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TANK CREWMAN (M60A1) TRAINING MODULES.(U)

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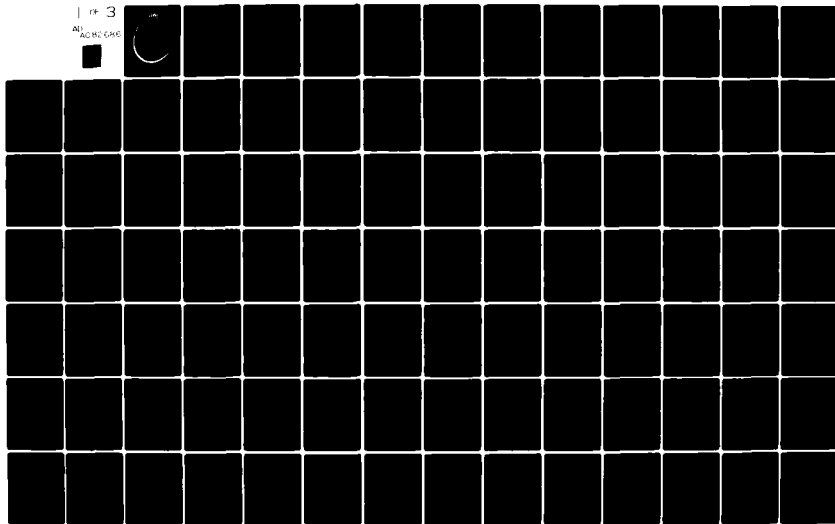
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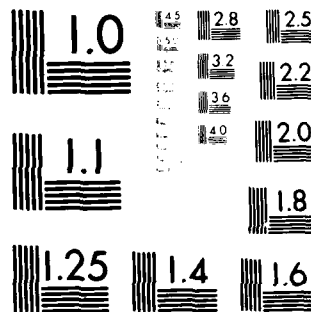
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TANK CREWMAN (M60A1) TRAINING MODULES

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Armor Training Skills Training Tank Gunnery Skills Testing M60A1		
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This document provides training outlines and administrative guidance for promoting M60A1 tank crewman readiness. Administrative guidance, time estimates and equipment requirements for training are given first. Remaining sections of the report are detailed outlines of training for the crew positions, driver, loader, gunner, and tank commander.		

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>The training outlines address knowledge and skill aspects of the important crewman tasks: those tasks that are most relevant to crew gunnery proficiency. The training is designed for use by the unit commander in promoting proficiency in the conduct of before-operations checks, disassembling and assembling weapons, and driving, loading, and shooting in a tactical setting.

When used with three companion documents, Tank Crewman (M60A1) Readiness Tests, Tank Crew (M60A1) Performance Exercise, and Program Management for a Tank Crewman Skills Training Program, the module outlines provide an integrated "train-up" package for annual gunnery evaluation.

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RESEARCH PRODUCT RP-79-14

TANK CREWMAN (M60A1) TRAINING MODULES

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FOREWORD

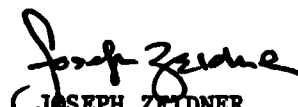
The Fort Knox Field Unit of the Army Research Institute for the Behavioral and Social Sciences (ARI) carries out research and exploratory development in the area of Armor training. An objective of this work is to develop, through analytic and field research, tank crew training methods that are effective and efficient.

This report is one of a set of four dealing with the development and maintenance of proficiency in M60A1 tank crewman with special emphasis on application in reserve training.

Companion documents are:

1. Tank Crewman (M60A1) Readiness Tests, ARI Research Product RP-79-13 , November 1979.
2. Tank Crew (M60A1) Performance Exercise, ARI Research Product RP-79-15 , November 1979.
3. Program Management for Tank Crewman Skills Training Program, ARI Research Product RP-79-16 , November 1979.

The project of which this report is a part was conducted by personnel of the Human Resources Research Organization (HumRRO) under Contract No. DAHC 19-76-C-0001 and monitored by Donald F. Haggard, Chief of ARI Field Unit at Fort Knox. The research was done under Army Project 2Q763743A773 and is responsive to requirements of the U.S. Army Armor School at Fort Knox, the Army Training and Doctrine Command, and the Army Forces Command.


JOSEPH ZEIDNER
Technical Director

SUMMARY

This report includes training modules for each of four M60A1 duty positions (Driver, Loader, Gunner, Tank Commander). The report also includes information pertaining to crosstraining, procedures for filling crew position vacancies, and an outline of a three-man crew training program.

Training modules are procedures for correcting deficiencies uncovered by readiness tests. There are four batteries of modules, one for each crew position. Each battery contains a group of modules structured to accommodate training of task deficiencies. For each readiness test there is a companion training module as listed below:

- . Driver: D-1, Operational Checks and Services
D-2, Before Operations Procedures and Tank Start-Up
D-3, Target Acquisition
D-4, Locating and Reporting Targets
D-5, Tactical Driving
- . Loader: L-1, Weapons Maintenance
L-2, Weapons Maintenance
L-3, Mission Preparation
L-4, Mission Preparation
L-5, Combat Loading
L-6, Combat Loading
L-7, Target Acquisition
L-8, Locating and Reporting Targets
- . Gunner: G-1, Weapons Maintenance
G-2, Weapons Maintenance
G-3, Before Operations Procedures
G-4, Weapon Systems Preparation
G-5, Weapon Systems Preparation
G-6, Combat Loading
G-7, Combat Loading
G-8, Target Acquisition
G-9, Locating and Reporting Targets
G-10, Tactical Operations
G-11, Tactical Operations
- . Tank Commander:
TC-1, Weapons Maintenance
TC-2, Weapons Maintenance
TC-3, Before Operations
TC-4, Weapon Systems Preparation
TC-5, Weapon Systems Preparation

TC-6, Combat Loading
TC-7, Combat Loading
TC-8, Target Acquisition
TC-9, Locating and Reporting Targets
TC-10, Tactical Operations
TC-11, Tactical Operations

The time to complete the various modules is estimated to be:

. Driver 7 1/2 - 15 1/2 hrs.	. Loader 19 - 26 hrs.
. Gunner 25 1/2 - 34 1/2 hrs.	. Tank Commander 25 - 34 hrs.

Another section of the report examines the need for crosstraining tank crew members. This section includes a review of current cross-training programs, the source of replacements, crosstraining implications, and procedures for filling crew vacancies.

A third section addresses the problems associated with fighting with a three-man crew. This section covers the development of a three-man crew training program to include crew drills for various contingencies.

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TANK CREWMAN (M60A1) TRAINING MODULES

INTRODUCTION

This research product contains procedures for administering individual training modules and a battery of tests for each crew position.

BACKGROUND

In 1977 the training needs of reserve component units were changing. The M48A1 tank was being replaced by the M48A5 tank and the draft had been eliminated. Equipment and personnel turbulence was on the increase and the cost of training related items continued to rise.

In response to the need for a new approach to reserve component training, the U.S. Army Research Institute for the Behavioral and Social Sciences (ARI) initiated research to design training plans for operating and maintaining the M48A5 tank. In 1977, the Tank Crewman Skills Training Program (TCST) (Harris, Osborn, and Boldovici, 1977) was developed to accommodate the ARI requirement. The TCST program consisted of three major components:

- . Crew Interaction Performance Test (CIPT)
- . Duty Position Readiness Tests (DPRTs)
- . Duty Position Training Modules (DPTMs)

PURPOSE

The purpose of the training modules is to provide a procedure for correcting deficiencies noted during the administration of readiness tests.

GUIDELINES
FOR
TRAINING MODULE ADMINISTRATOR

This section provides guidance for administering duty position training modules. Specific items covered are:

- . Pretraining conditions
- . Objective
- . Method
- . Equipment and materials
- . Estimated time
- . Procedure
- . Notes

PRETRAINING CONDITIONS

This part of the module lists conditions leading to the need for mastering the contents of the module; e.g., failure to meet the standard on a part of a readiness test.

OBJECTIVE

This is a statement which specifies:

- . What task(s) the crewman will be able to perform after training
- . How he will know when to perform the task(s)
- . When he will perform the task(s)
- . How well he will perform the task(s)
- . What he can use to help him perform the task(s)
- . How he will perform the task(s)

METHOD

This is a statement which specifies how the training will be conducted.

EQUIPMENT AND MATERIALS

This is a list, shown in Table 1, of equipment and materials that will be needed to conduct the training.

ESTIMATED TIME

Table 2 lists estimated times necessary to teach required knowledge and skills.

PROCEDURE

This is an outline of a sequence of instructional events leading to mastery of the module.

NOTES

The last section involves answers to questions which might arise upon reading the outlines.

TRAINING MANAGER FUNCTIONS

Although tank commander's administer training modules to their crew members the training manager is primarily responsible for providing the necessary training environment. To accomplish the responsibility, the training manager must:

- . Identify training deficiencies exposed by readiness tests.
- . Identify training modules required for correcting training deficiencies.
- . Make available training assets required for use in the training program.

- . Make available training facilities required for use in the training program.
- . Identify time requirements to implement the training modules and schedule the use of training assets and facilities.

NOTE: A companion research product, "Program Management for Tank Crewman Skills Training Program," explains in detail the development of the program and provides implementing guidance for training managers and trainers.

TABLE 1. CONSOLIDATED EQUIPMENT LIST FOR TRAINING MODULE

<u>Item</u>	<u>Used by</u>	<u>Quantity</u>	<u>Remarks</u>
TEC Tapes with pre-tests			
020-171-1611-F	DV,LD,GN,TC	1	
020-171-1612-F	DV,LD,GN,TC	1	
020-171-1614-F	DV,LD,GN,TC	1	
020-171-0201-F	DV,LD,GN,TC	1	
020-171-0203-F	DV,LD,GN,TC	1	
935-171-0203-F	DV,LD,GN,TC	1	
020-171-5366-F	DV,LD	1	
020-171-5367-F	DV,LD	1	
020-171-5368-F	DV,LD	1	
020-171-5369-F	DV,LD	1	
020-171-5370-F	DV,LD	1	
020-171-1132-F	LD,GN,TC	1	
020-171-1133-F	LD,GN,TC	1	
020-171-5229-F	LD,GN,TC	1	
020-171-5340-F	TC	1	
020-171-5343-F	TC	1	
020-171-5352-F	LD,GN,TC	1	
020-171-5353-F	GN,TC	1	
020-171-5354-F	GN,TC	1	
020-171-5355-F	GN,TC	1	
020-171-5341-F	GN,TC	1	
020-171-5351-F	GN,TC	1	
020-171-5337-F	GN,TC	1	
020-171-5331-F	LD,GN,TC	1	
020-171-5332-F	LD,GN,TC	1	
020-171-5346-F	LD,GN,TC	1	
020-171-5347-F	LD,GN,TC	1	
020-171-5348-F	LD,GN,TC	1	
020-171-5361-F	TC	1	
020-171-5364-F	GN,TC	1	
020-171-5342-F	GN	1	
(TEC pre-tests, 1 per crewmember)			
During main gun rounds	LD,GN,TC	3 APDS 3 HEAT 2 HEP	
Ammunition Stowage Plan	LD,GN,TC	1	
Dummy 7.62 ammunition	LD,GN,TC	3 ten rd. belts	
Dummy caliber .50 ammunition	LD,GN,TC	3 ten rd. belts	
Cardboard representation of 7.62 ammunition box	LD,GN,TC	3 sets, 15 ea.	
Cardboard representation of caliber .50 ammunition box	LD,GN,TC	3 sets, 15 ea.	
Replenisher tape mockup	LD,GN,TC	2	
Coax	LD,GN,TC	1 per tank	

TABLE 1. (Cont'd.) CONSOLIDATED EQUIPMENT LIST FOR TRAINING MODULES

<u>Item</u>	<u>Used by</u>	<u>Quantity</u>	<u>Remarks</u>
M85 Machinegun	LD,GN,TC	1 per tank	
Block of wood 1"x6"x6"	LD	1 per tank	
Heavy black thread	LD	1 ball	
Tape (Masking)	LD	1 roll	
Equipment to remove breechblock	LD,GN,TC	1 per tank	
Main gun zero target	LD,GN,TC	1	
Coax zero panel	LD,GN,TC	1	
M85 machinegun zero panel	TC	1	
Targets	LD,GN,TC	1 set	See TC Readiness Test, Part K
Beseler Cue/See	DV,LD,GN,TC	4	
Binoculars	LD,GN,TC	1 per tank	
Stopwatch	LD,GN,TC	1 per tank	
Protective mask	DV,LD,GN,TC	1 per crewman	
M60A1 tank	DV,LD,GN,TC	1 per crew	
Driving course	DV	1	See DV Readiness Test, Part E.
Target acquisition course	DV,LD,GN,TC	1	See DV,LD,GN,TC Readiness Test on "Locating and Reporting Targets"
Target engagement course	GN,TC		See GN, TC Readiness Test on Tactical Operations
Subcaliber device	GN,TC	1 per tank	.22 caliber inbore, Brewster Device or Telfare Device
Laser Gun Firing Trainer	GN,TC	1 per tank	
BOT Trainer	GN,TC	1	
Subcaliber Ammunition	GN,TC	See appropriate modules	
Pocket size task books (job aids)	DV,LD,GN,TC	1 per crewmember	

TABLE 2. TIME ESTIMATES FOR DUTY POSITION
TRAINING MODULES

<u>POSITION</u>	<u>TRAINING MODULE</u>	<u>HOURS</u>	<u>CROSS TRAINING HOURS</u>	<u>TOTAL HOURS</u>
DRIVER				
D-1	Operational Checks and Services (k)	1-5	-	1-5
D-2	Before Operations Procedures and Tank Start-up (s)	1	-	1
D-3	Target Acquisition (k)	2½	-	2½
D-4	Locating and Reporting Targets (s)	1-2	-	1-2
D-5	Tactical Driving (s)	2-5	-	2-5
		7½-15½	-	7½-15½
LOADER				
L-1	Weapons Maintenance (k)	3	-	3
L-2	Weapons Maintenance (s)	1	-	1
L-3	Mission Preparation (k)	5-8	-	5-8
L-4	Mission Preparation (s)	2-3	-	2-3
L-5	Combat Loading (k)	1-3	-	1-3
L-6	Combat Loading (s)	3½	(½)	3½
L-7	Target Acquisition (k)	2½	-	2½
L-8	Locating and Reporting Targets (s)	1-2	-	1-2
		19-26	(½)	19-26
GUNNER				
G-1	Weapons Maintenance (k)	3	-	3
G-2	Weapons Maintenance (s)	1	(½)	1
G-3	Before Operations Procedures (s)	½	-	½
G-4	Weapon Systems Preparation (k)	5-8	(½)	5-8
G-5	Weapons Systems Preparation (s)	1½	(½)	1½
G-6	Combat Loading (k)	2-5	(¾)	2-5
G-7	Combat Loading (s)	4½	(1½)	4½
G-8	Target Acquisition (k)	2½	-	2½
G-9	Locating and Reporting Targets (s)	1-2	-	1-2
G-10	Tactical Operations (k)	½	-	½
G-11	Tactical Operations (s)	4-6	-	4-6
		25½-34½	(3½)	25½-34½
TANK COMMANDER				
TC-1	Weapons Maintenance (k)	3	-	3
TC-2	Weapons Maintenance (s)	1	(½)	1
TC-3	Before Operations Procedures (s)	½	(½)	½
TC-4	Weapon Systems Preparation (k)	5-9	(½)	5-9
TC-5	Weapons System Preparation (s)	2½	(½)	2½
TC-6	Combat Loading (k)	2-5	(½)	2-5
TC-7	Combat Loading (s)	4½	(1)	4½
TC-8	Target Acquisition (k)	2½	-	2½
TC-9	Locating and Reporting Targets (s)	1-2	-	1-2
TC-10	Tactical Operations (k)	2	-	2
TC-11	Tactical Operations (s)	1-2	(½)	1-2
		25-34	(3½)	25-34

NOTE: (k) equals knowledge (written modules) and (s) equals skill (hands-on modules).

TRAINING MODULES

Training modules for each crewman are contained in Appendix A through D. Each appendix includes a consolidated listing of the crewman training module battery and training modules by functional groups.

USE OF TRAINING MODULES

As noted previously training modules are used to correct deficiencies uncovered by readiness tests. The process for implementing remedial training is illustrated in Figure 1.

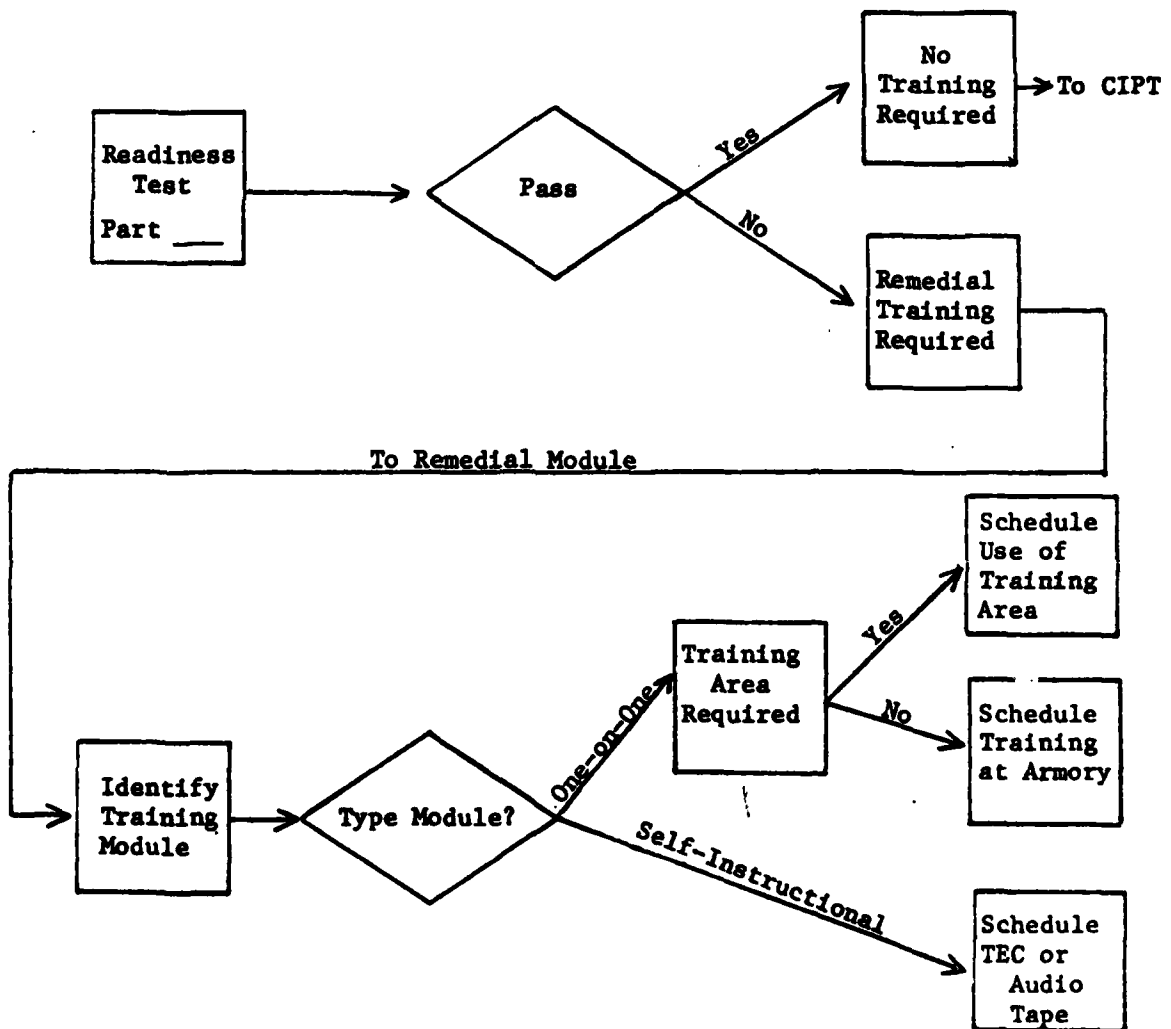


Figure 1. Remedial training process.

TRAINING TECHNIQUES

Training modules incorporate three different training techniques: self instructional sound-slide presentation (TEC programs), self instructional audio tapes, and one-one-one instructor controlled performance training. The first technique teaches knowledge of a skill, whereas, the last two teach the performance of a skill.

Self Instructional Sound-Slide Presentation

This type of module requires the crewman to review TEC programs appropriate to the deficiencies noted during the readiness tests. The crewman views the programs until he can successfully pass the end of course test.

Self Instructional Audio Tapes

In this module the crewman plugs into the tank intercom system the appropriate audio tape and listens to it while practicing a specific task, e.g., disassembly of the breechblock. When the crewman becomes proficient in performing the task he is tested for certification by the tank commander.

One-on-One Instructor Controlled Performance Training

This module is used to train a crewman to perform a specific task. The tank commander performs the task and then talks the crewman through the task. The crewman then practices the task until he becomes proficient and then the tank commander tests him for certification.

TRAINING MODULE/READINESS TEST CROSS REFERENCE

When deficiencies are uncovered by readiness tests remedial training is initiated by following the process shown in Figure 1. The training module/readiness test cross reference in Table 3 indicates the correct module to select for readiness test deficiencies.

TABLE 3. TRAINING MODULE/READINESS TEST CROSS REFERENCE

TM NR	FUNCTIONAL GROUP	RT PART
Driver		
D-1	Operational Checks and Service	A
D-2	Before Operations Procedures and Tank Start-UP	B
D-3	Target Acquisition	C
D-4	Locating and Reporting Targets	D
D-5	Tactical Driving	E
Loader		
L-1	Weapons Maintenance	A
L-2	Weapons Maintenance	B
L-3	Mission Preparation	C
L-4	Mission Preparation	D
L-5	Combat Loading	E
L-6	Combat Loading	F
L-7	Target Acquisition	G
L-8	Locating and Reporting Targets	H
Gunner		
G-1	Weapons Maintenance	A
G-2	Weapons Maintenance	B
G-3	Before Operations Procedures	C
G-4	Weapon Systems Preparation	D
G-5	Weapon System Preparation	E
G-6	Combat Loading	F
G-7	Combat Loading	G
G-8	Target Acquisition	H
G-9	Locating and Reporting Targets	I
G-10	Tactical Operations	J
G-11	Tactical Operations	K
Tank Commander		
TC-1	Weapons Maintenance	A
TC-2	Weapons Maintenance	B
TC-3	Before Operations Procedures	C
TC-4	Weapon Systems Preparation	D
TC-5	Weapon Systems Preparation	E
TC-6	Combat Loading	F
TC-7	Combat Loading	G
TC-8	Target Acquisition	H
TC-9	Locating and Reporting Targets	I
TC-10	Tactical Operations	J
TC-11	Tactical Operations	K

NOTE: TM = Training Module, RT = Readiness Test.

CROSSTRAINING

Crosstraining of tank crew members is a necessary requirement to insure the continued proficiency of tank crews during periods of personnel turbulence.

Detailed information regarding crosstraining is contained in Appendix E. The specifics include:

- . The need for crosstraining
- . Current crosstraining programs
- . Replacements
- . Tank crew organization and functions
- . Implementing crosstraining
- . Filling crew vacancies

FIGHTING WITH A THREE-MAN CREW

Combat losses, administrative losses, and failure of the replacement system frequently necessitates that tank crews function with only three men. FM 17-12, "Tank Gunnery" (U.S. Army, 1977), lists actions to take in preparing the crew and a tank to function with only three crew members. Appendix F expands on the procedures outlined in FM 17-12 and includes information pertaining to:

- . Four-man crew capabilities
- . Crew and vehicle preparations for three-man crew operations
- . Constraints of three-man crew operations
- . Engagement capabilities of three-man crew
- . Priority task
- . Conditional task clustering
- . Modified fire commands
- . Sequential crew duty matrix
- . Standard operating procedures/crew drills

REFERENCES

Harris, J.H., Osborn, W.C., and Boldovici, J.A. Reserve Component Training for Operating and Maintaining the M48A5 Tank. Alexandria, Virginia: U.S. Army Research Institute for the Behavioral and Social Sciences, 1977.

U.S. Army. Tank Gunnery, FM 17-12. Author, 1977.

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APPENDIX A
DRIVER'S MODULE OUTLINES

DRIVER'S MODULE OUTLINES

REQUIRED TIME: 7 1/2 - 15 1/2 hours.

MODULE D-1. OPERATIONAL CHECKS AND SERVICES

Type: Self instructional sound-slides presentations (TEC tapes)

020-171-5366-F (Before Operations Maintenance, Part I)
020-171-5367-F (Before Operations Maintenance, Part II)
020-171-5368-F (Before Operations and At Halt Maintenance Checks and Services)
020-171-5369-F (After Operations Maintenance Checks and Services, Part I)
020-171-5370-F (After Operations Maintenance Checks and Services, Part II)

Time: 1-5 hours

Location: Company Area or UTS

Support: Beseler Cue/See and TEC tapes

Scoring: Passing grade equals completing post-test without error

MODULE D-2. BEFORE OPERATIONS PROCEDURES AND TANK START-UP

Type: One-on-one instructor controlled performance training

Time: 1 hour

Location: Company Area or UTS

Support: M60A1 tank and job aids

Scoring: Passing grade equals completing each task without error

MODULE D-3. TARGET ACQUISITION

Type: Self instructional sound-slide presentations (TEC tapes)

020-171-1611-F (Target Range Determination)
020-171-1612-F (Locating and Reporting Targets)
020-171-1614-F (Target Acquisition Scoring Techniques)
935-171-0201-F (Armor Vehicle Recognition, Part I)
935-171-0202-F (Armor Vehicle Recognition, Part II)
935-171-0203-F (Armor Vehicle Recognition, Part III)

Time: 2 1/2 hours

Location: Company Area or UTS

Support: Beseler Cue/See and TEC tapes

Scoring: Passing grade equals completing post-test without error.

MODULE D-4. LOCATING AND REPORTING TARGETS

Type: One-on-one instructor controlled performance training

Time: 1-2 hours

Location: UTS

Support: M60A1 tank and target acquisition course

Scoring: Passing grade equals completing each task without error

MODULE D-5. TACTICAL DRIVING

Type: One-on-one instructor controlled performance training or
audio tape controlled practice

Time: 2-5 hours

Location: UTS

Support: Beseler Cue/See and TEC tapes and M60A1 tank and
tactical driving course

Scoring: Passing grade equals completing each task without error

MODULE D-1. OPERATIONAL CHECKS AND SERVICES

PRETRAINING CONDITIONS:

Driver failed to meet standard on pre-test for TEC lessons 020-171-5366-F through 020-171-5370-F (Part A, Driver's Readiness Test).

OBJECTIVE:

Given pictures or descriptions of tank components, driver will recognize unserviceable parts and describe actions necessary to service them.

METHOD:

Self-instructional sound-slide presentation with written response.

