Carl Gustav used:

   a. 84 mm complete, 1 per 3 soldiers;

   b. FFV 551 (DUMMY), 1 per gun;

   c. duplex ammunition container, 1 set per gun;

   d. 9 mm pistol w/case, 1 per 3 soldiers;

   e. C7, 2 per 3 soldiers;

   f. sandbags/string, sufficient to camouflage at least the SSRAW(M) duplex containers; and

   g. white tape, pegs, protractor and 200 m measuring tape.

6. **Preparation**:

   a. recce the ground to be used;

   b. decide on the direction of likely tank approaches and select a good fire position/trench, defilade to the approaches;

   c. peg out the dimensions of the backblast danger area; and

d. lay out the weapons and equipment sufficient to equip the section in three-man groups.

7. **Miscellaneous**:

a. During the practice stages, detail and equip 3 man teams. The third rifleman is normally an assessor, but occasionally he should act as part of the team.

b. The film *Tank Killing* (catalogue No. 07233) 66 mm film may be used as an introduction to this lesson.

c. The section is to carry out personal camouflage. Fit a telescopic sight to each gun.

CONDUCT OF THE LESSON

8. **Safety Precautions**. On all weapons and training ammunition.

9. **Review**:

a. the factors affecting the position for firing M 72 and Eryx without the tripod; and

b. the factors to be considered in the selection of a good rifle fire position.

10. **Introduction**. Explain. The Carl Gustav is adapted for all types of operations. It is allocated at infantry platoon level, one per command post. Although this weapon lacks the penetration power of the Eryx, the fact remains that the Carl Gustav is easier to use, more flexible, more mobile and can be involved in all phases of war, especially in the light infantry platoon. Thus, in some ways, the Carl Gustav fulfils the anti-armour requirement that the Eryx cannot. Eventually, with the acquisition of more capable ammunition and infra-red sight systems, the Carl Gustav will increase the platoon's anti-armour capability considerably, alongside Eryx. It is therefore important to be familiar with the tactics, techniques and procedures applicable to the use of Carl Gustav in all phases of war.

COMPOSITION AND FUNCTIONS OF A SRAAW(M) TEAM

11. **SRAAW(M) Team**. In addition from the section commander or weapon detachment commander, the team normally consists of two men:

a. **The No. 1**. He commands the team and fires the gun. He is responsible for the gun and No. 1 bag. His personal weapon is the C7 rifle or pistol.

b. **The No. 2**. His job is to carry four RAP FFV 551 rounds in their containers and the No. 2 bag. He is armed with a C7 rifle.

12. **Explain**. Riflemen may be attached to carry additional ammunition and provide local protection.

13. **Camouflage**. Explain and demonstrate. Sandbags, hessian or disruptive pattern material are to be used to camouflage the gun and ammunition containers. (Using the principles applied to other small arms, securely tie string or elastic to secure additional scrim, hessian strips and natural foliage). Ensure free access and use of the following:

a. the muzzle and venturi;

b. the venturi lock knob and lever;

c. the sight unit and field of view;

d. the trigger, front and rear housing for the mount; and

e. the ammunition.

Figure 2-42: Camouflaged 84 mm Gun

14. **Carriage**. Explain and demonstrate. The gun is normally carried by the No. 1 but on occasions the No. 2 may assist. The method of carriage used will be determined by the task and the nature of the ground and cover available. The following methods are a guide:

a. slung over the shoulder;

b. across the body, slung around the back of the neck;

c. using the side crawl, or the leopard crawl; and

d. ammunition containers strapped to the top of the webbing yoke, or carried "suitcase style" using the duplex ammunition container harness.

Figure 2-43: Slung Over the Shoulder

Figure 2-44: Carriage Across the Body

Figure 2-45: Side Crawl

Figure 2-46: Leopard Crawl

15. **Confirm by Practice**. (Designate two-man teams; leave the equipment camouflaged at the end of the practice period.)

CHOICE OF ANTI-ARMOUR FIRE POSITIONS

16. **The SRAAW(M) Fire Position**. Explain and demonstrate. The type of terrain normally dictates the firing position selected. In addition to the basic principles of a good fire position, the No. 1 is to consider the following factors when siting the SRAAW(M):

a. Cover from view must, whenever possible, include concealment of the backblast. This may be achieved by siting in defilade so that the arc of fire is at right angles to the line of approach of enemy AFVs. Then, when firing, the backblast may be hidden from supporting AFVs by the cover selected.

b. A position in defilade gives the added advantage of firing at the more vulnerable side of the AFV.

c. There should be room for the two-man team to operate, although if the cover or space dictates the No. 2 can work from the left side (as taught).

d. Alternate positions capable of covering the same task are to be selected.

e. Routes to alternate positions must be planned and marked, particularly in close country and at night.

f. Ammunition, in its containers, must be concealed yet readily available. Personal weapons must also be in hand.

g. If other riflemen are part of the team, their positions must be concealed and sited so that they can provide the necessary local protection.

h. The No. 1 needs early warning of the approach of enemy AFVs into his arcs or killing zone. The other members of the team may be used in this role. Nevertheless, knowledge of the situation and continuous updating is the best defence.

17. **Backblast Danger Area**. Explain. The section is to view the prepared layout of the backblast danger area. Question them on the dimensions and discuss the problems associated with the various types of cover.

18. **Use of Various Types of Cover**. Explain. In addition to the general factors, specific matters relating to the type of cover available must be considered. These are covered in the following paragraphs.

19. **The Fire Trench**. Explain and demonstrate the following:

a. This is normally a prepared position in defence and the normal rifleman's “I” trench is suitable.

b. Position the mount in the front housing (M2 only) and adjust it to suit the elbow rest and yet give muzzle clearance over the parapet.

c. Brace the back against the rear wall of the trench. The No. 2 is to ensure that the venturi is above ground level and clear of the rear face of the trench.

d. Use the left-hand section of the trench to enable the No. 2 to work on the right of the gun and permit storage of ammunition under the overhead cover of the trench.

e. The gun may be loaded, safety catch applied and laid front to rear across the trench.

20. **Fold in the Ground and Low Cover**. Explain and demonstrate the following:

a. The height of the cover may dictate the use of the lying position, therefore, the size of the arc and the killing zone may be greatly reduced.

b. Use the mount in the front housing but check carefully for muzzle clearance.

c. The need for a rising line of sight and clearance for the backblast danger area may be difficult to achieve.

d. Low cover may require the firing position to be modified to achieve concealment.

e. Similarly, the limitation of the cover may require the No. 2 to load and operate from the left side of the gun.

21. **Built Up Areas**. Explain and demonstrate the following:

a. Due to the problems of backblast debris and damage to hearing, confined spaces (narrow streets and

rooms) should be avoided except in extreme emergency.

b. If forced to fire within a room, open all doors and windows to help reduce the effect of overpressure.

c. Garden walls and demolished buildings provide adequate cover for use of the normal firing positions.

d. Firing parallel to a wall may help to conceal the backblast and also provides an alternative to having the wall directly behind the gun and within the backblast danger area.

e. Again, the No. 2 may be required to operate from the left side of the gun in order to allow the No. 1 to make maximum use of the cover.

22. **Weapon Safety**. Explain the following:

a. When moving to a planned fire position, the gun may be loaded in dead ground close to the position provided that the safety catch is on "SAFE."

b. Care must be taken when occupying an alternate position quickly that ammunition and equipment are NOT positioned in the backblast danger area.

c. When preparing to move, ammunition container lids must be replaced and tools and spare parts secured in their respective bags.

23. **Confirm by Practice**:

a. Detail and equip two-man teams.

b. Indicate areas of work to cater for various types of cover.

c. Brief teams on the direction of enemy AFV approaches.

d. Critique siting, cover and concealment. View from the enemy position.

e. Have teams move tactically from fire position to fire position, and have the No. 3 of each team critique their movement.

f. Discuss the positioning of other members of the team, where applicable.

CONCLUSION

24. Before concluding the lesson:

a. Answer questions from the class on the entire lesson.

b. Confirm by questions and practice.

c. Reinforce normal safety precautions.

d. Summarize the lesson, emphasizing the following points:

(1) the importance of teamwork;

(2) the value of defilade; and

(3) the need to balance the factors of concealment and protection with the need effectively to cover the arc of fire and killing zone.

e. Provide a preview of the next lesson in this subject.

f. Pack kit.

ANNEX A
BASIC INSTRUCTION—SRAAW(M) CARL GUSTAV M2/M3

SER	TEST	EQPT	CONDITIONS	MARKING	PASS/ FAIL
1	Normal safety precau-tions	Carl Gustav with training ammunition	a. Gun unloaded and placed on the ground with training ammunition. b. Order the soldier to carry out normal safety precautions: 1. cock the gun by pushing the cocking lever forward towards the pistol grip; 2. move the safety catch to "SAFE"; 3. push the venturi lock knob forward and raise the venturi lever, thus opening the venturi; 4. visually inspect the chamber to ensure that it is clear, however, do not put your hand in the breech due to the possibility of burning propellant; 5. visually inspect the venturi; 6. ease springs by closing the venture, to do this, press down on the venturi lever and tap the venturi lock knob towards the rear to ensure that it is fully locked; and 7. move the safety catch to "FIRE" and operate the trigger mechanism.	Note: Do not give a pass if a safety error has been committed.	

