

**WEAPONS**

**VOLUME 11**

**TOW TRAINING POLICY  
(ENGLISH)**

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Issued on Authority of the Chief of the Land Staff

**Canada**

## **WEAPONS**

## **VOLUME 11**

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Issued on Authority of the Chief of the Land Staff

**OPI: Anti-armour Cell**

**2000-04-28**

**Canada**

## **FOREWORD**

1. B-GL-385-011/PT-001, *Weapons, Volume 11, TOW Training Policy* is issued on authority of the Chief of the Land Staff.
2. It is effective upon receipt.
3. Unless otherwise noted, masculine pronouns contained herein refer to both genders.
4. Suggestions for changes shall be forwarded through normal channels to The Infantry School, Attention: Chief Standards Officer.

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## **CHAPTER 1 ANTI-ARMOUR TRAINING**

### **SECTION 1 AIM AND SCOPE**

#### **GENERAL**

1. Tube-launched optically-tracked wire-guided (TOW) weapon system training must be progressive. A soldier that has recently completed an anti-armour gunner's course will be proficient at individual skills - gun drills, armoured fighting vehicle (AFV) recognition and tracking. Maintaining these basic skills through continuation training is necessary while expanding the employment possibilities of the anti-armour detachment, section, and platoon through collective training. Consequently, all members of an anti-armour platoon must master and maintain individual skills before progressing to collective training. This progression must be closely monitored to ensure that all crew members are employed within their personal capabilities.

#### **AIM**

2. The aim of this manual is to give anti-armour commanders guidance for training and maintaining the skills of gunners, detachments, sections, and platoons in accordance with the infantry battle task standards and LFCO 21-14. It incorporates individual training using indoor and outdoor simulators and collective training for detachments and sections prior to TOW concentrations. The following manuals contain additional information pertinent to the conduct of training:

- a. B-GL-385-014/PT-001 *Weapons, TOW Long Range Weapon System;*
- b. B-GL-392-001/FT-001 *Infantry TTPs;*
- c. C-10-369-000/MB-001 *TVIGS Operator's Instructions;*

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- d. C-10-380-000/MB-000 *PGS Operator's Manual*;
- e. B-GL-383-002/PT-015 *Battle Task Standards - Infantry*;
- f. LFCO 21-13, AFV Standards;
- g. LFCO 21-14, Anti-armour Training; and
- h. Through Sight Video Camera System Recorder Operation Manual.

## **SECTION 2 INDIVIDUAL TRAINING**

### **TRACKING**

3. Tracking is the most basic of TOW skills, and time spent on tracking is directly proportional to hit percentages. It is a progressive skill. Therefore, gunner proficiency must be improved by continuous, reiterative exposure to tracking scenarios under indoor and field conditions. If time and resources are scarce, the priority for each detachment is, in order: gunner (no 2); loader (no 3); crew commander (no 1); and driver (no 4). Platoon headquarters staff who may be required to fire should track if time permits.

4. Tracking is a perishable skill. Gunners should practice regularly to maintain a basic tracking ability. Chapters 2 and 3 state the specific skill levels to be attained annually or before live firing on the indoor and outdoor training simulators.

### **AFV AND AIRCRAFT RECOGNITION**

5. The requirement for anti-armour platoon personnel to be proficient at AFV and aircraft recognition has been illustrated most recently by the unexpected number of fratricide incidents that occurred during the Gulf War. LFCO 21-13 defines the standards and types of vehicles that must be mastered.

6. AFV recognition is an individual skill. A soldier's proficiency is directly related to the amount of AFV recognition training conducted. Self-study can be done with the aid of computer multimedia programs (ACES, INTEREST), 35 mm slides, models, and reference books. As soldiers progress, the instructor should continue to challenge them by eliciting responses for each vehicle on:
- a. the type of missile that can destroy it;
  - b. the range at which the AFV can engage; and
  - c. the night fighting capability of the AFV.

### **ADDITIONAL SKILLS**

7. Other individual skills such as calculating target engagement data, radio voice procedure, reports and returns, and tactical driving are common to all soldiers but have specific applications to anti-armour platoons. These skills must be taken into consideration in the platoon's training plan.

## **SECTION 3 COLLECTIVE TRAINING**

### **DRILLS**

8. Dry gun drills should be practiced monthly as a detachment, with all members of the crew rotating through the different positions. Drills should be conducted first in the dismounted configuration, then in the mounted configuration of the unit. Drills can be evaluated using the appropriate checklists as found in the B-GL-385-014/PT-001 *Weapons, TOW Long Range Weapon System*.

9. Once assembly and disassembly drills are mastered, the detachment should perform engagement drills. When the section and platoon commander are satisfied with the performance of detachment drills, sections should practise as a single entity up to and including a fire control sequence.

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10. Detachments and sections, accomplished with dry gun drills, should next be evaluated under simulated firing conditions. AFV recognition, weather effects, blast simulation, and restricted engagement times will affect the detachment and section's ability to conduct timely and effective drills. The outdoor simulator provides very realistic live fire conditions and greater freedom to incorporate battlefield simulation. The detachment and section should be evaluated using the appropriate checklist.

## **TACTICAL MANOEUVRING**

11. Once dry gun drills and simulated target engagements have been mastered, detachments and sections should be evaluated on battle runs. These can include the use of the outdoor simulator and should be designed to incorporate battle-procedure, tactical driving, and target engagements. The appropriate checklists and score sheet should be used to debrief detachments and sections on their performance.

## **FIRE CONTROL**

12. Fire control is a detachment and section commander skill that should be practiced during all gun drill training and for every target engagement. In addition to controlling the direct fire of the detachment or section, the commanders must also be able to adjust indirect fire.

13. Detachment commanders must individually practise the sequence and content of fire orders before participating in detachment drills. They can practice on an indoor miniature range or with models. Section fire control can subsequently be exercised where the commander is responsible for designating targets to both detachments, determining the priority of engagement between multiple targets and directing all types of fire available.

## **SECTION 4 TOW TRAINING PROGRESSION**

### **PROGRESSION**

14. TOW training progresses as follows.
- a. Indoor tracking trainer to include:
    - (1) basic tracking tables;
    - (2) intermediate tracking tables; and
    - (3) advanced tracking tables.
  - b. Outdoor tracking trainer to include:
    - (1) basic tracking tables; and
    - (2) more advanced tracking tables, as required.
  - c. Tactical training to include:
    - (1) detachment battle runs;
    - (2) section battle runs; and
    - (3) tactical platoon exercises.
  - d. Live firing.

15. It is important to note that several forms of training can be done concurrently. Gaps in a training timetable may impede a steady progression. Regression is possible, especially for individual skills, if a minimum amount of time cannot be dedicated to continuation training. The table at Figure 1-1 shows the frequency of anti-armour training necessary to maintain individual and collective skills at established levels. It also dictates the minimum frequency of training required to progress from individual through collective training levels, culminating with the annual live fire qualification.

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16. The table at Figure 1-1 should be used as a guide while planning the platoon's annual training directive. The unit's training directive will direct a large portion of the platoon's training time; however, there is a sufficient variety of garrison and field training to allow for anti-armour training within this framework. Training up to platoon level should be completed before participating in unit training.

SER	TYPE OF TRAINING	LEVEL OF TRAINING			LEGEND
		DET	SECT	PL	
(a)	(b)	(c)	(d)	(e)	(f)
1	Indoor Tracking	W			W=weekly
2	Outdoor Tracking	M			M=monthly
3	Battle Run-Detachment	Q			Q=quarterly
4	Battle Run-Section		Q		S=semi-annually
5	Platoon Exercises			S	A=annually
6	Live Fire	A			
7	AFV Recognition	W			
8	Gun Drills	M			
9	Fire Control		M	Q	
10	TARGET Engagement Data		Q		

**Figure 1-1: Recommended Frequency and Progression of Anti-Armour Training**

**RECORD KEEPING**

17. Since anti-armour training is varied and multi-levelled, commanders must have an easy, efficient method of recording a gunner's progress. The unit employment record (UER) is used to record the member's participation in simulated and live firing exercises. AFV recognition scores and gun drill evaluations should be noted in the UER and may be reviewed during training periods.

**ANNEX A  
DETACHMENT BATTLE RUN**

1. PREPARE FOR COMBAT.
2. MOVE TACTICALLY.
3. FIRST POSITION (POSN):
  - a. OCCUPY AN ANTI-ARMOUR FIRING POSN;
  - b. ENGAGE A TARGET;
  - c. REACT TO INDIRECT FIRE; AND
  - d. REACT TO DIRECT FIRE.
4. MOVE TACTICALLY.
5. NEXT POSN:
  - a. OCCUPY AN ANTI-ARMOUR FIRING POSN;
  - b. ENGAGE A TARGET;
  - c. PERFORM MALFUNCTION DRILLS; AND
  - d. REACT TO CHEMICAL ATTACK.
6. MOVE TACTICALLY.
7. NEXT POSN:
  - a. OCCUPY AN ANTI-ARMOUR FIRING POSN;  
AND
  - b. ENGAGE A TARGET (MISSION-ORIENTED  
PROTECTIVE POSTURE [MOPP] HIGH).