EQUIPMENT/MATERIALS:

- a. Five filmstrip cartridges and audio cassettes (TEC Lessons 020-171-5366-F through 020-171-5370-F)
- b. Beseler Cue/See
- c. Paper and pencil

ESTIMATED TIME:

1-5 hours

PROCEDURE:

- a. Driver selects lesson corresponding to task elements failed on pre-test in Part A, Driver's Readiness Test.
- b. Driver completes relevant portion of assigned lesson and takes post-test.
- c. Driver reviews those lessons keyed on post-test for items missed.
- d. Driver has satisfactorily completed the lesson when he has completed relevant portions of post-test with no errors.

NOTE: Some of the maintenance tasks covered in these lessons are not considered to be priority training tasks. But since they are integrated with priority tasks, and since the lessons are not very long, the driver should be required to master the knowledge aspects of them as represented in the post-test.

MODULE D-2. BEFORE OPERATING PROCEDURES AND TANK START-UP

PRETRAINING CONDITIONS:

Driver passed Part A of Driver's Readiness Test but failed to meet standard for one or more tasks in Part B, Driver's Readiness Test.

OBJECTIVES:

- a. Given an M60A1 tank with M27 periscope installed, an M24 (IR) periscope in stowage box and a procedural job aid, driver will remove M27, install M24 and place it in operation. All steps in this three-task objective will be performed in accordance with Parts B.5, B.7, and B.8, Driver's Readiness Test and within 15 minutes without damage to equipment.
- b. Given an M60A1 tank, a procedural job-aid and an indication from the Loader that he wants to check engine and transmission oil levels; driver will start and idle tank engine according to procedures in Part B.9 and B.10, Driver's Readiness Test.
- c. Given an M60A1 on level ground with engine running, a request to move the vehicle into position for checking track tension, and guidance from the Loader; driver will drive the tank forward and coast it to a stop with track in proper position according to procedures in Part B.12, Driver's Readiness Test.
- d. Given an M60A1 with Driver's hatch open and the command, "PREPARE-TO-FIRE," driver will perform Driver's prepare-to-fire procedures, according to procedures in Part B.14, Driver's Readiness Test.
- e. Given an M60A1 tank with gas particulate unit mounted, driver will inspect gas particulate units for cleanliness and serviceability and will check the unit for operation according to procedures in Part B.15 of Driver's Readiness Test.

METHOD:

One-on-one instructor controlled performance training.

EQUIPMENT/MATERIALS:

- a. M60A1 tank
- b. Pocket-sized job aids listing steps in M27 periscope removal, M24 periscope installation and operational check-out, starting the tank engine and idling the engine for oil checks and placing the gas particulate unit into operation.

ESTIMATED TIME:

1 hour

PROCEDURE:

- a. TC makes sure driver has pocket job aids and urges him to refer to them during task performance.
- b. TC explains to driver task elements failed in Part B, Driver's Readiness Test.
- c. TC "talks driver through" task elements to be learned; driver performs as these oral directions are given.
- d. Driver then practices with instructor available to coach as necessary.
- e. Driver is retested on relevant portion of Part B, Driver's Readiness Test.

NOTES:

- a. This module should be conducted as remedial training immediately following administration of Part B fo the Driver's Readiness Test.
- b. Procedures for remedial training should be followed as given. Demonstrations of performance by the instructor or lengthy lectures on principles of equipment operation, while the trainee is idle, usually slow down the learning process.
- c. Checking and servicing the periscope are not covered here because of difficulty in providing a variety of damaged periscopes. Knowledge aspects of the task are covered in Module D-1.

MODULE D-3. TARGET ACQUISITION

UNIT D-3.1. TARGET RANGE ESTIMATION

PRETRAINING CONDITIONS:

Driver failed to meet standard on pre-test for TEC Lesson 020-171-1611-F (Part C, Driver's Readiness Test).

OBJECTIVE:

Driver will describe the "100-meter" and "Appearance of Objects" methods of range estimation.

METHOD:

Self-instructional sound-slide presentation with written response.

EQUIPMENT/MATERIALS:

- a. One filmstrip cartridge with audio-cassette (TEC Lesson 020-171-1611-F)
- b. Beseler Cue/See
- c. Paper and pencil

ESTIMATED TIME:

1/2 hour

PROCEDURE:

- a. Driver selects lesson corresponding to task elements failed on pre-test in Part C, Driver's Readiness Test.
- b. Driver completes relevant portion of assigned lesson and takes post-test.
- c. Driver reviews lesson keyed on post-test for items missed.
- d. Driver has satisfactorily completed the lesson when he completes relevant portions of post-test with no errors.

UNIT D-3.2. LOCATING AND REPORTING TARGETS

PRETRAINING CONDITIONS:

Driver failed to meet standard on pre-test for TEC Lesson 020-171-1612-F (Part C, Driver's Readiness Test).

OBJECTIVE:

Given targets depicted in various locations relative to the driver's tank, the driver will, in writing, report target location using "the clock method."

METHOD:

Self-instructional sound-slide presentation with written response.

EQUIPMENT/MATERIALS:

- a. One filmstrip cartridge with audio-cassette (TEC Lesson 020-171-1612-F).
- b. Beseler Cue/See
- c. Paper and pencil

ESTIMATED TIME:

1/2 hour

PROCEDURE:

- a. Driver selects lesson corresponding to task elements failed on pre-tests in Part C, Driver's Readiness Test.
- b. Driver completes relevant portion of assigned lesson and takes post-test.
- c. Driver reviews lesson keyed on post-test for items missed.
- d. Driver has satisfactorily completed the lesson when he can complete the post-test with no errors.

UNIT D-3.3. TARGET ACQUISITION SCANNING TECHNIQUES

PRETRAINING CONDITIONS:

Driver failed to meet standard on pre-test for TEC Lesson 020-171-1614-F (Part C, Driver's Readiness Test).

OBJECTIVE:

Driver will state from memory the correct procedure for scanning for targets (day or night) and acquiring and preserving night vision.

METHOD:

Self-instructional sound-slide presentation with written response.

EQUIPMENT/MATERIALS:

- a. One filmstrip cartridge with audio-cassette (TEC Lesson 020-171-1614-F)
- b. Beseler Cue/See
- c. Paper and pencil

ESTIMATED TIME:

1/2 hour

PROCEDURE:

- a. Driver selects lesson corresponding to task elements failed on pre-test in Part C, Driver's Readiness Test.
- b. Driver completes relevant portion of assigned lesson and takes post-test.
- c. Driver reviews lesson keyed on post-test for items missed.
- d. Driver has satisfactorily completed the lesson when he can complete the post-test with no errors.

UNIT D-3.4. ARMOR VEHICLE RECOGNITION

PRETRAINING CONDITIONS:

Driver failed to meet standard on pre-test for TEC Lesson 935-171-0203-F, (Part C, Driver's Readiness Test).

OBJECTIVE:

Shown pictures of friendly (NATO) and enemy (Warsaw Pact) armored vehicles at various ranges and in various degrees of concealment, driver will correctly identify each vehicle as to country of origin within 5 seconds.

METHOD:

Self-instructional sound-slide presentation with written response.

EQUIPMENT/MATERIALS:

- a. Three filmstrip cartridges and audio-cassettes (TEC Lessons 935-171-0201-F, 935-171-020-F, and 935-171-0203-F).
- b. Beseler Cue/See
- c. Paper and pencil

ESTIMATED TIME:

1 hour

PROCEDURE:

- a. Driver takes pre-test for Lessons 935-171-0201-F and 935-171-0202-F. If he fails, assign appropriate lesson and follow with Lesson 935-171-0203-F. If he passes both pre-tests, assign Lesson 935-171-0203-F.
- b. Driver completes relevant portion of Lesson 935-171-0203-F and takes post-test. (Instructor administers post-test since driver's responses should be oral and are limited by time.)
- c. Driver reviews lesson until he can complete post-test with no errors.

MODULE D-4 LOCATING AND REPORTING TARGETS

PRETRAINING CONDITIONS:

Driver passed Part C, Driver's Readiness Test but failed to meet standard in one or more tasks in Part D, Driver's Readiness Test.

OBJECTIVES:

- a. Given an M60A1 tank located at or on observation point on a target acquisition course, the driver from his position and buttoned up, will conduct a quick search scan of the target area in accordance with the procedures in Part D.1, Driver's Readiness Test.
- b. Given an M60A1 tank located at an observation point on a target acquisition course, the driver from his position and buttoned up, will have 5 minutes to locate and identify targets in the area according to procedures in Part D.2, Driver's Readiness Test.
- c. Given an M60A1 tank located at an observation point on a target acquisition course, the driver from his position and buttoned up, will estimate range to targets in the area to within ± 100 meters according to procedures in Part D.3, Driver's Readiness Test.
- d. Given an M60A1 tank located at an observation point on a target acquisition course, the driver from his position and buttoned up, will report the location of targets in the area according to procedures in Part D.4, Driver's Readiness Test.

METHOD:

One-on-one instructor controlled performance training.

EQUIPMENT/MATERIALS:

- a. M60A1 tank
- b. Target acquisition course with various targets at various ranges.

ESTIMATED TIME:

1-2 hours

PROCEDURE:

- a. TC explains to driver task elements failed in Part D, Driver's Readiness Test.
- b. TC "talks driver through" task elements to be learned; driver performs as these oral directions are given.
- c. Driver then practices with instructor available to coach as necessary.
- d. Driver is retested on relevant portion of Part D, Driver's Readiness Test.
- e. TC observes driver conduct a quick scan of target area.
- f. Practice should emphasize quickness as well as accuracy in locating and identifying targets.
- g. TC provides analysis and special cues for any range-to-target that driver estimated inaccurately.
- h. Practice continues until driver correctly reports location of targets in the area by the range and clock system to within one hour deviation for direction and to within ± 100 meters deviation for range.

MODULE D-5 TACTICAL DRIVING

UNIT D-5.1. VARIED TERRAIN DRIVING

PRETRAINING CONDITIONS:

Driver failed to meet standard in one or more tasks on varied terrain driving portion of Part E, Driver's Readiness Test.

OBJECTIVES:

- a. Given an M60A1 tank and a Driver's course the driver will drive the tank across a vertical obstacle according to procedures in Part E.1.a, Driver's Readiness Test.
- b. Given an M60A1 tank and a Driver's course the driver will drive the tank across a ditch according to procedures in Part E.1.b, Driver's Readiness Test.
- c. Given an M60A1 tank and a Driver's course the driver will drive the tank up a steep grade according to procedures in Part E.1.c, Driver's Readiness Test.
- d. Given an M60A1 tank and a Driver's course the driver will drive the tank down a steep grade according to procedures in Part E.1.d, Driver's Readiness Test.
- e. Given an M60A1 tank and a Driver's course the driver will drive the tank to a defilade firing position according to procedures in Part E.2, Driver's Readiness Test.

METHOD:

One-on-one instructor controlled performance training.

EQUIPMENT/MATERIALS:

- a. M60A1 tank
- b. Driver's course which provides obstacles, ditches, and steep grades.

ESTIMATED TIME:

1-2 hours

PROCEDURE:

- a. TC directs driver to move out to the first (easiest) obstacle. Driver practices negotiating obstacle, with coaching by TC, until he demonstrates the correct technique (in the TC's judgment) for approaching the obstacle, timing acceleration and deceleration over the obstacle.
- b. TC directs driver to move out to an obstacle of the same type but of slightly greater difficulty. TC provides guided practice as in a above.
- c. TC takes driver through all obstacles in this manner, proceeding from easy to difficult and from one type of obstacle to another.
- d. Practice in driving to defilade should be handled in the same way.
- e. When driver has mastered the more difficult obstacle of each type, and can drive to defilade under the more difficult terrain condition, he is given additional practice in driving over a variety of types of obstacles, all difficult.
- f. When TC thinks driver is ready, he administers a tactical driving test of the type described in Part E.1 and E.2, Driver's Readiness Test.

NOTE:

This training probably could be mediated more effectively and, in the long run, more inexpensively by a high fidelity driver trainer. The M34, Tracked Vehicle Driving Trainer, in its present form, is an inadequate simulator for varied terrain driving. It could be used, perhaps, as the basis for an effective simulator, if motion and visual systems were added. One type of simulator that should be effective in training terrain driving is outlined below:

- a. The simulator would consist of three major components:
 - (1) a Driver's station with visual display,
 - (2) a miniaturized terrain board and mobile video camera, and
 - (3) a computer to link the two.
- b. The Driver's station would consist of a Driver's seat, instrument panel and controls, all with high functional fidelity. Engine noise would be faithfully reproduced as a function of gear, accelerator and engine load. The station should have a motion capability in three dimension: pitch, yaw and roll. A screen to the front would receive a life-size video projection of the terrain.

- c. Inputs to the Driver's station would be provided by a scaled terrain board and mini-tank video system. A motorized miniature "tank" chassis, scaled to the terrain, would carry a video camera. The assembly is driven over the terrain board through linkage with controls in the Driver's station, with the camera transmitting a fixed view of terrain from the driver's perspective. The attitude of the assembly in relation to terrain obstacles is sensed and transmitted to the motion system in the Driver's station.
- d. A computer of some kind would be used to provide the necessary fidelity in translating engine speed, control and vehicle motion from the miniaturized analog to the Driver's station.

UNIT D-5.2. TARGET ENGAGEMENT DRIVING

PRETRAINING CONDITIONS:

Driver failed to meet standard in one or more tasks on target engagement portion of Part E, Driver's Readiness Test.

OBJECTIVES:

- a. Given an M60A1 tank and a coax engagement fire command for an area target the driver will demonstrate the correct driving response according to Part E.3.a, Driver's Readiness Test.
- b. Given an M60A1 tank and a caliber .50 engagement fire command for an area target the driver will demonstrate the correct driving response according to Part E.3.b, Driver's Readiness Test.
- c. Given an M60A1 tank and a coax engagement fire command for a point target the driver will demonstrate the correct driving response according to Part E.3.c, Driver's Readiness Test.
- d. Given an M60A1 tank and a caliber .50 engagement fire command for a point target the driver will demonstrate the correct driving response according to Part E.3.d, Driver's Readiness Test.
- e. Given an M60A1 tank and a main gun engagement fire command the driver will demonstrate the correct driving response according to Part E.3.e, Driver's Readiness Test.
- f. During target engagement driving the driver will acquire targets in assigned sector and report such according to Part E.4, Driver's Readiness Test.

METHOD:

One-on-one instructor controlled performance training.

EQUIPMENT/MATERIALS:

- a. M60A1 tank
- b. Tactical driving course with various targets at various ranges.

ESTIMATED TIME:

1-2 hours

PROCEDURE:

- a. TC directs driver to move out on tactical driving course. TC will detect various types of targets and give the appropriate fire command. Driver responds to the fire commands by driving to a defilade position for main gun targets and machinegun point targets. Driver will continue movement of the tank during machinegun area targets.
- b. Driver will detect and report location of targets in area.
- c. Driver will be buttoned up.

ALTERNATE METHOD:

Audio-tape controlled practice at a Driver's station mock-up.

EQUIPMENT/MATERIALS:

- a. Simple mock-up of the Driver's station containing the brake, accelerator, steering control and seat. The brake and accelerator should be similar in response and configuration to those in a tank. The steering control need not be operable. The relative position of the four components should be highly similar to that in a tank.
- b. Audio-cassette recording(s) of instructions, fire commands and feedback.
- c. Cassette player.

ESTIMATED TIME:

1 hour

PROCEDURE:

- a. Driver seats himself in the mock-up and starts cassette player. Taped instructions provide explanation of the purpose and procedure for this unit. The correct Driver response to be made to the various types of fire commands is also explained briefly.
- b. Driver practices responding to fire commands. Following each command is a statement of the correct response. Driver continues to practice until he thinks he is ready for a criterion test.
- c. TC tests driver by giving an assortment of fire commands and observing the driving responses.

NOTES:

- a. Additional practice in target engagement driving, following this unit, could be given in conjunction with Unit D-5, Varied Terrain Driving.
- b. If the Driver's station of an M60A1 tank is available, the mock-up is not necessary. Soldier can practice at the actual controls; a battery-operated cassette player can be plugged into the tank intercom or used directly with the player's internal speaker.

UNIT D-5.3 SENSING ROUNDS

PRETRAINING CONDITIONS

Driver failed to meet standard on one or more tasks on sensing rounds portion of Part E, Driver's Readiness Test.

OBJECTIVE:

Given a series of silhouettes with a target and tracer strike superimposed on each silhouette the driver will announce his sensing of the round fired.

METHOD:

One-on-one instructor controlled performance training.

EQUIPMENT/MATERIALS:

- a. M60A1 tank
- b. Four silhouettes with target and tracer strike superimposed.

ESTIMATED TIME:

1 hour

PROCEDURE:

- a. Driver is buttoned up in a tank. Located to the front are four silhouettes with a target and tracer strike superimposed. The tracer strike represents OVER-LEFT, TARGET, DOUBTFUL-RIGHT, and SHORT-RIGHT sensings. The TC will issue an appropriate fire command for each target and then announce LOST. The driver, observing the relationship between the target and tracer, will announce his sensing.
- b. TC tests driver until the driver is proficient in sensing rounds.

APPENDIX B
LOADER'S MODULE OUTLINES

LOADER'S MODULE OUTLINES

REQUIRED TIME: 19-26 hours

MODULE L-1. WEAPONS MAINTENANCE I

Type: Self-instructional sound-slide presentation (TEC tapes)

020-171-1132-F (Cleaning, Inspection, and Lubrication Coax)
020-171-1133-F (Troubleshooting Coax)
020-171-5229-F (Troubleshooting M85 Machinegun)

Time: 3 hours

Location: Company Area or UTS

Support: Beseler Cue/See and TEC tapes

Scoring: Passing grade equals completing post-test without error.

MODULE L-2. WEAPONS MAINTENANCE II

Type: One-on-one instructor controlled performance training

Time: 1 hour

Location: Company Area or UTS

Support: M60A1 tank with coax, caliber .50 machinegun, and gun roll.

Scoring: Passing grade equals passing each task without error.

MODULE L-3. MISSION PREPARATION I

Type: Self-instructional sound-slide presentation (TEC tapes)

020-171-5366-F (Before Operations Maintenance, Part 1)
020-171-5367-F (Before Operations Maintenance, Part 2)
020-171-5368-F (Before Operations and At Halt Maintenance Checks and Services)
020-171-5369-F (After Operations Maintenance Checks and Services, Part 1)
020-171-5370-F (After Operations Maintenance Checks and Services, Part 2)
020-171-5331-F (Tank Ammo: Selecting Ammunition)
020-171-5332-F (Tank Ammo: Handling, Main Gun)
020-171-5352-F (Boresighting the Machineguns [Exclusive of M85 Machinegun])

Time: 5-8 hours

Location: Company Area or UTS

Support: Beseler Cue/See and TEC tapes

Scoring: Passing grade equals completing post-test without error

MODULE L-4. MISSION PREPARATION II

Type: One-on-one instructor controlled performance training

Time: 2-3 hours

Location: Company Area or UTS

Support: M60A1 tank and job aids

Scoring: Passing grade equals passing each task without error

MODULE L-5. COMBAT LOADING I

Type: Self-instructional sound-slide presentation (TEC tapes)

Time: 1-3 hours

Location: Company Area or UTS

Support: Beseler Cue/See and TEC tapes

Scoring: Passing grade equals completing post-test without error

MODULE L-6. COMBAT LOADING II

Type: Audio-tape controlled practice at Loader's station and one-on-one instructor controlled performance training.

Time: 3 1/2 hours

Location: Company Area or UTS

Support: Audio-cassette recordings of fire commands, M60A1 tank, coax and caliber .50 machinegun, dummy rounds and cartridges.

Scoring: Passing grade equals passing each test without error

MODULE L-7. TARGET ACQUISITION

Type: Self-instructional sound-slide presentation (TEC tapes)

020-171-1611-F (Target Range Determination)
020-171-1612-F (Locating and Reporting Targets)
020-171-1614-F (Target Acquisition Scanning Techniques)
935-171-0201-F (Armor Vehicle Recognition, Part I)
935-171-0202-F (Armor Vehicle Recognition, Part II)
935 171-0203-F (Armor Vehicle Recognition, Part III)

Time: 2 1/2 hours

Location: Company Area or UTS

Support: Beseler Cue/See and TEC tapes

Scoring: Passing grade equals passing post-test without error

MODULE L-8. LOCATING AND REPORTING TARGETS

Type: One-on-one instructor controlled performance training

Time: 1-2 hours

Location: UTS

Support: M60A1 tank and target acquisition course

Scoring: Passing grade equals completing each task without error

MODULE L-1. WEAPONS MAINTENANCE I

UNIT L-1.1. CLEANING, INSPECTION, AND LUBRICATION COAX

PRETRAINING CONDITIONS:

Loader failed to meet standard on pre-test for TEC Lesson
020-171-1132-F (Part A, Loader's Readiness Test).

OBJECTIVE:

Loader describes in writing how to clean, inspect, and lubricate
the coax.

METHOD:

Self-instructional sound-slide presentation with written response.

EQUIPMENT/MATERIALS:

- a. Filmstrip cartridge and audio-cassette (TEC Lesson
020-171-1132-F)
- b. Beseler Cue/See
- c. Paper and pencil

ESTIMATED TIME:

1 hour

PROCEDURE:

- a. Loader selects lesson corresponding to task elements failed on
pre-tests in Part A, Loader's Readiness Test.
- b. Loader completes relevant portion of assigned lessons and takes
post-test.
- c. Loader reviews those lessons keyed on post-test for items missed.
- d. Loader has satisfactorily completed the lesson when he can
complete the post-test with no errors.

UNIT L-1.2. TROUBLESHOOTING COAX

PRETRAINING CONDITIONS:

Loader failed to meet standard on pre-test for TEC Lesson 020-171-1133-F (Part A, Loader's Readiness Test).

OBJECTIVE:

Loader describes in writing how to troubleshoot the coax.

METHOD:

Self-instructional sound-slide presentation with written response.

EQUIPMENT/MATERIALS:

- a. Filmstrip cartridge and audio-cassette (TEC Lesson 020-171-1133-F)
- b. Beseler Cue/See
- c. Paper and pencil

ESTIMATED TIME:

1 hour

PROCEDURE:

- a. Loader selects lesson corresponding to task elements failed on pre-tests in Part A, Loader's Readiness Test.
- b. Loader completes relevant portion of assigned lessons and takes post-test.
- c. Loader reviews those lessons keyed on post-test for items missed.
- d. Loader has satisfactorily completed the lesson when he can complete the post-test with no errors.

UNIT L-1.3. TROUBLESHOOTING M85 MACHINEGUN

PRETRAINING CONDITIONS:

Loader failed to meet standard on pre-test for TEC Lesson 020-171-5229-F (Part A, Loader's Readiness Test).

OBJECTIVE:

Loader describes in writing how to troubleshoot the M85 machinegun.

METHOD:

Self-instructional sound-slide presentation with written response.

EQUIPMENT/MATERIALS:

- a. Filmstrip cartridge and audio-cassette (TEC Lesson 020-171-5229-F).
- b. Beseler Cue/See
- c. Paper and pencil

ESTIMATED TIME:

1 hour

PROCEDURE:

- a. Loader selects lesson corresponding to task elements failed on pre-tests in Part A, Loader's Readiness Test.
- b. Loader completes relevant portion of assigned lessons and takes post-test.
- c. Loader reviews those lessons keyed on post-test for items missed.
- d. Loader has satisfactorily completed the lesson when he can complete the post-test with no errors.

MODULE L-2. WEAPONS MAINTENANCE II

PRETRAINING CONDITIONS:

Loader passed Part A of Loader's Readiness Test but failed to meet standard on one or more tasks in Part B, Loader's Readiness Test.

OBJECTIVES:

- a. In the Loader's station of an M60A1 tank with coax mounted; Loader removes, disassembles, inspects, assembles, checks operation, and mounts the coax. Loader carries out procedures as given in Parts B.1 through B.6, Loader's Readiness Test, completing the disassembly and assembly tasks each in 3 minutes.
- b. In the TC's station of an M60A1 tank with caliber .50 machinegun mounted; Loader removes, disassembles, inspects, assembles, checks operation, and mounts the caliber .50 machinegun. Loader carries out procedures as given in Parts B.7 through B.12, Loader's Readiness Test, completing the disassembly and assembly tasks each in 3 minutes.
- c. In the Loader's station of an M60A1 tank with complete gun-tool roll stowed and breech closed; Loader removes, disassembles, assembles, and installs the breechblock. Loader carries out procedures as given in Parts B.13 and B.14, Loader's Readiness Test, completing the entire operation within 12 minutes.

METHOD:

One-on-one instructor controlled performance training.

EQUIPMENT/MATERIALS:

- a. M60A1 tank
- b. Coax and caliber .50 machinegun
- c. Gun-tool roll stowed

ESTIMATED TIME:

1 hour

PROCEDURE:

- a. Instructor explains to Loader task elements failed in Part B of Loader's Readiness Test.
- b. Instructor "talks Loader through" task or task elements to be learned; Loader performs as these oral directions are given.

- c. Loader then practices with instructor available to coach as necessary.
- d. Loader is retested on relevant portion of Part B, Loader's Readiness Test.

NOTE:

- a. This module should be conducted as remedial training immediately following administration of Part B of the Loader's Readiness Test.
- b. Procedures for remedial training should be followed as given. Demonstrations of performance by the instructor or lengthy lectures on principles of equipment operation, while the trainee is idle, usually slows down the learning process.
- c. No TEC Lesson(s) exists, apparently, for disassembly/assembly of the breechblock. Some such self-instructional module for acquiring knowledge of breechblock disassembly/assembly procedures should be developed, used, and a proficiency standard met before Loader undertakes hands-on practice. For the time being, it is recommended that the soldier who fails the breechblock portion of the Readiness Test so substantially that he cannot be remediated in two or three hands-on trials, be required to memorize the steps in disassembly/assembly before resuming hands-on practice.

MODULE L-3. MISSION PREPARATION I

UNIT L-3.1. OPERATIONAL CHECKS AND SERVICES

PRETRAINING CONDITIONS:

Loader failed to meet standard on pre-tests for TEC Lessons 020-171-5366-F through 020-171-5370-F (Part C of Loader's Readiness Test).

OBJECTIVE:

Given pictures or descriptions of tank components, Loader will recognize unserviceable parts and describe actions necessary to service them.

METHOD:

Self-instructional sound-slide presentation with written response.

EQUIPMENT/MATERIALS:

- a. Five filmstrip cartridges and five audio-cassettes (TEC Lessons 020-171-5366-F through 020-171-5370-F)
- b. Baseler Cue/See
- c. Paper and pencil

ESTIMATED TIME:

1-5 hours

PROCEDURE:

- a. Loader selects lesson corresponding to task elements failed in pre-test in Part C, Loader's Readiness Test.
- b. Loader completes relevant portion of assigned lesson and takes post-test.
- c. Loader reviews those lessons keyed on the post-test for items missed.
- d. Loader has satisfactorily completed the lesson when he has completed relevant portion of post-test with no errors.