SER	TEST	EQPT	CONDITIONS	MARKING	PASS/ FAIL
2	Loading	Carl Gustav with telescopic sight and training ammunition type FFV 551 (two per gun)	**LOAD** In two-man teams: a. The No. 1 on deciding to load or receiving the order **LOAD** must: 1. cock the gun and put the safety catch to "SAFE"; 2. return both hands to the gun with the forefinger along the trigger guard and order **LOAD**. b. When the No. 1 orders **LOAD**, the No. 2 is to: 1. repeat the order **LOAD**, open the breech and remove any dirt or unburnt propellant; 2. remove a round from its container, hold it with the nose forward; 3. place one finger in the recess in the rim of the round and partially insert the round into the chamber; 4. ensuring that the recess and cartridge guide are aligned, push the round fully into the chamber; and 5. close the breech, firmly tap the venturi lock knob towards the venturi, ensuring it is correctly positioned. Check that the backblast area is clear and report **READY**. No. 1 will repeat **READY**.	No errors: pass One to two errors: average More than two errors: fail Note: Do not give a pass if a safety error has been committed.	

SER	TEST	EQPT	CONDITIONS	MARKING	PASS/ FAIL
3	Firing and aiming with the telescopic sight.	Same as serial 2 plus drill targets	**TARGET** In two-man teams: a. When the No. 1 receives the order **TARGET** followed by a target indication, he must: 1. set the sights and put the safety catch to "FIRE"; 2. when the hold and aim are correct, the No. 1 orders **STAND BY**, takes the first trigger pressure, fires and follows through as taught—on the order **STAND BY**, the No. 2, having ensured that the backblast area is clear, is to face forward and observe the target area; 3. immediately cock the gun, put the safety catch to "SAFE" and order **LOAD,** then proceed to load as taught. and 4. before firing again, the No. 1 is to make any corrections to range, lead or point of aim depending on the observation of strike of the previous round. Carry out four drills and apply lead using the telescopic sight to engage the following moving targets: a. 300 m, 15 km/h target at right angle from left to right; b. 300 m, 25 km/h target at right angle from right to left; c. 300 m, 35 km/h target at oblique angle from right to left; and d. 300 m, 45 km/h target advancing head on.	No errors: pass One to two errors: average More than two errors: fail Note: Do not give a pass if a safety error has been committed.	

SER	TEST	EQPT	CONDITIONS	MARKING	PASS/ FAIL
4	Misfire drills	Same as serial 2	**MISFIRE** In two-man teams: a. If the weapon fails to fire or on the order **MISFIRE**, the following actions shall be taken: 1. the No. 1 maintains his point of aim, re-cocks the weapon, puts the safety catch to "SAFE" and orders No. 2 to **CHECK VENTURI**; 2. the No. 2 taps the venturi lock to the rear and reports to the No. 1 **VENTURI LOCK CHECKED**; and 3. the No. 1 repeats **VENTURI LOCK CHECKED**, places the safety catch to "FIRE", aims and carries out the proper firing drills. b. If the weapon fails to fire a second time, the following action shall be taken: 1. the No. 1 will report **MISFIRE** and the No. 2 repeats **MISFIRE**; 2. Nos. 1 and 2 wait one minute, with the No. 1 maintaining the aim in the event of a possible hand fire. 3. If the gun has not fired after one minute, No. 1 recocks the weapon, places the safety catch to "SAFE" and orders **MISFIRE—UNLOAD**. No. 2 repeats **MISFIRE—UNLOAD** and proceeds to unload the gun. c. After unloading the gun, the following drills shall be carried out: 1. Primer struck: a) after removing the misfired round, No. 2 inspects the primer. If the primer is fully struck, he reports **PRIMER STRUCK**, No. 1 repeats **PRIMER STRUCK**. b) The No. 2 then lays the misfired round aside for disposal.	No errors: pass One to two errors: average More than two errors—fail Note: Do not give a pass if a safety error has been committed.	

SER	TEST	EQPT	CONDITIONS	MARKING	PASS/ FAIL
			c) If the target is still in view, the team reloads and carries on firing; or 2. Mechanical breakdown: a) If, on examination of the primer, No. 2 finds that it has been lightly struck or not struck at all, he will report **MECHANICAL BREAKDOWN** and No. 1 repeats **MECHANICAL BREAKDOWN**. b) No. 2 will then close the venturi and report **GUN CLEAR**. c) No. 1 repeats GUN CLEAR and completes the unloading drill. The firing mechanism must then be stripped and damaged parts replaced.		

SER	TEST	EQPT	CONDITIONS	MARKING	PASS/ FAIL
5	Unloading	Same as serial 2	**UNLOAD** On the order **UNLOAD**: a. The No. 1, on receiving the unload, is to hold the gun as for loading with the muzzle pointing towards the target area, check that the safety catch is at "SAFE" and order **UNLOAD**. b. The No. 2 is to repeat the order **UNLOAD** and open the venturi. c. The No. 2 will tap the venturi lock knob forward, catch the round in the left hand and withdraw it fully from the chamber. d. The No. 2 will close the venturi, tap the venturi lock knob to the rear and report **GUN CLEAR**. e. The No. 1 will repeat **GUN CLEAR**, put the safety catch to "FIRE" and operate the trigger. f. The No. 1 will turn the range knob to zero and fold the sights.	No errors: pass One to two errors: average More than two errors: fail Note: Do not give a pass if a safety error has been committed.	

SER	TEST	EQPT	CONDITIONS	MARKING	PASS/ FAIL
6	Boresight-ing with iron sights	Carl Gustav with foresight and backsights	In two-man teams: Carry out normal safety precautions on the gun then steady the gun on the mount. a. Set the range to zero with the range knob. b. Lay the bore onto the target and report **ON**. c. Adjust the open sights onto the target. d. Confirm by changing around. e. Reset the range scale indicator. f. Note the backsight scale reading.	No errors: pass One to two errors: average More than two errors: fail Note: Do not give a pass if a safety error has been committed.	

SER	TEST	EQPT	CONDITIONS	MARKING	PASS/ FAIL
7	Sub-calibre training device FFV 553	Carl Gustav with two sub-SCTD FFV 553	In two-man teams: a. Priming the device: 1. Turn the adapter counter-clockwise until the notch on the adapter points to the line on the rim and remove the adapter from the sub-calibre device. 2. Place a 7.62 mm round into the seating of the adapter. 3. Insert the adapter into the sub-calibre device with the arrow pointing to the line and turn the adapter to the Safe position "S." 4. Press down the cap with holder into its seating. b. Loading the sub-calibre device: 1. Insert the sub-calibre device fully into the gun chamber. 2. Turn the adapter of the sub-calibre device to the right (arrow pointing to "F"). 3. Close the venturi. c. Firing: The operation of the gun is the same as when firing the FFV 551 ammo.	No errors: pass One to two errors: average More than two errors: fail Note: Do not give a pass if a safety error has been committed.	

SER	TEST	EQPT	CONDITIONS	MARKING	PASS/ FAIL
			d. Misfire drills: 1. Initially the drills are as listed in Lesson 4. 2.. Misfire—unload. The No. 2 is to repeat **MISFIRE—UNLOAD**, unseat the device and check the adapter: a) If set at "S." check the primer then reload and continue the shoot. b) If set at "F," check the primer. If the primer has been struck, the sub-calibre device is defective; load a new sub-calibre device and continue the shoot. During this time, the first sub-calibre device is to be defused to determine whether it was a fault in the percussion of the sub-calibre device or the cartridge primer. c) If the primer has not been struck, the defect is in the striker of the gun. Complete the unloading of the gun, strip it and replace the defective part. e. Unload: 1. Cock the gun, place the safety catch at safe “S” and keep the gun pointed in a safe direction. 2. Open venturi. 3. Set the adapter to “S.” 4. Remove the sub-calibre device from the gun by pushing forward the venture locking knob. 5. When reloading, do the normal load with FFV 551 ammo. f. Depriming. Proceed in the reverse order for priming the device as shown in para 1.		

CHAPTER 3
PRACTICE LESSONS

GENERAL

1. All training must be progressive as unnecessary repetition is poor instructional practice. A soldier learns skills and facts in the basic lessons, which should be taught only once during his service. He then requires practice to maintain and improve his skills.

2. The sequence of a practice lesson is:

   a. remind—by explanation;

   b. assess weakness—by practice or test;

   c. improve on weakness—by practice; and

   d. progressive practice—by competitions.

3. The practice lessons in this publication are intended as a guide to exercising soldiers to improve skills that soldiers have already learned. The instructor should plan the lesson based on an assessment of the soldier's weak points.

4. Faults should be immediately brought to the attention of the soldier and corrected.

5. It may become obvious during a practice lesson that the soldiers have failed to grasp a particular skill or fact. In this case the instructor will have to teach that part of the lesson again.

COMPETITION

6. The incentive of competition will always help to make practice more interesting. Some points on conducting competitions are:

   a. It may be on an individual or team basis.

   b. If conducted on a team basis, the instructors must ensure that the selected teams are all fairly equal with respect to their ability. The more advanced members of the team will help the weaker members.

c. Marks can be awarded up to a given total, or instructors may begin with a total and deduct marks for mistakes as the competition progresses.

d. A score chart drawn on the chalkboard or a sheet of paper on which to mark the results should always be used, as it will create interest.

e. Further interest can always be attained by making one team or individual watch another to find faults which results in the awarding or deducting of marks.

f. Above all the instructor must make certain that competitions are simple and realistic, i.e., that they exercise the soldier's ability to perform particular skills.

g. Within each practice lesson there is a final practice competition. Scores and standards achieved can be assessed by the instructor and used as a basis for continued training and practice to correct weak points. During advanced training the standard for the final practice competition is to match those laid down in the handling tests where applicable.