**APPENDIX 1  
DETACHMENT BATTLE RUN**

**CHECKLIST/SCORESHEET**

DETACHMENT: \_\_\_\_\_

ANTI-ARMOUR PLATOON: \_\_\_\_\_(UNIT)

DETACHMENT COMMANDER:: \_\_\_\_\_

DATE: \_\_\_\_\_

GUNNER: \_\_\_\_\_

LOADER: \_\_\_\_\_

DRIVER: \_\_\_\_\_

1.	<u>BATTLE DRILLS</u>	<u>POINTS</u>
a.	Prepares for combat	___ /50
b.	Moves tactically	___ /40
c.	Reacts to indirect fire	___ /50
d.	Occupies anti-armour firing position	___ /120
e.	Engages a target	___ /120
f.	Reloads the launcher	___ /150
g.	Reacts to direct fire	___ /50
h.	Performs Hangfire/Misfire drill	___ /50
i.	Reacts to chemical attack	___ /40



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**BATTLE DRILL TOTAL**      \_\_\_/670

**NOTES :**

**EVALUATED BY:**

---

SERVICE NUMBER	RANK	NAME
----------------	------	------

## DETACHMENT BATTLE RUN

### CHECKLIST

1.	<u>PREPARES FOR COMBAT</u>	<u>POINTS</u>
a.	Driver performs vehicle maintenance	___ / 5
b.	Detachment commander verifies that communications and machine gun are operational	___ / 5
c.	Self-test performed (TOW under armour: includes systems checkout procedure)	___ /15
d.	Vehicle and individuals are camouflaged	___ / 5
e.	Vehicle is loaded according to unit standing operating procedures	___ / 5
f.	Detachment commander gives orders	___ /15
	<b>TOTAL</b>	<b>___ /50</b>
2.	<u>MOVES TACTICALLY</u>	
a.	Detachment commander planned and chose a good route before starting out	___ /15
b.	Good use of cover and concealment, vehicle not skylined	___ /15
c.	Open areas crossed quickly	___ /10
	<b>TOTAL</b>	<b>___ /40</b>

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3. REACTS TO INDIRECT FIRE

- a. Warning given on internal communications system      \_\_\_ / 5
- b. All personnel return to vehicle      \_\_\_ /10
- c. Driver and commander close hatches      \_\_\_ /10
- d. Detachment commander gives direction and distance to move      \_\_\_ /10
- e. Driver moves rapidly in the direction ordered      \_\_\_ / 5
- f. Detachment commander gives SITREP      \_\_\_ /10

**TOTAL**      \_\_\_ /50

4. OCCUPIES ANTI-ARMOUR FIRING POSITION (occurs three times during the exercise)

POINTS

- a. Position is hull down or in defilade      \_\_\_ /10 + \_\_\_ /10 + \_\_\_ /10 = \_\_\_ /30
- b. Good concealment      \_\_\_ /10 + \_\_\_ /10 + \_\_\_ /10 = \_\_\_ /30
- c. Position is occupied without showing the vehicle      \_\_\_ /5 + \_\_\_ /5 + \_\_\_ /5 = \_\_\_ /15
- d. Position has ease of exit      \_\_\_ /10 + \_\_\_ /15 + \_\_\_ /15 = \_\_\_ /45

**TOTAL**      \_\_\_ /120

5. ENGAGES A TARGET (occurs three times during the exercise)

- |    |   |   |
|----|---|---|
| a. | Detachment commander gives the alert                | $\underline{\quad} /10 + \underline{\quad} /10 + \underline{\quad} /10 = \underline{\quad} /30$ |
| b. | Detachment commander gives target indication        | $\underline{\quad} /10 + \underline{\quad} /10 + \underline{\quad} /10 = \underline{\quad} /30$ |
| c. | Detachment commander gives command to fire          | $\underline{\quad} /10 + \underline{\quad} /10 + \underline{\quad} /10 = \underline{\quad} /30$ |
| d. | Detachment commander sends CONTACT REPORT or SITREP | $\underline{\quad} /10 + \underline{\quad} /10 + \underline{\quad} /10 = \underline{\quad} /30$ |

**TOTAL**  $\underline{\quad} /120$

6. RELOADS LAUNCHER (occurs three times during the exercise)

- |    |   |   |
|----|---|---|
| a. | Detachment commander directs vehicle behind cover | $\underline{\quad} /10 + \underline{\quad} /10 + \underline{\quad} /10 = \underline{\quad} /30$ |
| b. | Detachment commander orders crew to reload        | $\underline{\quad} /5 + \underline{\quad} /5 + \underline{\quad} /5 = \underline{\quad} /15$    |
| c. | no 3 performs correct drills                      | $\underline{\quad} /20 + \underline{\quad} /20 + \underline{\quad} /20 = \underline{\quad} /60$ |
| d. | no 2 performs correct drills                      | $\underline{\quad} /15 + \underline{\quad} /15 + \underline{\quad} /15 = \underline{\quad} /45$ |

**TOTAL**  $\underline{\quad} /150$

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7.	<u>REACTS TO DIRECT FIRE</u>	<u>POINTS</u>
a.	Detachment commander gives warning <b>MISSILE OR TANK LEFT/CENTRE/RIGHT</b>	___ /10
b.	Detachment commander fires machine gun in the direction of the enemy (TUA: gunner fires smoke grenades)	___ /15
c.	Driver moves towards cover	___ /15
d.	Detachment commander sends <b>CONTACT REPORT</b> within 15 seconds of being under cover	___ /10
	<b>TOTAL</b>	<b>___ /50</b>
8.	<u>PERFORMS HANGFIRE/MISFIRE DRILLS</u>	
a.	no 1 performs proper drills	___ /10
b.	no 2 performs proper drills	___ /20
c.	no 3 performs proper drills	___ /20
	<b>TOTAL</b>	<b>___ /50</b>

9. REACTS TO CHEMICAL ATTACK

- a. Detachment commander gives warning **GAS-GAS-GAS** or **SPRAY-SPRAY-SPRAY** \_\_\_ /10
- b. Crew assumes appropriate mission-oriented protective posture (MOPP) within 1 minute \_\_\_ /10
- c. Driver moves out of area of contamination. \_\_\_ /10
- d. Detachment commander sends **CONTACT REPORT** within 15 seconds of being under cover \_\_\_ /10

**TOTAL** \_\_\_ /40

## **CHAPTER 2 TRAINING WITH TVIGS**

### **SECTION 1 TRAINING**

#### **GENERAL**

1. The TOW video interactive gunnery simulator (TVIGS) indoor trainer is an excellent system for the teaching and practice of tube-launched optically-tracked wire-guided (TOW) weapon system tracking skills. Although it is an indoor trainer, various elements of realism can be incorporated in it to provide better training. There are numerous different missions and many more targets a gunner may engage with this system. A much greater variety of engagements can be programmed by adding precipitation, fog, varying the target size, etc.

#### **ORGANIZATION OF TRAINING**

2. TVIGS has been conceived for indoor training. Only one man is required for its operation. Because of the responsibility associated with the operation of a complex and expensive piece of equipment, as well as the teaching/coaching aspect of the task, this operator should be a non-commissioned officer (NCO). At the minimum, an anti-armour platoon should have two or three NCOs qualified to conduct training with TVIGS. TVIGS should also be set up permanently in a training room. This enables training to start without losing time on system set up. Having this facility permanently staffed enables the ongoing training of platoon personnel. Such training may be given to anyone who has at least 30 minutes of training time available.

#### **STRUCTURE OF TRAINING**

3. Prior to training with TVIGS, TOW gunners should receive a refresher period of instruction on TOW firing principles and techniques (See B-GL-385-014/PT-001, *Weapons, TOW Long Range*

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*Weapon System*, Chapter 13). Before each training session, a quick refresher on firing principles should also be conducted. After each target engagement or series of target engagements, the NCO operating the TVIGS must analyse the tracking printout and debrief the gunner on his strengths and weaknesses.

4. Each gunner's performance will be kept on a TVIGS tracking table score sheet (See Annex A of this chapter). In order to keep track of a gunner's progression, the score sheet results will be noted in the member's unit employment record. This notation also provides the training NCO or platoon Warrant Officer with an easy and efficient way of allocating personnel to training.

5. Training with TVIGS must be paced to ensure a gunner maintains a high level of tracking skills without causing saturation. Platoons should have their gunners accomplish two or three tables every day. Since this will rarely be possible, the minimal norm should be three tables every week. This frequency will ensure that, in accordance with the standards detailed in Section 2 of this chapter, gunners receive progressive training and not be subjected to last minute cramming.

## **SECTION 2 TVIGS TRACKING TABLES**

### **GENERAL**

6. A tracking table consists of 10 target engagements on the TVIGS trainer. Each successful engagement is worth one point. To be successful, an engagement must meet two criteria. First, it must be a "hit." Second, the target score must be maintained in accordance with the standard of difficulty for that mission (tracking table are categorized as being level one, intermediate or advanced). If a gunner misses his target and engages it again before the end of the mission, this will count as two engagements. Some missions contain more than one target that may be engaged.



## **PROGRESSION**

7. TVIGS being a training aid, gunners must receive progressive training. As there are many possible parameters, instructors must follow the suggested training program to ensure their gunners make consistent progress. Finally, sound judgement on the part of the instructor will contribute to good training for gunners.
8. Before attempting the next higher level TVIGS table, a gunner must achieve the standard of the table he is attempting.

## **TVIGS BASIC TRACKING TABLE**

9. The TVIGS basic tracking table will be completed, using the optical sight only. Training will be progressive so that all parameters are initially at the lowest level (no fog, hit zone is at full size [100%], minimum obscuration, beginner's control cone, etc.). Missions numbered one to twenty inclusively will be completed at the beginner's level. It is suggested that gunners complete a minimum of 20 tracking missions before attempting the test.

10. To complete successfully the beginner's level, the suggested standard will be as follows:

- a. 10 different missions: one "hit" per mission: 100%;
- b. "on target" average: 90%;
- c. hit zone: 75%;
- d. no fog;
- e. obscuration: average;
- f. control cone: beginner; and
- g. missions number 3, 7, 8, 5, 6, 9, 16, 11, 15, and 4.

11. The gunner must not be pressured to engage and must be allowed to take a rest after completing 5 missions. If a gunner misses

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his target or does not achieve the required "on target" percentage, additional training must be provided to ensure he passes the basic tracking table test.

### **TVIGS INTERMEDIATE TRACKING TABLE**

12. The TVIGS intermediate tracking table actually consists of two tracking tables: one using the optical sight, the other with the thermal imagery (TI) sight. Training will be progressive and will start with the basic parameters used for the beginner's level test. Missions number 1 to 41 with the optical sight can all be used. Missions number 1 to 23 inclusive will be used with the TI sight, with the exception of missions number 9, 11, 17, and 18, which will be completed during advanced level training. It is suggested that gunners complete a minimum of 20 missions with each the optical sight and the TI sight before attempting the test.