NOTES:

Some of the maintenance tasks covered in these lessons are not considered here to be priority training tasks. But since they are integrated with priority tasks, and since the lessons are not that long, the loader should be required to master the knowledge aspects of them as represented in the post-tests.

UNIT L-3.2. AMMUNITION SELECTING AND HANDLING

PRETRAINING CONDITIONS:

Loader failed to meet standard on pre-test for TEC Lessons 020-171-5331-F and 020-171-5332-F (Part C, Loader's Readiness Test).

OBJECTIVE:

Given pictures of correct and incorrect procedures, Loader will identify correct procedures for unpacking, inspecting, servicing, carrying, handling and stowing main gun ammunition.

METHOD:

Self-instructional sound-slide presentation with written response.

EQUIPMENT/MATERIALS:

- a. Two filmstrip cartridges and audio-cassettes (TEC Lessons 020-171-5331-F and 020-171-5332-F)
- b. Beseler Cue/See
- c. Paper and pencil

ESTIMATED TIME:

1-2 hours

PROCEDURE:

- a. Loader selects lesson corresponding to task elements failed in Part C, Loader's Readiness Test.
- b. Loader completes relevant portion of assigned lesson and takes post-test.
- c. Loader reviews those lessons keyed on post-test for items missed.
- d. Loader has satisfactorily completed the lesson when he has completed relevant portions of post-test with no errors.

UNIT L-3.3. BORESIGHTING THE COAX

PRETRAINING CONDITIONS:

Loader failed to meet standard on pre-test for TEC Lesson 020-171-5352-F (Part C, Loader's Readiness Test).

OBJECTIVE:

Loader must be able, in writing, to: (a) list the characteristics of a good target for use in boresighting the coax, (b) identify the conditions that must exist before the coax can be boresighted, and (c) describe the procedures for boresighting the coax.

METHOD:

Self-instructional sound-slide presentation with written response.

EQUIPMENT/MATERIALS:

- a. Filmstrip cartridge and audio-cassette (TEC Lesson 020-171-5352-F)
- b. Beseler Cue/See
- c. Paper and pencil

ESTIMATED TIME:

1 hour

PROCEDURE:

- a. Loader selects lesson corresponding to task elements failed in pre-test in Part C, Loader's Readiness Test.
- b. Loader completes relevant portion of assigned lesson and takes post-test.
- c. Loader reviews those lessons keyed on the post-test for items missed.
- d. Loader has satisfactorily completed the lesson when he has completed relevant portion of post-test with no errors.

NOTE:

Portions of lesson pertaining to M85 machinegun should be skipped.

MODULE L-4. MISSION PREPARATION II

PRETRAINING CONDITIONS:

Loader passed Part C of the Loader's Readiness Test (or completed MODULE L-3) but failed to meet standard on one or more tasks in Part D of Readiness Test.

OBJECTIVES:

- a. Given an M60A1 tank with engine or transmission oil low, a skilled Driver, access to engine and transmission oil, and a procedural job aid; Loader will check and adjust engine and transmission oil levels according to procedures in Part D.4, Loader's Readiness Test.
- b. Given an M60A1 tank on level ground with track tension loose, a skilled Driver, BII, a 1"x6"x6" block of wood, and a procedural job aid; Loader will check and adjust track tension according to procedures in Part D.5 and D.6, Loader's Readiness Test.
- c. Given an M60A1 tank with gun tube aimed at a suitable boresight target (but slightly out of alignment with respect to target), heavy black thread, tape and the M17A1 binocular; Loader will prepare tank for boresighting (Part D.7, Loader's Readiness Test) and on request to check main gun alignment, detect that alignment is off (Part D.8, Loader's Readiness Test).
- d. At the Loader's station in an M60A1 tank with coax out of boresight, a suitable boresight target available, the M17A1 binocular, and a procedural job aid; Loader will boresight the coax according to procedures in Part D.9, Loader's Readiness Test.
- e. At the Loader's station of an M60A1 tank with open slots in the ammunition racks, a supply of several rounds of each type of dummy ammunition, an Ammunition Stowage Plan and a crewman to hand rounds in through the turret; Loader will complete stowage of main gun rounds in accord with Ammunition Stowage Plan (Part D.10, Loader's Readiness Test).
- f. At the Loader's station of an M60A1 tank and an Ammunition Stowage Plan a crewman will hand boxes of machinegun ammunition (cardboard representations) through the turret; Loader will complete stowage of machinegun ammunition in accord with Ammunition Stowage Plan (Part D.11, Loader's Readiness Test) and then stow coax ammunition (dummy linked belt) in the ready (banana) box according to procedures in Part D.12, Loader's Readiness Test.

- g. At the Loader's station of an M60A1 tank with an operational radio; Loader will install and operate the AN/VRC-12 or AN/VRC-64 radio and operate the tank intercommunications system according to procedures in Parts D.13 and D.14, Loader's Readiness Test.
- h. At the Loader's station of an M60A1 tank with BII and a procedural job aid, and given the command "PREPARE-TO-FIRE"; Loader will carry out Loader's prepare-to-fire procedures as given in Part D.15, Loader's Readiness Test.
- i. Given an M60A1 tank with gas particulate unit mounted, Loader will check the air heater unit for operation according to procedures in Part D.16, Loader's Readiness Test.

METHOD:

One-on-one instructor controlled performance training.

EQUIPMENT/MATERIALS:

- a. M60A1 tank with BII
- b. Block of wood 1"x6"x6", heavy black thread, tape
- c. Pocket-sized job aids listing steps in checking/servicing engine and transmission oil, checking/adjusting track tension, boresighting coax, performing prepare-to-fire procedures, and installation and operation of tank radios.

ESTIMATED TIME:

2-3 hours

PROCEDURE:

- a. Instructor makes sure Loader has pocket job aids and urges him to refer to them during task performance (where applicable).
- b. Instructor explains to Loader task elements failed in Part D, Loader's Readiness Test.
- c. Instructor "talks Loader through" task or task elements to be learned; Loader performs as these oral directions are given.
- d. Loader then practices with instructor available to coach as necessary.
- e. Loader is retested on relevant portion of Part D, Loader's Readiness Test.

NOTE:

- a. This module should be conducted as remedial training immediately following administration of Part D of the Loader's Readiness Test.
- b. Procedures for remedial training should be followed as given. Demonstrations of performance by the instructor or lengthy lectures on principles of equipment operation, while the trainee is idle, usually slows down the learning process.

MODULE L-5. COMBAT LOADING I

UNIT L-5.1. LOADING AMMUNITION

PRETRAINING CONDITIONS

Loader failed to meet standard on pre-test for TEC Lesson 020-171-5346-F (Part E, Loader's Readiness Test).

OBJECTIVE:

Loader will list the steps in correct and safe loading, recognize common loading errors, and describe in writing the dangers of incorrect loading procedures.

METHOD:

Self-instructional sound-slide presentation with written response.

EQUIPMENT/MATERIALS:

- a. Filmstrip cartridge and audio-cassette (TEC Lesson 020-171-5346-F)
- b. Beseler Cue/See
- c. Paper and pencil

ESTIMATED TIME:

1 hour

PROCEDURE:

- a. Loader selects lesson corresponding to task elements failed on pre-test in Part E of Loader's Readiness Test.
- b. Loader completes relevant portions of assigned lessons and takes post-test.
- c. Loader reviews those lessons keyed on post-test for items missed.
- d. Loader has satisfactorily completed the lesson when he can complete the post-test with no errors.

UNIT L-5.2. MISFIRE AND UNLOADING PROCEDURES

Loader failed to meet standard on pre-test for TEC Lessons 020-171-5347-F or 020-171-5348-F (Part E, Loader's Readiness Test).

OBJECTIVE:

Loader will describe in writing the procedures (announcements, actions and precautions) followed in reacting to a main gun misfire and in unloading a misfired round.

METHOD:

Self-instructional sound-slide presentation with written response.

EQUIPMENT/MATERIALS:

- a. Two filmstrip cartridges and audio-cassettes (TEC Lessons 020-171-5347-F and 020-171-5348-F)
- b. Beseler Cue/See
- c. Paper and pencil

ESTIMATED TIME:

2 hours

PROCEDURE:

- a. Loader selects lesson corresponding to task elements failed on pre-test in Part E of Loader's Readiness Test.
- b. Loader completes relevant portions of assigned lessons and takes post-test.
- c. Loader reviews those lessons keyed on post-test for items missed.
- d. Loader has satisfactorily completed the lesson when he can complete the post-test with no errors.

MODULE L-6. COMBAT LOADING II

UNIT L-6.1. REPLENISHER TAPE READING

PRETRAINING CONDITIONS:

Loader failed to meet standard in one or more tasks in Part F, Loader's Readiness Test.

OBJECTIVE:

Stationed at a mock-up of the replenisher tape, and given any one of the four possible settings of the tape; Loader feels the tape and states what remedial action he would take, if any, given that reading, (a) during firing and (b) before firing. Loader must respond accurately and immediately upon feeling the tape, and respond so on eight consecutive trials according to Part F.1, Loader's Readiness Test.

METHOD:

One-on-one instructor controlled performance training.

EQUIPMENT/MATERIALS:

Replenisher tape mock-up. The mock-up, which can be simple and inexpensive, should have the following characteristics:

- . . A representation of the replenisher cylinder (same general size and configuration)
- . A representation of the replenisher tape that is highly accurate with respect to size, opening, feel of edges, and location with respect to replenisher cylinder and rangefinder; tape should be operable so that it can easily be set in one of the four positions.
- . A representation of that portion of the rangefinder which blocks the view of the replenisher cylinder and that is accurate with respect to size and position relative to the tape.
- . The components should be mounted on some kind of frame at the same general height as in the tank.

ESTIMATED TIME:

1/2 hour

PROCEDURE:

- a. Instructor explains to Loader task elements failed in Part F, Loader's Readiness Test.

- b. If Loader has trouble remembering the correct responses, instructor might provide the mnemonic:
 "Rough and Smooth: in The Groove:
 Two Rough: Not Enough;
 Two Smooth: Remove."
- c. Loader practices, with instructor varying the setting from trial to trial so that practice is geared to the more troublesome settings for the Loader.
- d. Loader is retested on relevant portion of Part F, Gunner's Readiness Test.

NOTE:

Since there are no safety requirements involved, practice on the device could be administered by anyone (e.g. the Loader's buddy). The criterion test, though, should probably be administered by the instructor.

UNIT L-6.2. LOAD MAIN GUN IN RESPONSE TO FIRE COMMANDS

PRETRAINING CONDITIONS:

Loader passed Part G of Loader's Readiness Test but failed to meet standard in one or more tasks of Part F, Loader's Readiness Test.

OBJECTIVE:

Positioned in the Loader's station of an M60A1 tank with at least 8 dummy rounds (3 APDS, 3 HEP, and 2 HEAT) in the ready rack, and given a series of five fire commands; Loader selects and loads correct rounds. Loader must load according to procedures given in Part F.2, Loader's Readiness Test, and meet the following time standards:

- a. 10 seconds (breech open) from time ammunition element is given until announces "UP".
- b. 2 seconds (battlesight round loaded) from time "BATTLESIGHT" is given until announces "UP".
- c. 55 seconds (battlesight round loaded) from time ammunition element (other than battlesight round) is given until announces "UP".
- d. Total time for five consecutive loadings should be no more than the sum of the individual time standards.
- e. Carry out two series of five consecutive loadings within 10 minutes.

METHOD:

Audio-tape controlled practice at Loader's station in M60A1 tank.

EQUIPMENT/MATERIALS:

- a. M60A1 tank
- b. Main gun dummy ammunition, including at a minimum: 3 APDS, 3 HEP, and 2 HEAT. Dummy rounds may have to be locally fabricated. In any case, each should have the same configuration, color, markings, weight and weight distribution as an actual round.
- c. Audio-cassette recordings of instructions, fire commands and feedback. Various mixes of fire commands should be recorded in blocks of five, and the blocks should be graded from easy to difficult in terms of the mix of commands and time allowed to execute each.
- d. Cassette player that will plug into tank intercom.

ESTIMATED TIME:

1 hour

PROCEDURE:

- a. Loader positions himself in Loader's station and starts cassette player. Taped instructions provide explanation of the purpose and procedure for this unit, including the necessary requirement to unload between rounds.
- b. Loader takes the first exercise (block of 5 commands), which gives the commands at a relatively slow pace. Loader replaces rounds in ready rack and starts next exercise. When he can complete two of most difficult exercises within the time limit, he is ready for a criterion test.
- c. Instructor tests Loader by giving two difficult exercises and observing loading procedures for accuracy, safety and time.

NOTES:

- a. Because of the physical conditioning aspect of this training, the Loader should be required to practice the module frequently during the training year.
- b. This module could be greatly improved if a Loader's simulator were developed to support the exercises. Such a simulator should provide for motion (since the first few steps in loading are often carried out while the tank is still moving), gun recoil (training in safety) and movement of breech into battery, and automatic ejection of dummy round. Noise of the round firing is also desirable, but probably not an essential factor in the simulation.

UNIT L-6.3. CONDUCT MAIN GUN MISFIRE PROCEDURES

PRETRAINING CONDITIONS:

Loader passed Part G of Loader's Readiness Test but failed to meet standard in one or more tasks of Part F, Loader's Readiness Test.

OBJECTIVE:

Positioned in the Loader's station of an M60A1 tank with a dummy round loaded in the main gun, and given the announcement "MISFIRE"; Loader, on command, rotates the round 1/2 turn and, also on command, unloads the misfired round with assistance from the instructor, according to procedures in Parts F.3 and F.4, Loader's Readiness Test. Responding to the MISFIRE, including unloading the misfired round, is completed within 2 1/2 minutes.

METHOD:

One-on-one instructor controlled performance training.

EQUIPMENT/MATERIALS:

M60A1 tank with dummy rounds of main gun ammunition.

ESTIMATED TIME:

1/2 hour

PROCEDURE:

- a. Instructor explains to Loader task elements failed in Part F, Loader's Readiness Test.
- b. Instructor "talks Loader through" the task elements to be learned; Loader performs as these oral directions are given.
- c. Loader then practices with instructor available to coach as necessary.
- d. Loader is retested on relevant portion of Part F, Loader's Readiness Test.

NOTES:

- a. This unit should be conducted as remedial training immediately following administration of Part F, Loader's Readiness Test.
- b. Procedures for remedial training should be followed as given. Demonstrations of performance by the instructor or lengthy lectures on principles of equipment operation, while the trainee is idle, usually slows down the learning process.

UNIT L-6.4. LOAD COAX AND READY COAX IN RESPONSE TO FIRE COMMANDS

PRETRAINING CONDITIONS

Loader passed Part G of Loader's Readiness Test but failed to meet standard in one or more tasks of Part F, Loader's Readiness Test.

OBJECTIVE:

Positioned in the Loader's station of an M60A1 tank with the coax mounted and a belt of dummy 7.62mm ammunition available for loading; Loader will load the coax and upon hearing the appropriate fire command ready the coax for firing according to procedures in Parts F.5 and F.6, Loader's Readiness Test.

METHOD:

One-on-one instructor controlled performance training.

EQUIPMENT/MATERIALS:

M60A1 tank with coax mounted and a belt of dummy 7.62mm ammunition.

ESTIMATED TIME:

1/2 hour

PROCEDURE:

- a. Instructor explains to Loader task elements failed in Part F, Loader's Readiness Test.
- b. Instructor "talks Loader through" the task elements to be learned; Loader performs as these oral directions are given.
- c. Loader then practices with instructor available to coach as necessary.
- d. Loader is retested on relevant portion of Part F, Loader's Readiness Test.

NOTE:

- a. This unit should be conducted as remedial training immediately following administration of Part F, Loader's Readiness Test.
- b. Procedures for remedial training should be followed as given. Demonstrations of performance by the instructor or lengthy lectures on principles of equipment operation, while the trainee is idle, usually slows down the learning process.

UNIT L-6.5. CLEAR, UNLOAD AND REDUCE COAX STOPPAGE

PRETRAINING CONDITIONS:

Gunner passed Part G of Loader's Readiness Test but failed to meet standard in one or more tasks of Part F, Loader's Readiness Test.

OBJECTIVES:

- a. Positioned in the Loader's station of an M60A1 tank with dummy 7.62mm ammunition loaded in the coax, Loader will clear and unload the coax according to procedures in Part F.7, Loader's Readiness Test.
- b. Positioned in the Loader's station of an M60A1 tank with dummy 7.62mm round hand loaded in chamber of coax and a belt of dummy rounds loaded on top so that chamber round will not extract when weapon is charged, and given the announcement "STOPPAGE", Loader will apply immediate action to reduce stoppage in the coax. Misfired round is removed within 10 seconds, and the entire procedure executed correctly, according to Part F.8, Loader's Readiness Test, through announcement "UP" within 15 seconds.
- c. Positioned in the Loader's station of an M60A1 tank and a simulated ruptured cartridge in the chamber of the coax; Loader will change the coax barrel according to procedures in Part F.9, Loader's Readiness Test.

METHOD:

One-on-one instructor controlled performance training.

EQUIPMENT/MATERIALS:

M60A1 tank with coax mounted, belt of dummy 7.62mm ammunition, and extra coax barrel.

ESTIMATED TIME:

1/2 hour

PROCEDURE:

- a. Instructor explains to Loader task elements failed in Part F, Loader's Readiness Test.
- b. Instructor "talks Loader through" task elements to be learned; Loader performs as these oral directions are given.
- c. Loader then practices with instructor available to coach as necessary.

- d. Loader is retested on relevant portion of Part F, Loader's Readiness Test.

NOTE:

- a. This unit should be conducted as remedial training immediately following administration of Part F, Loader's Readiness Test.
- b. Procedures for remedial training, should be followed as given. Demonstrations of performance by the instructor or lengthy lectures on principles of equipment operation, while Loader is idle, usually slows down learning process.

UNIT L-6.6. LOAD, CLEAR AND REDUCE STOPPAGE M85 MACHINEGUN

PRETRAINING CONDITIONS:

Loader passed Part E of Loader's Readiness Test but failed to meet standard in one or more tasks of Part F, Loader's Readiness Test.

OBJECTIVES:

- a. Positioned in an M60A1 tank with M85 machinegun mounted and a belt of dummy caliber .50 ammunition available for loading; Loader will load the M85 according to procedures in Part F.10, Loader's Readiness Test.
- b. Positioned in an M60A1 tank with a belt of dummy caliber .50 ammunition loaded in the M85; Loader will unload and clear the machinegun according to Part F.11, Loader's Readiness Test.
- c. Positioned in an M60A1 tank with dummy caliber .50 round hand loaded in chamber of M85 and a belt of dummy rounds loaded on top so that the chamber round will not extract when weapon is charged, and given the announcement "STOPPAGE"; Loader will apply immediate action to reduce stoppage in the M85. Misfired round is removed within 10 seconds, and entire procedure executed correctly according to Part F.12, Loader's Readiness Test, within 15 seconds.

METHOD:

One-on-one instructor controlled performance training.

EQUIPMENT/MATERIALS:

M60A1 tank with M85 mounted and belt of dummy caliber .50 ammunition.

ESTIMATED TIME:

1/2 hour

PROCEDURE:

- a. Instructor explains to Loader task elements failed in Part F, Loader's Readiness Test.
- b. Instructor "talks Loader through" task elements to be learned; Loader performs as these oral directions are given.
- c. Loader then practices with instructor available to coach as necessary.
- d. Loader is retested on relevant portion of Part F, Loader's Readiness Test.

NOTE:

- a. This unit should be conducted as remedial training immediately following administration of Part F, Loader's Readiness Test.
- b. Procedures for remedial training should be followed as given. Demonstrations of performance by the instructor or lengthy lectures on principles of equipment operation, while Loader is idle, usually slows down the learning process.

MODULE L-7. TARGET ACQUISITION

UNIT L-7.1. TARGET RANGE ESTIMATION

PRETRAINING CONDITIONS:

Loader failed to meet standard on pre-test for TEC Lesson 020-171-1611-F (Part G, Loader's Readiness Test).

OBJECTIVE:

Loader will describe the "100-meter" and "Appearance of Objects" methods of range estimation.

METHOD:

Self-instructional sound-slide presentation with written response.

EQUIPMENT/MATERIALS:

- a. One filmstrip cartridge with audio-cassette (TEC Lesson 020-171-1611-F)
- b. Beseler Cue/See
- c. Paper and pencil

ESTIMATED TIME:

1/2 hour

PROCEDURE:

- a. Loader selects lesson corresponding to task elements failed on pre-test in Part G, Loader's Readiness Test.
- b. Loader completes relevant portion of assigned lesson and takes post-test.
- c. Loader reviews those lessons keyed on post-test for items missed.
- d. Loader has satisfactorily completed the lesson when he can complete relevant portions of post-test with no errors.

UNIT L-7.2. LOCATING AND REPORTING TARGETS

PRETRAINING CONDITIONS:

Loader failed to meet standard on pre-test for TEC Lesson 020-171-1612-F (Part G, Loader's Readiness Test).

OBJECTIVE:

Given targets depicted at various locations relative to the Loader's tank, the Loader will, in writing, report target location using "the clock method".

METHOD:

Self-instructional sound-slide presentation with written response.

EQUIPMENT/MATERIALS:

- a. One filmstrip cartridge with audio-cassette (TEC Lesson 020-171-1612-F)
- b. Beseler Cue/See
- c. Paper and pencil

ESTIMATED TIME:

1/2 hour

PROCEDURE:

- a. Loader selects lesson corresponding to task elements failed on pre-test in Part G, Loader's Readiness Test.
- b. Loader completes relevant portion of assigned lesson and takes post-test.
- c. Loader reviews those lessons keyed on post-test for items missed.
- d. Loader has satisfactorily completed the lesson when he can complete relevant portion of post-test with no errors.

UNIT L-7.3. TARGET ACQUISITION SCANNING TECHNIQUES

PRETRAINING CONDITIONS:

Loader failed to meet standard on pre-test Lesson 020-171-1614-F (Part G, Loader's Readiness Test).

OBJECTIVE:

Loader will state from memory the correct procedure for scanning for targets (day or night) and acquiring and preserving night vision.

METHOD:

Self-instructional sound-slide presentation with written response.

EQUIPMENT/MATERIALS:

- a. One filmstrip cartridge with audio-cassette (TEC Lesson 020-171-1614-F)
- b. Beseler Cue/See
- c. Paper and pencil

ESTIMATED TIME:

1/2 hour

PROCEDURE:

- a. Loader selects lesson corresponding to task elements failed on pre-test in Part G, Loader's Readiness Test.
- b. Loader completes relevant portion of assigned lessons and takes post-test.
- c. Loader reviews those lessons keyed on post-test for items missed.
- d. Loader has satisfactorily completed the lesson when he can complete the post-test with no errors.

UNIT L-7.4. ARMOR VEHICLE RECOGNITION

PRETRAINING CONDITIONS:

Loader failed to meet standard on pre-test for TEC Lesson 935-171-0203-F (Part G, Loader's Readiness Test).

OBJECTIVE:

Shown picture of friendly (NATO) and enemy (Warsaw Pact) armored vehicles at various ranges and in various degrees of concealment Loader will correctly identify each vehicle as to country of origin within 5 seconds.

METHOD:

Self-instructional sound-slide presentation with written response.

EQUIPMENT/MATERIALS:

- a. Three filmstrip cartridges with audio-cassettes (TEC Lessons 020-171-0201-F, 935-171-0202-F, and 935-171-0203-F)
- b. Beseler Cue/See
- c. Paper and pencil

ESTIMATED TIME:

1 hour

PROCEDURES:

- a. Loader takes pre-tests for Lessons 935-171-0201-F and 935-171-0202-F. If he fails, assign appropriate lesson, and follow with Lesson 935-171-0203-F. If he passes both pre-tests, assign Lesson 935-171-0203-F.
- b. Loader completes relevant portion of Lesson 935-171-0203-F and takes post-test. (Instructor administers post-test since Loader's responses should be oral and limited by time.)
- c. Loader reviews lesson until he can complete post-test with no errors.

MODULE L-8. LOCATING AND REPORTING TARGETS

PRETRAINING CONDITIONS:

Loader passed Part G, Loader's Readiness Test but failed to meet standard in one or more tasks in Part H, Loader's Readiness Test.

OBJECTIVES:

- a. Given an M60A1 tank located at an observation point on a target acquisition course, the Loader, from his position, will conduct a quick search scan of the target area in accordance with the procedures in Part H.1, Loader's Readiness Test.
- b. Given an M60A1 tank located at an observation point on a target acquisition course, the Loader, from his position, will have 5 minutes to locate and identify targets in the area according to procedures in Part H.2, Loader's Readiness Test.
- c. Given an M60A1 tank located at an observation point on a target acquisition course, the Loader, from his position, will estimate range to target in area to within ± 100 meters according to procedures in Part H.3, Loader's Readiness Test.
- d. Given an M60A1 tank located at an observation point on a target acquisition course, the Loader, from his position, will report the location of targets in the area according to procedures in Part H.4, Loader's Readiness Test.

METHOD:

One-on-one instructor controlled performance training.

EQUIPMENT/MATERIALS:

- a. M60A1 tank and binoculars
- b. Target acquisition course with various targets at various ranges.

ESTIMATED TIME:

1-2 hours

PROCEDURE:

- a. Instructor explains to Loader task elements failed in Part H, Loader's Readiness Test.

- b. Instructor "talks Loader through" task elements to be learned; Loader performs as these oral directions are given.
- c. Loader then practices with instructor available to coach as necessary.
- d. Loader is retested on relevant portion of Part H, Loader's Readiness Test.
- e. Instructor observes Loader conduct a quick scan of target area.
- f. Practice should emphasize quickness as well as accuracy in locating and identifying targets.
- g. Instructor provides analysis and special cues for any range to target that Loader estimated incorrectly.
- h. Practice continues until Loader correctly reports location of targets in the area by the range and clock system to within one hour deviation for direction and to within ± 100 meters for range.

APPENDIX C

GUNNER'S MODULE OUTLINES

GUNNER'S MODULE OUTLINES

REQUIRED TIME: 25 1/2 - 34 1/2 hours

MODULE G-1. WEAPONS MAINTENANCE I

Type: Self-instructional sound-slide presentation (TEC tapes)

Time: 3 hours

Location: Company Area or UTS

Support: Beseler Cue/See and TEC tapes

Scoring: Passing grade equals completing post-test without error.

MODULE G-2. WEAPONS MAINTENANCE II

Type: One-on-one instructor controlled performance training

Time: 1 hour

Location: Company Area or UTS

Support: M60A1 tank with coax, caliber .50 machinegun, and gun roll

Scoring: Passing grade equals passing each task without error.