MASTER AND PUPIL

7. The master and pupil method of practice in its simplest form is for one man (the pupil) to work under the supervision of another (the master); the instructor watches both.

8. At all stages of training, this stimulates interest and attention to detail. It is particularly useful with large sections and in competitions.

NIGHT LESSONS

9. Practice in handling the gun by night is essential. Details are given in practice lessons 3 and 5.

NBC LESSONS

10. It is important to practice handling the gun in NBC clothing. Details are given in practice lessons 6 and 7.

PRACTICE LESSON 1
STRIPPING, CARE AND CLEANING

INSTRUCTOR'S NOTES

1. **Aim**. Check the material has been learned by holding practices and competitions to correct weaknesses and maintain the level of skill required.

2. **Main Teaching Points**:

   a. stripping, assembling and cleaning; and

   b. recognition of ammunition, safe handling and the characteristics of the gun.

3. **Time**. One 40-minute lesson.

4. **Method**. An indoor practice lesson.

5. **Stores**. The following equipment is required:

   a. 84 mm gun complete, 1 per 3 soldiers;

   b. 84 mm dummy rounds, as required; and

   c. cleaning material, as required.

6. **Preparation**:

   a. Fit telescopic sights to all guns.

   b. Prepare a chalkboard for the final practice competition as follows:

NAME	STRIPPING	ASSEMBLING	CLEANING	SAFE HANDLING AND CHARACTERISTICS	TOTAL

   c. To score, record the number of mistakes made in each test. The soldier or team with the lowest combined totals for all the tests is the winner. Winners of individual tests can also be determined.

7. **Miscellaneous**:

   a. at no time during this practice period is any skill to be timed;

   b. teaching is only to be done when considered absolutely necessary; and

c. questions for the section on handling and safe handling are to be carefully planned and should be general questions not related to skills.

CONDUCT OF THE LESSON

8. **Safety Precautions**. Inspect all guns and ammunition and sub-calibre devices. Done by the instructor.

9. **Review**. Nil.

10. **Introduction**. The 84 mm SRAAW(M) team must take care to ensure that the gun is well cleaned and correctly assembled. Negligence could lead to the gun failing to operate at a critical time. Practice in these skills will improve the team's ability to achieve a first round kill.

SUGGESTED PRACTICES

11. **Stripping and Assembling**:

a. allow the section to practice stripping the gun, each man removing only one part at a time;

b. practice assembling the gun in the same way;

c. each man is then to practice stripping and assembling the gun completely; and

d. leave the guns stripped at the end of the practice.

12. **Description of the Gun**:

a. with the guns stripped, question the section on the names of various parts;

b. questions on characteristics, to include:

(1) dimensions of backblast area;

(2) maximum effective range; and

(3) roles of the guns.

13. **Cleaning**:

a. have the section practice cleaning;

b. question the section in cleaning in adverse conditions and the use of the contents of the No. 2 bag; and

c. assemble the guns.

14. **Ammunition and Safe Handling**. Question the section on the recognition of all types of ammunition and on safe handling.

FINAL PRACTICE

15. A suggested method of conducting the final practice is a competition as follows:

a. divide the section into two or three teams, each soldier checking an opposing team member;

b. have each team, in turn, practice stripping, assembling, cleaning, safe handling and naming the characteristics of the weapons; and

c. record individual and team scores on the chalkboard.

CONCLUSION

16. **End-of-lesson drill**:

a. take questions from the section on the entire lesson;

b. reinforce normal safety precautions;

c. summarize the lesson, emphasizing the overall standard attained and the weak points;

d. provide a preview of the next lesson in this subject; and

e. pack kit.

PRACTICE LESSON 2
FIRING POSITIONS, LOADING, UNLOADING AND AIMING

INSTRUCTOR'S NOTES

1. **Aim**. Check the material has been learned by holding practices and competitions to correct weaknesses and maintain the level of skill required.

2. **Main Teaching Points**:

   a. loading and unloading in various firing positions; and

   b. aiming at stationary and moving targets using the telescopic and open sights.

3. **Time**. One 40-minute lesson.

4. **Method**. An indoor or outdoor practice lesson.

5. **Stores**. The following equipment is required:

   a. 84 mm gun complete, 1 per 3 soldiers;

   b. 84 mm drill rounds, as required;

   c. duplex ammunition containers, 1 per gun;

   d. aiming aide, as required;

   e. AFV recognition cards, as required; and

   f. stopwatch, 1.

6. **Preparation**:

   a. Check that the stopwatch is serviceable.

   b. Chamber test all drill rounds to ensure drill rounds chamber properly.

   c. Prepare a chalkboard for the final practice competition as follows:

NAME	LOADING AND UNLOADING HPS 10		AIMING AND SIGHTSETTING HPS 15			TOTAL HPS 25
	NO 1	NO 2	PROB 1	PROB 2	PROB 3	

d. To score in loading and unloading, deduct one point for each drill error and one point for each second over the time limit. To score in aiming and sight setting, deduct five points for each incorrect answer. Winners of the individual test can also be determined.

7. **Miscellaneous**. Teaching is only to be done when considered absolutely necessary.

CONDUCT OF THE LESSON

8. **Safety Precautions**. Normal.

9. **Review**. Nil.

10. **Introduction**. In battle the gun team can only be effective if it is capable of selecting good fire positions, accurate sighting and able to load and unload the gun instinctively. This requires a great deal of practice.

SUGGESTED PRACTICES

11. **Loading and Unloading**:

a. have members of the section practice in loading and unloading in all firing positions, initially without a time limit, in order to check correct drills; and

b. alternate roles within the section until each soldier has practiced the duties as No. 1 and No. 2.

12. **Sight Setting**:

a. have members of the section practice in setting sights to varying ranges on both telescopic and iron sights; and

b. use other section members to check for any errors.

13. **Aiming**:

a. question the section on the vulnerable areas of the various types of AFV;

b. further questions on correct points of aim allowing for speed and direction of movement; and

c. include problems associated with both telescopic and iron sights.

FINAL PRACTICE

14. A suggested method of conducting the final practice as a competition is as follows:

a. Within each gun team, have each member practice as No. 1 and No. 2 in loading and unloading. Score as suggested in paragraph 6d.

b. Set three problems on aiming at moving targets, two with telescopic and one with the iron sight. The section should illustrate answers using individual aiming aids.

c. Record individual and team results on the chalkboard.

CONCLUSION

15. **End-of-lesson drill**:

a. answer questions from the class on the entire lesson;

b. reinforce normal safety precautions;

c. summarize the lesson, emphasizing the overall standards attained and the weak points;

d. provide a preview of the next lesson in this subject and

e. pack kit.

PRACTICE LESSON 3
SAFETY, STRIPPING, ASSEMBLING AND GUN DRILLS AT NIGHT

INSTRUCTOR'S NOTES—GENERAL

1. **Aim**. Check the material has been learned by holding practices and competitions to correct weaknesses and maintain the level of skill required.

2. **Main Teaching Points**:

   a. safety;

   b. stripping and assembling; and

   c. loading and unloading in different firing positions.

3. **Time**. One 40-minute lesson.

4. **Method**. Conduct the practice lesson outdoors at night, or indoors with the lights off.

5. **Stores**. The following equipment is required:

   a. 84 mm gun complete, 1 per 3 soldiers;

   b. 84 mm drill rounds, as required;

   c. 84 mm duplex ammunition containers, as required; and

   d. AN/PVS-505 Kite and/or AN/TVS-505 Maxi Kite night viewing device.

6. **Preparation**:

   a. Prepare the training area or classroom.

   b. Chamber test all drill rounds.

   c. Ensure night viewing device is available and in working order.

   d. Prepare a chalkboard for the final practice competition as follows:

NAME	STRIPPING & ASSEMBLING HPS 15	LOADING AND UNLOADING HPS 25	TOTAL HPS 40

e. To score, deduct one point for each mistake and five points for each safety error.

7. **Miscellaneous**:

a. When carrying out normal safety precautions, extend the requirement by allowing each member of the section to practice.

b. Number the section in groups of three, allocate each group to a gun and explain the system of change around.

CONDUCT OF THE LESSON

8. **Safety Precautions**. Normal.

9. **Review**. Nil.

10. **Introduction**. In battle, much of the soldier's weapon handling will be done at night. If he is to function effectively during the hours of darkness, it is essential that the soldier is practiced in basic handling drills under these conditions.

SUGGESTED PRACTICES

11. **Stripping and Assembling**. Have the section practice stripping and assembling the gun completely.

12. **Loading, Unloading and Safe Handling**:

a. have the section practice loading and unloading in all fire positions; and

b. introduce backblast area “not clear” and damaged round or over-gauged round.

FINAL PRACTICE

13. A suggested method of conducting the final practice as a competition is as follows:

a. divide the section into teams, each team is to check the faults of an opposing team;

b. have each team, in turn, practice “stripping, assembling” and “loading and unloading;” and

c. record team results.

CONCLUSION

14. **Before concluding the lesson**:

a. answer questions from the class on the entire lesson;

b. allow further practice as time permits;

c. reinforce normal safety precautions;

d. summarize the lesson, emphasizing the following points:

(1) the overall standard achieved and any weak points; and

(2) the importance of night training.

e. provide a preview of the next lesson in this subject; and

f. pack kit.