13. To complete successfully the intermediate's level, the suggested standard will be as follows:

- a. 10 missions:
  - (1) 5 missions using the optical sight; and
  - (2) 5 missions using the TI sight;
- b. one engagement per mission: 10 "hits" (100%);
- c. "on target" average: 80%;
- d. hit zone: 75%;
- e. fog: light;
- f. obscuration: heavy;
- g. control cone: intermediate; and
- h. TI sight: ON (only with TI sight).

14. The following mission allocation is suggested for use with optical and TI sights:

- a. with optical sight: number 30, 31, 37, 39, and 41;  
and
- b. with TI sight: number 6, 8, 13, 27, and 40.

15. Gunners may be allowed to take a rest after completing 5 missions. If a gunner misses his target or does not achieve the required "on target" percentage, additional training must be provided to ensure he passes the intermediate tracking table test.

### **TVIGS ADVANCED TRACKING TABLE**

16. The TVIGS advanced tracking table will be completed, using the TI sight only. Training will be progressive and initial basic parameters will be as follows: 75% hit zone, intermediate control cone, and TI sight ON. Currently, all missions are identified as being at the intermediate level. However, a certain number were categorized as being at the advanced level. A new disk will be produced in the near future for advanced level missions. For the time being, units must complete missions number 9, 11, 17, 18, 24, 25, 32, 34, 40, and 42. For additional training purposes, gunners may complete missions number 1 to 42. A minimum of 30 missions must be completed before attempting the test.

17. To complete the advanced level, the suggested standard will be as follows:

- a. 10 missions: number 9, 11, 17, 18, 24, 25, 32, 34, 40, and 42;
- b. one engagement per mission;
- c. 10 "hits" (10/10);
- d. "on target" average = 80%;
- e. obscuration: heavy;

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- f. hit zone: 50%; and
- g. control cone: advanced.

18. While training and during the test, it is suggested to dim the lights in the training room to make it easier for the gunner to see his target.

19. Gunners may be allowed to take a rest after completing five missions. If a gunner misses the target or does not achieve the required "on target" percentage, additional training must be provided to ensure he passes the advanced tracking table test.

### **SECTION 3 ADDITIONAL TRAINING**

#### **GENERAL**

20. In addition to the tracking tasks detailed in Section 2, a gunner may train with TVIGS using additional elements of realism. For example, he may fire in Nuclear, Biological, and Chemical task oriented protective posture High, fragmentation vest, etc. While these are not included in the tracking task descriptions, anti-armour platoon commanders may impose them, at least as a part of their tracking training.

21. Gun drill must not be practiced when using the TVIGS trainer. Even though the likelihood of damaging the system is slight, the dissimilarities of TVIGS and an actual TOW 2 weapon system mean that improper gun drill, be it only loading and unloading, will be performed. Gun drills must be taught and practiced only using actual TOW 2 weapon systems.

**ANNEX A  
TOW VIDEO INTERACTIVE GUNNERY SIMULATOR**

**SCORE SHEET**

**NAME:** \_\_\_\_\_ **RANK:** \_\_\_\_\_ **SN:** \_\_\_\_\_

**COURSE:** \_\_\_\_\_ **DATE:** \_\_\_\_\_

**BASIC:** OPTICAL / KILL ZONE = 75 / 90% ON TARGET (TGT) / 5 STATIONARY AND 5 MOVING

<b>SER</b>	<b>MISSION</b>	<b>TARGET</b>	<b>RANGE</b>	<b>DIRECTION</b>	<b>HIT (Y/N)</b>	<b>% ON TGT</b>	<b>REMARKS</b>
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)
							PRECIPITATION
							PRECIPITATION
							PRECIPITATION
							PRECIPITATION

**INTERMEDIATE: THERMAL / KILL ZONE = 75 / 80% ON TARGET / 5 STATIONARY AND 5 MOVING**

<b>SER</b>	<b>MISSION</b>	<b>TARGET</b>	<b>RANGE</b>	<b>DIRECTION</b>	<b>HIT (Y/N)</b>	<b>% ON TGT</b>	<b>REMARKS</b>
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)
							PRECIPITATION
							PRECIPITATION
							PRECIPITATION
							PRECIPITATION

**ADVANCED: THERMAL / KILL ZONE = 50 / 70% ON TARGET / 10 MOVING**

<b>SER</b>	<b>MISSION</b>	<b>TARGET</b>	<b>RANGE</b>	<b>DIRECTION</b>	<b>HIT (Y/N)</b>	<b>% ON TGT</b>	<b>REMARKS</b>
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)
							PRECIPITATION
							PRECIPITATION
							PRECIPITATION
							PRECIPITATION

\_\_\_\_\_

GUNNER

\_\_\_\_\_

INSTRUCTOR

## **CHAPTER 3 OUTDOOR TRAINING**

### **SECTION 1 INTRODUCTION**

#### **SCOPE**

1. This chapter provides guidance for tube-launched optically-tracked wire-guided (TOW) weapon system commanders on training with the outdoor trainer. It describes where the outdoor training fits in an anti-armour training plan and how it should be employed to gain the maximum benefit from its use.

#### **OUTDOOR TOW TRAINING SET**

2. The outdoor training set is a crew portable set designed for any TOW mounting kit. It is used for TOW gunner training, supervisor instruction, and pre-fire qualification. It can be used in any tactical exercise and will operate in all weather conditions in which a gunner is capable of tracking.

#### **STRUCTURE OF INSTRUCTION**

3. Practice on the outdoor simulator will complete training by exposing the gunner to all variable conditions such as weather, tactical movement, and blast simulator. This will be the last stage before actual firing of a missile. Tracking with the precision gunnery simulator (PGS) will integrate the conditions that the gunner will have to face on the actual live firing range.

4. Before continuing training with the PGS, the gunner must first successfully pass the basic and intermediate levels by using the indoor simulator TOW video interactive gunnery simulator (TVIGS) in accordance with Chapter 2 of this manual.



## **SECTION 2 TARGET TRACKING TABLES**

### **GENERAL**

5. The target tracking tables consists of 12 engagements. Each engagement must satisfy two criteria—HIT-KILL or HIT-NO KILL—in order to achieve success with the tracking tables.
6. Six of the twelve engagements will be done with the thermal sight. The minimum score to pass will be HIT-KILL or HIT-NO KILL for all the engagements, as stated on the score sheet (Annex A).
7. Six of the twelve engagements will be done with the optical sight. The minimum score to pass will be HIT-KILL or HIT-NO KILL for all the engagements, as stated on the score sheet (Annex A).
8. After six engagements the gunner should have a rest.
9. The target vehicle should maintain an average speed of 10 km/h, the obscuration will be set at position number 3, and the target size will be at position number 1. Finally, the blast simulator will be used for certain engagements, as stated in Annex A, if not firing on a TOW under armour (TUA).

### **TRACKING RANGE SPECIFICATIONS**

10. The target vehicle road should be parallel with the firing line at a range of 2000 metres or more. The area between the firing point and the target vehicle must be clear of obstructions that would otherwise interfere with the PGS laser beam. The target vehicle road should be 100 to 500 metres long.

### **PROGRESSION**

11. The PGS is an aid to instruction, which the gunners should receive gradually. The adjustable parameters of the simulator should be at the lowest level at the beginning of training and, according to the constant progress of the gunner and the good judgement of the

instructor, be augmented in accordance with the instructions given in Annex A to this chapter.

## **RECORD KEEPING**

12. While conducting a tracking exercise, scores for each engagement are recorded on a PGS tracking table (Annex A to this chapter). The average total for each task is recorded the gunner's unit employment record.

**ANNEX A**  
**PRECISION GUNNERY SIMULATOR TRACKING TABLE**

Target size 1, obscuration 3, Range 2000 m ( minimum ), must pass all 12 serials						
SER	SIGHT	BLAST SIMULATOR	ORIENTATION	SPEED	RESULTS	REMARKS
(a)	(b)	(c)	(d)	(e)	(f)	(g)
1	Optical	Yes	Side	Static		Kill
2	Optical		Front	Static		Kill
3	Thermal Imagery (TI)	Yes	Side	Static		Kill
4	TI	Yes	Front	Static		Hit—NO KILL (HNK)
5	Optical		LEFT to RIGHT	10 km/h		1 Kill
6	Optical		LEFT to RIGHT	10 km/h		1 HNK
7	Optical		LEFT to RIGHT	10 km/h		1 Kill
8	Optical	Yes	LEFT to RIGHT	10 km/h		1 HNK
9	TI		LEFT to RIGHT	10 km/h		4 HNK
10	TI		LEFT to RIGHT	10 km/h		
11	TI		RIGHT to LEFT	10 km/h		
12	TI	Yes	RIGHT to LEFT	10 km/h		

## **CHAPTER 4 LIVE FIRE TRAINING**

### **SECTION 1 INTRODUCTION**

#### **GENERAL**

1. The increased importance of the tube-launched optically-tracked wire-guided (TOW) weapon system and the cost in both missiles and training resources call for the requirement to standardize and maximize the training value from TOW live fire exercises. LFCO 23-16 states the requirements for the conduct of TOW live fire training.

2. The preceding chapters have set out a progression in each category of training to elevate an anti-armour crew to a level of performance whereby it can engage and destroy a target in a realistic battlefield scenario. This is done through the use of a TOW video interactive gunnery simulator (TVIGS), a precision gunnery simulator (PGS), and by dry training.

3. Since there is a limited number of missiles that can be fired each training year, there is an overriding requirement to make the best use of each gunner's missile. The aim of TOW live firing is to optimize TOW gunnery through the best possible use of each missile fired by each gunner according to his skill and experience. This aim can be expanded and achieved by adherence to the following objectives:

- a. give each gunner and assistant gunner confidence in the weapon system;
- b. give each gunner and assistant gunner confidence in his ability to hit a moving target with a live missile;
- c. provide a challenging, yet reasonable, target for each gunner and assistant gunner in accordance with the level of skill to be achieved; and

- d. provide progressive training for the introduction of more challenging tactical live fire scenarios.