MODULE G-3. BEFORE OPERATIONS PROCEDURES

Type: One-on-one instructor controlled performance training

Time: 1/2 hour

Location: Company Area or UTS

Support: M60A1 tank and job aids

Scoring: Passing grade equals passing each task without error.

MODULE G-4. WEAPON SYSTEMS PREPARATION I

Type: Self-instructional sound-slide presentation (TEC tapes)

020-171-5351-F (Boresighting the Main Gun, Rangefinder, Tele/
Peri, M60/M60A1, Part 1, [Exclusive of RF])

020-171-5355-F (Boresighting the Main Gun, Rangefinder, Tele/
Peri M60/M60A1, Part 2, [Exclusive of RF])

020-171-5342-F (Preparing Periscope/Telescope for Operation)

020-171-5337-F (Auxiliary Fire Control Instruments, Part II
[Exclusive of Azimuth Indicator])
020-171-5354-F (Boresighting the Xenon Searchlight, M60/M60A1
Tank)
020-171-5353-F (Zeroing the Main Gun and Machinegun and Setting
Battlesights)
020-171-5341-F (Prepare the Ballistic Computer for Operation)
020-171-5352-F (Boresighting the Machinegun [Exclusive of M85
Machinegun])

Time: 5-8 hours

Location: Company Area or UTS

Support: Beseler Cue/See and TEC tapes

Scoring: Passing grade equals completing post-test without error.

MODULE G-5. WEAPON SYSTEMS PREPARATION II

Type: One-on-one instructor controlled performance training

Time: 1 1/2 hours

Location: Company area or UTS

Support: M60A1 tank and job aids

Scoring: Passing grade equals passing each task without error.

MODULE G-6. COMBAT LOADING I

Type: Self-instructional sound-slide presentation (TEC tapes)

020-171-5331-F (Tank Ammo: Selecting Ammunition)
020-171-5332-F (Tank Ammo: Handling, Main Gun)
020-171-5346-F (105MM Gun: Loading)
020-171-5347-F (105MM Gun: Misfire Procedures)
020-171-5348-F (105MM Gun: Unloading)

Time: 2-5 hours

Location: Company Area or UTS

Support: Beseler Cue/See and TEC tapes

Scoring: Passing grade equals completing post-test without error.

MODULE G-7. COMBAT LOADING II

Type: Audio-tape controlled practice at Loader's Station and one-on-one instructor controlled performance training

Time: 4 1/2 hours

Location: Company Area or UTS

Support: Audio-cassette recordings of fire commands, M60A1 tank, coax and caliber .50 machinegun, dummy rounds and cartridges.

Scoring: Passing grade equals passing each task without error

MODULE G-8. TARGET ACQUISITION

Type: Self-instructional sound-slide presentation (TEC tapes)

020-171-1611-F (Target Range Determination)
020-171-1612-F (Locating and Reporting Targets)
020-171-1614-F (Target Acquisition Scanning Techniques)
935-171-0201-F (Armor Vehicle Recognition, Part I)
935-171-0202-F (Armor Vehicle Recognition, Part II)
935-171-0203-F (Armor Vehicle Recognition, Part III)

Time: 2 1/2 hours

Location: Company Area or UTS

Support: Beseler Cue/See and TEC tapes

Scoring: Passing grade equals completing post-test without error

MODULE G-9. LOCATING AND REPORTING TARGETS

Type: One-on-one instructor controlled performance training

Time: 1-2 hours

Location: UTS

Support: M60A1 tank and target acquisition course

Scoring: Passing grade equals completing each task without error

MODULE G-10. TACTICAL OPERATIONS I

Type: Self-instructional sound-slide presentation (TEC tapes)
and one-on-one instructor controlled performance training

Time: 1/2 hour

Location: Company Area or UTS

Support: Beseler Cue/See and TEC tapes, Laser Gun Firing Trainer,
and sub caliber device (.22 caliber (inbore) Brewster, or
Telfare)

Scoring: Passing grade equals completing each task without error

MODULE G-11. TACTICAL OPERATIONS II

Type: One-on-one instructor controlled performance training

Time: 4-6 hours

Location: UTS

Support: M60A1 tank and "dry" tank crew qualifications course

Scoring: Passing grade equals completing each task without error

MODULE G-1. WEAPONS MAINTENANCE I

UNIT G-1.1. CLEANING, INSPECTION, AND LUBRICATION COAX

PRETRAINING CONDITIONS:

Gunner failed to meet standard on pre-test for TEC Lesson 020-171-1132 (Part A, Gunner's Readiness Test).

OBJECTIVE:

Gunner describes in writing how to clean, inspect, and lubricate the coax.

METHOD:

Self-instructional sound-slide presentation with written response.

EQUIPMENT/MATERIALS:

- a. Filmstrip cartridge and audio-cassette (TEC Lesson 020-171-1132-F)
- b. Beseler Cue/See
- c. Paper and pencil

ESTIMATED TIME:

1 hour

PROCEDURE:

- a. Gunner selects lesson corresponding to task elements failed on pre-tests in Part A, Gunner's Readiness Test.
- b. Gunner completes relevant portion of assigned lessons and takes post test.
- c. Gunner reviews those lessons keyed on post-test for items missed.
- d. Gunner has satisfactorily completed the lesson when he can complete the post-test with no errors.

UNIT G-1.2. TROUBLESHOOTING COAX

PRETRAINING CONDITIONS:

Gunner failed to meet standard on pre-test for TEC Lesson 020-171-1133-F (Part A, Gunner's Readiness Test).

OBJECTIVE:

Gunner describes in writing how to troubleshoot the coax.

METHOD:

Self-instructional sound-slide presentation with written response.

EQUIPMENT/MATERIALS:

- a. Filmstrip cartridge and audio-cassette (TEC Lesson 020-171-1133-F)
- b. Beseler Cue/See
- c. Paper and pencil

ESTIMATED TIME:

1 hour

PROCEDURE:

- a. Gunner selects lesson corresponding to task elements failed on pre-tests in Part A, Gunner's Readiness Test.
- b. Gunner completes relevant portion of assigned lessons and takes post-test.
- c. Gunner reviews those lessons keyed on post-test for items missed.
- d. Gunner has satisfactorily completed the lesson when he can complete the post-test with no errors.

UNIT G-1.3. TROUBLESHOOTING M85 MACHINEGUN

PRETRAINING CONDITIONS:

Gunner failed to meet standard on pre-test for TEC Lesson 020-171-5279-F (Part A, Gunner's Readiness Test).

OBJECTIVE:

Gunner describes in writing how to troubleshoot the M85 machinegun.

METHOD:

Self-instructional sound-slide presentation with written response.

EQUIPMENT/MATERIALS:

- a. Filmstrip cartridge and audio-cassette (TEC Lesson 020-171-5229-F).
- b. Beseler Cue/See
- c. Paper and pencil

ESTIMATED TIME:

1 hour

PROCEDURE:

- a. Gunner selects lesson corresponding to task elements failed on pre-tests in Part A, Gunner's Readiness Test.
- b. Gunner completes relevant portion of assigned lessons and takes post-test.
- c. Gunner reviews those lessons keyed on post-test for items missed.
- d. Gunner has satisfactorily completed the lesson when he can complete the post-test with no errors.

MODULE G-2. WEAPONS MAINTENANCE II

PRETRAINING CONDITIONS:

Gunner passed Part A of Gunner's Readiness Test but failed to meet standard on one or more tasks in Part B, Gunner's Readiness Test.

OBJECTIVES:

- a. In the Loader's station of an M60A1 tank with coax mounted; Gunner removes, disassembles, inspects, assembles, checks operation, and mounts the coax. Gunner carries out procedures as given in Parts B.1 through B.6, Gunner's Readiness Test, completing the disassembly and assembly tasks each in 3 minutes.
- b. In the TC's station of an M60A1 tank with caliber .50 machinegun mounted; Gunner removes, disassembles, inspects, assembles, checks operation, and mounts the caliber .50 machinegun. Gunner carries out procedures as given in Parts B.7 through B.12, Gunner's Readiness Test, completing the disassembly and assembly tasks each in 3 minutes.
- c. In the Loader's station of an M60A1 tank with complete gun-tool roll stowed and breech closed; Gunner removes, disassembles, assembles, and installs the breechblock. Gunner carries out procedures as given in Parts B.13 and B.14, Gunner's Readiness Test, completing the entire operation within 12 minutes.

METHOD:

One-on-one instructor controlled performance training.

EQUIPMENT/MATERIALS:

- a. M60A1 tank
- b. Coax and caliber .50 machinegun
- c. Gun-tool roll stowed

ESTIMATED TIME:

1 hour

PROCEDURE:

- a. Instructor explains to Gunner task elements failed in Part B of Gunner's Readiness Test.
- b. Instructor "talks Gunner through" task or task elements to be learned, Gunner performs as these oral directions are given.

- c. Gunner then practices with instructor available to coach as necessary.
- d. Gunner is retested on relevant portion of Part B, Gunner's Readiness Test.

NOTE:

- a. This module should be conducted as remedial training immediately following administration of Part B of the Gunner's Readiness Test.
- b. Procedures for remedial training should be followed as given. Demonstrations of performance by the instructor or lengthy lectures on principles of equipment operation, while the trainee is idle, usually slows down the learning process.
- c. No TEC Lesson(s) exists, apparently, for disassembly/assembly of the breechblock. Some such self-instructional module for acquiring knowledge of breechblock disassembly/assembly procedures should be developed, used, and a proficiency standard met before Gunner undertakes hands-on practice. For the time being, it is recommended that the soldier who fails the breechblock portion of the Readiness Test so substantially that he cannot be remediated in two or three hands-on trials, be required to memorize the steps in disassembly/assembly before resuming hands-on practice.

MODULE G-3. BEFORE OPERATIONS PROCEDURES

PRETRAINING CONDITIONS:

Gunner failed to meet standard in one or more tasks in Part C, Gunner's Readiness Test.

OBJECTIVES:

- a. Given an M60A1 tank, a procedural job aid, and a command from the instructor "PLACE TURRET INTO POWER OPERATION", the Gunner will place the turret into power operation according to procedures in Part C.3, Gunner's Readiness Test.
- b. Given an M60A1 tank, a procedural job aid, and a command from the instructor "PREPARE-TO-FIRE", Gunner will perform Gunner's prepare-to-fire procedures according to Part C.4, Gunner's Readiness Test.
- c. Given an M60A1 tank with a gas particulate unit mounted and the requirement to perform before operation checks, the Gunner will check the operation of the M3 heater according to procedures in Part C.5, Gunner's Readiness Test.

METHOD:

One-on-one instructor controlled performance training.

EQUIPMENT/MATERIALS:

M60A1 tank with gas particulate unit mounted and a protective mask.

ESTIMATED TIME:

1/2 hour

PROCEDURE:

- a. Instructor makes sure Gunner has pocket job-aids and urges him to refer to them during task performance.
- b. Instructor explains to Gunner task element failed in Part C, Gunner's Readiness Test.
- c. Instructor "talks Gunner through" task or task elements to be learned; Gunner performs as these oral directions are given.
- d. Gunner then practices with instructor available to coach as necessary.

- e. Gunner is retested on relevant portion of Part C, Gunner's Readiness Test.

NOTE:

- a. This module should be conducted as remedial training immediately following administration of Part C of the Gunner's Readiness Test.
- b. Procedures for remedial training should be followed as given. Demonstrations of performance by the instructor or lengthy lectures on principles of equipment operation, while the Gunner is idle, usually slows down the learning process.

MODULE G-4. WEAPON SYSTEMS PREPARATION I

UNIT G-4.1. BORESIGHT WEAPON SYSTEMS

PRETRAINING CONDITIONS:

Gunner failed to meet standard on pre-tests for TEC Lessons 020-171-5351-F, 020-171-5355-F, 020-171-5342-F, 020-171-5337-F, 020-171-5354-F, 020-171-5352-F, and 020-171-5341-F (Part D, Gunner's Readiness Test).

OBJECTIVES:

Given the requirement to boresight the tank weapon systems, the Gunner will:

- . Identify good targets for use in boresighting the main gun and coax.
- . Locate and use various parts of the ballistic computer.
- . State the procedures or conditions necessary to complete sight alignment of the reticles of the periscope and telescope.
- . Identify the correct slip scales settings for the boresight knobs of the periscope and telescope.
- . Describe the controls used and adjustments necessary to boresight the Xenon searchlight by both the primary and alternate methods.
- . Identify and list in the correct order of removal, the parts that must be removed from the coax for boresighting.
- . Describe the procedures for boresighting the coax.

EQUIPMENT/MATERIALS:

- a. Seven filmstrip cartridges and audio-cassettes (TEC Lessons 020-171-5351-F, 020-171-5355-F, 020-171-5342-F, 020-171-5337-F, 020-171-5354-F, 020-171-5352-F)
- b. Beseler Cue/See
- c. Paper and pencil

ESTIMATED TIME:

7 hours

PROCEDURE:

- a. Gunner selects lesson corresponding to task elements failed on pre-tests in Part D, Gunner's Readiness Test.
- b. Gunner completes relevant portion of assigned lessons and takes post-test.
- c. Gunner reviews those lessons keyed on post-test for items missed.
- d. Gunner has satisfactorily completed the lesson when he can complete the post-test with no errors.

NOTE:

These lessons address Gunner as well as TC tasks and in some cases tasks performed by both.

UNIT G-4.2. ZERO WEAPON SYSTEMS

PRETRAINING CONDITIONS:

Gunner failed to meet standard on pre-test for TEC Lesson Q20-171-5353-F (Part D, Gunner's Readiness Test).

OBJECTIVE:

Given the requirement to zero the tank main gun and coax, the Gunner will:

- . List the desired characteristics of a target used for zeroing the main gun and coax.
- . Describe the procedures for zeroing the main gun and coax.
- . Identify the sight reticles that must be alined after the main gun and coax are zeroed.

METHOD:

Self-instructional sound-slide presentation with written response.

EQUIPMENT/MATERIALS:

- a. Filmstrip cartridge with audio-cassette (TEC Lesson Q20-171-5353-F)
- b. Beseler Cue/See
- c. Paper and pencil

ESTIMATED TIME:

1 hour

PROCEDURE:

- a. Gunner selects lesson corresponding to task elements failed on pre-tests in Part D, Gunner's Readiness Test.
- b. Gunner completes relevant portion of assigned lessons and takes post-test.
- c. Gunner reviews those lessons keyed on post-test for items missed.
- d. Gunner has satisfactorily completed the lesson when he can complete the post-test with no errors.

NOTE:

This lesson addresses Gunner as well as TC tasks and in some cases tasks performed by both.

MODULE G-5. WEAPON SYSTEMS PREPARATION II

UNIT G-5.1. BORESIGHT WEAPON SYSTEM

PRETRAINING CONDITIONS:

Gunner passed Part D, Gunner's Readiness Test but failed to meet standard in one or more tasks of Part E, Gunner's Readiness Test.

OBJECTIVES:

- a. Given an M60A1 tank on level ground with boresight panel at 1200 meters, the Gunner will prepare the tank for boresighting and prepare the periscope and telescope for operation. All steps in this objective will be performed within 20 minutes and according to Parts E.1 through E.3 of Gunner's Readiness Test.
- b. Given an M60A1 tank situation on level ground with boresight panel at 1200 meters and the periscope and telescope prepared for boresighting, the Gunner will boresight telescope, periscope (daylight and IR) tank searchlight (primary and alternate methods) and coax according to Parts E.6 through E.11, Gunner's Readiness Test.

METHOD:

One-on-one instructor controlled performance training.

EQUIPMENT/MATERIALS:

- a. M60A1 tank with BII and coax.
- b. Boresight panels at ranges of 1200 meters.

ESTIMATED TIME:

1 hour

PROCEDURE:

- a. Instructor explains to Gunner elements failed in Part E, Gunner's Readiness Test.
- b. Instructor directs Gunner to insure that the headrest of various fire control optics are adjusted to desired position.
- c. Instructor directs Gunner to take up correct sight pictures, Gunner's periscope and Gunner's telescope. Instructor emphasizes importance of placing head in same position in headrest each time Gunner takes up sight picture. Point out to Gunner that he should be aware of pressure points on the head and face which can serve as cues to insure he has his head in correct position in headrest.

- d. Instructor "talks Gunner through" task elements to be learned; Gunner performs as these oral directions are given.
- e. Gunner then practices with instructor available to coach as necessary.
- f. Gunner is retested on relevant portions of Part E, Gunner's Readiness Test.

NOTE:

- a. This module should be conducted as remedial training immediately following administration of Part E, Gunner's Readiness Test.
- b. Procedures for remedial training should be followed as given. Demonstrations of performance by the instructor or lengthy lectures on principles of equipment operation, while the Gunner is idle, usually slows down the learning process.

UNIT G-5.2. ZERO WEAPON SYSTEMS

PRETRAINING CONDITIONS:

Gunner failed to meet standard in one or more tasks in Part E, Gunner's Readiness Test.

OBJECTIVES:

Given an M60A1 tank with subcaliber device attached, situated on level ground at a subcaliber range, with a main gun zero panel at a scaled range of 1200 meters and a coax machinegun zero panel at a scaled range of 800 meters. Gunner will zero the tank main gun and coax according to Parts E.12 and E.13, Gunner's Readiness Test.

METHOD:

One-on-one instructor controlled performance training.

EQUIPMENT/MATERIALS:

- a. M60A1 tank with BII and coax.
- b. Main gun zero panel at scaled range of 1200 meters.
- c. Coax panel at scaled range of 800 meters.
- d. Subcaliber ammunition.

ESTIMATED TIME:

1/2 hour

PROCEDURE:

- a. Instructor explains to Gunner task elements failed in Part E, Gunner's Readiness Test.
- b. Instructor directs Gunner to insure that the periscope and telescope headrests are adjusted to desired position.
- c. Instructor directs Gunner to take up correct sight pictures through periscope and telescope. Instructor emphasizes importance of placing head in same position in headrest each time Gunner takes up sight picture. Point out to Gunner that he should be aware of pressure points on the head and face which can serve as cues to insure he has head in correct position in headrest.
- d. Instructor "talks Gunner through" task on task elements to be learned; Gunner performs as these oral directions are given.
- e. Gunner then practices with instructor available to coach as necessary.
- f. Gunner is retested on relevant portion of Part E, Gunner's Readiness Test.

NOTE:

This training probably could be mediated more effectively and in the long run, less expensively, by a high fidelity Tank Gunnery trainer. One type of simulator that should be effective in training main gun machinegun zeroing is outlined in MODULE G-10, TACTICAL OPERATIONS.

MODULE G-6. COMBAT LOADING I

UNIT G-6.1. SELECTING AND HANDLING TANK AMMUNITION

PRETRAINING CONDITIONS:

Gunner failed to meet standard in pre-test for TEC Lessons
020-171-5331-F and 020-171-5332-F (Part F, Gunner's Readiness Test).

OBJECTIVE:

Given pictures of different types of tank ammunition, or different types of targets, or statements of various fire commands; Gunner identifies the (correct) round in writing or by selecting a picture of the round.

METHOD:

Self-instructional sound-slide presentation with written response.

EQUIPMENT/MATERIALS:

- a. Two filmstrip cartridges and audio-cassettes (TEC Lessons 020-171-5331-F and 020-171-5332-F)
- b. Beseler Cue/See
- c. Paper and pencil

ESTIMATED TIME:

2 hours

PROCEDURE:

- a. Gunner selects lesson corresponding to pre-test failed in Part F, Gunner's Readiness Test.
- b. Gunner completes relevant portion of assigned lesson and takes post-test.
- c. Gunner reviews those lessons keyed on post-test for items missed.
- d. Gunner has satisfactorily completed the lesson when he can complete the post-test with no errors.

UNIT G-6.2. LOADING, MISFIRE PROCEDURES, AND UNLOADING MAIN GUN

PRETRAINING CONDITIONS

Gunner failed to meet standard in pre-test for TEC Lessons 020-171-5346-F, 020-171-5347-F, and 020-171-5348-F (Part F, Gunner's Readiness Test).

OBJECTIVES:

- a. Gunner will list the steps in correct and safe loading, recognize common loading errors, and describe in writing the dangers of incorrect loading procedures.
- b. Gunner will describe in writing the procedures (announcements, actions, and precautions) followed in reacting to a main gun misfire and in unloading a misfired round.

METHOD:

Self-instructional sound-slide presentation with written response.

EQUIPMENT/MATERIALS:

- a. Three filmstrip cartridges with audio-cassettes (TEC Lessons 020-171-5346-F, 020-171-5347-F, and 020-171-5348-F)
- b. Beseler Cue/See
- c. Paper and pencil

ESTIMATED TIME:

3 hours

PROCEDURE:

- a. Gunner selects lesson corresponding to task elements failed on pre-test in Part F of Gunner's Readiness Test.
- b. Gunner completes relevant portions of assigned lessons and takes post-test.
- c. Gunner reviews those lessons keyed on post-test for items missed.
- d. Gunner has satisfactorily completed the lesson when he can complete the post-test with no errors.

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TANK CREWMAN (M60A1) TRAINING MODULES.(U)

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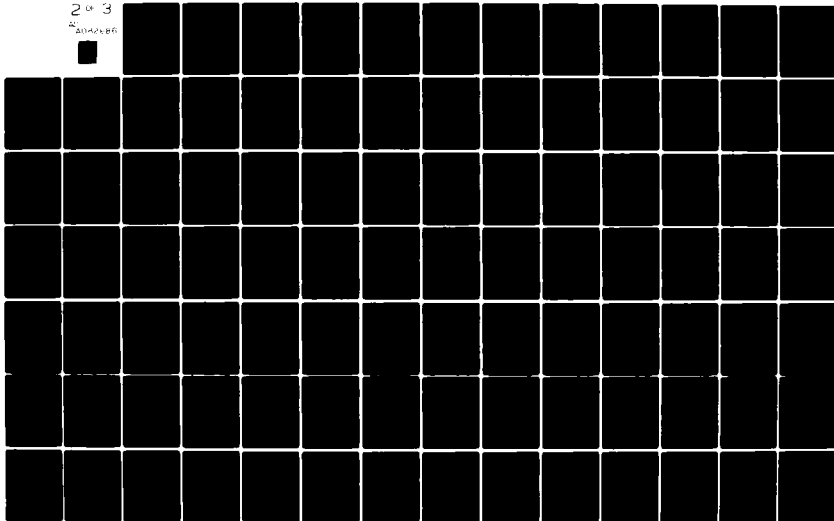
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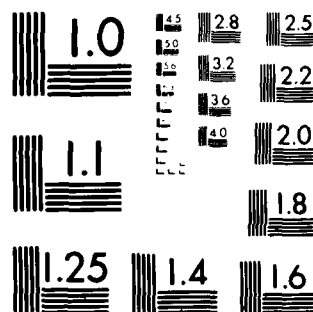
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MODULE G-7. COMBAT LOADING II

UNIT G-7.1. STOW TANK AMMUNITION

PRETRAINING CONDITIONS:

Gunner passed Part F of Gunner's Readiness Test but failed to meet standard in one or more tasks of Part G, Gunner's Readiness Test.

OBJECTIVES:

Given an M60A1 tank, and dummy rounds (3-ADPS, 3-HEAT, 2-HEP, and two dimensional representations of 7.62mm and caliber .50 machine-gun ammunition boxes) and a Unit Ammunition Stowage Plan; Gunner will stow tank ammunition according to procedures in Part G.1 through G.3, Gunner's Readiness Test.

METHOD:

One-on-one instructor controlled performance training.

EQUIPMENT/MATERIALS:

- a. M60A1 tank
- b. Dummy rounds (3-ADPS, 3-HEAT, 2-HEP)
- c. Two dimensional representations of 7.62mm and caliber .50 machine-gun ammunition boxes.
- d. Unit Ammunition Loading Plan.

ESTIMATED TIME:

1 hour

PROCEDURE:

- a. Gunner positions himself in the Loader's station and receives ammunition (or cardboard representations) through the Loader's hatch and stows ammunition according to the Unit Ammunition Stowage Plan.
- b. Instructor explains to Gunner task elements failed in Part G, Gunner's Readiness Test.
- c. Instructor "talks Gunner through" task elements to be learned; Gunner performs as these oral directions are given.
- d. Gunner then practices with instructor available to coach as necessary.
- e. Gunner is retested on relevant portion of Part G, Gunner's Readiness Test.

UNIT G-7.2. REPLENISHER TAPE READING

PRETRAINING CONDITIONS:

Gunner failed to meet standard in one or more tasks in Part G, Gunner's Readiness Test.

OBJECTIVE:

Stationed at a mock-up of the replenisher tape, and given any one of the four possible settings of the tape; Gunner feels the tape and states what remedial action he would take, if any, given that reading, (a) during firing and (b) before firing. Gunner must respond accurately and immediately upon feeling the tape, and respond so on eight consecutive trials according to Part G.4, Gunner's Readiness Test.

METHOD:

One-on-one instructor controlled performance training.

EQUIPMENT/MATERIALS:

Replenisher tape mock-up. The mock-up, which can be simple and inexpensive, should have the following characteristics:

- . A representation of the replenisher cylinder (same general size and configuration)
- . A representation of the replenisher tape that is highly accurate with respect to size, opening, feel of edges, and location with respect to replenisher cylinder and rangefinder; tape should be operable so that it can easily be set in one of the four positions.
- . A representation of that portion of the rangefinder which blocks the view of the replenisher cylinder and that is accurate with respect to size and position relative to the tape.
- . The components should be mounted on some kind of frame at the same general height as in the tank.

ESTIMATED TIME:

1/2 hour

PROCEDURE:

- a. Instructor explains to Gunner task elements failed in Part G, Gunner's Readiness Test.
- b. If Gunner has trouble remembering the correct responses, instructor might provide the mnemonic:
"Rough and Smooth: in The Groove:
Two Rough: Not Enough;
Two Smooth: Remove."

- c. Gunner practices, with instructor varying the setting from trial to trial so that practice is geared to the more troublesome settings for the Gunner.
- d. Gunner is retested on relevant portion of Part G, Gunner's Readiness Test.

NOTE:

Since there are no safety requirements involved, practice on the device could be administered by anyone (e.g., the Gunner's buddy). The criterion test, though, should probably be administered by the instructor.

UNIT G-7.3. LOAD MAIN GUN IN RESPONSE TO FIRE COMMANDS

PRETRAINING CONDITIONS:

Gunner passed Part F of Gunner's Readiness Test but failed to meet standard in one or more tasks of Part G, Gunner's Readiness Test.