PRACTICE LESSON 4
FIRING, MISFIRE DRILLS

INSTRUCTOR'S NOTES

1. **Aim**. Check the material has been learned by holding practices and competitions to correct weaknesses and maintain the level of skill required.

2. **Main Teaching Points**:

   a. firing drills; and

   b. action should the gun fail to fire.

3. **Time**. One 40-minute lesson.

4. **Method**. An indoor or outdoor practice lesson.

5. **Stores**. The following equipment is required:

   a. 84 mm complete, 1 per 3 soldiers;

   b. 84 mm drill rounds, 2 per gun;

   c. duplex ammunition containers, 1 per gun; and

   d. AFV armour representative targets, as required.

6. **Preparation**:

   a. fit a telescope to each gun;

   b. position representative targets;

   c. chamber test all drill rounds; and

   d. prepare a chalkboard for the final practice competition as follows:

TEAM	FIRING DRILLS HPS 10	MISFIRE DRILLS HPS 10	TOTAL HPS 20

7. **Miscellaneous**:

   a. Although neither the final practice competition nor the training test has a time limit, the section should be encouraged to conduct actions quickly when dealing with misfires.

b. The 15-second waiting time may be reduced for training expedience. The instructor orders **TIME UP** when he considers it appropriate.

c. Be continually looking for mistakes in any drills during target engagement and deduct marks accordingly.

d. Number the section in groups of three. Allocate each group to a gun and explain the system of change around.

e. During the practice of misfire drills, use the command **MISFIRE**, **TIME UP** to the No. 1 and **LIGHTLY STRUCK**, or **NOT STRUCK** to the No. 2.

CONDUCT OF THE LESSON

8. **Safety Precautions**. Normal.

9. **Review**. Nil.

10. **Introduction**. The techniques of firing the weapon must be mastered by both members of the team. Should the gun fail to fire, actions must be done quickly and instinctively. Survival could depend on it.

SUGGESTED PRACTICES

11. **Firing**. Have the section practice all firing positions in the following:

a. the firing drill (indicate the target, the direction of movement, range and speed);

b. corrections (plot the fall of shot); and

c. rapid reloading.

12. **Action Should the Gun Fail to Fire**. Have the section practice various firing positions in the following:

a. The initial drill on a failure to fire.

b. The subsequent drill if the gun still fails to fire. Give the necessary orders to indicate a:

(1) **FAULTY ROUND**; and

(2) **DAMAGED OR BROKEN PART**.

FINAL PRACTICE

13. A suggested method of conducting the final practice as a competition is as follows:

a. Divide the section into teams. Each team tries to find mistakes made by the other team.

b. Practice each team in firing drills and misfire drills.

c. Record team scores on a board.

CONCLUSION

14. **End-of-lesson drill**:

a. answer questions from the class on the entire lesson;

b. reinforce normal safety precautions;

c. summarize the lesson, emphasizing the overall standard attained and the weak points;

d. provide a preview of the next lesson in this subject; and

e. pack kit.

PRACTICE LESSON 5
TACTICAL HANDLING AT NIGHT

INSTRUCTOR'S NOTES

1. **Aim**. Check the material has been learned by holding practices and competitions to correct weaknesses and maintain the level of skill required.

2. **Main Teaching Points**:

   a. camouflage, movement and selection of a fire position;

   b. tank hunting; and

   c. operating in a tank ambush.

3. **Time**. One 40-minute lesson by day (preparation and briefing) followed by two 40-minute practice lessons at night.

4. **Method**. An outdoor practice exercise by night.

5. **Stores**. The following equipment is required:

   a. 84 mm gun complete, 1 per section (additional weapons will be required for the camouflage and movements phase and for ambush drills if more than one SRAAW(M) team is to be exercised);

   b. 84 mm drill rounds, 2 per SRAAW(M);

   c. duplex ammunition containers, 2 per SRAAW(M);

   d. C7 weapons with EIS, 1 per rifleman;

   e. C9 weapon with EIS, 2 per section;

   f. SRAAW(L) drill weapon, 2 per section;

   g. vehicle and driver, 1;

   h. radios, 2;

   i. material to cam eqpt, as required; and

   j. AN/PVS-505 and AN/TVS-505 night viewing device.

6. **Preparation**:

a. Recce the ground and select positions for the vehicle for tank hunting. Select realistic tank lines of approach, ambush positions and killing zones.

b. Brief the vehicle driver on his actions and the method of communication.

c. Fit telescopic sights, layout the SRAAW(M) team equipment and weapons by groups including drill rounds and camouflage material.

d. Chamber test all the drill rounds.

e. Prepare a paper on clipboard as follows:

TEAM A NAME/FAULTS	TEAM B NAME/FAULTS	TEAM C NAME/FAULTS

f. To score deduct one point for each mistake and five points for each safety error.

g. Ensure night viewing devices are available and in working order.

CONDUCT OF THE LESSON

7. **Safety Precautions**. Normal.

8. **Review**. Nil.

9. **Introduction**. When dealing with an armour threat at night the SRAAW(M) team must be able to conduct themselves effectively by using the ground to carry out any movement and to handle the gun instinctively in the dark. The team must also understand the tactics of tank stalking and the setting of a tank ambush by night.

SUGGESTED PRACTICE BY DAY

10. **Camouflage and Movement**. Allocate personal weapons to the SRAAW(M) teams. Have the teams practice the following:

a. camouflage—personal, weapons and ammunition containers;

b. methods of carriage and movement across varied types of ground and obstacles;

c. weapon handling drills—to ensure the operability of camouflaged weapons; and

d. change gun numbers and do the practice again.

11. **Tactical Knowledge**. Relating to the chosen area of ground. Question the section on the following:

a. characteristics of a good SRAAW(M) fire position;

b. the factors to be considered and the information needed to plan and carry out tank hunting; and

c. the factors to be considered when setting a tank ambush.

DAYLIGHT PREPARATION FOR NIGHT PRACTICE

12. **General**. The groups are to be equipped as a section. Section instructors to act as section commanders.

13. **Daylight Briefing—Tank Hunting**. Position the vehicle, brief the driver and any assessors being used as enemy. Brief the section on the following:

a. the tactical setting;

b. the aim;

c. final fire position—alternate position;

d. likely line of approach and bounds;

e. the section formation;

f. fire position for rifleman and C9s—local protection;

g. means of communication and signals; and

h. consolidation point or RV.

14. **Daylight Briefing—Tank Ambush**. Position the vehicle, brief the driver on his line of approach and the signal to move. Brief the section on the following:

a. the tactical setting;

b. likely lines of enemy AFV approach;

c. selection of ambush positions;

d. any observation posts (OPs) required;

e. position of C9s and SRAAW(M) if used;

f. communication and signals; and

g. consolidation and RV.

NIGHT PRACTICE

15. Brief the driver and critics and allow them time to move into position. The SRAAW(M) team and section are to prepare in a safe area. Conduct the practice and debrief the section and any critics used.

16. Organize the section, detail a different SRAAW(M) team and repeat exercise.

FINAL PRACTICE

17. A suggested method of conducting the final practice is to organize a simple competition requiring teams to:

a. stalk to a fire position using various methods of movement;

b. judge distance and fire from these positions;

c. move to an alternative ambush position;

d. each team checks the faults of the opposing team; and

e. practice each team and record scores on the scoresheet.

CONCLUSION

18. **End-of-lesson drills**:

a. answer questions from the class on the entire lesson;

b. reinforce normal safety precautions;

c. summarize the lesson, emphasizing the overall standard attained and the weak points;

d. provide a preview of the next lesson in this subject; and

e. pack kit.

PRACTICE LESSON 6
NBCD HANDLING

INSTRUCTOR'S NOTES

1. **Aim**. Check the material has been learned by holding practices and competitions to correct weaknesses and maintain the level of skill required.

2. **Main Teaching Points**:

   a. loading and unloading in various fire positions;

   b. aiming at stationary and moving targets using telescopic and iron sights; and

   c. firing and misfire drills.

3. **Time**. One 40-minute lesson.

4. **Method**. Indoor/outdoor practice lesson.

5. **Stores**. The following equipment is required:

   a. NBC kit complete, 1 per soldier;

   b. 84 mm gun, 1 per 3 soldiers;

   c. 84 mm drill rounds, 2 per gun;

   d. duplex ammunition containers, as required;

   e. AFV recognition posters, as required;

   f. representative targets, as required; and

   g. stopwatch, 1.

6. **Preparation**:

   a. Check that the stopwatch is serviceable.

   b. Chamber test all drill rounds.

   c. Fit telescope to each gun.

   d. Position representative targets.

e. Prepare chalkboard for the final practice as follows:

TEAM	LOADING / UNLOADING HPS 20	AIMING / FIRING HPS 10	MISFIRE DRILLS HPS 20	TOTAL HPS 50

f. To score the loading and unloading, deduct one point for each error in drill and one point for each second over the time limit. To score in the aiming and firing, deduct points for inaccurate sight setting and errors in drill. To score the misfire drills deduct one point for each mistake and five points for each safety error.

7. **Miscellaneous**:

a. Although the final practice competition in firing and misfire drills carries no time limit, the section should be encouraged to complete drills quickly, except when stripping and assembling required during misfire drills.

b. During **TOPP HIGH** practice, have other gun detachments at **TOPP MEDIUM** to check faults.

CONDUCT OF THE LESSON

8. **Safety Precautions**. Supervised.

9. **Review**. Nil.