## **SECTION 2 PREREQUISITES TO FIRING**

### **GENERAL**

4. The specific training prerequisite that must be achieved prior to live firing is the successful completion of the indoor and outdoor tracking tables, one week before the shoot and preferably 48 hours before. There can be considerable difference between each gunner's ability to successfully engage with a live missile. The most important factor to consider when planning TOW live firing is *confidence*. This means not only instilling confidence in the weapon system but also in each gunner's ability to hit the target. A range practice that includes battle simulation, radio orders, movement, and limited engagement time may provide a realistic battlefield scenario but may be too complex for a first time gunner. The probability is that, for some gunners, the outside distractions resulting from the scenario coupled with natural nervousness will result in a miss. Not all gunners will be adversely affected by these factors; however, the increased probability of a miss and, more importantly, the resulting loss of confidence by the gunner does not make this a "cost effective" training situation.

## **SECTION 3 PLANNING**

### **GENERAL**

5. Live fire exercises and concentrations have often been organized around a particular range. The correct method is to plan a range that will suit the aim and specific training objectives (i.e., gunner's skill and experience levels). The final product should be an exercise with different ranges suited to each gunner's skill level.

6. For brigade concentrations, a brigade office of primary interest (OPI) should be set up. Responsible for the planning process, the OPI may task a unit anti-armour platoon commander to organize a given range on which gunners from all participating anti-armour

platoons will fire. Decentralized anti-armour platoon firing on separate ranges defeats the purpose of concentrating resources and expertise for the benefit of all participants.

## **GROUPING OF GUNNERS**

7. All sub-units participating in the concentration should provide the OPI with a complete list of the following at least one month prior to the actual shoot:

- a. the number of first time gunners;
- b. the number of experienced gunners, including their hit/miss record for each missile with the type of sight and target used; and
- c. a list of the groups as per criteria listed below.

8. The OPI must consider this information and group the firers, regardless of units, according to the above factors. This will provide him with a detailed breakdown of all firers attending the concentration.

9. All firers will be grouped in accordance with their previous experience. The anti-armour platoon commander is responsible for ensuring that the gunners are correctly grouped.

10. The breakdown should be as follows:

- a. group 1 - first time firers;
- b. group 2 - firers who have successfully engaged a moving target from firing point; and
- c. group 3 - firers who have successfully engaged moving targets, either from a firing point or on a battle run.

11. There is latitude for commanders to judge each gunner individually based on his tracking ability and to place him in a higher group in order to optimize the training value.

## **RECONNAISSANCE**

12. The next step in the planning process is the reconnaissance of the ranges that may be used for TOW live fire. The TOW range resembles any other range in the sense of administration area, vehicle parking, and ammunition storage. The major differences are:

- a. topographical layout of the TOW range to include:
  - (1) type of ground (i.e. undulating),
  - (2) battle runs,
  - (3) line of missile flight, and
  - (4) general layout of the range;
- b. type of targets available (e.g. pop-up moving target system [PMTS]); and
- c. consideration for other weapons providing tactical support to the range.

## **TIME ESTIMATE**

13. A detailed time estimate should be developed to include timings from the onset of planning until submission of post-exercise reports.

14. The time estimate should be based on the following outline:

- a. D-90:
  - (1) range reconnaissance/bookings;
  - (2) inform all participants of the outline plan; and

- (3) prepare administrative and financial requirements to be filled outside of the formation.
- b. D-60:
  - (1) confirm administrative requirements from outside of the formation;
  - (2) prepare range instructions; and
  - (3) pre-concentration coordination conference.
- c. D-30:
  - (1) confirm attendance of all participants;
  - (2) confirm all internal requests; and
  - (3) receive information on gunner experience in each platoon.
- d. D-7: begin range preparation.
- e. D day to D + 5:
  - (1) D day: briefings and dry training;
  - (2) D + 1: fire basic range;
  - (3) D + 2: fire intermediate range;
  - (4) D + 3: fire advanced range; and
  - (5) D + 4: alternate range day and post-concentration drills.
- f. D + 7: send TOW missile firing message to NDHQ/DLR-5/DSSPM 4, brigade headquarters, and to The Infantry School Gagetown.
- g. D + 30:



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- (1) receive The Infantry School observations from firing;
- (2) complete post-concentration report; and
- (3) submit TOW missile firing reports to DSSPM 4.

## COORDINATION BEFORE FIRING

15. A pre-concentration meeting involving the staff of the participating anti-armour platoons, the major support staff personnel, and, if possible, representation from DLAEEM 2-6, CLS, and the Infantry School should be held a minimum of two months prior to the concentration. If possible, this meeting should be held at the range to be used. At this meeting the general outline and conduct of the range is discussed.

16. The following points must also be taken into consideration:

- a. **The Infantry School/DSSPM 4 Briefings.** These briefings are an integral part of the concentration. The total time for briefings is 2-3 hours. Liaison with the briefing team must be done prior to the formalizing of the concentration timetable.
- b. **Technical Support** Concentration of technical support personnel and equipment should be planned coincident with a TOW concentration. Fire Control System technicians can exchange experience of problems with the systems. Similarly, training equipment should be pooled to ensure efficient use of time on the range.
- c. **Targetry.** The initial reconnaissance determines the type of moving target system to be used, the employment of thermal or optical targets, and the variety of ranges of target engagement. Targetry should be discussed to ensure that everyone's needs are met.

- d. **Range Instrumentation.** With The Infantry School and DSSPM 4 participation, additional resources and range instrumentation such as TDAS and through sight video filming (also one per brigade) are available. These instruments provide a more definitive analysis of missile flights to immediately debrief gunners as well as the ability to determine the reasons for malfunctions and misses. Finally, these instruments allow the application of immediate corrective action and develop our training to give the gunner a better chance with the next missile. The employment of these devices must be discussed with respect to their benefit to all firers.

## SECTION 4 CONDUCT

### TYPES OF RANGES

17. The three types of TOW ranges are basic, intermediate, and advanced, each with progressively more difficult characteristics.

18. **Basic Range.** The basic range should be used mainly for first time firers or firers who are unsuccessful in their first engagement. This provides a non-stressful situation to increase gunner confidence. The characteristics of a basic range are:

- a. same range layout and conduct by day and night;
- b. TOW is fired from a pre-selected and staked fire position;
- c. moving targets (five to fifteen km/h);
- d. choice of optical or Thermal Imagery (TI) sight for engagement;
- e. full range instrumentation and coaching in place;
- f. non-tactical movement prior to adopting firing position, if required;

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- g. no time limitations; and
- h. gunner must positively identify target prior to adopting his firing position.

19. **Intermediate Range.** The range is used for repeat firers who have been successful on the basic range with either optical or thermal sight. The goal is to provide a more realistic scenario and target for the experienced gunner, and still maintain a level of confidence. The characteristics an intermediate range are:

- a. same range layout and conduct by day or night;
- b. TOW is fired from a pre-selected and staked position and, normally, more tactically sound positions are selected;
- c. moving targets (fifteen to twenty-five km/h);
- d. use of TI sight for engagement;
- e. full range instrumentation and coaching in place;
- f. tactical movement prior to firing;
- g. speed of engagement increased;
- h. use of fire control orders; and
- i. limited scenario used to paint tactical picture and provide realism.

20. **Advanced Range.** The advanced range is designed for repeat firers who were successful on the intermediate range. The major differences between this range and the basic or intermediate range are the use of battlefield simulation and a detailed tactical scenario. The characteristics of an advance range are:

- a. same layout and conduct by day and night;
- b. TOW fired from a sound tactical position;

- c. moving targets (twenty-five to thirty-five km/h);
- d. use of TI sight;
- e. full range instrumentation in place;
- f. tactical movement;
- g. quick speed of engagement;
- h. use of range card;
- i. detailed tactical scenario; and
- j. use of battlefield simulation.

## CONCLUSION

21. As stated in the LFCO 23-16, The TOW Long Range Anti-Armour Weapon System is the primary anti-tank system within the Canadian Army and is likely to remain so for the foreseeable future. It goes without saying that the need to train to a high level of expertise is operationally imperative. In addition, the high cost of each missile makes it essential that training be carried out as efficiently as possible.

22. Initially, the conduct of a TOW concentration will offer a brigade OPI a definite challenge. But most importantly, employing battle runs, battle simulation, and engaging moving targets will provide more advanced and realistic training for anti-armour personnel. The benefit to training will be directly proportional to the time and effort spent in developing a sound tactical TOW range.

## ANNEX A COACHING

### INTRODUCTION

1. This annex contains information for instruction such as the definition of a coach, qualities of a coach, points to look for while coaching, and the use of the precision gunnery simulator (PGS) and TOW video interactive gunnery simulator (TVIGS) as a coaching aid. Information on conducting detachment drills can be found in Chapter 1.

2. **Definition.** A coach is a person who can inspire confidence and determination in a gunner by gentle prompting and intelligent correction.

3. **Qualities of a Coach.** A good coach demonstrates the following qualities:

- a. patience,
- b. enthusiasm,
- c. alertness, and
- d. ability to inspire confidence.

### NOTE

Do not over coach as excessive talking distracts the gunner.