OBJECTIVE:

Positioned in the Loader's station of an M60A1 tank with at least 8 dummy rounds (3 APDS, 3 HEP, and 2 HEAT) in the ready rack, and given a series of five fire commands; Gunner selects and loads correct rounds. Gunner must load according to procedures given in Part G.5, Gunner's Readiness Test, and meet the following time standards:

- a. 10 seconds (breech open) from time ammunition element is given until announces "UP".
- b. 2 seconds (battlesight round loaded) from time "BATTLESIGHT" is given until announces "UP".
- c. 55 seconds (battlesight round loaded) from time ammunition element (other than battlesight round) is given until announces "UP".
- d. Total time for five consecutive loadings should be no more than the sum of the individual time standards.
- e. Carry out two series of five consecutive loadings within 10 minutes.

METHOD:

Audio-tape controlled practice at Loader's station in M60A1 tank.

EQUIPMENT/MATERIALS:

- a. M60A1 tank
- b. Main gun dummy ammunition, including at a minimum: 3 APDS, 3 HEP, and 2 HEAT. Dummy rounds may have to be locally fabricated. In any case, each should have the same configuration, color, markings, weight and weight distribution as an actual round.
- c. Audio-cassette recordings of instructions, fire commands and feedback. Various mixes of fire commands should be recorded in blocks of five, and the blocks should be graded from easy to difficult in terms of the mix of commands and time allowed to execute each.
- d. Cassette player that will plug into tank intercom.

ESTIMATED TIME:

1 hour

PROCEDURE:

- a. Gunner positions himself in Loader's station and starts cassette player. Taped instructions provide explanation of the purpose and procedure for this unit, including the necessary requirement to unload between rounds.
- b. Gunner takes the first exercise (block of 5 commands), which gives the commands at a relatively slow pace. Gunner replaces rounds in ready rack and starts next exercise. When he can complete two of most difficult exercises within the time limit, he is ready for a criterion test.
- c. Instructor tests Gunner by giving two difficult exercises and observing loading procedures for accuracy, safety and time.

NOTES:

- a. Because of the physical conditioning aspect of this training, the Gunner should be required to practice the module frequently during the training year.
- b. This module could be greatly improved if a Loader's simulator were developed to support the exercises. Such a simulator should provide for motion (since the first few steps in loading are often carried out while the tank is still moving), gun recoil (training in safety) and movement of breech into battery, and automatic ejection of dummy round. Noise of the round firing is also desirable, but probably not an essential factor in the simulation.

UNIT G-7.4. CONDUCT MAIN GUN MISFIRE PROCEDURES

PRETRAINING CONDITIONS:

Gunner passed Part F of Gunner's Readiness Test but failed to meet standard in one or more tasks of Part G, Gunner's Readiness Test.

OBJECTIVE:

Positioned in the Loader's station of an M60A1 tank with a dummy round loaded in the main gun, and given the announcement "MISFIRE"; Gunner, on command, rotates the round 1/2 turn and, also on command, unloads the misfired round with assistance from the instructor, according to procedures in Parts G.6 and G.7, Gunner's Readiness Test. Responding to the MISFIRE, including unloading the misfired round, is completed within 2 1/2 minutes.

METHOD:

One-on-one instructor controlled performance training.

EQUIPMENT/MATERIALS:

M60A1 tank with dummy rounds of main gun ammunition.

ESTIMATED TIME:

1/2 hour

PROCEDURE:

- a. Instructor explains to Gunner task elements failed in Part G, Gunner's Readiness Test.
- b. Instructor "talks Gunner through" the task elements to be learned; Gunner performs as these oral directions are given.
- c. Gunner then practices with instructor available to coach as necessary.
- d. Gunner is retested on relevant portion of Part G, Gunner's Readiness Test.

NOTES:

- a. This unit should be conducted as remedial training immediately following administration of Part G, Gunner's Readiness Test.
- b. Procedures for remedial training should be followed as given. Demonstrations of performance by the instructor or lengthy lectures on principles of equipment operation, while the trainee is idle, usually slows down the learning process.

UNIT G-7.5. LOAD COAX AND READY COAX IN RESPONSE TO FIRE COMMANDS

PRETRAINING CONDITIONS:

Gunner passed Part F of Gunner's Readiness Test but failed to meet standard in one or more tasks of Part G, Gunner's Readiness Test.

OBJECTIVE:

Positioned in the Loader's station of an M60A1 tank with the coax mounted and a belt of dummy 7.62mm ammunition available for loading; Gunner will load the coax and upon hearing the appropriate fire command ready the coax for firing according to procedures in Parts G.8 and G.9, Gunner's Readiness Test.

METHOD:

One-on-one instructor controlled performance training.

EQUIPMENT/MATERIALS:

M60A1 tank with coax mounted and a belt of dummy 7.62mm ammunition.

ESTIMATED TIME:

1/2 hour

PROCEDURE:

- a. Instructor explains to Gunner task elements failed in Part G, Gunner's Readiness Test.
- b. Instructor "talks Gunner through" the task elements to be learned; Gunner performs as these oral directions are given.
- c. Gunner then practices with instructor available to coach as necessary.
- d. Gunner is retested on relevant portion of Part G, Gunner's Readiness Test.

NOTE:

- a. This unit should be conducted as remedial training immediately following administration of Part G, Gunner's Readiness Test.
- b. Procedures for remedial training should be followed as given. Demonstrations of performance by the instructor or lengthy lectures on principles of equipment operation, while the trainee is idle, usually slows down the learning process.

UNIT G-7.6. CLEAR, UNLOAD AND REDUCE COAX STOPPAGE

PRETRAINING CONDITIONS:

Gunner passed Part F of Gunner's Readiness Test but failed to meet standard in one or more tasks of Part G, Gunner's Readiness Test.

OBJECTIVES:

- a. Positioned in the Loader's station of an M60A1 tank with dummy 7.62mm ammunition loaded in the coax, Gunner will clear and unload the coax according to procedures in Part G.10, Gunner's Readiness Test.
- b. Positioned in the Loader's station of an M60A1 tank with dummy 7.62mm round hand loaded in chamber of coax and a belt of dummy rounds loaded on top so that chamber round will not extract when weapon is charged, and given the announcement "STOPPAGE", Gunner will apply immediate action to reduce stoppage in the coax. Misfired round is removed within 10 seconds, and the entire procedure executed correctly, according to Part G.11, Gunner's Readiness Test, through announcement "UP" within 15 seconds.
- c. Positioned in the Loader's station of an M60A1 tank and a simulated ruptured cartridge in the chamber of the coax; Gunner will change the coax barrel according to procedures in Part G.12, Gunner's Readiness Test.

METHOD:

One-on-one instructor controlled performance training.

EQUIPMENT/MATERIALS:

M60A1 tank with coax mounted, belt of dummy 7.62mm ammunition, and extra coax barrel.

ESTIMATED TIME:

1/2 hour

PROCEDURE:

- a. Instructor explains to Gunner task elements failed in Part G, Gunner's Readiness Test.
- b. Instructor "talks Gunner through" task elements to be learned; Gunner performs as these oral directions are given.
- c. Gunner then practices with instructor available to coach as necessary.

- d. Gunner is retested on relevant portion of Part G, Gunner's Readiness Test.

NOTE:

- a. This unit should be conducted as remedial training immediately following administration of Part G, Gunner's Readiness Test.
- b. Procedures for remedial training, should be followed as given. Demonstrations of performance by the instructor or lengthy lectures on principles of equipment operation, while Gunner is idle, usually slows down learning process.

UNIT G-7.7. LOAD, CLEAR AND REDUCE STOPPAGE M85 MACHINEGUN

PRETRAINING CONDITIONS:

Gunner passed Part F of Gunner's Readiness Test but failed to meet standard in one or more tasks of Part G, Gunner's Readiness Test.

OBJECTIVES:

- a. Positioned in an M60A1 tank with M85 machinegun mounted and a belt of dummy caliber .50 ammunition available for loading; Gunner will load the M85 according to procedures in Part G.13, Gunner's Readiness Test.
- b. Positioned in an M60A1 tank with a belt of dummy caliber .50 ammunition loaded in the M85; Gunner will unload and clear the machinegun according to Part G.14, Gunner's Readiness Test.
- c. Positioned in an M60A1 tank with dummy caliber .50 round hand loaded in chamber of M85 and a belt of dummy rounds loaded on top so that the chamber round will not extract when weapon is charged, and given the announcement "STOPPAGE"; Gunner will apply immediate action to reduce stoppage in the M85. Misfired round is removed within 10 seconds, and entire procedure executed correctly according to Part G.15, Gunner's Readiness Test, within 15 seconds.

METHOD:

One-on-one instructor controlled performance training.

EQUIPMENT/MATERIALS:

M60A1 tank with M85 mounted and belt of dummy caliber .50 ammunition.

ESTIMATED TIME:

1/2 hour

PROCEDURE:

- a. Instructor explains to Gunner task elements failed in Part G, Gunner's Readiness Test.
- b. Instructor "talks Gunner through" task elements to be learned; Gunner performs as these oral directions are given.
- c. Gunner then practices with instructor available to coach as necessary.
- d. Gunner is retested on relevant portion of Part G, Gunner's Readiness Test.

NOTE:

- a. This unit should be conducted as remedial training immediately following administration of Part G, Gunner's Readiness Test.
- b. Procedures for remedial training should be followed as given. Demonstrations of performance by the instructor or lengthy lectures on principles of equipment operation, while Gunner is idle, usually slows down the learning process.

MODULE G-8. TARGET ACQUISITION

UNIT G-8.1. TARGET RANGE ESTIMATION

PRETRAINING CONDITIONS:

Gunner failed to meet standard on pre-test for TEC Lesson 020-171-1611-F (Part H, Gunner's Readiness Test).

OBJECTIVE:

Gunner will describe the "100-meter" and "Appearance of Objects" methods of range estimation.

METHOD:

Self-instructional sound-slide presentation with written response.

EQUIPMENT/MATERIALS:

- a. One filmstrip cartridge with audio-cassette (TEC Lesson 020-171-1611-F)
- b. Beseler Cue/See
- c. Paper and pencil

ESTIMATED TIME:

1/2 hour

PROCEDURE:

- a. Gunner selects lesson corresponding to task elements failed on pre-test in Part H, Gunner's Readiness Test.
- b. Gunner completes relevant portion of assigned lesson and takes post-test.
- c. Gunner reviews those lessons keyed on post-test for items missed.
- d. Gunner has satisfactorily completed the lesson when he can complete relevant portions of post-test with no errors.

UNIT G-8.2. LOCATING AND REPORTING TARGETS

PRETRAINING CONDITIONS:

Gunner failed to meet standard on pre-test for TEC Lesson 020-171-1612-F (Part H, Gunner's Readiness Test).

OBJECTIVE:

Given targets depicted at various locations relative to the Gunner's tank, the Gunner will, in writing, report target location using "the clock method".

METHOD:

Self-instructional sound-slide presentation with written response.

EQUIPMENT/MATERIALS:

- a. One filmstrip cartridge with audio-cassette (TEC Lesson 020-171-1612-F)
- b. Beseler Cue/See
- c. Paper and pencil

ESTIMATED TIME:

1/2 hour

PROCEDURE:

- a. Gunner selects lesson corresponding to task elements failed on pre-test in Part H, Gunner's Readiness Test.
- b. Gunner completes relevant portion of assigned lesson and takes post-test.
- c. Gunner reviews those lessons keyed on post-test for items missed.
- d. Gunner has satisfactorily completed the lesson when he can complete relevant portions of post-test with no errors.

UNIT G-8.3. TARGET ACQUISITION SCANNING TECHNIQUES

PRETRAINING CONDITIONS:

Gunner failed to meet standard on pre-test Lesson 020-171-1614-F (Part H, Gunner's Readiness Test).

OBJECTIVE:

Gunner will state from memory the correct procedure for scanning for targets (day or night) and acquiring and preserving night vision.

METHOD:

Self-instructional sound-slide presentation with written response.

EQUIPMENT/MATERIALS:

- a. One filmstrip cartridge with audio-cassette (TEC Lesson 020-171-1614-F)
- b. Beseler Cue/See
- c. Paper and pencil

ESTIMATED TIME:

1/2 hour

PROCEDURE:

- a. Gunner selects lesson corresponding to task elements failed on pre-test in Part H, Gunner's Readiness Test.
- b. Gunner completes relevant portion of assigned lessons and takes post-test.
- c. Gunner reviews those lessons keyed on post-test for items missed.
- d. Gunner has satisfactorily completed the lesson when he can complete the post-test with no errors.

UNIT G-8.4. ARMOR VEHICLE RECOGNITION

PRETRAINING CONDITIONS:

Gunner failed to meet standard on pre-test for TEC Lesson 935-171-0203-F (Part H, Gunner's Readiness Test).

OBJECTIVE:

Shown picture of friendly (NATO) and enemy (Warsaw Pact) armored vehicles at various ranges and in various degrees of concealment, Gunner will correctly identify each vehicle as to country of origin within 5 seconds.

METHOD:

Self-instructional sound-slide presentation with written response.

EQUIPMENT/MATERIALS:

- a. Three filmstrip cartridges with audio-cassettes (TEC Lessons 935-171-0201-F, 935-171-0202-F, and 935-171-0203-F)
- b. Beseler Cue/See
- c. Paper and pencil

ESTIMATED TIME:

1 hour

PROCEDURE:

- a. Gunner takes pre-tests for Lessons 935-171-0201-F and 935-171-0202-F. If he fails, assign appropriate lesson, and follow with Lesson 935-171-0203-F. If he passes both pre-tests, assign Lesson 935-171-0203-F.
- b. Gunner completes relevant portion of Lesson 935-171-0203-F and takes post-test. (Instructor administers post-test since Gunner's responses should be oral and limited by time.)
- c. Gunner reviews lesson until he can complete post-test with no errors.

MODULE G-9. LOCATING AND REPORTING TARGETS

PRETRAINING CONDITIONS:

Gunner passed Part H, Gunner's Readiness Test but failed to meet standard in one or more tasks in Part I, Gunner's Readiness Test.

OBJECTIVES:

- a. Given an M60A1 tank located at an observation point on a target acquisition course, the Gunner, from his position, will conduct a quick search scan of the target area in accordance with the procedures in Part I.1, Gunner's Readiness Test.
- b. Given an M60A1 tank located at an observation point on a target acquisition course, the Gunner, from his position, will have 5 minutes to locate and identify targets in the area according to procedures in Part I.2, Gunner's Readiness Test.
- c. Given an M60A1 tank located at an observation point on a target acquisition course, the Gunner, from his position, will estimate range to target in area to within ± 100 meters according to procedures in Part I.3, Gunner's Readiness Test.
- d. Given an M60A1 tank located at an observation point on a target acquisition course, the Gunner, from his position, will report the location of targets in the area according to procedures in Part I.4, Gunner's Readiness Test.

METHOD:

One-on-one instructor controlled performance training.

EQUIPMENT/MATERIALS:

- a. M60A1 tank and binoculars
- b. Target acquisition course with various targets at various ranges.

ESTIMATED TIME:

1-2 hours

PROCEDURE:

- a. Instructor explains to Gunner task elements failed in Part I, Gunner's Readiness Test.

- b. Instructor "talks Gunner through" task elements to be learned; Gunner performs as these oral directions are given.
- c. Gunner then practices with instructor available to coach as necessary.
- d. Gunner is retested on relevant portion of Part I, Gunner's Readiness Test.
- e. Instructor observes Gunner conduct a quick scan of target area.
- f. Practice should emphasize quickness as well as accuracy in locating and identifying targets.
- g. Instructor provides analysis and special cues for any range to target that Gunner estimated incorrectly.
- h. Practice continues until Gunner correctly reports location of targets in the area by the range and clock system to within one hour deviation for direction and to within ± 100 meters for range.

MODULE G-10. TACTICAL OPERATIONS I

PRETRAINING CONDITIONS:

Gunner failed to meet standard on pre-test for TEC Lesson 020-171-5364-F (Part J, Gunner's Readiness Test).

OBJECTIVES:

Gunner will:

- a. Name the ammunition setting on the ballistic computer that is used for the coax.
- b. Identify sight pictures that show proper leads for engaging moving targets with the coax.
- c. Identify correct methods of firing coax engagements from a moving tank at moving personnel targets.

METHOD:

Self-instructional sound-slide presentation with written response.

EQUIPMENT/MATERIALS:

- a. One filmstrip cartridge with audio-cassette (TEC Lesson 020-171-5364-F)
- b. Beseler Cue/See
- c. Paper and pencil

ESTIMATED TIME:

1/2 hour

PROCEDURE:

- a. Gunner selects lesson corresponding to task elements failed in Part J, Gunner's Readiness Test.
- b. Gunner completes relevant portion of assigned lesson and takes post-test.
- c. Gunner reviews those lessons keyed on post-test for items missed.
- d. Gunner has satisfactorily completed the lesson when he can complete relevant portions of post-test with no errors.

MODULE G-11. TACTICAL OPERATIONS II

UNIT G-11.1. TARGET ENGAGEMENTS (CONDUCT-OF-FIRE TRAINING DEVICES)

PRETRAINING CONDITIONS:

Gunner failed to meet standard on one or more tasks in Part K, Gunner's Readiness Test.

OBJECTIVES:

- a. On a gunnery trainer (boresighted and zeroed) at the Company Area, Subcaliber Range, or training site; and given a series of 10 targets (8 hard and two soft), 4 moving and 6 stationary, at scaled ranges from 500 to 2500 meters, with one near and one far moving target; Gunner will engage targets in response to fire commands. Gunner will fire on each target within 10 seconds of the target designation and hit 8 of 10 targets on first round.
- b. On a gunnery trainer (out of boresight) at the Company Area, Subcaliber Range, or training site; and given a series of 6 targets, 3 moving and 3 stationary at scaled ranges from 500 to 2500 meters (one moving and one stationary at near, medium and far ranges); Gunner will fire on each target within 10 seconds of target designation and second round within 5 seconds of first, and hit 4 of 6 targets within 2 rounds.

METHOD:

One-on-one instructor controlled performance training.

EQUIPMENT/MATERIALS:

- a. Any one of the following gunnery trainers:
 - (1). Laser Gun Firing Trainer (DVC 17-33; Model 3A102B)
 - (2). Subcaliber Devices:
 - a. .22 caliber (inbore) (DVC 17-53)
 - b. Brewster Device (DVC 17-87)
 - c. Telfare Device (DVC 17-88)
 - (3). Conduct-of-Fire Trainer (DVC 17-4)
- b.. Range or terrain board appropriate to trainer
- c. Targets and other supporting equipment

ESTIMATED TIME:

2-4 hours

PROCEDURE:

- a. TC directs Gunner to take up correct sight picture through both Gunner's telescope and periscope, emphasizing importance of placing head in same position in headrest each time he takes up a sight picture, and pointing out that he should be aware of pressure points on the head and face which can serve as cues to correct positioning of head.
- b. TC starts Gunner (boresighted and zeroed) on several close-targets, emphasizing speed and technique of engagement, then gradually increases target difficulty by introducing moving targets and increasing range. Speed of engagement should be emphasized first as a criterion for practice, with accuracy building up within the 10 second limit.
- c. Gunner continues to practice under supervision of TC until he can meet the training objective for first round engagements.
- d. TC takes gun out of boresight and gives Gunner practice in second round engagements. TC helps Gunner sense rounds.
- e. If Gunner is having trouble applying burst-on-target techniques, he is given remedial training on the Burst-on-Target Tank Gunnery Trainer (DVC 17-58; Model 17B4), then resumes practice with laser or subcaliber trainer.
- f. Gunner continues to practice under supervision of TC until he can meet the training objective for second round engagements.

NOTES:

- a. The standards given in the training objectives reflect neither Armor doctrine nor extensive research or experience. The unit training manager is therefore encouraged to experiment with different standards and conditions (ranges and target speeds) to determine what level of proficiency should be attained here by the Gunner in order to qualify in later live-fire exercises.
- b. BOT with laser gunnery trainer can be practiced only if a retroflective background is used.
- c. The Chrysler Fire Control Simulator (FCCS), a conduct of fire trainer currently undergoing developmental test at the Armor School, offers considerable promise as a relatively low cost gunnery trainer suitable for the early stages of training target engagement and tracking. If some of its shortcomings (e.g., no BOT capability, limited target speed and direction, no coax firing simulation, excessive reliance on an instructor) can be remedied, it will be a more cost-effective device for this stage of gunnery training. If it does not replace laser or subcaliber devices, it should precede them in the training sequence.

UNIT G-11.2. TARGET ENGAGEMENTS

PRETRAINING CONDITIONS:

Gunner failed to meet the standard in one or more tasks of Part K, Gunner's Readiness Test but completed Unit G-11.1.

OBJECTIVE:

Given a fully operational M60A1 tank with a skilled Driver, BII, coaxial machinegun, blank coaxial machinegun rounds, a tactical driving course including obstacles and terrain conditions suitable for tank defilade, and simulated targets (both moving and stationary, main gun and coaxial), Gunner will engage targets in response to fire commands, meeting the standards laid out in Part K of Gunner's Readiness Test.

METHOD:

One-on-one instructor controlled performance training.

EQUIPMENT/MATERIALS:

- a. Operational M60A1 tank with BII, coaxial machinegun, blank coaxial machinegun rounds
- b. Sufficient terrain to provide several natural or man-made obstacles and features such as ridges suitable for tank defilade; simulated targets (both moving and stationary, main gun and coaxial)

ESTIMATED TIME:

2 hours

PROCEDURE:

- a. TC will act as both TC and LOADER and give appropriate fire commands and LOADER responses for each target encountered. Gunner practices appropriate responses for each command with coaching by TC, until he demonstrates the correct techniques for engaging the target.
- b. TC coaches Gunner through all the target engagements in this manner, repeating any the TC deems necessary. When TC thinks Gunner is ready, he administers a tactical operations test of the type described in Part K of the Gunner's Readiness Test.
- c. TC directs Gunner to take up correct sight pictures through both Gunner's telescope and periscope. TC emphasizes importance of placing head in same position in headrest each time Gunner takes up sight picture. Point out to Gunner that he should be aware of pressure points on the head and face which can serve as cues to insure he has head in correct position in headrest.

NOTE:

This training probably could be mediated more effectively and in the long run, less expensively, by a high fidelity Tank Gunnery Trainer. There are many conduct-of-fire training devices in the inventory. [See UNIT G-11.1] Each device has its own advantages and disadvantages. None appears adequate to conduct the tactical operations described here. Another simulator that could be effective in tactical operations training is outlined below.

[NOTE: Some of the characteristics discussed are detailed in Training Device Requirements,¹ and Unified Industries, Incorporated (1976)²]:

- a. The simulator should provide for training in target acquisition, vehicle identification and target engagements with the tank main gun and coaxial machinegun using either the primary or alternate fire control and sighting equipment; as well as the .50 caliber machinegun. Provision must be made for moving and stationary targets, single and multiple target arrays in a realistic battlefield environment and day, night and reduced visibility conditions.
- b. The instructor's station must provide the capability to: monitor both the Gunner's and Tank Commander's fire control equipment, insert faults to test judgement and reaction, and provide automatic scoring/feedback system for evaluating individual performance.
- c. The target scene would provide the normal environmental characteristics in which a tank functions. Day, night and reduced visibility conditions should be simulated along with the appropriate terrain and vegetation. Targets would appear to be the appropriate size and shape according to the range at which they are simulated. The Tank Commander and Gunner will have the appropriate Scene at their respective station. All types of targets would be provided, both stationary and moving. Moving targets are variable in their movement direction and both individual and multiple target arrays are provided.
- d. Intercommunications and radio would be provided for use in conjunction with the CVC helmet.

¹U.S. Army Armor School, Directorate of Training Developments, "Training Device Requirements for a Unit Conduct of Fire Trainer (U-COFT) for the M60 series (M60A1AOS, M60A1, M60 and M48A5) Tanks," Fort Knox, Ky. (Draft), 1977.

²Conduct-of-Fire Trainers Study, Unified Industries Incorporated, Alexandria, Va. Author, 1976.

- e. All fire control equipment used during gunnery would be available, to include the following: weapon selection, ammunition indexing, all sighting equipment with appropriate reticles, headrests, control handles, rangefinder, firing switches and auxiliary fire control equipment. The location, appearance, feel and reaction of each fire control component will be representative of the actual equipment. The headrests would have some kind of sensors internally mounted and pre-exercise adjustable to insure the soldier puts his head in the same position each time.
- f. Appropriate obscuration seen in the sights during firing would be provided. Obscuration of the target caused by short rounds is required. Smoke and other reduced visibility conditions would provide training in firing during degraded sighting conditions.
- g. The instructor station would permit the instructor to establish and select the initial engagement parameters and sequences. Visual display and monitoring of each station is provided. The instructor would be able to insert faults such as misfires, lost and erratic rounds, machinegun stoppages. A variable three to ten second firing inhibit switch between rounds and a freeze capability to allow immediate corrections would be available.
- h. Adjustable boresight knobs and a zero panel that permits generating a shot group would provide for zeroing both the main gun and the machinegun.
- i. Firing vehicle motion would permit firing on the move (machinegun) and making initial main gun lay during moving-to-halt engagements.

The cost-effectiveness of such a simulator would have to be compared with the use of actual tanks. But live tank or high-fidelity simulator appear to be the only option in training tactical gunnery operations.

APPENDIX D

TANK COMMANDER'S MODULE OUTLINES

TANK COMMANDER'S MODULE OUTLINES

REQUIRED TIME: 25-34 hours

MODULE TC-1. WEAPONS MAINTENANCE I

Type: Self-instructional sound-slide presentation (TEC tapes)

020-171-1132-F (Cleaning, Inspection, and Lubrication Coax)

020-171-1133-F (Troubleshooting Coax)

020-171-5229-F (Troubleshooting M85 Machinegun)

Time: 3 hours

Location: Company Area or UTS

Support: Beseler Cue/See and TEC tapes

Scoring: Passing grade equals completing post-test without error.