10. **Introduction**. Lessons taught initially and the related practice lessons will instill confidence in the operating procedures required to achieve battle effectiveness with the gun in NBC conditions. The drills are the same, except the difficulty of carrying out the drills in an NBC suit. Consistent practice will be required to become operationally effective under these conditions.

SUGGESTED PRACTICE

11. **Loading and Unloading**: (State **TOPP MEDIUM** and then **TOPP HIGH**)

a. do not impose a time limit initially to allow gun crews to gain confidence;

b. alternate within the section until each soldier has practiced the duties as No. 1 and No. 2 on the gun; and

c. repeat the practice under state **TOPP HIGH** conditions and later introduce a time limit.

12. **Sight Setting**, **Aiming and Firing**.

a. have the section practice setting sights to varying ranges on both telescopic and iron sights;

b. have the gun numbers practice in aiming and firing with the telescopic and iron sights at stationary and moving targets; and

c. use assessors to check for errors.

13. **Action Should Gun Fail to Fire**. Have the section practice the various fire positions in the following:

a. the initial drill on a failure to fire; and

b. the subsequent drill if the gun still fails to fire giving the necessary orders to indicate:

(1) a faulty round; and

(2) a damaged or broken part.

FINAL PRACTICE

14. A suggested method of conducting the final practice as a competition is as follows:

a. Have SRAAW(M) gun teams practice loading and unloading. Score as suggested in para. 6f above.

b. Conduct a practice in aiming and firing, paying particular attention to the accurate setting of sights.

c. Have each team practice firing drills and misfire drills. Score as suggested in para. 6f above.

d. Record team results on scoreboard.

CONCLUSION

15. **Before concluding the lesson**:

a. answer questions from the class on the entire lesson;

b. reinforce normal safety precautions;

c. summarize the lesson, emphasizing the overall standard achieved and any weak points;

d. provide a preview of the next lesson in this subject; and

e. pack kit.

PRACTICE LESSON 7
NBC TACTICAL HANDLING

INSTRUCTOR'S NOTES

1. **Aim**. Check the material has been learned by holding practices and competitions to correct weaknesses and maintain the level of skill required.

2. **Main Teaching Points**:

   a. movement and selection of a fire position;

   b. tank hunting; and

   c. operation in a tank ambush.

3. **Time**. Two 40-minute periods.

4. **Method**. Outdoor practice period.

5. **Stores**. The following equipment is required:

   a. NBC kit complete, 1 set per soldier;

   b. 84 mm gun complete, 1 per section (additional weapons will be required for the camouflage and movement phase and for ambush drills if more than one SRAAW(M) team is to be exercised);

   c. 84 mm drill rounds, 4 per gun;

   d. duplex ammunition containers, 2 per gun;

   e. C7, 1 per rifleman;

   f. C9, 2 per section;

   g. SRAAW(M) Carl Gustav drill weapon, 2 per section;

   h. vehicle and driver, 1;

   i. radios, 2; and

   j. camouflage material, as required.

6. **Preparation**:

   a. Recce the ground and select positions for the vehicle for tank hunting. Select realistic tank lines of approach, ambush positions and killing areas.

b. Brief the vehicle driver on his actions as the enemy vehicle driver and the method of communication.

c. Fit telescopic sights, lay out the SRAAW(M) team equipment and weapons by groups, including drill rounds and camouflage material.

d. Chamber test all drill rounds.

e. Prepare a score sheet as follows for the final competition:

TEAM A		TEAM B		TEAM C	
NAME	FAULTS	NAME	FAULTS	NAME	FAULTS

7. **Miscellaneous**:

a. Number the section in groups of three and allocate each group to a gun for the initial movement and selection of a fire position. Then prepare the groups as a section for either the tank hunting or setting an ambush.

b. Alternate members of each group through the duties of No. 1, No. 2 and assessor throughout the practice.

c. The section will be placed on state "TOPP LOW."

CONDUCT OF THE LESSON

8. **Safety Precautions**. Normal.

9. **Review**. Nil.

10. **Introduction**. The principle of "one round—one kill" has to be maintained even under NBC conditions. The armoured threat could well be even more evident at such times. Only with persistent practice in NBC clothing will the required weapons handling standard be achieved.

SUGGESTED PRACTICES

11. **Movement and Selection of Fire Positions**. Allocate personal weapons to the SRAAW(M) teams. Detail assessors. Practice the teams in the following:

a. methods of carriage and movement across varied types of ground;

b. adoption of various types of fire positions and weapon handling drills; and

c. change the gun numbers and critics and conduct the practice again.

12. **Tank Hunting**. The group is to be equipped as a section. Section instructor is to act as section commander. Position the enemy vehicle, brief the driver and any assessors.

13. **Tank Ambush**. Position the vehicle and brief on his line of approach and signal to move.

FINAL PRACTICE

14. Do this in the same manner as Practical Lesson 5.

CONCLUSION

15. **Before concluding the lesson**:

a. answer questions from the class on the entire lesson;

b. reinforce normal safety precautions;

c. summarize the lesson, emphasizing the overall standard attained and the weak points;

d. provide a preview of the next lesson in this subject; and

e. pack kit.

CHAPTER 4
INFORMATION FOR INSTRUCTORS

SECTION 1
DESCRIPTION, AMMUNITION, STRIPPING, ASSEMBLY AND CLEANING

1. **General**. It may be necessary, working in extreme conditions of sand or dust, to strip and clean areas of the gun that have not been previously taught. Such further stripping is to be carried out only by those officers and NCOs who have received instruction on the subject on a recognized course. The information for the instructor is provided as general information and is not to be taught on basic skill lessons.

2. **Data**. Not all of the data contained in this article is of importance to the infantry soldier and is provided as supporting information for instructors.

3. **General Data**:

   a. Total weight of weapon with cleaning equipment, tools, gun board and gun cover (canvas) is 29.5 kg (M2) and 21.5 kg (M3).

   b. Weight of the weapon with face pad and sling is 14.2 kg (M2) and 8.5 kg (M3 without the impact protector).

   c. Weight of mount is 0.8 kg (M2) and 0.5 kg (M3).

   d. Weight of telescopic sight unit M2 is 0.91 kg.

   e. Weight of gun with mount and telescopic sight unit is 15.91 kg (M2) and 9.91 kg (M3).

   f. Length of gun is 113 cm (M2) and 106.5 cm (M3).

4. **Barrel**:

   a. **Bore**. Made up of land and grooves:

      (1) Diameter—84 mm.

      (2) Twist of rifling, right hand, irregular (accelerating); one turn in 43 calibres (i.e., 84 mm x 43 calibres = 3.612 mm for a full turn).

(3) Length of barrel without the venturi—84.3mm.

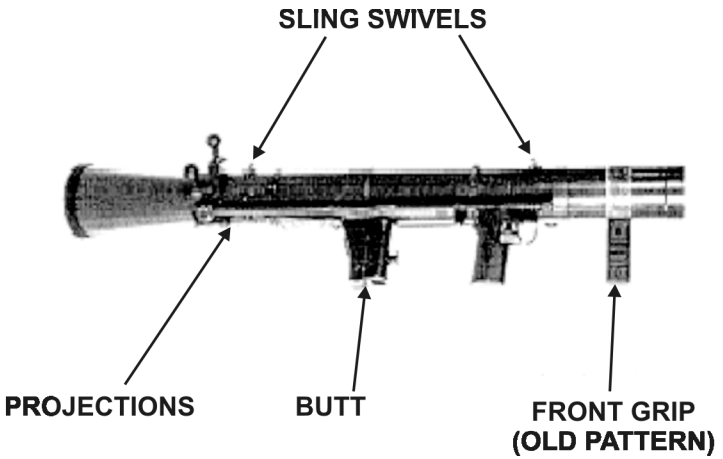


Figure 4-1: Barrel (Model M2)

5. **Description**:

a. The barrel of the M2 (Figure 4-1) is a forged steel tube, which is shaped internally at the rear end to form a chamber. From the front of the chamber, the barrel is rifled out to the muzzle. The rear end of the barrel is enlarged in diameter. Externally, the right side has a guide over which the venturi guideway is located in the closed position. Secured to the bottom of the rear face is a triangular-shaped projection, which guides the cartridge rim into its seating. It has a stop face to limit the opening movement of the venturi. On the left side of the barrel, two keyways, one wide and one narrow, hold the telescope sight mount and rear sight bracket support (M2 telescopic sight). At the front of the barrel, a projection forms a housing for the front sight. Two sling swivels are fitted to the barrel for carrying purposes.

b. As far as the M3 is concerned, the difference lies in the composition of the barrel, which consists of a thin layer of steel (interior) covered in a laminate of fibreglass and carbon fibre. Many of the outer parts are made of plastic or aluminium, including a moulded carrying handle.

c. In view of the addition of new types of ammunition, the Land Force Equipment Procurement Directorate is currently considering a number of options for replacing the M2 sight. This is essentially a sight that will allow the use of the Carl Gustav with all the new types of ammunition. This sight could be adjusted longitudinally, if the use of a rail-type mount were selected (somewhat like the C9 sight for the C7 rifle).