### POINTS TO LOOK FOR WHILE COACHING

4. A thorough knowledge of tracking techniques is necessary before faults can be identified.

5. The following points are to be considered while coaching:

a. **Firing Positions.**

- (1) Adjust the platform and pedestal in the Iltis or BV 206.
- (2) Adjust the gunner seat assembly in the M113A2 TOW under armour (TUA), and adjust the height of the tripod for the ground mount to the correct height so that the gunner can comfortably see through the optical or thermal imagery (TI) sight.
- (3) The gunner's body should be in the middle of the angle that is made by moving the target and the launcher.
- (4) The feet should be open the same width as the shoulders when standing on the gunner platform of the Iltis pedestal mount or BV 206. When the ground mount is used, the gunner may rest on one or both knees, whichever makes him more comfortable.

b. **Holding.**

- (1) Hold both control knobs firmly (for TUA, hold the hand controller with both hands naturally, leaving both hands on the hand controller throughout the entire tracking of a target).
- (2) Place elbows against the body.
- (3) Place eye against the focussing ring, to avoid jerking during missile launch.

c. **Sighting and Aiming.**

- (1) Use control knobs (hand controller for TUA).
- (2) Look at the target through the sight (TI or optical sight system [OSS]) and select the point of aim on the centre of the target.
- (3) Align the crosshair on the point of aim.
- (4) The TUA gunner must feel for the natural position on the hand controller.
- (5) Ensure the point of aim is maintained in the centre of the target, whether the target is stationary or moving.

**NOTE**

The angle of the body is important. The gunner should be comfortable throughout tracking. Changing of the body position will cause jerking and may cause the missile to ground.

d. **Breathing.**

- (1) The gunner should breath normally. Prior to firing, he should take a normal breath and let part of it out.
- (2) The gunner presses the trigger.
- (3) The gunner should then keep the mouth open until the impact, continuing to breathe smoothly.

e. **Trigger Control.**

- (1) Use light pressure on trigger.
- (2) Avoid moving the hand at this time.
- (3) The gunner may keep a thumb on the trigger, but if the gunner moves it, it must happen smoothly.

f. **Follow Through.**

- (1) The gunner must keep an eye open during the obscuration caused by the missile's launch motor until the target reappears.
- (2) The gunner must not look for the target by moving the system about. The gunner finds the target without using the control knobs.
- (3) Continue to track a moving target at the same speed.
- (4) When the target reappears, it will be close to the original point of aim.

g. **Tracking.**

- (1) When the target re-appears, bring the crosshair back to the original point of aim with a slow and smooth movement over a period of about three seconds.
- (2) If necessary, adjust elevation with a steady twist of the wrist.
- (3) If necessary, adjust azimuth by combining the motion of the body and arms into a smooth, steady lateral force (pressure) on the control knobs, pushing and pulling.



- (4) Tracking must always be done smoothly and without any jerking movements.
- (5) Keep the crosshairs on the centre of the target until you receive the command **CEASE TRACKING**.

## USING THE PGS AS A COACHING AID

6. The purpose of the PGS is to practise and qualify the tube-launched optically-tracked wire-guided (TOW) gunner. All TOW gunners shall practise regularly on this system. The PGS improves the gunner's determination and develops his concentration. The PGS is very effective and is less costly than a live missile. Firing the blast simulator with the PGS training set will help correct flinching during live firing (non-TUA TOW platforms). Every opportunity to coach a TOW gunner using this training set should be used to correct any gunner's faults. Details covering the use of the PGS training set can be found in Chapter 3 of this manual.

7. **Common Crew Faults.** Common crew faults can be avoided by having a thorough knowledge of the weapon system's tactical employment and limitation as well as good detachment drills. The following are some common crew faults that have been observed during TOW live fire range practices:

FAULT	CAUSE	CORRECTIVE ACTION
Erratic Flight	Nervousness – usually first time gunners.	Relax, breath deeply, find a comfortable position to fire from. Detachment Commanders (Det Comd) should fully brief new gunners prior to firing on location and identification of target. Det Comd should not rush or put pressure on first time gunners. TOW Gunners should train on the Trainer (TVIGS and PGS) prior to firing.

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FAULT	CAUSE	CORRECTIVE ACTION
	Using System to Search for Target - correcting to point of aim too quickly.	Do not jerk system about to look for target. Use your eye to search field of view. Identify prominent features in target area prior to firing to help find targets. When target is found, move crosshairs to point of aim using a steady slow movement. Keep crosshairs on target. <b>Do not track missile.</b>
Launch Excursion	Improper grip on control knobs of tracking unit.	Hold control knobs firmly by using the counter-torque method: left hand twist left control knob up; right hand twist right control knob down. This will help prevent the system from jerking too much during launch.
	Improper alignment of launch tub and sight system.	Ensure that the alignment between the launch tube and the sight system is visually checked prior to firing. If in doubt, have system checked by FCS Tech.
Ground Impact Before Reaching Target	Did not have one metre clearance between line of sight and ground. When the missile is launched it will fly in a spiral pattern below the line of sight.	Ensure that the weapon system is positioned to allow at least one metre clearance between line of sight and ground from weapon system to target.

<b>FAULT</b>	<b>CAUSE</b>	<b>CORRECTIVE ACTION</b>
	Over correcting the point of aim in the downward movement of the system will send a downward command to the missile. This command, combined with weight of the missile, may cause the missile to over fly the correction and ground impact.	Keep firm grip on control knobs; make slow smooth corrections.
	Broken command link wires. Firing through bushes or other obstacles that may cause the command link wires to entangle and break.	Ensure field of fire is clear of such obstacles.
	Broken command link wires may also be broken by the entanglement of the forward rubber 'O' ring that may be protruding from the inside of the missile casing.	Check for loose or protruding 'O' rings in front of missile casing when preparing the missile for loading. Remove any exposed 'O' rings.
	Manufacture's defects to missile.	Manufacture defects are beyond the control of the TOW crews. However, all malfunctions of missile must be recorded. If there are more than three missile malfunctions from the same lot number on the same shoot, it is directed to stop firing that lot.

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FAULT	CAUSE	CORRECTIVE ACTION
	<p>Target out of range of missile.</p>	<p>Ensure you know what type of missile is being fired. A BGM 71A-2 has a range of 3000 metres, while a BGM 71C-1 has a range of 3750 metres. The reticle of the TI Sight has 2 parallel lines called Range Stadia Lines. These lines are used to determine whether or not a tank target is within range. If a side-on view of a tank touches both Range Stadia Lines, it is within missile range. If a front view of a tank touches the vertical crosshair and one range Stadia Line, it is within missile range.</p>
<p>Loss of target in OSS field of view (FOV)</p>	<p>The jerk of the weapon system at launch will cause the point of aim to alter. Smoke and debris from missile's launch and flight motors will obscure the FOV. Obscuration caused by the back blast smoke drifting into FOV.</p>	<p>To overcome obscuration from missile launch, use the TI sight to see through the smoke. If TI sight is inoperable and you must use the OSS, keep a firm grip on the control knobs using the counter-torque method. Check wind direction when moving into fire position.</p>
<p>Loss of target in TI sight</p>	<p>Target heat signature too small, missile heat signature larger than target.</p>	<p>Ensure target is thoroughly heated. When the target heat signature is too small, the heat signature from the missile will appear larger and may even cover the target. Continue to track at same speed as moving target; do not change point of aim on stationary target. Missile heat signature will become smaller as the missile flies.</p>

FAULT	CAUSE	CORRECTIVE ACTION
	Improper target identification prior to firing missile.	Ensure gunner has identified the correct target using the TI sight prior to firing. Look for specific characteristics of the target andfor background or surrounding features near the target.
	Improper use of TI sight.	Use brightness, contrast, reticle focus and range focus knobs to obtain the best TI sight picture and collimate with the OSS.
	Inclement Weather - medium to heavy rain or snow.	Medium to heavy rain or snow will cause the temperature to remain the same at medium to long ranges (500 metres plus). The TI sight cannot pick up any variant in temperature at these ranges. Wait for break in weather.
Failure of one or more TOW system components.	Rough handling, improper maintenance, wear and tear.	The TOW system is a fragile electrical-optical system that must be handled with care. TOW crews must do their proper maintenance and system self-test in accordance with B-GL-385-014/PT-001, <i>TOW Long Range Anti-Armour Weapon</i> .

**Figure 4A-1: Common Crew Faults Causing Misses**

8. Use the PGS, TVIGS, and the through sight video camera system (TSVCS) as coaching aids. The aim of PGS and TVIGS training sets is to practise and qualify the TOW gunner. All TOW gunners shall regularly practise on these systems. These systems will improve the gunner's determination and develop his concentration. The PGS and TVIGS are very effective and certainly less costly than a live missile. Firing the blast simulator with the PGS training set will

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help correct flinching during live firing. Every opportunity to coach a TOW gunner using these training sets should be used to correct any gunner's faults. Details covering the use of the indoor/outdoor training sets can be found in Chapter 1 of this manual.

9. The TSVCS is an excellent means to debrief a gunner on the flight of the missile fired. The TSVCS should be used to record the missile flight of all first time gunners. Operation and maintenance of the TSVCS will be done in accordance with the TSVCS Recorder Operation Manual, which is issued with each TSVCS system.

## ANNEX B RANGES

### APPLICABILITY

1. This annex has been written as a guideline. It does not supersede B-GL-381-001/TS-001 *Operational Training, Volume 3, Book 1, Training Safety*, even though it has been extracted from that manual.

### SCOPE

2. This chapter contains regulations that govern the safe firing, during training, of anti-tank guided missiles. These regulations also apply to battle runs conducted with small arms mounted on vehicles.

3. Additional regulations for field-firing exercises are given in Chapter 10 of B-GL-381-001/TS-001. Regulations for armoured fighting vehicles (AFV) employed in the indirect fire role are given in Chapter 7 of B-GL-381-001/TS-001. Section 1 of this chapter applies to AFVs using direct or semi-indirect techniques of firing.

4. The range organization described herein illustrates what is required to fire these weapons on permanently designated ranges with several targets spread over a safe arc of fire.

### RESPONSIBILITIES

5. **Officer in Charge (OIC) Practice.** The duties of the OIC Practice are generally the same for any field firing. In exercises involving anti-tank guided missiles, he must be an experienced officer. His duties will not include those of the range safety officer (RSO).