MODULE TC-2. WEAPONS MAINTENANCE II

Type: One-on-one instructor controlled performance training

Time: 1 hour

Location: Company Area or UTS

Support: M60A1 tank with coax, caliber .50 machinegun, and gun roll

Scoring: Passing grade equals passing each task without error

MODULE TC-3. BEFORE OPERATIONS PROCEDURES

Type: One-on-one instructor controlled performance training

Time: 1/2 hour

Location: Company Area or UTS

Support: M60A1 tank and job aids

Scoring: Passing grade equals passing each task without error

MODULE TC-4. WEAPON SYSTEMS PREPARATION I

Type: Self-instructional sound-slide presentation (TEC tapes)

020-171-5340-F (Rangefinder, Part I)
020-171-5343-F (Operation of Xenon Searchlight, M60/M60A1)
020-171-5352-F (Boresighting the Machinegun, M60/M60A1)
020-171-5353-F (Zeroing the Main Gun and Machineguns and
Setting Battlesights)
020-171-5354-F (Boresighting the Xenon Searchlight,
M60/M60A1)
020-171-5351-F (Boresighting the Main Gun, RF, Telescope/
Peri, Part 1)
020-171-5341-F (Preparing the Ballistic Computer for
Operation)
020-171-5355-F (Boresighting the Main Gun, RF, Telescope/
Peri, Part 2)
020-171-5337-F (Auxiliary Fire Control Instruments, Part 2)

Time: 5-9 hours

Location: Company Area or UTS

Support: Beseler Cue/See and TEC tapes

Scoring: Passing grade equals completing post-test without error

MODULE TC-5. WEAPON SYSTEMS PREPARATION II

Type: One-on-one instructor controlled performance training

Time: 2 1/2 hours

Location: Company area or UTS

Support: M60A1 tank and job aids

Scoring: Passing grade equals passing each task without error

MODULE TC-6. COMBAT LOADING I

Type: Self-instructional sound-slide presentation (TEC tapes)

020-171-5331-F (Tank Ammo: Selecting Ammunition
020-171-5332-F (Tank Ammo: Handling Main Gun)
020-171-5346-F (105MM Gun: Loading)
020-171-5347-F (105MM Gun: Misfire Procedures)
020-171-5348-F (105MM Gun: Unloading)

Time: 2-5 hours

Location: Company Area or UTS

Support: Beseler Cue/See and TEC tapes

Scoring: Passing grade equals completing post-test without error

MODULE TC-7. COMBAT LOADING II

Type: Audio-tape controlled practice at Loader's station and one-on-one instructor controlled performance training

Time: 4 1/2 hours

Location: Company Area or UTS

Support: Audio-cassette recordings of fire commands, M60A1 tank, coax and caliber .50 machinegun, dummy rounds and cart
ridges

Scoring: Passing grade equals passing each task without error

MODULE TC-8. TARGET ACQUISITION

Type: Self-instructional sound-slide presentation (TEC tapes)

020-171-1611-F (Target Range Determination)
020-171-1612-F (Locating and Reporting Targets)
020-171-1614-F (Target Acquisition Scanning Techniques)
935-171-0201-F (Armor Vehicle Recognition, Part I)
935-171-0202-F (Armor Vehicle Recognition, Part II)
935-171-0203-F (Armor Vehicle Recognition, Part III)

Time: 2 1/2 hours

Location: Company Area or UTS

Support: Beseler Cue/See and TEC tapes

Scoring: Passing grade equals completing post-test without error

MODULE TC-9. LOCATING AND REPORTING TARGETS

Type: One-on-one instructor controlled performance training

Time: 1-2 hours

Location: UTS

Support: M60A1 tank and target acquisition course

Scoring: Passing grade equals completing each task without error

MODULE TC-10. TACTICAL OPERATIONS I

Type: Self-instructional sound-slide presentation (TEC tapes)

020-171-5361-F (Initial Fire Commands, M60/M60A1/M60A3 Tank)
020-171-5364-F (Machinegun Engagements, M60/M60A1/M60A3 Tank)

Time: 2 hours

Location: Company Area or UTS

Support: Beseler Cue/See and TEC tapes

Scoring: Passing grade equals completing post-test without error

MODULE TC-11. TACTICAL OPERATIONS II

Type: One-on-one instructor controlled performance training

Time: 1-2 hours

Location: UTS

Support: M60A1 tank and "dry" tank crew qualification course

Scoring: Passing grade equals completing each task without error

MODULE TC-1. WEAPONS MAINTENANCE I

UNIT TC-1.1. CLEANING, INSPECTION, AND LUBRICATION COAX

PRETRAINING CONDITIONS:

TC failed to meet standard on pre-test for TEC Lesson
020-171-1132 (Part A, Tank Commander's Readiness Test).

OBJECTIVE:

TC describes in writing how to clean, inspect, and lubricate
the coax.

METHOD:

Self-instructional sound-slide presentation with written response.

EQUIPMENT/MATERIALS:

- a. Filmstrip cartridge and audio-cassette (TEC Lesson
020-171-1132-F)
- b. Beseler Cue/See
- c. Paper and pencil

ESTIMATED TIME:

1 hour

PROCEDURE:

- a. TC selects lesson corresponding to task elements failed
on pre-tests in Part A, Tank Commander's Readiness Test.
- b. TC completes relevant portion of assigned lessons and
takes post test.
- c. TC reviews those lessons keyed on post-test for items
missed.
- d. TC has satisfactorily completed the lesson when he can
complete the post-test with no errors.

UNIT TC-1.2. TROUBLESHOOTING COAX

PRETRAINING CONDITIONS:

TC failed to meet standard on pre-test for TEC Lesson 020-171-1133-F (Part A, Tank Commander's Readiness Test).

OBJECTIVE:

TC describes in writing how to troubleshoot the coax.

METHOD:

Self-instructional sound-slide presentation with written response.

EQUIPMENT/MATERIALS:

- a. Filmstrip cartridge and audio-cassette (TEC Lesson 020-171-1133-F)
- b. Beseler Cue/See
- c. Paper and pencil

ESTIMATED TIME:

1 hour

PROCEDURE:

- a. TC selects lesson corresponding to task elements failed on pre-tests in Part A, Tank Commander's Readiness Test.
- b. TC completes relevant portion of assigned lessons and takes post-test.
- c. TC reviews those lessons keyed on post-test for items missed.
- d. TC has satisfactorily completed the lesson when he can complete the post-test with no errors.

UNIT TC-1.3. TROUBLESHOOTING M85 MACHINEGUN

PRETRAINING CONDITIONS:

TC failed to meet standard on pre-test for TEC Lesson 020-171-5229-F (Part A, Tank Commander's Readiness Test).

OBJECTIVE:

TC describes in writing how to troubleshoot the M85 machinegun.

METHOD:

Self-instructional sound-slide presentation with written response.

EQUIPMENT/MATERIALS:

- a. Filmstrip cartridge and audio-cassette (TEC Lesson 020-171-5229-F).
- b. Beseler Cue/See
- c. Paper and pencil

ESTIMATED TIME:

1 hour

PROCEDURE:

- a. TC selects lesson corresponding to task elements failed on pre-tests in Part A, Tank Commander's Readiness Test.
- b. TC completes relevant portion of assigned lessons and takes post-test.
- c. TC reviews those lessons keyed on post-test for items missed.
- d. TC has satisfactorily completed the lesson when he can complete the post-test with no errors.

MODULE TC-2. WEAPONS MAINTENANCE II

PRETRAINING CONDITIONS:

TC passed Part A of TC's Readiness Test but failed to meet standard on one or more tasks in Part B, Tank Commander's Readiness Test.

OBJECTIVES:

- a. In the Loader's station of an M60A1 tank with coax mounted; TC removes, disassembles, inspects, assembles, checks operation, and mounts the coax. TC carries out procedures as given in Parts B.1 through B.6, Tank Commanders Readiness Test, completing the disassembly and assembly tasks each in 3 minutes.
- b. In the TC's station of an M60A1 tank with caliber .50 machinegun mounted; TC removes, disassembles, inspects, assembles, checks operation, and mounts the caliber .50 machinegun. TC carries out procedures as given in Parts B.7 through B.12, Tank Commander's Readiness Test, completing the disassembly and assembly tasks each in 3 minutes.
- c. In the Loader's station of an M60A1 tank with complete gun-tool roll stowed and breech closed; TC removes, disassembles, assembles, and installs the breechblock. TC carries out procedures as given in Parts B.13 and B.14, Tank Commander's Readiness Test, completing the entire operation within 12 minutes.

METHOD:

One-on-one instructor controlled performance training

EQUIPMENT/MATERIALS:

- a. M60A1 tank
- b. Coax and caliber .50 machinegun
- c. Gun-tool roll stowed

ESTIMATED TIME:

1 hour

PROCEDURE:

- a. Instructor explains to TC task elements failed in Part B of Tank Commander's Readiness Test.
- b. Instructor "talks TC through" task or task elements to be learned; TC performs as these oral directions are given.

- c. TC then practices with instructor available to coach as necessary.
- d. TC is retested on relevant portion of Part B, Tank Commander's Readiness Test.

NOTE:

- a. This module should be conducted as remedial training immediately following administration of Part B of the Tank Commander's Readiness Test.
- b. Procedures for remedial training should be followed as given. Demonstrations of performance by the instructor or lengthy lectures on principles of equipment operation, while the trainee is idle, usually slows down the learning process.
- c. No TEC Lesson(s) exists, apparently, for disassembly/assembly of the breechblock. Some such self-instructional module for acquiring knowledge of breechblock disassembly/assembly procedures should be developed, used, and a proficiency standard met before TC undertakes hands-on practice. For the time being, it is recommended that the soldier who fails the breechblock portion of the Readiness Test so substantially that he cannot be remediated in two or three hands-on trials, be required to memorize the steps in disassembly/assembly before resuming hands-on practice.

MODULE TC-3. BEFORE OPERATIONS PROCEDURES

PRETRAINING CONDITIONS:

TC failed to meet standard in one or more tasks in Part C, Tank Commander's Readiness Test.

OBJECTIVES:

- a. Given an M60A1 tank, a procedural job aid, and a command from the instructor "PLACE TURRET INTO POWER OPERATION FROM GUNNER'S POSITION", the TC will place the turret into power operation from the Gunner's position according to procedures in Part C.2, Tank Commander's Readiness Test.
- b. Given an M60A1 tank, a procedural job aid, and a command from the instructor "PREPARE-TO-FIRE", TC will perform TC's prepare-to-fire procedures according to Part C.3, Tank Commander's Readiness Test.
- c. Given an M60A1 tank with a gas particulate unit mounted and the requirement to perform before operation checks, the TC will check the operation of the M3 heater according to procedures in Part C.4, Tank Commander's Readiness Test.

METHOD:

One-on-one instructor controlled performance training.

EQUIPMENT/MATERIALS:

M60A1 tank with gas particulate unit mounted and a protective mask.

ESTIMATED TIME:

1/2 hour

PROCEDURE:

- a. Instructor makes sure TC has pocket job-aids and urges him to refer to them during task performance.
- b. Instructor explains to TC task element failed in Part C, Tank Commander's Readiness Test.
- c. Instructor "talks TC through" task or task elements to be learned; TC performs as these oral directions are given.
- d. TC then practices with instructor available to coach as necessary.

- e. TC is retested on relevant portion of Part C, Tank Commander's Readiness Test.

NOTE:

- a. This module should be conducted as remedial training immediately following administration of Part C of the Tank Commander's Readiness Test.
- b. Procedures for remedial training should be followed as given. Demonstration of performance by the instructor or lengthy lectures on principles of equipment operation, while the TC is idle, usually slows down the learning process.

MODULE TC-4. WEAPON SYSTEMS PREPARATION I

UNIT TC-4.1. BORESIGHT WEAPON SYSTEMS

PRETRAINING CONDITIONS:

TC failed to meet standard on pre-test for TEC Lessons
020-171-5340-F, 020-171-5343-F, 020-171-5352-F, 020-171-5354-F,
020-171-5355-F, 020-171-5341-F, 020-171-5351-F, and 020-171-5337-F
(Part D, Tank Commander's Readiness Test).

OBJECTIVES:

Given the requirements to boresight the tank weapon systems, the
TC will:

- . Identify a good target for use in boresighting the main gun, coax, and M85 machinegun.
- . Locate and use various parts of the rangefinder.
- . Locate and use various parts of the ballistic computer.
- . State the procedures or conditions necessary to complete sight alignment of the reticles of the rangefinder, periscope, and telescope.
- . Identify the correct slip scale settings for the boresight knobs of the rangefinder, periscope, and telescope.
- . Describe operation of Xenon searchlight.
- . Describe the controls used and adjustments necessary to boresight the Xenon searchlight by both the primary and alternate methods.
- . Identify and list in the correct order of removal, the parts that must be removed from the coax for boresighting.
- . Describe the procedures for boresighting the coax.
- . Identify and list in the correct order of removal, the parts that must be removed from the M85 machinegun for boresighting.
- . Describe the procedures for boresighting the M85 machinegun.

METHOD:

Self-instructional sound-slide presentation with written response.

- e. TC is retested on relevant portion of Part C, Tank Commander's Readiness Test.

NOTE:

- a. This module should be conducted as remedial training immediately following administration of Part C of the Tank Commander's Readiness Test.
- b. Procedures for remedial training should be followed as given. Demonstration of performance by the instructor or lengthy lectures on principles of equipment operation, while the TC is idle, usually slows down the learning process.

MODULE TC-4. WEAPON SYSTEMS PREPARATION I

UNIT TC-4.1. BORESIGHT WEAPON SYSTEMS

PRETRAINING CONDITIONS:

TC failed to meet standard on pre-test for TEC Lessons
020-171-5340-F, 020-171-5343-F, 020-171-5352-F, 020-171-5354-F,
020-171-5355-F, 020-171-5341-F, 020-171-5351-F, and 020-171-5337-F
(Part D, Tank Commander's Readiness Test).

OBJECTIVES:

Given the requirements to boresight the tank weapon systems, the TC will:

- . Identify a good target for use in boresighting the main gun, coax, and M85 machinegun.
- . Locate and use various parts of the rangefinder.
- . Locate and use various parts of the ballistic computer.
- . State the procedures or conditions necessary to complete sight alignment of the reticles of the rangefinder, periscope, and telescope.
- . Identify the correct slip scale settings for the boresight knobs of the rangefinder, periscope, and telescope.
- . Describe operation of Xenon searchlight.
- . Describe the controls used and adjustments necessary to boresight the Xenon searchlight by both the primary and alternate methods.
- . Identify and list in the correct order of removal, the parts that must be removed from the coax for boresighting.
- . Describe the procedures for boresighting the coax.
- . Identify and list in the correct order of removal, the parts that must be removed from the M85 machinegun for boresighting.
- . Describe the procedures for boresighting the M85 machinegun.

METHOD:

Self-instructional sound-slide presentation with written response.

EQUIPMENT/MATERIALS:

- a. Eight filmstrip cartridges and audio-cassettes (TEC Lesson 020-171-5340-F, 020-171-5343-F, 020-171-5352-F, 020-171-5354-F, 020-171-5355-F, 020-171-5341-F, 020-171-5351-F, 020-171-5337-F).
- b. Beseler Cue/See
- c. Paper and pencil

ESTIMATED TIME:

8 hours

PROCEDURE:

- a. TC selects lesson corresponding to task elements failed on pre-tests in Part D, Tank Commander's Readiness Test.
- b. TC completes relevant portion of assigned lessons and takes post-test.
- c. TC reviews those lessons keyed on post-test for items missed.
- d. TC has satisfactorily completed the lesson when he can complete the post-test with no errors.

NOTE:

These lessons address Gunner as well as TC tasks and in some cases tasks performed by both.

UNIT TC-4.2. ZERO WEAPON SYSTEMS

PRETRAINING CONDITIONS:

TC failed to meet standard on pre-test for TEC Lesson 020-171-5353-F (Part D, Tank Commander's Readiness Test).

OBJECTIVE:

Given the requirement to zero the tank main gun, coax machinegun, and M85 machinegun, the TC will:

- . List the desired characteristics of a target used for zeroing the main gun, coax machinegun, and M85 machinegun.
- . Describe the procedures for zeroing the main gun, coax machinegun, and M85 machinegun.
- . Identify the sight reticles that must be aligned after the main gun and coax machinegun are zeroed.

- . Identify the point on the M85 machinegun sight reticle used for zeroing the machinegun.

METHOD:

Self-instructional sound-slide presentation with written response.

EQUIPMENT/MATERIALS:

- a. Filmstrip cartridge with audio-cassette (TEC Lesson 020-171-5353-F)
- b. Beseler Cue/See
- c. Paper and pencil

ESTIMATED TIME:

1 hour

PROCEDURE:

- a. TC selects lesson corresponding to task elements failed on pre-tests in Part D, Tank Commander's Readiness Test.
- b. TC completes relevant portion of assigned lessons and takes post-test.
- c. TC reviews those lessons keyed on post-test for items missed.
- d. TC has satisfactorily completed the lesson when he can complete the post-test with no errors.

NOTE:

This lesson addresses Gunner as well as TC tasks and in some cases tasks performed by both.

MODULE TC-5. WEAPON SYSTEMS PREPARATION II

UNIT TC-5.1. BORESIGHT WEAPON SYSTEMS

PRETRAINING CONDITIONS:

TC passed Part D, Tank Commander's Readiness Test but failed to meet standard in one or more tasks in Part E, Tank Commander's Readiness Test.

OBJECTIVES:

- a. Given an M60A1 tank situated on level ground with boresight panels at ranges of 1200 meters and 500 meters, TC will prepare tank for boresighting and prepare tank rangefinder operation. All steps in this objective will be performed within 20 minutes and according to Parts E.1 and E.8, Commander's Readiness Test.
- b. Given an M60A1 tank situated on level ground with boresight panels at ranges of 1200 meters and 500 meters and the tank and optics prepared for boresighting, the TC will boresight the Gunner's telescope, Gunner's periscope, (daylight and IR), tank searchlight (primary and alternate methods), coax, rangefinder, and caliber .50 machinegun according to Parts E.2 through E.7, E.9, and E.14, Tank Commander's Readiness Test.

METHOD:

One-on-one instructor controlled performance training.

EQUIPMENT/MATERIALS:

- a. M60A1 tank with BII, coax, caliber .50 machinegun.
- b. Boresight panels at ranges of 1200 meters and 500 meters.

ESTIMATED TIME:

1 hour

PROCEDURE:

- a. Instructor explains to TC task elements failed in Part E, Tank Commander's Readiness Test.
- b. Instructor directs TC to insure that the headrest of various fire control optics are adjusted to desired position.
- c. Instructor directs TC to take up correct sight pictures through rangefinder, Gunner's periscope, Gunner's telescope,

and caliber .50 sights. Instructor emphasizes importance of placing head in same position in headrest each time TC takes up sight picture. Point out to TC that he should be aware of pressure points on the head and face which can serve as cues to insure he has his head in correct position in headrest.

- d. Instructor "talks TC through" task elements to be learned; TC performs as these oral directions are given.
- e. TC then practices with instructor available to coach as necessary.
- f. TC is retested on relevant portions of Part E, Tank Commander's Readiness Test.

NOTE:

- a. This module should be conducted as remedial training immediately following administration of Part E, Tank Commander's Readiness Test.
- b. Procedures for remedial training should be followed as given. Demonstrations of performance by the instructor or lengthy lectures on principles of equipment operation, while the TC is idle, usually slows down the learning process.

UNIT TC-5.2. RANGING TEST

PRETRAINING CONDITIONS:

TC failed to determine correct range to target, Part E-10, Tank Commander's Readiness Test.

OBJECTIVES:

Given an M60A1 tank with BII, situated on level ground, and a minimum of six 6-by 6-foot target panels placed at varying known ranges from 1,000 to 3,500 meters, TC will make 20 rangings on each target according to Part E.10, Tank Commander's Readiness Test.

METHOD:

One-on-one instructor controlled performance training.

EQUIPMENT/MATERIALS:

- a. M60A1 tank with BII
- b. Six 6-by 6-foot target panels at varying known ranges from 1,000 to 3,500 meters.

ESTIMATED TIME:

1 hour

PROCEDURE:

- a. Each ranging starts from an indexed range of 500 meters in such a sequence that no two rangings on any one target are consecutive.
- b. The range scale on the range finder is covered so that the TC cannot read it. The instructor notes and records each reading from the computer and reindexes 500 meters on the rangefinder for the next ranging.
- c. At the completion of the test, the readings for all targets are computed. Proficiency is determined as follows:
 - . Compute average range reading for each target by adding all 20 readings for that target and dividing by 20.
 - . Obtain range bias for each target by determining the difference between the average range reading and the known range for that target.
 - . Obtain range spread by subtracting the smallest reading from the largest.
 - . The standard for qualification is a range bias not greater than ± 50 meters and a range spread not greater than 100 meters.

UNIT TC-5.3. ZERO WEAPON SYSTEMS

PRETRAINING CONDITIONS:

TC failed to meet standard in one or more tasks in Part E, Tank Commander's Readiness Test.

OBJECTIVES:

Given an M60A1 tank with subcaliber devices attached, situated on level ground at a subcaliber range, with a main gun zero panel at a scaled range of 1200 meters, a coax machinegun zero panel at a scaled range of 800 meters, an M85 machinegun zero panel at a scaled range of 500 meters, TC will zero the tank main gun, coax, and M85 machinegun according to Parts E.11, E.12, and E.15, Tank Commander's Readiness Test.

METHOD:

One-on-one instructor controlled performance training.

EQUIPMENT/MATERIALS:

- a. M60A1 tank with BII, coax, and M85 machinegun.
- b. Main gun zero panel at scaled range of 1200 meters.
- c. Coax machinegun zero panel at scaled range of 800 meters.
- d. M85 machinegun zero panel at scaled range of 500 meters.
- e. Subcaliber ammunition.

ESTIMATED TIME:

1/2 hour

PROCEDURE:

- a. Instructor explains to TC task elements failed in Part E, Tank Commander's Readiness Test.
- b. Instructor directs TC to insure that TC's rangefinder and Gunner's periscope and telescope headrests are adjusted to desired position.
- c. Instructor directs TC to take up correct sight pictures through rangefinder, Gunner's periscope and telescope. Instructor emphasizes importance of placing head in same position in headrest each time TC takes up sight picture. Point out to TC that he should be aware of pressure points on the head and face which can serve as cues to insure he has head in correct position in headrest.
- d. Instructor "talks TC through" task on task elements to be learned; TC performs as these oral directions are given.
- e. TC then practices with instructor available to coach as necessary.
- f. TC is retested on relevant portion of Part E, Tank Commander's Readiness Test.

NOTE:

This training probably could be mediated more effectively and in the long run, less expensively, by a high fidelity Tank Gunnery trainer. One type of simulator that should be effective in training main gun and machinegun zeroing is outlined in MODULE G-10, TACTICAL OPERATIONS.

MODULE TC-6. COMBAT LOADING I

UNIT TC-6.1. SELECTING AND HANDLING TANK AMMUNITION

PRETRAINING CONDITIONS:

TC failed to meet standard in pre-test for TEC Lesson 020-171-5331-F and 020-171-5332-F (Part F, Tank Commander's Readiness Test).

OBJECTIVE:

Given pictures of different types of tank ammunition, or different types of targets, or statements of various fire commands; TC identifies the (correct) round in writing or by selecting a picture of the round.

METHOD:

Self-instructional sound-slide presentation with written response.

EQUIPMENT/MATERIALS:

- a. Two filmstrip cartridges and audio-cassettes (TEC Lessons 020-171-5331-F and 020-171-5332-F).
- b. Beseler Cue/See
- c. Paper and pencil

ESTIMATED TIME:

2 hours

PROCEDURE:

- a. Select lesson(s) corresponding to pre-test(s) failed in Part F, Tank Commander's Readiness Test.
- b. TC completes relevant portion of assigned lesson and takes post-test.
- c. TC reviews those lessons keyed on post-test for items missed.
- d. TC has satisfactorily completed the lesson when he can complete the post-test with no errors.

UNIT TC-6.2. LOADING, MISFIRE PROCEDURES, AND UNLOADING MAIN GUN

PRETRAINING CONDITIONS:

TC failed to meet standard in pre-test for TEC Lessons 020-171-5346-F, 020-171-5347-F, and 020-171-5348-F (Part F, Tank Commander's Readiness Test).

OBJECTIVES:

- a. TC will list the steps in correct and safe loading, recognize common loading errors, and describe in writing the dangers of incorrect loading procedures.
- b. TC will describe in writing the procedures (announcements, actions, and precautions) followed in reacting to a main gun misfire and in unloading a misfired round.

METHOD:

Self-instructional sound-slide presentation with written response.

EQUIPMENT/MATERIALS:

- a. Three filmstrip cartridges with audio-cassettes (TEC Lessons 020-171-5346-F, 020-171-5347-F, and 020-171-5348-F)
- b. Beseler Cue/See
- c. Paper and pencil

ESTIMATED TIME:

3 hours

PROCEDURE:

- a. TC selects lessons corresponding to task elements failed on pre-tests in Part F of Tank Commander's Readiness Test.
- b. TC completes relevant portions of assigned lessons and takes post-test.
- c. TC reviews those lessons keyed on post-test for items missed.
- d. TC has satisfactorily completed the lesson when he can complete the post-test with no errors.

MODULE TC-7. COMBAT LOADING II

UNIT TC-7.1. STOW TANK AMMUNITION

PRETRAINING CONDITIONS:

TC passed Part F of Tank Commander's Readiness Test but failed to meet standard in one or more tasks of Part G, Tank Commander's Readiness Test.

OBJECTIVES:

Given an M60A1 tank, and dummy rounds (3-ADPS, 3-HEAT, 2-HEP, and two dimensional representations of 7.62mm and caliber .50 machinegun ammunition boxes) and a Unit Ammunition Stowage Plan; TC will stow tank ammunition according to procedures in Part G.1 through G.3, Tank Commander's Readiness Test.

METHOD:

One-on-one instructor controlled performance training.

EQUIPMENT/MATERIALS:

- a. M60A1 tank
- b. Dummy rounds (3-ADPS, 3-HEAT, 2-HEP)
- c. Two dimensional representations of 7.62mm and caliber .50 machinegun ammunition boxes.
- d. Unit Ammunition Loading Plan.

ESTIMATED TIME:

1 hour

PROCEDURE:

- a. TC positions himself in the Loader's station and receives ammunition (or cardboard representations) through the Loader's hatch and stows ammunition according to the Unit Ammunition Stowage Plan.
- b. Instructor explains to TC task elements failed in Part G, Tank Commander's Readiness Test.
- c. Instructor "talks TC through" task elements to be learned; TC performs as these oral directions are given.
- d. TC then practices with instructor available to coach as necessary.
- e. TC is retested on relevant portion of Part G, Tank Commander's Readiness Test.

UNIT TC-7.2. REPLENISHER TAPE READING

PRETRAINING CONDITIONS:

TC failed to meet standard in one or more tasks in Part G, Tank Commander's Readiness Test.

OBJECTIVE:

Stationed at a mock-up of the replenisher tape, and given any one of the four possible settings of the tape; TC feels the tape and states what remedial action he would take, if any, given that reading, (a) during firing and (b) before firing. TC must respond accurately and immediately upon feeling the tape, and respond so on eight consecutive trials according to Part G.4, Tank Commander's Readiness Test.

METHOD:

One-on-one instructor controlled performance training.

EQUIPMENT/MATERIALS:

Replenisher tape mock-up. The mock-up, which can be simple and inexpensive, should have the following characteristics:

- . A representation of the replenisher cylinder (same general size and configuration)
- . A representation of the replenisher tape that is highly accurate with respect to size, opening, feel of edges, and location with respect to replenisher cylinder and rangefinder; tape should be operable so that it can easily be set in one of the four positions.
- . A representation of that portion of the rangefinder which blocks the view of the replenisher cylinder and that is accurate with respect to size and position relative to the tape.
- . The components should be mounted on some kind of frame at the same general height as in the tank.