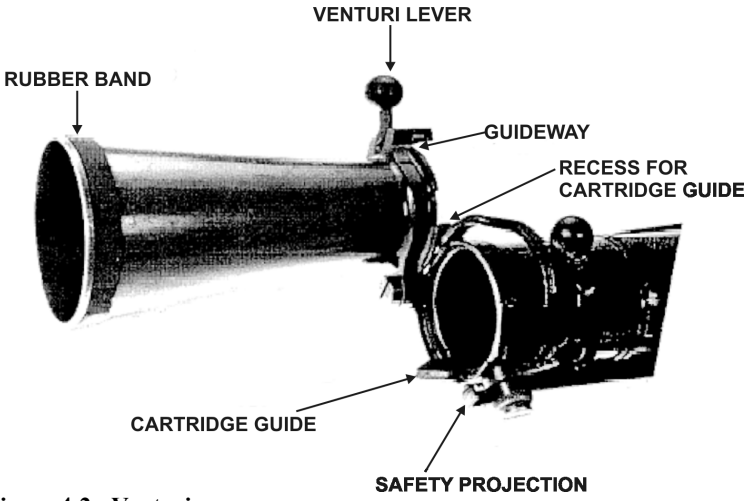


Figure 4-2: Venturi

d. The venturi (Figure 4-2) is in the form of a cone-shaped cylinder. At the rear end it is fitted with a rubber band to reduce the metallic sounds, which would occur when closing the venturi. Formed between two lugs is a rim, which, on one side of the venturi, is cut away to fit over the cartridge guide.

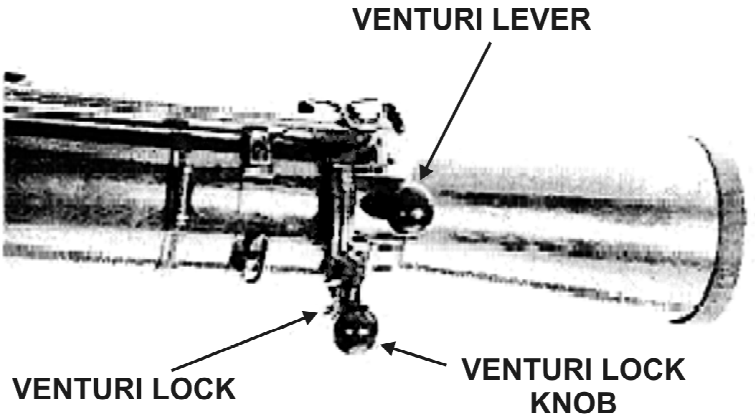


Figure 4-3: Venturi Lock

e. The venturi lock (Figure 4-3) is semi-circular in shape and has a knob at the top to facilitate movement. At the rear of the housing, the lock is fitted with a safety projection, which prevents the gun from being fired while the venturi is open or before it is fully locked in the closed position. The venturi is locked in the closed position by the venturi lock.

6. **Ammunition**. The SRAAW(M) Carl Gustav, models M2/M3, can fire a broad range of 84 mm ammunition available in NATO. Recently, developments related to the weapon system have seen the appearance of not only an improved version of the gun and its sight system, but also a new range of ammunition allowing for much broader use, better suited to the requirements of the modern battlefield. The Canadian Forces already use a substantial number of this ammunition and are currently studying the requirement for procuring flare ammunition and ammunition against reactive armour.

a. **Cartridge 84 mm HEAT RAP FFV 551**:

(1) The shell is fin stabilized and rotates slowly during flight. The rocket motor assist enables the shell to obtain a flat trajectory over its short time of flight.

(2) The hollow charge explosive filling plus a piezo-electric fusing system enables the shell to function at large angles of impact

with high penetrating power. Safety features are included in the fusing system,which allow the shell to be fired through brush and scrub without igniting.

(3) The cartridge has the following characteristics:

(a) maximum range—up to 700 m;

(b) time of flight:

i. 400 m—1.3 s;

ii. 500 m—1.6 s;

iii. 600 m—1.9 s; and

iv. 700 m—2.2 s.

(c) arming distance—5 to 15 m;

(d) maximum angle of impact—800 mils to normal impact;

(e) penetration, solid armour—up to 400 mm; and

(f) operating temperature range—-40°C to +60°C.

(4) **Description**. The projectile assembly consists of the following main parts:

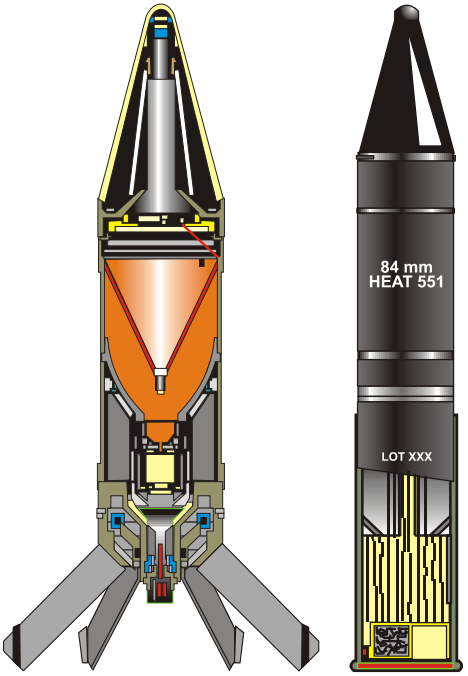


Figure 4-4: Projectile HEAT RAP FFV 551

(a) **Nose**. This consists of a plastic ballistic cap and a light alloy distance tube (shock transmitter). The front end of the distance tube is fitted with an edge of steel to decrease the natural tendency of a shell to slip from the point of impact.

(b) **Projectile body**. The body is made of light alloy and contains a bursting charge consisting of 500 grams of octol, a copper liner and a booster. The booster is press loaded with 8 grams of tetryl.

(c) **Fuse**:

(i) The fuse system has a pressure activated (piezo)

generator, an arming device with an electric detonator and an inflight safety device.

(ii) To prevent accidental arming of the rotor in the arming device, there are two mechanical safety devices which function independently of each other.

(d) **Rocket motor**:

(i) The motor body is made of light alloy. The base of the shell forms the front closure of the rocket chamber. The aft closure, also of light alloy, has a rocket motor nozzle and contains the delay unit and the ignition charge. The rocket motor charge consists of about 300 g of smokeless double base propellant.

(ii) On firing, the propellant gases ignite the delay composition, which, in turn, ignites the ignition charge of the rocket motor through the delay unit intermediate charge. The ignition charge then ignites the rocket motor charge and the pressure rises. To ensure effective ignition of the rocket propellant, the delay unit has been designed to leave the nozzle when the motor pressure exceeds a

predetermined figure. The shell is then about 18 m in front of the gun. On leaving the nozzle, the delay unit continues forward in the line of fire at slow speed. The rocket motor propellant burns for 1.5 seconds.

(e) **Stabilizing Unit**. This unit is fitted to the aft closure of the rocket motor during assembly of the cartridge and consists of a light alloy fin section and a plunger device with two non-return gas valves.

(f) **Slipping Ring**. This teflon ring is located externally between the aft closure of the rocket motor and the stabilizing unit. Although the shell is fired from a rifled barrel, the slipping ring ensures that the rate of spin does not reach a rotation that would degrade the fin stabilization of the shell or the hollow-charge performance of the high explosive.

b. **Cartridge 84 mm TP RAP FFV 552**:

(1) **Performance**. The target practice (TP) projectile FFV 552 is the practice version of the HEAT round FFV 551 and has the same ballistic characteristics.

(2) The practice projectile resembles the HEAT RAP FFV 551 counterpart only in the area of the rocket motor and aft closure. The remaining components are made largely from aluminum alloy and contain no explosives. The weight of the explosives omitted is made up by using a thick walled forward portion.

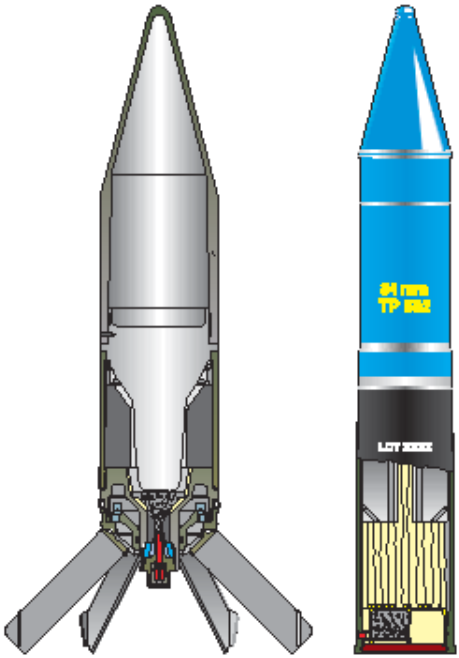


Figure 4-5: Cartridge TP RAP FFV 552

c. **Cartridge 84 mm Flare FFV 545**:

(1) This cartridge is used to illuminate the battlefield to support direct antitank fire. It consists of a variable-chronometry pyrotechnic fuse (adjustable), a light alloy case, a container with a sodium flare compound (500 g) and a nylon parachute, for a total weight of 2.2 kg (without the loading cartridge).

(2) The variable chronometry pyrotechnic fuse (nose) can be adjusted between 200 and 2,300 m at 50 m intervals. Three preselected distances can be set quickly at night with a “click.”

(3) The flare container is ejected and begins illumination at 650 000 candela (cd) at an altitude of approximately 200 m, covering an area 500 m in diameter.

(4) The container descends slowly with its parachute brake, giving an average 30 seconds of illumination.