6. The OIC Practice will man a control point (preferably a tower) located at some vantage point outside the danger area that allows a good field of view over both the target area and the firing point. If only one firing point is being used, he will command it. If more than one firing point is in use simultaneously, the OIC Practice

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will be centrally located and will delegate a Firing Point Officer on each firing point to assist him in safely controlling the exercise.

7. The OIC Practice ensures safety by coordinating the actions of the range party and the firing of the guns.

8. The OIC Practice must be appointed by the commanding officer (CO) for a specific exercise. The OIC Practice shall be responsible for the command and control of all aspects of that exercise. The OIC Practice's responsibilities include:

- a. planning and controlling the exercise to ensure that it accomplishes the aim;
- b. issuing any detailed local instruction;
- c. informing appropriate base and unit staffs of the exercise plan;
- d. ensuring that applicable safety regulations are made known and are understood by all participating personnel;
- e. close control and supervision of the personnel and weapons;
- f. ensuring that all safety regulations are observed during the exercise;
- g. giving orders to commence and cease fire;
- h. ensuring that communications required by range and unit orders are maintained at all times;
- i. ensuring that the range facilities are left in an acceptable condition, and any defects or suggested improvements are reported in accordance with range and unit orders;
- j. ensuring duds and misfires are dealt with in accordance with regulations and range standing orders; and



- k. reporting ammunition failures in accordance with range and unit orders.

9. **Range Safety Officer.** The RSO is responsible to the CO for monitoring all aspects of safety associated with the exercise. The appointment of RSO is not a position of command. However the RSO may brief personnel on safe practices by instructing them on the order of **STOP** or **CHECK FIRING** when an unsafe event is occurring or about to occur.

10. Ideally, the RSO should not be involved in any tasks other than that of safety. The RSO must be qualified for the task involved and be completely conversant with this manual, the range standing orders, and the appropriate weapon manuals. The RSO must be in position each time weapons are fired or demolitions are used. In the event that the RSO and OIC Practice differ in their point of view on a safety question, the CO will make the final decision.

11. The CO may appoint the following persons as RSO:

- a. A commissioned officer or non-commissioned member (NCM) who holds the rank of sergeant or above and who is currently qualified for the appointment. The appointment shall be published in the exercise instructions.
- b. Military personnel of other countries on duty in Canada may act as RSO. They shall be qualified and shall comply with range standing orders and other instructions applicable to the range in use.

12. The RSO is responsible for the following:

- a. ensuring the safety of all personnel;
- b. implementing the safety policy and ensuring the observance of the safety regulations contained in appropriate orders;
- c. stopping the firing or demolitions when conditions arise that in his opinion would constitute a hazard;

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- d. reporting all unsafe equipment or practices to the CO of the unit and recommending changes to existing orders in the interest of safety;
- e. inspecting all range facilities for correct operation before the practice; and
- f. giving a proper safety briefing to all personnel on safety aspects of the particular weapon, identification of range safety personnel, and the signals to be used by them, if necessary.

13. **Firing Point Officer.** A qualified officer or senior non-commissioned officer (NCO) will carry out the detailed supervision of the activity on each firing point where a troop or section is on a battle run. The firing point officer is responsible for all safety arrangements on the firing point and must be present whenever firing takes place. His responsibilities are as follows:

- a. he commands the firing point and controls vehicle and personnel movement on it;
- b. he ensures that all safety orders, instructions, and procedures are followed;
- c. he ensures that appropriate control flags are displayed at all times; and
- d. he personally gives the order to permit firing to commence on his firing point after receiving authorization from the OIC Practice.

14. **Firing Point Assistant.** The firing point officer may have an assistant, not below the rank of sergeant, to perform the following:

- a. control the red and green warning flags;
- b. lay out the back blast danger area (BBDA), if applicable;
- c. count rounds fired and plot the position of any duds;

- d. score the firing, if required; and
- e. otherwise assist the firing point officer.

15. **Range Party.** Range parties normally consist of winch house parties and target parties at each end of a target run.

16. **Section/Detachment Commander.** The crew commander of each AFV or the detachment commander of each gun or missile to be fired must:

- a. ensure, before firing begins, that he knows the limits of the arc of fire and has identified the markers for his weapons;
- b. ensure that his weapon, when loaded or armed, is never traversed outside the safe arc of fire; and
- c. order **CHECK FIRING** when this order is received from the firing point officer.

## GENERAL RULES FOR SITING AND FIRING

17. Rounds shall *not* be fired so as to endanger the safety of the range party or to cause damage to bunkers or mechanical target runs.

18. If, during a firing practice, a high explosive antitank (HEAT) dud occurs and the dud is so located that injury to personnel may result, the firing practice shall cease. The dud shall be located and destroyed in accordance with the appropriate regulations before the firing practice resumes. In cases where the dud cannot be located, an assessment shall be made by Range Control before permission is given to resume the practice.

19. No weapon is to be traversed out of the authorized arc of fire while loaded or armed.

20. Firing positions must be laterally in line and generally parallel with each other. If at any time it is necessary for personnel to move forward of the trunnion, e.g., to boresight, all guns must be unloaded. Withdrawing the weapon from the line of fire removes the

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requirement to unload adjacent guns but the withdrawn weapon must itself be unloaded before being withdrawn.

21. All personnel not involved in the actual firing will stay well behind the firing point during practices and outside of any BBDAs.
22. Smoking is *not* allowed except in areas designated by the OIC Practice.
23. Should a potentially dangerous situation occur, the person first noticing it, regardless of rank, will give the emergency order of **STAND FAST**. Everyone on the range will freeze in his movements until the fault has been discovered and corrected, and the order **CANCEL STAND FAST** has been given by the OIC Practice.

## BATTLE RUNS

24. Battle runs, unlike field-firing exercises, are exercises in which firing positions and arcs of fire are clearly marked and closely controlled.
25. During battle runs, the firing point officer shall accompany the formation of vehicles forward, maintaining radio communications with the formation and the control tower throughout the practice. He will move immediately in the rear of the exercising vehicles. He shall ensure that:
  - a. weapons are *not* traversed or fired outside the safe arcs; and
  - b. weapons are unloaded and cleared on those vehicles moving in the rear of other vehicles.
26. If an exercising vehicle gets into a position dangerous to itself or to others during a practice, all weapons will be unloaded and reported clear and the green flags hoisted.

## AMMUNITION

### 27. **General :**

- a. replenishment will take place between practices and *never* when firing is taking place;
- b. empty casings should be collected on each of the firing position and removed periodically at suitable times; and
- c. live ammunition and empty casings shall be kept separate on all occasions.

28. **Limitations.** Limitations on the use of ammunition and ammunition components are given in CFTO C-09-216-001/TX-000 *Ammunition Restrictions*.

## TUBE-LAUNCHED OPTICALLY-TRACKED WIRE-GUIDED (TOW) MISSILES

29. TOW guide-wire will be recovered from the range on completion of each practice.

30. In addition to the safety procedures outlined in B-GL-385-014/PT-001 *Weapons, TOW Long Range Weapon System*, Chapter 11, the OIC Practice shall ensure:

- a. all movement is controlled on the firing point;
- b. the red and green flags are properly employed on the firing point;
- c. the BBDA is properly marked;
- d. vehicle engines are turned off during the loading and unloading of missiles;
- e. missile containers are opened only on OIC Practice direction;

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- f. missiles are inspected, and faulty missiles are set aside for return to the ammunition storage area;
- g. an ammunition technical officer (ATO) or ammunition technician is present during firing of HEAT rounds; and
- h. HEAT rounds are fired at hard targets *only*.

31. **TOW shall *not* be fired over the heads of troops during training in peacetime.**

32. **The Range 2IC.** Normally, the range second in command (2IC) does not become directly involved with the controlling or supervising of the TOW range practice. His main duties are administrative and may consist of some, or all, of the following:

- a. ensuring that all stores and equipment necessary for the range practice (ammunition, flags, radios, etc.) are available;
- b. ensuring that meals and coffee are arranged for, and available at, the designated times;
- c. assisting the OIC/RSO in the layout and setting up of the range;
- d. organizing the firing relays;
- e. ensuring a proper cleaning and inspection of the range is carried out prior to leaving;
- f. forming-up all personnel for ammunition declaration;
- g. ensuring all weapons and equipment are properly cleaned and turned in;
- h. ensuring the TOW logbooks are maintained and the TOW Missile Firing Reports Parts I and II are filled out; and

- i. ensuring that all non-serviceable equipment is tagged and reported to the RSO.

33. **The Ammunition NCM.** The duties of the ammunition NCM vary but normally consist of the following:

- a. drawing the required amount and types of ammunition from the ammunition storage area and delivering it to the range;
- b. ensuring all safety regulations pertaining to the transportation of the ammunition are observed:
  - (1) vehicles have proper signs, flags, and fire extinguishers,
  - (2) missiles are kept in over-packs,
  - (3) vehicle engines are turned off during loading and unloading,
  - (4) there is no smoking in area of vehicles (30 metres),
  - (5) there are no troops being transported in ammunition vehicle,
  - (6) only authorized classification of ammunition is carried,
  - (7) the off-loading and storage of missiles does not take place any closer than 80 metres from the firing point,
  - (8) the over-packs are opened only on order, and
  - (9) records of damaged or defective ammunition are made prior to issue to gunners and faulty missiles are returned to the ammunition supply area (ASA);

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- c. recording the ammunition lot number and serial number and the name of the person to whom that missile is issued (this information is for entry into the TOW logbook and for filling out the TOW Missile Firing Report);
- d. controlling the issue of ammunition;
- e. ensuring all unexpended ammunition, empty casings, and crates are returned to the ASA;
- f. ensuring that there is no smoking in or around the ammunition point (30 metres);
- g. ensuring necessary fire extinguishers are available at the ammunition point; and
- h. making available an ammunition state at the request of the RSO or range 2IC.

## TARGET TRACKING RANGE REQUIREMENT

34. **General.** TOW training with the precision gunnery simulator (PGS) does not require the use of a live firing range. Qualification is accomplished without the use of live missiles. Only the blast simulator, installed in the missile simulation round, is fired during the instructional and qualification courses.