ESTIMATED TIME:

1/2 hour

PROCEDURE:

- a. Instructor explains to TC task elements failed in Part G, Tank Commander's Readiness Test.

- b. If TC has trouble remembering the correct responses, instructor might provide the mnemonic:
 "Rough and Smooth: in The Groove:
 Two Rough: Not Enough;
 Two Smooth: Remove."
- c. TC practices, with instructor varying the setting from trial to trial so that practice is geared to the more troublesome settings for the TC.
- d. TC is retested on relevant portion of Part G, Tank Commander's Readiness Test.

NOTE:

Since there are no safety requirements involved, practice on the device could be administered by anyone (e.g., the TC's buddy). The criterion test, though, should probably be administered by the instructor.

UNIT TC-7.3. LOAD MAIN GUN IN RESPONSE TO FIRE COMMANDS

PRETRAINING CONDITIONS:

TC passed Part F of Tank Commander's Readiness Test but failed to meet standard in one or more tasks of Part G, Tank Commander's Readiness Test.

OBJECTIVE:

Positioned in the Loader's station of an M60A1 tank with at least 8 dummy rounds (3 APDS, 3 HEP, and 2 HEAT) in the ready rack, and given a series of five fire commands; TC selects and loads correct rounds. TC must load according to procedures given in Part G.5, Tank Commander's Readiness Test, and meet the following time standards:

- a. 10 seconds (breech open) from time ammunition element is given until announces "UP".
- b. 2 seconds (battlesight round loaded) from time "BATTLESIGHT" is given until announces "UP".
- c. 55 seconds (battlesight round loaded) from time ammunition element (other than battlesight round) is given until announces "UP".
- d. Total time for five consecutive loadings should be no more than the sum of the individual time standards.
- e. Carry out two series of five consecutive loadings within 10 minutes.

METHOD:

Audio-tape controlled practice at Loader's station in M60A1 tank.

EQUIPMENT/MATERIALS:

- a. M60A1 tank
- b. Main gun dummy ammunition, including at a minimum: 3 APDS, 3 HEP, and 2 HEAT. Dummy rounds may have to be locally fabricated. In any case, each should have the same configuration, color, markings, weight and weight distribution as an actual round.
- c. Audio-cassette recordings of instructions, fire commands and feedback. Various mixes of fire commands should be recorded in blocks of five, and the blocks should be graded from easy to difficult in terms of the mix of commands and time allowed to execute each.
- d. Cassette player that will plug into tank intercom.

ESTIMATED TIME:

1 hour

PROCEDURE:

- a. TC positions himself in Loader's station and starts cassette player. Taped instructions provide explanation of the purpose and procedure for this unit, including the necessary requirement to unload between rounds.
- b. TC takes the first exercise (block of 5 commands), which gives the commands at a relatively slow pace. TC replaces rounds in ready rack and starts next exercise. When he can complete two of most difficult exercises within the time limit, he is ready for a criterion test.
- c. Instructor tests TC by giving two difficult exercises and observing loading procedures for accuracy, safety and time.

NOTES:

- a. Because of the physical conditioning aspect of this training, the TC should probably be required to practice the module frequently during the training year.
- b. This module could be greatly improved if a Loader's simulator were developed to support the exercises. Such a simulator should provide for motion (since the first few steps in loading are often carried out while the tank is still moving), gun recoil (training in safety) and movement of breech into battery, and

automatic ejection of dummy round. Noise of the round firing is also desirable, but probably not an essential factor in the simulation.

UNIT TC-7.4. CONDUCT MAIN GUN MISFIRE PROCEDURES

PRETRAINING CONDITIONS:

TC passed Part F of Tank Commander's Readiness Test but failed to meet standard in one or more tasks of Part G, Tank Commander's Readiness Test.

OBJECTIVE:

Positioned in the Loader's station of an M60A1 tank with a dummy round loaded in the main gun, and given the announcement "MISFIRE"; TC, on command, rotates the round 1/2 turn and, also on command, unloads the misfired round with assistance from the Gunner, according to procedures in Parts G.6 and G.7, Tank Commander's Readiness Test. Responding to the MISFIRE, including unloading the misfired round, is completed within 2 1/2 minutes.

METHOD:

One-on-one instructor controlled performance training.

EQUIPMENT/MATERIALS:

M60A1 tank with dummy rounds of main gun ammunition.

ESTIMATED TIME:

1/2 hour

PROCEDURE:

- a. Instructor explains to TC task elements failed in Part G, Tank Commander's Readiness Test.
- b. Instructor "talks TC through" the task elements to be learned; TC performs as these oral directions are given.
- c. TC then practices with instructor available to coach as necessary.
- d. TC is retested on relevant portion of Part G, Tank Commander's Readiness Test.

NOTES:

- a. This unit should be conducted as remedial training immediately following administration of Part G, Tank Commander's Readiness Test.

- b. Procedures for remedial training should be followed as given. Demonstrations of performance by the instructor or lengthy lectures on principles of equipment operation, while the trainee is idle, usually slows down the learning process.

UNIT TC-7.5. LOAD COAX AND READY COAX IN RESPONSE TO FIRE COMMANDS

PRETRAINING CONDITIONS:

TC passed Part F of Tank Commander's Readiness Test but failed to meet standard in one or more tasks of Part G, Tank Commander's Readiness Test.

OBJECTIVE:

Positioned in the Loader's station of an M60A1 tank with the coax mounted and a belt of dummy 7.62mm ammunition available for loading; TC will load the coax and upon hearing the appropriate fire command ready the coax for firing according to procedures in Parts G.8 and G.9, Tank Commander's Readiness Test.

METHOD:

One-on-one instructor controlled performance training.

EQUIPMENT/MATERIALS:

M60A1 tank with coax mounted and a belt of dummy 7.62mm ammunition.

ESTIMATED TIME:

1/2 hour

PROCEDURE:

- a. Instructor explains to TC task elements failed in Part G, Tank Commander's Readiness Test.
- b. Instructor "talks TC through" the task elements to be learned; TC performs as these oral directions are given.
- c. TC then practices with instructor available to coach as necessary.
- d. TC is retested on relevant portion of Part G, Tank Commander's Readiness Test.

NOTE:

- a. This unit should be conducted as remedial training immediately following administration of Part G, Tank Commander's Readiness Test.
- b. Procedures for remedial training should be followed as given. Demonstrations of performance by the instructor or lengthy lectures on principles of equipment operation, while the trainee is idle, usually slows down the learning process.

UNIT TC-7.6. CLEAR, UNLOAD AND REDUCE COAX STOPPAGE

PRETRAINING CONDITIONS:

TC passed Part F of Tank Commander's Readiness Test but failed to meet standard in one or more tasks of Part G. Tank Commander's Readiness Test.

OBJECTIVES:

- a. Positioned in the Loader's station of an M60A1 tank with dummy 7.62mm ammunition loaded in the coax, TC will clear and unload the coax according to procedures in Part G.10, Tank Commander's Readiness Test.
- b. Positioned in the Loader's station of an M60A1 tank with dummy 7.62mm round hand loaded in chamber of coax and a belt of dummy rounds loaded on top so that chamber round will not extract when weapon is charged, and given the announcement "STOPPAGE", TC will apply immediate action to reduce stoppage in the coax. Misfired round is removed within 10 seconds, and the entire procedure executed correctly, according to Part G.11, Tank Commander's Readiness Test, through announcement "UP" within 15 seconds.
- c. Positioned in the Loader's station of an M60A1 tank and a simulated ruptured cartridge in the chamber of the coax; TC will change the coax barrel according to procedures in Part G.12, Tank Commander's Readiness Test.

METHOD:

One-on-one instructor controlled performance training.

EQUIPMENT/MATERIALS:

M60A1 tank with coax mounted, belt of dummy 7.62mm ammunition, and extra coax barrel.

ESTIMATED TIME:

1/2 hour

PROCEDURE:

- a. Instructor explains to TC task elements failed in Part G, Tank Commander's Readiness Test.
- b. Instructor "talks TC through" task elements to be learned; TC performs as these directions are given.
- c. TC then practices with instructor available to coach as necessary.
- d. TC is retested on relevant portion of Part G, Tank Commander's Readiness Test.

NOTE:

- a. This unit should be conducted as remedial training immediately following administration of Part G, Tank Commander's Readiness Test.
- b. Procedures for remedial training, should be followed as given. Demonstrations of performance by the instructor or lengthy lectures on principles of equipment operation, while TC is idle, usually slows down learning process.

UNIT TC-7.7. LOAD, CLEAR AND REDUCE STOPPAGE M85 MACHINEGUN

PRETRAINING CONDITIONS:

TC passed Part F of Tank Commander's Readiness Test but failed to meet standard in one or more tasks of Part G, Tank Commander's Readiness Test.

OBJECTIVES:

- a. Positioned in an M60A1 tank with M85 machinegun mounted and a belt of dummy caliber .50 ammunition available for loading; TC will load the M85 according to procedures in Part G.13, Tank Commander's Readiness Test.
- b. Positioned in an M60A1 tank with a belt of dummy caliber .50 ammunition loaded in the M85; TC will unload and clear the machinegun according to Part G.14, Tank Commander's Readiness Test.
- c. Positioned in an M60A1 tank with dummy caliber .50 round hand loaded in chamber of M85 and a belt of dummy rounds loaded on top so that the chamber round will not extract when weapon is charged, and given the announcement "STOPPAGE"; TC will apply immediate action to reduce stoppage in the M85. Misfired round is removed within 10 seconds, and entire procedure executed correctly according to Part G.15, Tank Commander's Readiness Test, within 15 seconds.

METHOD:

One-on-one instructor controlled performance training.

EQUIPMENT/MATERIALS:

M60A1 tank with M85 mounted and belt of dummy caliber .50 ammunition.

ESTIMATED TIME:

1/2 hour

PROCEDURE:

- a. Instructor explains to TC task elements failed in Part G, Tank Commander's Readiness Test.
- b. Instructor "talks TC through" task elements to be learned; TC performs as these directions are given.
- c. TC then practices with instructor available to coach as necessary.
- d. TC is retested on relevant portion of Part G, Tank Commander's Readiness Test.

NOTE:

- a. This unit should be conducted as remedial training immediately following administration of Part G, Tank Commander's Readiness Test.
- b. Procedures for remedial training should be followed as given. Demonstrations of performance by the instructor or lengthy lectures on principles of equipment operation, while TC is idle, usually slows down the learning process.

MODULE TC-8. TARGET ACQUISITION

UNIT TC-8.1. TARGET RANGE ESTIMATION

PRETRAINING CONDITIONS:

TC failed to meet standard on pre-test for TEC Lesson 020-171-1611-F (Part H, Tank Commander's Readiness Test).

OBJECTIVE:

TC will describe the "100-meter" and "Appearance of Objects" methods of range estimation.

METHOD:

Self-instructional sound-slide presentation with written response.

EQUIPMENT/MATERIALS:

- a. One filmstrip cartridge with audio-cassette (TEC Lesson 020-171-1611-F).
- b. Beseler Cue/See
- c. Paper and pencil

ESTIMATED TIME:

1/2 hour

PROCEDURE:

- a. TC selects lesson corresponding to task elements failed on pre-test in Part H, Tank Commander's Readiness Test.
- b. TC completes relevant portion of assigned lesson and takes post-test.
- c. TC reviews those lessons keyed on post-test for items missed.
- d. TC has satisfactorily completed the lesson when he can complete relevant portions of post-test with no errors.

UNIT TC-8.2. LOCATING AND REPORTING TARGETS

PRETRAINING CONDITIONS:

TC failed to meet standard on pre-test for TEC Lesson 020-171-1612-F (Part H, Tank Commander's Readiness Test).

OBJECTIVE:

Given targets depicted at various locations relative to the TC's tank, the TC will, in writing, report target location using "the clock method".

METHOD:

Self-instructional sound-slide presentation with written response.

EQUIPMENT/MATERIALS:

- a. One filmstrip cartridge with audio cassette (TEC Lesson 020-171-1612-F)
- b. Beseler Cue/See
- c. Paper and pencil

ESTIMATED TIME:

1/2 hour

PROCEDURE:

- a. TC selects lesson corresponding to task elements failed on pre-test in Part H, Tank Commander's Readiness Test.
- b. TC completes relevant portion of assigned lesson and takes post-test.
- c. TC reviews those lessons leyd on post-test for items missed.
- d. TC has satisfactorily completed the lesson when he can complete relevant portions of post-test with no errors.

UNIT TC-8.3. TARGET ACQUISITION SCANNING TECHNIQUES

PRETRAINING CONDITIONS:

TC failed to meet standard on pre-test Lesson 020-171-1614-F (Part H, Tank Commander's Readiness Test).

OBJECTIVE:

TC will state from memory the correct procedure for scanning for targets (day or night) and acquiring and preserving night vision.

METHOD:

Self-instructional sound-slide presentations with written response.

EQUIPMENT/MATERIALS:

- a. One filmstrip cartridge with audio-cassette (TEC Lesson 020-171-1614-F).
- b. Beseler Cue/See
- c. Paper and pencil

ESTIMATED TIME:

1/2 hour

PROCEDURE:

- a. TC selects lesson corresponding to task elements failed on pre-test in Part H, Tank Commander's Readiness Test.
- b. TC completes relevant portion of assigned lessons and takes post-test.
- c. TC reviews those lessons keyed on post-test for items missed.
- d. TC has satisfactorily completed the lesson when he can complete the post-test with no errors.

UNIT TC-8.4. ARMOR VEHICLE RECOGNITION

PRETRAINING CONDITIONS:

TC failed to meet standard on pre-test for TEC Lesson 935-171-0203-F (Part H, Tank Commander's Readiness Test).

OBJECTIVE:

Shown picture of friendly (NATO) and enemy (Warsaw Pact) armored vehicles at various ranges and in various degrees of concealment, TC will correctly identify each vehicle as to country of origin within 5 seconds.

METHOD:

Self-instructional sound-slide presentation with written response.

EQUIPMENT/MATERIALS:

- a. Three filmstrip cartridges with audio-cassettes (TEC Lessons 935-171-0201-F, 935-171-0202-F, and 935-171-0203-F).
- b. Beseler Cue/See
- c. Paper and pencil

ESTIMATED TIME:

1 hour

PROCEDURE:

- a. TC takes pre-tests for Lessons 935-171-0201-F and 935-171-0202-F. If he fails, assign appropriate lesson, and follow with Lesson 935-171-0203-F. If he passes both pre-tests, assign Lesson 935-171-0203-F.
- b. TC completes relevant portion of Lesson 935-171-0203-F and takes post-test. (Instructor administers post-test since TC's responses should be oral and limited by time.
- c. TC reviews lesson until he can complete post-test with no errors.

MODULE TC-9. LOCATING AND REPORTING TARGETS

PRETRAINING CONDITIONS:

TC passed Part H, Tank Commander's Readiness Test but failed to meet standard in one or more tasks in Part I, Tank Commander's Readiness Test.

OBJECTIVES:

- a. Given an M60A1 tank located at an observation point on a target acquisition course, the TC, from his position, will conduct a quick search scan of the target area in accordance with the procedures in Part I.1, Tank Commander's Readiness Test.
- b. Given an M60A1 tank located at an observation point on a target acquisition course, the TC, from his position, will have 5 minutes to locate and identify targets in the area according to procedures in Part I.2, Tank Commander's Readiness Test.
- c. Given an M60A1 tank located at an observation point on a target acquisition course, the TC, from his position, will estimate range to target in area to within $\pm$ 100 meters according to procedures in Part I.3, Tank Commander's Readiness Test.
- d. Given an M60A1 tank located at an observation point on a target acquisition course, the TC, from his position, will report the location of targets in the area according to procedures in Part I.4, Tank Commander's Readiness Test.

METHOD:

One-on-one instructor controlled performance training.

EQUIPMENT/MATERIALS:

- a. M60A1 tank and binoculars
- b. Target acquisition course with various targets at various ranges.

ESTIMATED TIME:

1-2 hours

PROCEDURE:

- a. Instructor explains to TC task elements failed in Part I, Tank Commander's Readiness Test.

- b. Instructor "talks TC through" task elements to be learned; TC performs as these oral directions are given.
- c. TC then practices with instructor available to coach as necessary.
- d. TC is retested on relevant portion of Part I, Tank Commander's Readiness Test.
- e. Instructor observes TC conduct a quick scan of target area.
- f. Practice should emphasize quickness as well as accuracy in locating and identifying targets.
- g. Instructor provides analysis and special cues for any range to target that TC estimated incorrectly.
- h. Practice continues until TC correctly reports location of targets in the area by the range and clock system to within one hour deviation for direction and to within ± 100 meters for range.

MODULE TC-10. TACTICAL OPERATIONS (TARGET ENGAGEMENTS) I

PRETRAINING CONDITIONS:

TC failed to meet standard on pre-test for TEC Lessons 020-171-5361-F and 020-171-5364-F (Part J, Tank Commander's Readiness Test).

OBJECTIVE:

The TC must be able, in writing, to: (a) indicate the correct fire command for various targets at various ranges, (b) explain ammunition setting on ballistic computer for the coax, (c) indicate correct range settings for coax targets at various ranges, and (d) identify correct sight pictures for engaging various targets with the coax and caliber .50 machinegun.

METHOD:

Self-instructional sound-slide presentation with written response.

EQUIPMENT/MATERIALS:

- a. Two filmstrip cartridges and audio-cassettes (TEC Lessons 020-171-5361-F and 020-171-5364-F)
- b. Beseler Cue/See
- c. Paper and pencil

ESTIMATED TIME:

2 hours

PROCEDURE:

- a. TC selects lesson corresponding to task elements failed on pre-tests in Part J, Tank Commander's Readiness Test,
- b. TC completes relevant portion of assigned lessons and takes post-test.
- c. TC reviews lessons keyed on post-test for items missed.
- d. TC has satisfactorily completed the lesson when he can complete the post-test with no errors.

MODULE TC-11. TACTICAL OPERATIONS (TARGET ENGAGEMENTS) II

PRETRAINING CONDITIONS:

TC passed Part J, Tank Commander's Readiness Test but failed to meet the standard on one or more tasks in Part K, Tank Commander's Readiness Test.

OBJECTIVE:

Given a fully operational M60A1 tank with a skilled driver, BII, coax machinegun, caliber .50 machinegun, blank coax machinegun rounds, a tactical driving course including obstacles and terrain conditions suitable for tank defilade, and simulated targets (both moving and stationary, main gun, coax, and caliber .50), TC will give initial and subsequent fire commands to engage each target according to procedures in Part K, Tank Commander's Readiness Test.

METHOD:

One-on-one instructor controlled performance training.

EQUIPMENT/MATERIALS:

- a. Operational M60A1 tank with BII, coax and caliber .50 machineguns, and blank coax machinegun rounds.
- b. Sufficient terrain to provide several natural or man-made obstacles and features such as ridges suitable for tank defilade; simulated targets (both moving and stationary, main gun and machineguns).

ESTIMATED TIME:

2 hours

PROCEDURE:

- a. Instructor will act as both Gunner and Loader and give appropriate responses as the TC gives the initial and subsequent fire commands. Instructor should announce CANNOT IDENTIFY for at least one main gun and one coaxial machinegun engagement. He should also give the TC information to make subsequent fire commands.
- b. Instructor coaches TC through the initial and subsequent fire commands for each target, and through the target engagement techniques for each target that the Gunner announces CANNOT IDENTIFY. Instructor repeats any instructions he deems necessary and when he thinks TC is ready, he administers a tactical operations test of the type described in Part K of the Tank Commander's Readiness Test.

- c. Instructor directs TC to take up correct sight pictures through rangefinder. Instructor emphasizes importance of placing head in same position in headrest each time TC takes up sight picture. Point out to TC that he should be aware of pressure points on the head and face which can serve as cues to insure he has head in correct position in headrest.

APPENDIX E
CROSSTRAINING

CROSSTRAINING

INTRODUCTION

This Appendix provides information pertaining to crosstraining of tank crew members and filling crew position vacancies.

- . The need for crosstraining arises from inherent inadequacies of the replacement/recruitment system, administrative losses, and combat losses. Personnel turbulence resulting from these factors degrade crew proficiency.
- . At the present time there are several programs which provide crosstraining of various crew members. These programs include: basic armor crewman and driver courses, guidelines in Field Manual 17-12, "Tank Gunnery," Field Manual 17-12-2, "Tank Gunnery for M60, M60A1, M60A1(AOS) and M48A5 Tanks," and the Tank Crewman Skills Training (TCST) program.
- . Replacements to fill crew vacancies have varying degrees of applicable knowledge and skills. The spectrum of knowledge and skills extends from the experienced crewman through the gunner/loader basic armor crewman graduate, to the recruit awaiting basic training.
- . The structure of the tank crew includes four crewmen who are required to perform many position specific tasks in a team environment. The crew structure is part of the platoon organization which has flexible grade composition for drivers, loaders, and gunners.
- . Implementation of the tank gunnery program outlined in the Tank Crewman Skills Training (TCST) program will result in crosstraining of various crewmembers. In addition, trainees in the armor basic courses receive cross-training in the gunner, loader, and driver positions.
- . As implied before, the need for crosstraining is to fill crew vacancies. Procedures must be established to insure that the method used places the most qualified individual in the vacancy with the minimum of crew displacement.

THE NEED FOR CROSSTRAINING

The tank crew functions as a team. Each crew member performs individual tasks which collectively are team tasks. As crew members become proficient in performing their tasks they respond automatically to the tank commander's directions or environmental conditions. The rote procedure is essential for immediate reaction to engagement conditions. As time passes and the crew improves in proficiency personnel turbulence enters the picture and its pervasive action degrades team performance.

Personnel turbulence is inherent in every organization. In military units it is caused by the imperfections of man, administrative requirements, and enemy actions. Crosstraining will reduce the impact of personnel turbulence and enhance the interchangeability of crew members and the assignment of replacements.

INADEQUACIES IN THE REPLACEMENT/RECRUITMENT SYSTEM

Imperfections in the replacement system and the socio-economic impact on recruiting programs have a debilitating affect upon the military personnel system.

Active Army Units

Inadequacies in the replacement system cause a high degree of crew turbulence in active Army units. Replacements often arrive at a unit after crew vacancies occur. In this situation the commander's only recourse is to fill vacancies with available untrained personnel or, in emergency situations operate with with three-man crews.

Reserve Component (RC) Units

In RC units the commander is the replacement system. His recruiting program provides replacements, and the success or failure of the program reflects directly upon the degree of crew turbulence in the unit. The predictability of recruiting and retention success is questionable and projections of replacements to fill losses is difficult. Often the RC commander's only alternative is to fill vacancies with untrained personnel or leave the vacancy open.

ADMINISTRATIVE LOSSES

Unpredictable personnel losses, i.e., sickness, disciplinary actions, and emergency leave are continuing causes of turbulences. Very little can be done to prevent their happening. Predictable losses, i.e., details, school quotes, regular leave, transfers, and promotions also cause turbulence, however, good leadership and efficient administrative practices can minimize their impact on crew integrity.

COMBAT LOSSES

Combat losses are personnel casualties resulting from enemy actions or related operations. Each crew member is vulnerable to becoming a casualty and therefore crews should be trained to operate as three-man teams until replacements are available. (Annex 2 expatiates current procedures for fighting with a three-man crew.)

CROSSTRAINING PROGRAMS

Crosstraining programs are included in the basic armor courses, FM 17-12, "Tank Gunnery," FM 17-12-2, "Tank Gunnery for M60, M60A1, M60A1(AOS), and M48A5 Tanks," and the Tank Crewman Skills Training (TCST) program. In addition, commanders who recognize the need for interchangeability of crew members, develop crosstraining programs and procedures for filling crew vacancies.

BASIC ARMOR CREWMAN COURSE

The "Armor Crewman (BAT) Course"¹ is a thirteen week training program designed to prepare individual soldiers to perform assigned job tasks for MOS 19E10 (Gunner/Loader). The course includes 380 hours of tank instruction. Three hundred sixty-five hours cover gunner/loader tasks and 15 hours cover driver tasks. The course develops skills required for gunner or loader assignment or consideration as a driver (see Table 4).

BASIC ARMOR DRIVER COURSE

The "Tank Driver's Basic Armor (BAT) Course"² is a thirteen week training program designed to prepare individual soldiers to perform job tasks for MOS 19F10 (Tank Driver). The course includes 331 hours of tank instruction, of which 285 hours cover driver tasks and 46 hours cover gunner/loader tasks. The course develops skills required for driver assignment or consideration as a gunner or loader (see Table 4).

FIELD MANUAL FM 17-12, TANK GUNNERY

FM 17-12³ provides for a limited amount of crosstraining as indicated in subcaliber firing Tables I, II and III. All crew members fire the tables.

¹U.S. Army Armor School. Program of Instruction for 19E10-OSUT, M48/M60A1 Armor Crewman (BAT) Course. Fort Knox, Kentucky: Author, 1979.

²U.S. Army Armor School. Program of Instruction for 19F10-OSUT, Tank Driver Armor Basic Training (BAT). Fort Knox, Kentucky: Author, 1979.

³U.S. Army. Tank Gunnery, FM 17-12. Author, 1977.