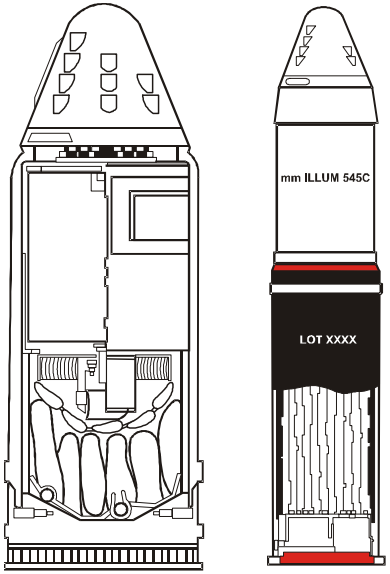


Figure 4-6: Cartridge Flare FFV 545

d. **Cartridge 84 mm Double Fin HEDP FFV 502**. This type of ammunition is described in detail in Chapter 2, Lesson 1.

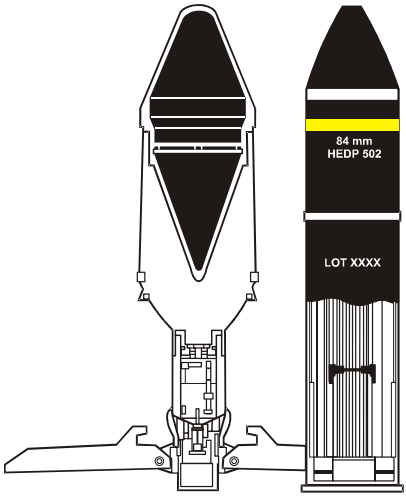


Figure 4-7: Cartridge HEDP FFV 502

e. **Cartridge 84 mm HEAT RAP FFV 751**:

(1) The shell is fin stabilized and rotates slowly during flight. The rocket motor enables the shell to obtain a flat trajectory over its short time of flight (comparable to the FFV 551 cartridge).

(2) The tandem charge (front charge against reactive armour and hollow main charge) plus a piezo electric fusing system give the shell sufficient penetrating power to destroy all existing tanks from the side at large angles of impact, even those equipped with reactive armour. Safety features are included in the fusing system, which allow the shell to be fired through brush and scrub without igniting.

(3) The cartridge has the following primary characteristics:

(a) weight (without loading cartridge)—2.9 kg;

(b) effective range—over 500 m;

(c) shell speed:

i. 210 m/s muzzle velocity; and

ii. 340 m/s maximum.

(d) Penetration, reactive armour—over 425 mm of laminated armour.

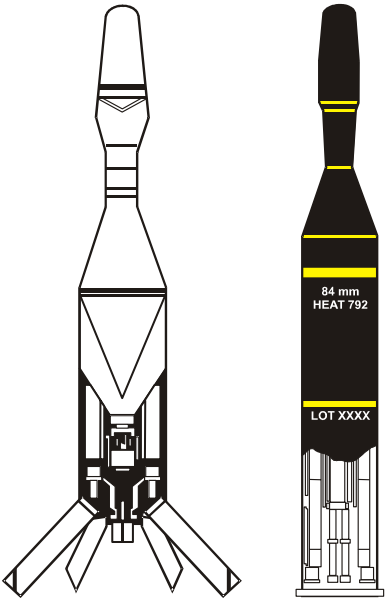


Figure 4-8: Shell HEAT RAP FFV 751

f. **Cartridge 84 mm Smoke FFV 469B/C**:

(1) The shell consists of a direct action fuse, a body containing a non-toxic titanium tetrachloride and calcium silicate compound and a central smoke emission tube. The smoke effect develops on impact with the ground.

(2) The main functions are:

(a) **blinding** when fired directly at the target;

(b) **smoke screen** when fired in front of the target; and

(c) **target spotting** for artillery and close air support.

(3) The main characteristics of the round are:

(a) weight of shell (without loading cartridge)—2.2 kg;

(b) effective range—1,300 m;

(c) muzzle velocity—240 m/s; and

(d) weight of smoke compound—800 g.

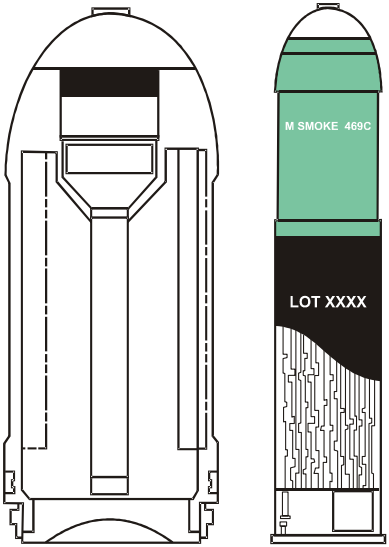


Figure 4-9: Cartridge 84 mm Smoke FFV 469B/C

7. **Additional Stripping and Assembling**. Additional stripping of the weapon may be done under supervision by an NCO or officer with the correct qualifications as follows (Figures 4-10, 4-11, 4-12):

a. Remove the screw and retaining leaf spring from the trigger and sear axis pins. Remove the safety catch, withdraw the axis pins and remove the trigger with its spring and the sear with its spring.

b. Unscrew the extractor axis screw and remove the extractor with spring. Separate the extractor and spring by removing the screw.

c. Assembly is in reverse order. Care must be taken when replacing the sear to ensure the claw is towards the venturi, with the spring towards the barrel.

d. Using the sight-adjusting tool, remove the retaining nut and push out the pivot pin. Assemble in the reverse order.

e. Remove the extractor retaining screw and remove the spring. Assemble in reverse order.