## LIVE FIRE RANGE REQUIREMENT

35. A TOW live firing range must be large enough for the ranges and safety arcs as shown in the danger area template. (See Figure 4B-1).

### 36. **Reporting Procedures:**

- a. If two consecutive malfunctions occur in the same launcher, that launcher will be isolated. The missiles are to be disposed of on the authority of the ammunition technician, provided it has been



determined that the missiles are defective. The matter is to be referred to NDHQ (DSSPM 4) by priority message outlining the action taken and seeking additional direction, if required. The launching system will be held for complete inspection by the second line Fire Control System technicians.

- b. If two missile malfunctions occur from different launchers during the same firing practice and the missiles involved have the same lot number, carry out the procedures outlined in sub-para a, suspend firing of missiles bearing the same lot number, and seek NDHQ (DSSPM 4) direction by telephone.
- c. If a malfunction occurs that may be attributed to the launching system, the weapon should be isolated and tested by unit FCS technicians. Back-up systems should be made available to account for this possibility.
- d. In the event of a wire break once the missile has been fired, recover all available wire—particularly that portion either side of the break—and send the wire to NDHQ, Attention: DSSPM 4, along with the appropriate Strip chart.
- e. Notwithstanding the special reporting provisions of this paragraph, all malfunctions are to be reported in the TOW Firing Report.
- f. All malfunctions of the missile shall be reported in accordance with CFAO 71-4, Ammunition Accident, Incident, Defect, and Malfunction Reports.

## **TOW MISSILE FIRING REPORT**

37. The following message will be sent within seven days of each TOW missile firing. Combined reports are acceptable for multiple launchings, exercises or concentrations.

FM: FIRING UNIT

TO: SUPERIOR HQ (BRIGADE/AREA HQ)

INFO :NDHQ OTTAWA//DLR 5-7/DSSPM 4//INF SCHOOL  
GAGETOWN//

SUBJ: TOW FIRING REPORT

REF: FMCO 21-14

1. REQUIRED DETAILS ARE AS FOLLOWS:
  - A. UIC AND NAME OF FIRING UNIT
  - B. DATES
  - C. PURPOSE OF FIRING
  - D. NUMBER OF MISSILES FIRED
  - E. LOT NUMBER, MISSILE NUMBER, TYPE FOR EACH MISSILE, MISSILE GUIDANCE SET SERIAL NUMBER
  - F. HIT/MISS/MALFUNCTION AND RANGE FOR EACH MISSILE
  - G. REASONS FOR MISS/MALFUNCTION FOR EACH MISSILE
  - H. TARGET DESCRIPTION
2. REMARKS

## PRELIMINARY ORGANIZATION AND BRIEFING

38. **General.** The OIC Practice is responsible for all aspects of an exercise. To obtain maximum results, he must conduct a reconnaissance, make an estimate of the situation, and prepare a plan that details specific tasks. Preliminary organization and briefing is the key to success in the conduct of all range training. The preliminary action for an exercise consist of:

- a. physical reconnaissance of the range;
- b. administrative preparation; and
- c. tasking and briefing the exercise control staff.

39. **Reconnaissance.** The following points should be considered when conducting the physical reconnaissance of a range:

- a. its suitability for the exercise to be conducted;
- b. range standing orders;
- c. the facilities available such as communications, control facilities, shelters, and latrines;
- d. the location of suitable targets for the practices to be fired; and
- e. the location of warning and control flags, telephone hook-ups, range bunkers, vehicle parking areas, and sentries.

40. **Administration.** The following administrative preparations should be considered.

- a. **Transport For:**
  - (1) movement to the site;
  - (2) injured personnel (helicopter if available); and

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- (3) stores, ammunition, explosives, weapons, rations, etc..

b. **Requisitions (including time, date, location) For :**

- (1) rations, meals;
- (2) administrative stores;
- (3) first aid stores, kits, stretchers;
- (4) ammunition/explosives, type and quantity;
- (5) medical assistance;
- (6) communications equipment; and
- (7) targetry.

c. **Miscellaneous :**

- (1) personal dress and equipment required, including helmets, webbing, etc.; and
- (2) special equipment and stores required.

### 41. **Tasking.**

- a. The OIC Practice or his assistant will ensure that troops, stores, and ammunition arrive on time at the correct place.
- b. The OIC Practice will normally man the firing point and issue the orders for the conduct of each practice. When more than one firing point or position is in simultaneous use, however, he will be in overall control of safety from a central location, and will delegate an assistant for each firing point.
- c. Butt or range parties may be required on some ranges to operate targets. They will work under the control of the OIC Practice and will be supervised

by an officer or NCM not below the rank of master corporal, who is responsible for the safety of all members of the party and for controlling, checking, and replacing the targets.

42. **Briefing.** Briefing of the exercise staff should include:
- a. the practices to be conducted and their sequence; and
  - b. local safety regulations, working arrangements, and positions of firing points and arc of fire markers.

### **ACTION BEFORE FIRING**

43. On arriving at the range, the OIC Practice will ensure that the following activities, if applicable, are carried out:

- a. signing of the range book;
- b. raising of flags and posting of sentries;
- c. establishing communications with range control;
- d. establishing communications with butts or range bunkers, firing points, and control towers;
- e. carrying out a visual check to confirm the range is unobstructed, in good order, and safe for use;
- f. establishing an administrative area and an ammunition point;
- g. clearing the danger area of personnel and livestock;
- h. forming the personnel into relays prior to commencement of the exercise; and
- i. briefing the troops and control staff on:
  - (1) range safety;

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- (2) location of medical assistance and ambulances; and
- (3) nature and scope of exercise, administrative details, etc.

44. For gun camps or similar exercises, a daily briefing should be given by the OIC Practice to cover all aspects of the day's activities, including arcs of fire and safety precautions. A specific briefing will be given to each relay before each practice.

45. The following points must be considered by the OIC Practice *before* firing begins:

- a. positioning of relays;
- b. detailing of assistants and their duties;
- c. employment of waiting relays;
- d. change-over of relays;
- e. location of the OIC Practice for maximum control of the firing relays;
- f. sequence of the practices;
- g. fire orders;
- h. safety; and
- i. obtaining permission to fire from range control, if required.

46. The object of planning and preparation is twofold:

- a. the troops being exercised arrive at the firing point calm and completely prepared for the practices; and
- b. the troops get the best possible advice on the firing point.

## CONDUCT OF FIRING EXERCISES

47. The following is the normal sequence of activity for firing exercises. The principles underlying the procedure can be adapted to any direct fire weapon practice on any range:

- a. The coaches and supervisory personnel, ammunition party, communicators, range target party, and sentries take up their positions. Some of the sentries may have to depart for their positions quite early if their posts are a considerable distance from the firing point.
- b. The troops being exercised are brought to an assembly area about 100 m from the firing point.
- c. The practices to be fired are explained.
- d. Gunners are detailed to relays and, if applicable, their names are recorded on the firing point register.
- e. The first two relays are sent to the ammunition point, where they are issued with ammunition for the practices they are about to fire. The ammunition is loaded directly into magazines or placed on vehicles for delivery to the firing point. During the conduct of the practice, only three relays shall be in possession of live ammunition: one on the firing point, one waiting, and one in the process of drawing ammunition. For large crew-served weapons, an ammunition party may bring ammunition for each practice to the firing point.
- f. The first relay is sent to the ready line just behind the firing point, where it is inspected. When ready, the OIC Practice orders **FIRST RELAY MOVE ON TO THE FIRING POINT**.
- g. The supervisor of the relay will hold up one arm to indicate to the OIC Practice that the gunners are ready.

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- h. The OIC Practice then orders the raising of the red flag and issues the necessary orders for firing to start. In the case of crew-served weapons, detachment commanders will follow the orders with supplementary orders of their own, as necessary.
  - i. On completion of firing by the relay, the OIC Practice orders weapons to be unloaded and inspected and ensures that weapons are reported clear of ammunition.
  - j. When the weapons have been inspected, the OIC Practice orders the green flag raised. He then order **CHANGE RELAYS**. The second relay proceeds to the firing point. The first relay, which has just fired, returns to the ammunition point, where it hands in empty cases, magazines, belts, etc. and then goes back to the assembly area for a discussion of the results of the firing practice.
48. The above procedure should ensure that the following actions take place:
- a. One relay is always on the firing point.
  - b. A second relay is waiting to fire and posted in rear of, and as close as practicable to, the firing point, while still being outside the danger area. It should be fully prepared for firing and should observe the progress of the practice. Every person should be covering off a firing position.
  - c. A third relay is at the ammunition point outside the danger area and to the rear of the firing point. An NCM shall accompany this relay for the purpose of inspecting ammunition, magazines, belts, etc. and to ensure that ammunition is clean, magazines are properly charged, or vehicles properly loaded.
  - d. Other relays are ready in the assembly area and should be accompanied by experienced officers, warrant officers, or NCMs, who should verify that



all preliminaries have been carried out (e.g., systems check out procedure, that barrels are clean and dry, parts of weapons are properly oiled, etc.). They will also ensure that troops understand the practices to be fired and know the targets to which they have been detailed. They can also give advice on the techniques to be used to meet the challenge of the practice and the prevailing weather.

49. Good range discipline is demonstrated by quiet, efficient organization, the absence of unnecessary shouting or talking, and efficient target control and marking.

## CONCLUSION OF EXERCISES

50. The OIC Practice shall ensure that, on the completion of an exercise, action is taken to ensure that:

- a. weapons are cleaned and inspected;
- b. targets are picked up;
- c. all brass casings, links, and wires are picked up;
- d. the range is cleaned and inspected;
- e. a verbal declaration is obtained from every person present on the range as follows: **I HAVE NO LIVE ROUNDS OR EMPTY CASINGS (OR EXPLOSIVES OR ACCESSORIES) IN MY POSSESSION;**
- f. range control staff is notified that the exercise has been completed;
- g. the range book, if applicable, is signed;
- h. troops leave the area; and
- i. stores are returned.

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51. Upon returning to base, the OIC Practice shall also ensure that:
- a. reports required by range standing orders are completed;
  - b. results of the exercise are reported to the CO so that appropriate entries can be made in Routine Orders and unit employment records; and
  - c. missile firing reports are completed.

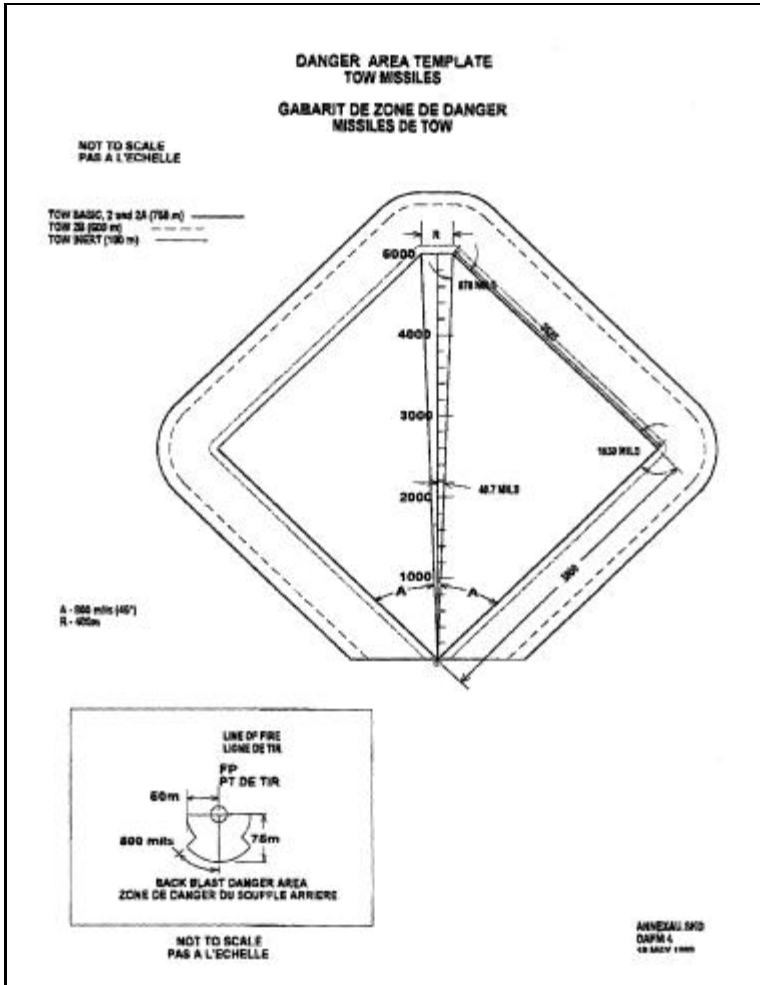


Figure 4B-1: TOW Danger Area Template

**WARNING**

Figure 4B-1 is an example only. Do not photocopy and use to determine arcs on a live firing range.

## **DANGER AREA TEMPLATES**

52. **Use.** Templates are scale drawings showing a danger area for a specific weapon in specific circumstances. They are used to make danger area traces.

53. **Design.** Each danger area template will be labelled with the following:

- a. type of weapon and ammunition;
- b. scale/distances and angles;
- c. type of targets (ground or hard), when applicable;
- d. date and number of drawing;
- e. other information that pertains to its correct use; and
- f. ricochet heights for ground and hard targets.

## **SAFE TARGET AREA TRACE**

54. A trace provides the quickest means of applying the criteria of safety during the practice and must be held by safety officers and supervisors/instructors.

55. To prepare the trace one should do the following:

- a. Fix a piece of tracing paper or talc over the map. The trace material should be generous in proportion to the area to be covered.
- b. Draw in and number at least three grid intersections for orienting the trace. These should be outside the target area and generally in different corners.
- c. Draw in the outline of the target area.

- d. Mark on the trace the locations of the firing position or deployment area and the observation posts (OP) which were used in planning.
- e. Enter the following details in a convenient corner of the trace:
  - (1) the name of the area the safety trace represents;
  - (2) the unit or individual groups to which the trace applies;
  - (3) the date and times for which it is applicable;
  - (4) the equipment and charge to be used; and
  - (5) any other details or instructions pertinent to safety.

56. Further information on templates may be found in B-GL-381-001/TS-001, *Training Safety*.

## **SUPPORT AND TECHNICAL ASSISTANCE**

57. The suggested list of equipment, stores, and technical assistance may be used as a guide. Experience will dictate specific stores requirements:

- a. Stores:
  - (1) mine tape (at least 400 m);
  - (2) 1.8 m metal pickets (26);
  - (3) camouflet driver, heavy (Thumper);
  - (4) megaphones (2);
  - (5) ear defenders;

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- (6) tarpaulin to cover ammunition;
  - (7) red and green flags;
  - (8) armoured personnel carrier (APC) flag set (one per APC);
  - (9) radios and batteries;
  - (10) signs, as required for safety;
  - (11) first aid kit;
  - (12) stretcher and blankets;
  - (13) fire extinguisher;
  - (14) wire cutters (2);
  - (15) shovels and machetes (2);
  - (16) background activity materials;
  - (17) lens paper and cloth;
  - (18) hay boxes and feeding utensils;
  - (19) compass (one per range staff);
  - (20) lights for night firing;
  - (21) charcoal to heat target when using thermo light;
  - (22) flashlights (one per range staff); and
  - (23) flare projectors (2).
- b. TOW equipment for conducting a tracking practice:
- (1) TOW 2 complete;

- (2) precision gunnery simulator, complete;
  - (3) battery assemblies;
  - (4) target board assembly; and
  - (5) score sheets.
- c. Transport needs:
- (1) TOW 2-equipped vehicles;
  - (2) vehicle (APC) for target vehicle;
  - (3) communication/RSO vehicle;
  - (4) medium logistic vehicle wheeled (MLVW) ammunition vehicle;
  - (5) MLVW stores vehicle;
  - (6) MLVW troop carrying vehicle; and
  - (7) ambulance, as required by range standing orders.
- d. Ammunition needs:
- (1) TOW missiles;
  - (2) blast simulators;
  - (3) flares, as required;
  - (4) battle simulation explosives, as required;
  - (5) small arms ammunition, as required; and
  - (6) smoke/fragmentation grenade (TUA), as required.

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### e. Publications:

- (1) B-GL-385-014/PT-001, *TOW Long Range Weapon System*;
- (2) B-GL-381-001/TS-001, *Operational Training, Volume 3, Book 1, Training Safety*;
- (3) range standing orders;
- (4) daily range safety orders, where applicable;
- (5) range/training area clearance certificate, where applicable;
- (6) map of area; and
- (7) missile firing reports Part II.

### f. Technical assistance:

- (1) ammunition technician (HE only), and
- (2) fire control systems (FCS) technician.

## TRACKING PRACTICES

58. Before firing, the OIC/RSO describes the range and gives instructions pertaining to firing procedures and safety.

59. Weapon systems are numbered from left to right.

60. The firing point officer, numbers 2 and 3 take positions at the weapon. Numbers 2 and 3 perform a system self test and the assistant firing point officer checks the operation of the instructor's console. Number 3s pick up the blast simulators on order.

61. When all weapon systems are prepared for firing and the observance of safety regulation has been checked, the OIC/RSO, who



is in radio contact with the target vehicle driver, will order the driver to start the run.

62. The firing point officer will issue the fire orders to the operator.

63. At the completion of the tracking practice, the OIC/RSO commands **CEASE FIRING**, and each detachment will carry out the proper drills and report **ALL CLEAR** to the OIC/RSO.

## **QUALIFICATION FIRING**

64. The procedures prescribed for tracking practices are used for qualification, except that:

- a. each person completes the prescribed tracking practices before qualification;
- b. unless the time allotted for firing is limited, qualification firing is not conducted on the same day with any portion of an instructional practice;
- c. before firing any exercise for qualification, number 2 is given a reasonable period of time to check the condition of the weapon system and missile simulation round;
- d. during qualification firings when a malfunction occurs, number 2 calls, **MISFIRE**. Thereafter, neither number 2 nor number 3 touches the weapon until the firing point officer examines it;
- e. if a malfunction occurs through no fault of number 2, the gunner is permitted to fire the tracking gun again;
- f. decision to disregard scores or to authorize an extra practice rest solely with the OIC; and

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- g. if number 2 is considered to be responsible for the malfunction, an additional practice will not be conducted.

## LIVE FIRE PRACTICE

65. All personnel that will be firing a live missile must first qualify on indoor and outdoor tracking at most one week, but preferably 48 hours, prior to a live fire practice. Other requirements are detailed in LFCO 23-16.

66. The OIC/RSO may decide on a variety of scenarios for the range practice. In any case, the OIC/RSO must ensure that the practice is kept within the safety limitations and distances for the weapons and ammunition as described in this chapter and IAW B-GL-381-001/TS-001, *Operational Training, Volume 3, Book 1, Training Safety*.

67. The suggested format for a TOW range instruction is as follows:

- a. cover page;
- b. table of contents;
- c. sequence and timings;
- d. organization of range staff;
- e. relays;
- f. radio net diagram;
- g. range diagram;
- h. introduction to the range;
- i. annexes:
  - (1) request for range;

- (2) request for technical assistance;
- (3) request for transport;
- (4) request for rations;
- (5) request for ammunition;
- (6) request for stores and equipment;
- (7) duties of the OIC/RSO;
- (8) duties of the range 2IC;
- (9) duties of the firing point officer(s) and assistant firing point officer(s);
- (10) duties of the ammunition NCM;
- (11) duties of the background activity NCM;
- (12) duties of the communications operator;
- (13) duties of medical pers, if RSOs dictate;
- (14) duties of sentries and flagmen;
- (15) duties of target vehicle driver; and
- (16) danger area trace, if required.