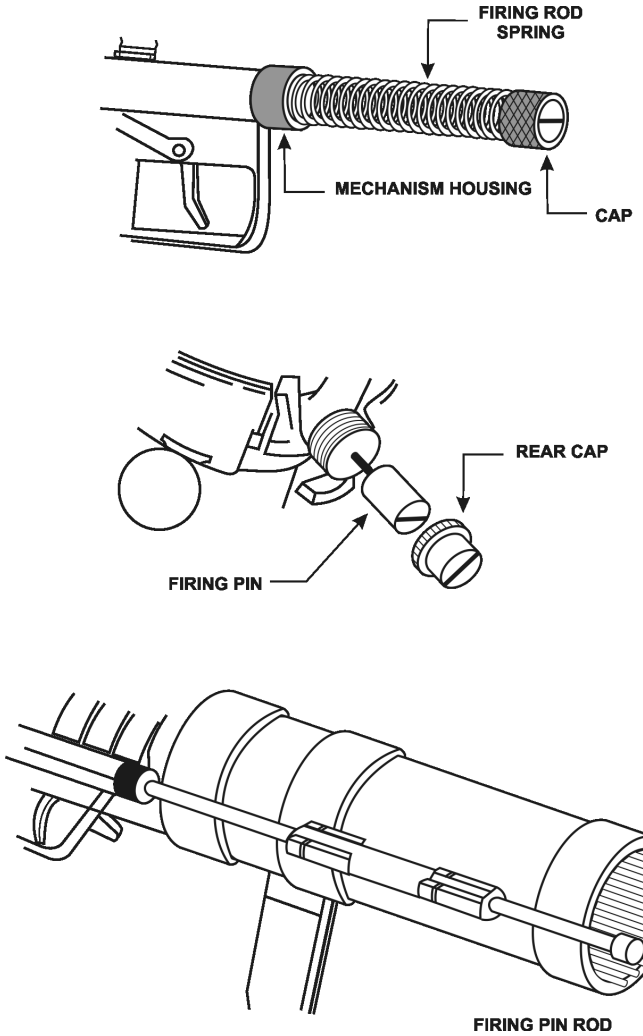


Figure 4-10: Basic Stripping

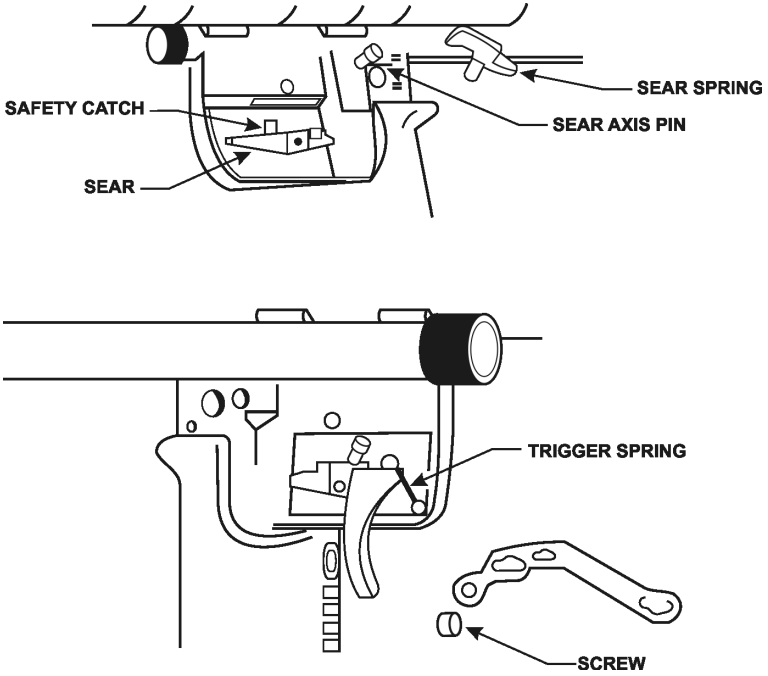


Figure 4-11: Removing Retaining Leaf Spring Safety Catch—Trigger and Sear

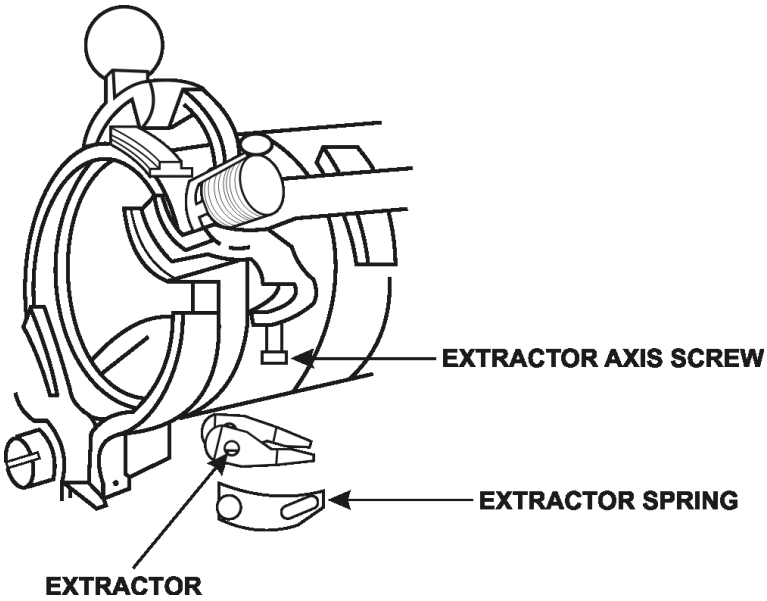


Figure 4-12: To Remove Extractor and Spring

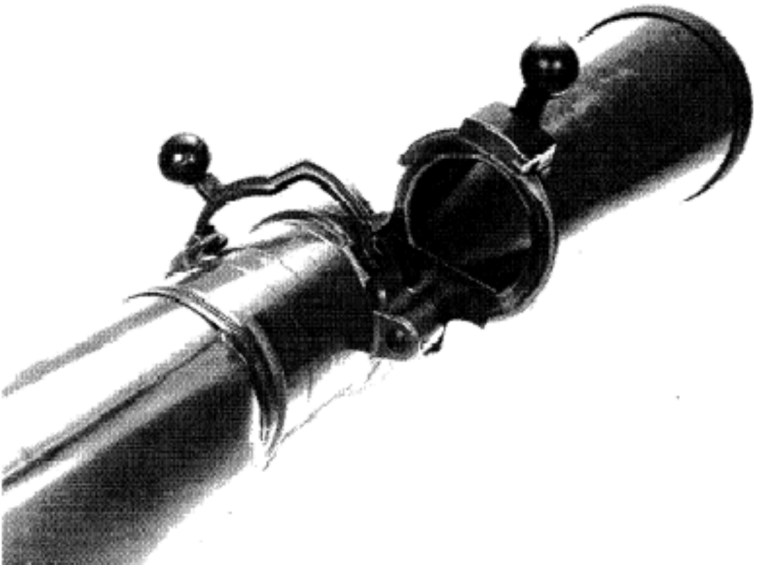
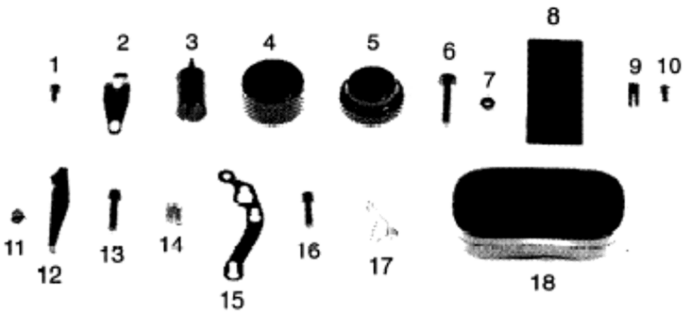


Figure 4-13: Checking Venturi

8. **Cleaning**. After carrying out cleaning before firing, the clearance between the front face of the venturi and the rear face of the breech at the venturi axis screw must be checked. With the venturi in the open position, the 0.25 mm venturi clearance gauge "No Go" is held against the joint (see Figure 4-13). It should not be possible to insert the gauge into the joint. If it can be inserted, the unit weapons technician must be informed and adjustment made to the setting of the venturi axis screw.

9. No. 2 spare part bag, which also has one metal spare parts box, contains the items listed in Figure 4-14.



1. Extractor spring screw leaf
2. Extracor spring
3. Firng pin
4. Front cap
5. Rear cap
6. Front sight pivot pin
7. Front sight retaining nut
8. Plate gauge 0.25 mm (Venturi clearance "No Go")
9. Range indicator
10. Range indicator or retaining spring screw
11. Two spring screw
12. Sear
13. Sear axis pin
14. Two sear springs
15. Retaining leaf spring
16. Trigger axis pin
17. Trigger spring
18. Metal spare part box

Figure 4-14: Spare Parts and Box

10. **Zeroing the Sub-Calibre Adapters FFV 553 and L1A2**.

a. The use of the sub-calibre adapters FFV 553 and L1A2 is an economical way in which to practice weapon crews in engaging targets and weapon drills. In addition, weapon crews become familiar with the weapon prior to firing full-calibre ammunition. To obtain best results, the sub-calibre adapter must be zeroed to the gun with which it is normally used.

b. **Adjustment during zero**:

(1) There are four zeroing screws at right angles around the front of the casing of the adapter held by grub screws through the front of the casing. Copper locking plugs are placed between the grub screws and zeroing screws to avoid damaging the zeroing screws. The zeroing screws are in opposing pairs and adjustment of these screws will move the mean point of impact (MPI) laterally and vertically.

(2) Before adjustments are made on the zeroing screws, the grub screws must be loosened and after every adjustment they must be tightened.

(3) To adjust the MPI, always move the barrel in the direction the shot is to go; that is, if the MPI is to move to the right, loosen the right hand screw and tighten the left.

(4) One half turn of the zeroing screws will move the MPI approximately 250 mm at 100 metres. A correctly zeroed adapter will have the MPI fall on the correct zero position (CZP), which is level with the point of aim and 100 mm to the right of it. This compensates for the distance between the line of sight and axis of the barrel, which are theoretically parallel after boresighting. The permissible variation at 100 m is 100 mm in all directions from the CZP.

(5) Both the casing and adapter are numbered; hence prior to use, ensure that the numbers correspond.

(6) The correct sequence of zeroing is to first rough zero and then zero, as described in the present chapter. The gun must be boresighted before starting.

c. **Rough Zeroing the Device**:

(1) Place the front boresight in the muzzle of the weapon. Remove the adapter from the device and place the device in the weapon. Close the venturi and place the rear boresight in the back of the venturi.

(2) Sight through the rear boresight down the barrel of the device to the muzzle boresight. Remove the device, and bring the centre of the barrel onto the centre of the front boresight with the zeroing screws by trial

and error. Replace and remove as necessary.

d. **Zeroing**:

(1) Prepare the device for firing and carry out loading drills.

(2) With the telescopic sight unit set at 100 m, fire a three round group.

(3) Check the MPI of the group and make lateral and vertical adjustments as necessary to superimpose the MPI on the CZP. Fire a three round group after each adjustment.

(4) When the zero has been established with the telescopic sight unit, a group should be fired using the open sight to check its zero. If it has been boresighted correctly, it should be aligned.

(5) The 6.5 mm tracer projectile does not conform exactly to full calibre ballistics at all ranges.

11. **L1A2 Sub-calibre Firing Mechanism**:

a. **Cocking Action**:

(1) By drawing back on the cocking cap with the cocking tool, the entire firing pin housing is drawn to the rear. This compresses the firing pin spring between the firing pin and the firing spring rear seating.

(2) When the firing pin housing has been drawn approximately half way to the rear, the hooked end of the safety sear clears its safety cocking notch, allowing it to rotate under the influence of its sear spring so that the hooked end is in front of and in line with its safety cocking notch. This prevents the accidental firing of the device.

(3) When the firing pin housing has been drawn fully to the rear of the toe of the cocking sear, it rotates under the influence of its sear spring. When the cocking tool is removed, the firing pin housing moves forward until the cocking notch bears against the toe of the cocking sear holding the firing pin to the rear. The mechanism is now cocked.

b. **Safe Position**. When the firing mechanism of the adapter is positioned at "S," both the cocking sear and the safety sear are positioned out of alignment with their respective firing plunger. Neither sear can become disengaged.

c. **Action When Rotating from "S" to "F"**:

(1) When the mechanism is rotated from "S" to "F," the cocking and safety sears are moved into alignment with their respective firing and safety plungers.

(2) The action of rotating the mechanism to the "F" position must be done prior to inserting the body fully into the parent weapon because, once the adapter is fully inserted into the gun, the safety plunger protrudes through the inside of the casing of the adapter, thus restricting the rotation of the mechanism. There is still no danger of accidental firing, as the safety sear is still in position to arrest the forward movement of the firing pin housing.

d. **Action When Fully Inserted into the Parent Weapon**:

(1) When the adapter is fully inserted into the weapon, the safety plunger is forced by the side of the barrel to bear against the safety sear and pivot out of alignment with its cocking notch. The mechanism is now positioned for firing.

(2) The safety sear is made up of two pieces, with a spring which causes them to work together, as long as the hooked end of the sear is not engaged in the safety cocking notch. When the hooked end is engaged, the rear portion will rotate but the sear will not move from in front of its cocking notch, thus preventing accidental firing on insertion into the weapon should the cocking sear be disengaged.

12. **Firing Action**:

a. When the firing pin of the 84 mm strikes the firing plunger, it forces the plunger through its recess in the body to strike the cocking sear.

b. The toe of the cocking sear is forced out of engagement with its cocking notch. The firing pin spring reasserts itself, forcing the firing pin violently forward to strike the cap of the round.