Table 4

COMPARISON: POI'S FOR BASIC ARMOR TRAINING
(BAT) COURSES (MOS'S 19E10 and 19F10)

GN/LD POI FOR 19E10-OSUT (13 WKS)	HOURS	HOURS	DRIVER POI FOR 19F10-OSUT (13 WKS)
Combat Skills and Tactics Soviet Soldier and Equipment	6 (6)	6 (6)	Combat Skills and Tactics Soviet Soldier and Equipment
Driving	15	147	Driving
Start/Stop M60A1 Engine	(4)	(6)	Start/Stop M60A1 Engine
Basic Driving	(4)	(4)	Basic Driving
Recovery	(4)	(4)	Recovery
Prepare for Tactical Operations	(2)	(4)	Prepare for Tactical Operation
Tactical Driving Class	(1)	(1)	Tactical Driving Class
	-	(4)	Convoy Driving (Day)
	-	(4)	Convoy Driving (Night)
	-	(12)	Negotiate Obstacles
	-	(24)	Tactical Driving
	-	(84)	Tactical Driving in Gunnery
			Exercise (Advanced Gunnery Driving)
Gunnery	198	25	Gunnery
Ammunition Identification	(1)	(1)	Ammunition Identification
Turret Familiarization	(2)	(2)	Turret Familiarization
Turret Operation	(4)	(4)	Turret Operation
Conduct of Fire	(8)	(8)	Conduct of Fire
Loading & Misfire Procedures	(2)	(2)	Loading & Misfire Procedures
Laser Exercises (Day)	-	(8)	Laser Exercises
Laser Exercises (Night)	(8)	(8)	
Operate Auxiliary Fire Control/ Prepare a Range Card	(5)	(5)	
	(4)	(4)	

Table 4 (Cont'd)

COMPARISON: POI'S FOR BASIC ARMOR TRAINING
(BAT) COURSES (MOS'S 19E10 AND 19F10)

GN/LD POI FOR 19E10-OSUT (13 WKS)	HOURS	HOURS	DRIVER POI FOR 19F10-OSUT (13 WKS)
Bore-sight/Zero (nonfire)	(4)	-	
Subcaliber Firing	(32)	-	
Non-firing Gunnery Exercise	(32)	-	
Main Gun Firing	(32)	-	
Advanced Gunnery Exercise	(64)	-	
Maintenance	62	62	Maintenance
Maintenance Dispatch Forms and Publications	(4)	(4)	Maintenance Dispatch Forms and Publications
Remove/Install Track	(4)	(4)	Remove/Install Track
Maintain Basic Issue Items	(2)	(2)	Maintain Basic Issue Items
Assist Scheduled Maintenance	(4)	(4)	Assist in Scheduled Maintenance
Maintenance Services	(32)	(32)	Maintenance Services
	-	(2)	Before Operations Maintenance
	-	(2)	After Operations Maintenance
	-	(4)	Troubleshoot the Hull
	-	(4)	BDA Automotive
	-	(8)	Suspension System
	-	(2)	Lubricate the Hull
BDA Turret	(4)		
Troubleshoot the Turret	(4)		
Lubricate the Turret	(2)		
BDA Maintenance Checks	(4)		
Disassemble/Assemble Breechblock	(2)		

Table 4 (Cont'd)

COMPARISON: POI'S FOR BASIC ARMOR TRAINING
(BAT) COURSES (MOS'S 19E10 AND 19F10)

GN/LD POI FOR 19E10-OSUT (13 WKS)	HOURS	HOURS	DRIVER POI FOR 19F10-OSUT (13 WKS)
Weapons Mechanical Training, M219 Coax MG Mechanical Training, M240 Coax MG Mechanical Training, M85 MG	16 (4) (8) (4)	16 (4) (8) (4)	Weapons Mechanical Training, M219 Coax MG Mechanical Training, M240 Coax MG Mechanical Training, M85 MG
Communications Operate and Communicate Using Tank Mounted Radios	8 (8)	8 (8)	Communications Operate and Communicate Using Tank Mounted Radios
Combat Skills and Tactics Tank Demonstration/Orientation	3 (3)	3 (3)	Combat Skills and Tactics Tank Demonstration/Orientation
Testing and Reinforcement Training Reinforcement Training Gunnery Refresher Training Gate II Testing Gate III Testing	52 (28) (8) (8) (8)	42 (26) - (8) (8)	Testing and Reinforcement Training Reinforcement Training Gate II Testing Gate III Testing
Concurrent Training Operate External Phone Escape/Evacuate a Wounded Man from a Tank Unpack, Service, and Stow Ammunition During Firing Checks and Services After Firing Checks and Services	20 (1) (2) (2) (1) (3)	16 (1) (2) (2) (1) (3)	Concurrent Training Operate External Phone Escape/Evacuate a Wounded Man from a Tank Unpack, Service, and Stow Ammunition During Firing Checks and Services After Firing Checks and Services

Table 4 (Cont'd)

COMPARISON: POI'S FOR BASIC ARMOR TRAINING
(BAT) COURSES (MOS'S 19E10 AND 19F10)

GN/LD POI FOR 19E10-OSUT (13 WKS)	HOURS	HOURS	DRIVER POI FOR 19F10-OSUT (13 WKS)
Maintain and Operate Gas Particulate Unit	(1)	(1)	Maintain and Operate Gas Particulate Unit
Prepare a Tank for Nuclear Attack	(1)	(1)	Prepare a Tank for Nuclear Attack
Decontaminate a Tank	(1)	(1)	Decontaminate a Tank
Camouflage a Tank	(1)	(1)	Camouflage a Tank
Mount/Dismount Searchlight	-	(2)	Mount/Dismount Driver's Night Vision Devices
Mount/Dismount Coax/Change Barrel	-	(1)	Inspect Batteries
Boresight/Operate Searchlight	(1)	-	
Mount/Dismount M85 MG	(2)	-	
Engage Targets with M85 MG	(1)	-	
Recap of Tank Skills Core Subjects*	380	331	Recap of Tank Skills Core Subjects*
Combat Skills and Tactics	(6)	(6)	Combat Skills and Tactics
Driving	(15)	(147)	Driving
Gunnery	(198)	(25)	Gunnery
Maintenance	(62)	(68)	Maintenance
Weapons	(16)	(16)	Weapons
Communications	(8)	(8)	Communications
Combat Skills and Tactics	(3)	(3)	Combat Skills and Tactics
Testing and Reinforcement Training	(52)	(42)	Testing and Reinforcement Training
Concurrent Training	(20)	(16)	Concurrent Training

Table 4 (Cont'd)

COMPARISON: POI'S FOR BASIC ARMOR TRAINING
(BAT) COURSES (MOS'S 19E10 AND 19F10)

GN/LD POI FOR 19E10-OSUT (13 WKS)	HOURS	HOURS	DRIVER POI FOR 19F10-OSUT (13 WKS)
Crosstraining Driving	15 (15)	46 (25) (16)	Crosstraining Gunnery Concurrent
*All hours of POI not included.			*All hours of POI not included.

Tank Gunnery Table I

This table includes zeroing the subcaliber device, manipulation with the primary and secondary sights, firing range card data, and firing range card lay to direct fire.

Tank Gunnery Table II

Included in this table are engagement of stationary targets and BOT, mil change, range change, and target form--adjustments.

Tank Gunnery Table III

This table includes engagement of moving targets and BOT, mil change, range change, and target form--adjustments.

FIELD MANUAL FM 17-12-2, TANK GUNNERY FOR M60, M60A1, M60A1(AOS), and M48A5 TANKS

FM 17-12-2¹ provides for some crosstraining as indicated in the Tank Crew Gunnery Skills Test (TCGST). The TCGST is divided into four groups of tasks which are to be performed by various crew members (see Table 5).

Driver Group

This group consists of nine driver tasks of which six are driver specific and three are crew-common. (Note: This group does not include crosstraining tasks and therefore degrades consideration for intra-crew progression.)

TC, Gunnery, Loader Group

The second group consists of 13 tasks, of which most are loader tasks. Six tasks are loader specific, one is crew-common, two are team tasks, and four are crew tasks. (Note: This group does not include driver crosstraining tasks and precludes interchangeability to the driver's position.)

¹U.S. Army. Tank Gunnery for M60, M60A1, M60A1(AOS) and M48A5 Tanks, FM 17-12-2. Author, 1977.

Table 5

TASK LIST FOR TANK CREW GUNNERY SKILLS TEST

DRIVER GROUP	TC, GUNNER, LOADER GROUP	TC, GUNNER GROUP	TC GROUP
1. Identify US and foreign equipment. 2. Check engine and transmission oil levels. 3. Perform driver's prepare to fire checks, including placing IR periscope into operation. 4. Select the most advantageous route. 5. Bring the vehicle to a smooth stop. 6. Select a hull-down position. 7. Detect a target while buttoned up. 8. Observe for additional targets. 9. Check track tension.	1. Disassemble/assemble all subcaliber weapons. 2. Identify and describe use of ammunition. 3. Identify US and foreign equipment. 4. Stow ammunition aboard the vehicle according to unit loading plan. 5. Bore-sight/zero the coax. 6. Load, clear, and apply immediate action to all subcaliber weapons. 7. Disassemble/assemble breechblock. 8. Read the replenisher indicator tape. 9. Load the main gun. 10. Remove a misfired round. 11. Set headspace and timing on cal. 50 machinegun (if appropriate). 12. Change coax barrel. 13. Perform prepare-to-fire checks.	1. Place turret into power operation. 2. Bore-sight main gun and apply established zero. 3. Index announced ammunition into computer and perform computer check. 4. Perform misfire procedure for main gun. 5. Lay telescope reticle on target properly. 6. Apply burst-on-target and target form methods of adjustments. 7. Respond to subsequent fire commands. 8. Announce correct reading from elevation quadrant and azimuth indicator.	1. Bore-sight the TC's weapon. 2. Place rangefinder into operation. 3. Detect and identify target. 4. Issue correct initial fire command. 5. Lay the gun for direction. 6. Determine range to the target. 7. Determine if target is within battlesight range using binoculars or field expedients. 8. Issue subsequent fire command. 9. Describe method of bore-sighting the searchlight and explain operations of searchlight controls. 10. Designate crew sections of responsibility for target acquisition.

TC, Gunner Group

Group three consists of eight TC and gunner tasks. Five are gunner-specific, two are team tasks, and one is common to both crew members.

TC Group

The last group consists of ten TC tasks. Nine are TC-specific and one is crew-common. (Note: This group does not include cross-training tasks for the gunner and therefore degrades gunner's intra-crew progression.)

Table 6 lists TCGST tasks by functional groups. An analysis of this table also reveals the inadequacies of the TCGST as a vehicle for crosstraining. For example, there are no provisions for interchangeability or progression for: the driver to any crew position, the loader and gunner to the driver position, the loader to the gunner position, or the gunner to the TC position

TANK CREWMAN SKILLS TRAINING PROGRAM (TCST)

This is an experimental tank gunnery training program which has been field tested in various settings and revised to reflect the latest changes in FM 17-12. The program was originally published as, "Reserve Component Training for Operating and Maintaining the M48A5 Tank."¹ The revised program is contained in the documents referenced below.² The TCST program includes all initial tasks listed in the previous programs.

¹Harris, J.H., Osborn, W.C., and Boldovici, J.A. Reserve Component Training for Operating and Maintaining the M48A5 Tank. Alexandria, Virginia: U.S. Army Research Institute for the Behavioral and Social Sciences, 1977.

²O'Brien, R.E., Harris, J.H., Osborn, W.C., and Healy, R.D. Tank Crewman (M60A1) Readiness Tests. Alexandria, Virginia: U.S. Army Research Institute for the Behavioral and Social Sciences, 1979.

O'Brien, R.E., Harris, J.H., Osborn, W.C., and Healy, R.D. Tank Crewman (M60A1) Training Modules. Alexandria, Virginia: U.S. Army Research Institute for the Behavioral and Social Sciences, 1979.

O'Brien, R.E., Harris, J.H., Osborn, W.C., and Healy, R.D. Tank Crew (M60A1) Performance Exercise. Alexandria, Virginia: U.S. Army Research Institute for the Behavioral and Social Sciences, 1979.

O'Brien, R.E. and Crum, W.J. Program Management for Tank Crewman Skills Training Program. Alexandria, Virginia: U.S. Army Research Institute for the Behavioral and Social Sciences, 1979.

ACCELERATED TRAINING PROGRAM

A second experimental program, "Accelerated Tank Gunnery Training Program for Gunner and Loader Replacements,"¹ was designed and field tested to determine if non-11E MOS personnel could be trained in three days as gunners and loaders. This program is a complete training package for implementation during emergency personnel situations. The program was considered to be a success and it provides the commander with another training tool for crosstraining or emergency replacement situations.

¹O'Brien, R.E., Crum, W.J., and Healy, R.D. Accelerated Tank Gunnery Training Program for Gunner and Loader Replacements. Alexandria, Virginia: U.S. Army Research Institute for the Behavioral and Social Sciences, 1979.

Table 6

FUNCTIONAL TASK GROUPS: TANK CREW GUNNERY SKILLS TEST

TCGST TASKS	DRIVER	LOADER	GUNNER	TC
A. TARGET ACQUISITION				
1. Identify US/foreign armored vehicles.	X	X	X	X
2. Detect targets and alert TC or crew.	X			X
3. Identify targets.				X
B. MISSION PREPARATION				
1. Check oil levels.	X			
2. Check track tension.	X			
3. Perform prepare-to-fire checks from assigned crew position.	X	X	X	X
4. Ammunition--identification and use.		X	X	X
5. Stow ammunition.		X	X	X
6. Designate crew sectors of responsibility for target acquisition.				X
C. WEAPONS MAINTENANCE				
1. Disassemble/assemble machinegun.		X	X	X
2. Disassemble/assemble breechblock.		X	X	X
D. WEAPON SYSTEMS PREPARATION				
1. Place turret into power operation.			X	X
2. Place rangefinder into operation.				X
3. Boresight main gun and apply established zero.*			X	X
4. Boresight the coax machinegun.*		X	X	X
5. Boresight the TC's weapon.				X
6. Boresight the Xenon searchlight.				X
7. Index correct ammunition into computer and perform computer check.			X	X
E. TACTICAL OPERATIONS				
1. Select the best route.	X			
2. Stop smoothly within 3 seconds.	X			
3. Select a hull-down position within 5 seconds.	X			
4. Issue correct initial fire command.				X
5. Load the main gun.		X	X	X
6. Read replenisher indicator tape.		X	X	X
7. Lay main gun for direction.				X
8. Determine range to target $\pm$ 50 meters with RF and $\pm$ 20 meters without RF.				X
*Team tasks.				

Table 6 (Cont'd)

FUNCTIONAL TASK GROUPS: TANK CREW GUNNERY SKILLS TEST

TCGST TASKS	DRIVER	LOADER	GUNNER	TC
10. Perform misfire procedures for main gun.*		X	X	X
11. Load, clear, and apply immediate actions for machineguns.		X	X	X
12. Change the coax barrel.		X	X	X
13. Issue correct subsequent fire command.				X
14. Apply BOT or TF methods of adjustment.			X	X
15. Respond to subsequent fire command.			X	X
16. Remain in position to observe and sense round.	X			
17. Lay telescope reticle on target properly.			X	X
18. Announce correct reading from elevation quadrant and azimuth indicator.			X	X
TOTAL TASKS BY CREW POSITION	9	12	19	30
*Team tasks.				

REPLACEMENTS

The source of replacements are basic armor training graduates, trained individual crewmen, and unit personnel.

BASIC ARMOR TRAINING GRADUATES

The U.S. Army Armor Center conducts two training programs for tank crewmen. The basic armor crewman course trains soldiers as a gunner/loader to fill gunner or loader positions. The basic armor driver course trains soldiers as a tank driver. Active Army units requisition these graduates to fill projected losses, whereas RC units recruit personnel and send them to the Armor Center for training and subsequent assignment back to the unit.

TRAINED INDIVIDUAL CREWMEN

Active Army units also requisition trained crewmen, by MOS and grade, to fill projected losses. However, RC units are seldom able to recruit prior Army personnel with an armor MOS. Most prior service recruitments are personnel from a different service or with a non-armor MOS.

UNTRAINED PERSONNEL

Within each unit there are personnel that can be used to fill crew vacancies. These include untrained personnel or individuals who formerly had an armor MOS. Although they can be used to "fill the slot," crew proficiency will suffer and additional training will be required. Most untrained personnel bring into the service driving related skills and can be integrated into a crew as a driver.

TANK CREW--ORGANIZATION AND FUNCTIONS

To understand the problems involved in crosstraining crewmen and filling crew vacancies, a thorough understanding of the tank crews organization and functions is essential.

ORGANIZATION

To understand the crew organization it is first necessary to look at the job positions and grade structure authorized by TOE 17-037HO. The TOE does not present an organization for a specific crew, but as indicated in paragraph 03 of the TOE, prescribes a certain number of positions by MOS and grade to man the three platoons of the tank company. This organizational technique, shown in Table 7, enhances crew progression within duty positions and provides for greater flexibility in filling loader and gunner positions.

It can be noted (in Table 7) that a driver and loader can progress from E3 to E5 and upon reaching E5, they, along with a senior gunner, can progress to tank commander.

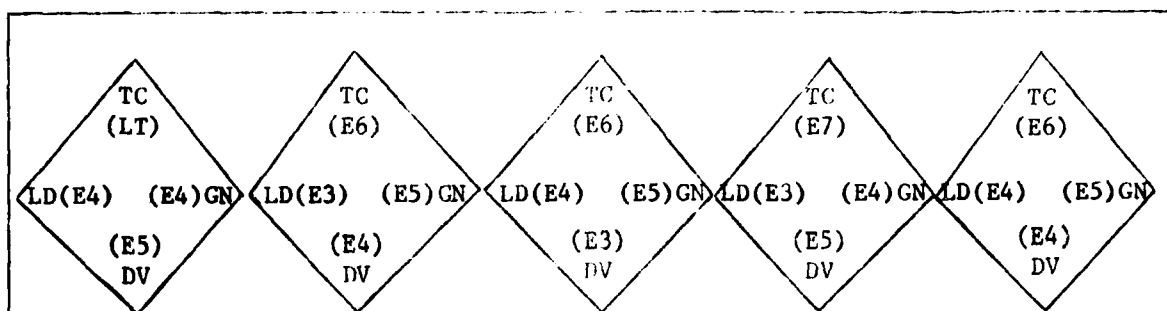
Table 7

EXTRACT FROM PARA 03, TOE 17-037 HO

<u>Description</u>	<u>Grade</u>	<u>Quantity</u>
Platoon Leader	LT	3
Platoon Sergeant	E7	3
Tank Commander	E6	9
Senior Gunner	E5	10
Senior Driver	E5	5
Loader/Gunner	E4	10
Tank Driver	E4	5
Loader	E3	10
Tank Driver	E3	5

(Personnel for three tank platoons)

Figure 2 shows a tank platoon organized from the personnel listed in Table 7. The figure also shows five differently organized tank crews--each with the same duty positions but each with a different grade structure.



PERSONNEL RECAPITULATION

<u>Duty Position</u>	<u>Title</u>	<u>Grade</u>	<u>Quantity</u>
TANK COMMANDER	Platoon Leader	01 or 02	1
	Platoon Sergeant	E7	1
	Tank Commander	E6	3
GUNNER	Senior Gunner	E5	3
	Gunner/Loader	E4	2
LOADER	Gunner/Loader	E4	3
	Loader	E3	2
DRIVER	Senior Driver	E5	2
	Driver	E4	2
	Driver	E3	1

Figure 2. Tank platoon organization.

FUNCTIONS

The tank crew, functioning as a highly coordinated team, destroys or neutralizes enemy targets. (Job tasks for specific crew members are listed in Table 8.) The crew's basic functions involve: movement, target acquisition, target destruction/neutralization, and communications.

Movement

This is the action required to position the tank in a location where targets can be acquired and engaged. It is accomplished, under the guidance of the tank commander, by the driver.

Target Acquisition

Target acquisition--the detection, identification, and location of targets--is the responsibility of all crew members.

Target Destruction/Neutralization

This is the act of placing fire on a target in such a manner as to destroy or neutralize it. All crew members are involved. The tank commander controls the engagement by issuing a fire command, the gunner lays the weapons on the target and fires them, the loader loads the weapons, and the driver observes for additional targets and reports weapons impact.

Communications

On vehicle communications system provides for coordinated crew activities and external guidance/reporting.

Table 8

CREW DUTY TASK LIST

<u>TC</u>	<u>GUNNER</u>
Acquires targets.	Turn on necessary switches.
Issue fire commands.	Index ammunition into fire control system.
Lay main gun near target.	Identify target.
Determine range to target.	Range with laser rangefinder (on tanks so equipped).
Command gunner to fire.	Take correct sight picture.
Observe and adjust fire.	Fire and adjust as appropriate.
Issue orders to cease fire.	Use auxiliary fire control instruments and range card when firing in an indirect mode.
Fire and adjust from TC position if gunner cannot identify target.	
Fire machinegun at TC station.	
Clear and reduce stoppages and malfunctions of TC machinegun.	
<u>DRIVER</u>	<u>LOADER</u>
Search for routes and firing positions which provide protection from enemy fire.	Load main gun.
Maintain a stable platform for firing on the move.	Apply misfire procedures on main gun.
	Load coax machinegun.
	Reduce coax machinegun stoppage and malfunction by: applying immediate action or changing barrel.

IMPLEMENTING CROSSTRAINING

Crosstraining improves crew proficiency and reduces the impact of personnel turbulence. However, a dedicated crosstraining program should not be implemented until the primary duties of each crew-member are mastered.

Current approved tank gunnery training programs and armor basic courses provide for a limited degree of crosstraining. In addition, the TCST experimented program encompasses all the cross-training activities indicated in the approved programs as well as additional tasks for various crewmembers.

CROSSTRAINING PROGRAM

A formalized crosstraining program is usually the result of a personnel contingency and is implemented for a specific crew position. The commander considers knowledge and skill levels of available personnel, administers a screening test to select the most qualified individual, and initiates a training program to bring the selected individual to the required proficiency. The next section of this report covers the process for filling crew vacancies.

FILLING CREW VACANCIES

Filling crew vacancies is a serious and complex procedure. Past practices of assigning replacements automatically to the loader position are no longer valid because of changes in armor basic training programs and the recognition that the loader's duties are as important to crew performance as are the duties of other crew members. Another method of replacement assignment and crewmen progression is shown in Table 9. In this method, replacements are assigned to crew positions in the priority of assumed job knowledge and skill. Crew members are rotated "upward" to fill vacancies. However, this method is also inadequate because it does not consider such factors as: crew grade structure, progression, and most importantly verified individual job qualification.

Table 9

A METHOD OF REPLACEMENT ASSIGNMENT

REPLACEMENT/ CREW MEMBER	CREW POSITION			
	TC	GN	LD	DV
GN/LD (BAT)		2	1	3
DV (BAT)		3	2	1
UNTRAINED CREW MBR.			2	1
GN to -	X			
LD to -		X		

SELECTION CONSIDERATIONS

When filling a crew vacancy the following factors should be seriously considered:

- . Individual qualification
- . Minimum crew displacement
- . Opportunity for advancement
- . Balanced grade structure

Individual Qualification.

This is the most important consideration when filling vacancies. At the start of the process the commander has some appreciation of the knowledge and skills of the replacement. He is aware of the abilities of current crew members, he should be familiar with the program of instruction of the armor basic courses, and he should also realize the inherent driving skills of most untrained personnel. However, to fully justify the selection of an individual for a vacancy, or to determine the better of two candidates for a position, the commander can administer screening tests. (An explanation of these tests and procedures for using them are outlined in a succeeding paragraph.)

Minimum Crew Displacement.

Although crew displacement to fill vacancies cannot always be avoided, it should be closely controlled. Without control, the shifting of even one crew member to another position can set off a chain reaction which can result in the lowering of proficiency of several crews. The only sure thing that happens when displacing crew members to accommodate replacements is that the act results in two less qualified crew members than were available prior to the act.

Opportunity for Advancement.

Promotion to a higher grade is a major morale factor. Within the tank platoon, every crewman, except the platoon leader and platoon sergeant, have an opportunity to advance in grade. Table 10 illustrates the sequence.

Table 10

INTRA-PLATOON ADVANCEMENT SEQUENCE

CURRENT STATUS			— TO —>	PROMOTION STATUS		
TITLE	DUTY POSITION	GRADE		TITLE	DUTY POSITION	GRADE
Tank Commander	TC	E6		Platoon Sergeant	TC	E7
Senior Gunner	GN	E5		Tank Commander	TC	E6
Gunner/Loader	GN	E4		Senior Gunner	GN	E5
Gunner/Loader	LD	E4		Senior Gunner	GN	E5
Loader	LD	E3		Gunner/Loader	LD	E4
Senior Driver	DV	E5		Tank Commander	TC	E6
Driver	DV	E4		Senior Driver	DV	E5
Driver	DV	E3		Driver	DV	E4

Grade advancement is based upon job task proficiency and job leadership requirements.

Balanced Grade Structure.

The TOE of the tank platoon provides a balanced and flexible grade structure. Consideration must be given to maintaining this balance. Over grade situations should be the exception and of a temporary nature. In addition, personnel should not be assigned to crew positions which are of a lower grade than the grade the individual has.

SELECTION PROCESS

The selection of a candidate to fill a vacancy requires thorough consideration of all the factors mentioned above. The example below illustrates a procedure for filling a vacancy and satisfying a consideration for advancement.

PROBLEM: Gunner position; grade E5 becomes vacant.

CONDITIONS: 1. Gunner/loader (BAT) replacement, grade E3 is being considered for the vacancy.
2. Crew loader, grade E4, wants the position.

ACTION: 1. Administer gunner screening test to both candidates.
2. Select the most qualified individual for the vacancy.

When selecting candidates to fill vacancies, the commander will be confronted with several options, i.e., should he put the replacement directly into the vacancy or should he put another crewman in the vacancy and the replacement in the crewman's vacated position? To arrive at the best solutions, the commander must go back to selection considerations: individual qualification, minimum crew displacement, opportunity for advancement, and balanced grade structure. He balances all of the considerations to arrive at a solution which is the most beneficial for the unit. Figure 3 is a guide for selecting candidates for crew vacancies.

CREW VACANCY SCREENING TESTS

Screening tests are used to select the most qualified candidates to fill crew vacancies. These tests are scaled down hands-on readiness tests from the Tank Crewman Skills Training (TCST) program. The screening tests include selected tasks which are representative of major functions of each position.

The administering of screening tests should follow a set procedure to insure fairness for all concerned. Appropriate steps to follow are:

- . Identify and announce crew vacancies.
- . Identify candidates for crew vacancies.
- . Announce time and place of screening test.
- . Check Table 11 for vacancy screening test task and readiness test cross reference.

- . Check appropriate hands-on readiness test in TCST program.
- . Assemble equipment and test material and organize test site.
- . Administer and score test.
- . Announce results and any necessary crew displacement.

Table 11 is vacancy screening tests for various crew positions.

REPLACEMENT	VACANT POSITION			
	DRIVER	LOADER	GUNNER	TC
GN/LD (BAT)	CONDITION: CO assigns repl. to plat. PL assigns repl. to TC. ACTION: 1. Test LD and repl. for DV vacancy. 2. Most qualified fills DV vacancy.	CONDITION: CO assigns repl. to plat. PL assigns repl. to TC. ACTION: 1. Repl. fills LD vacancy.	CONDITION: CO assigns repl. to plat. PL assigns repl. to TC. ACTION: 1. Test LD and repl. for GN vacancy. 2. Most qualified fills GN vacancy.	CONDITION: CO retains repl. for assignment. ACTION: 1. CO tests Senior Gunners and Senior Drivers for TC vacancy. 2. Repl. assigned to crew loosing Senior GN or Senior DV. 3. Test LD and repl. for DV position. - or - 4. Test LD and repl. for GN position.
	CONDITION: CO assigns repl. to plat. PL assigns repl. to TC. ACTION: 1. Repl. fills DV vacancy.	CONDITION: CO assigns repl. to plat. PL assigns repl. to TC. ACTION: 1. Test DV and repl. for LD vacancy. 2. Most qualified fills LD vacancy.	CONDITION: CO assigns repl. to plat. PL assigns repl. to TC. ACTION: 1. Test DV, LD, repl. for GN vacancy. 2. If DV fills vacancy repl. fills DV position. 3. If LD fills vacancy repl. fills LD position.	CONDITION: CO retains repl. for assignment. ACTION: 1. CO tests Senior Gunners and Senior Drivers for TC vacancy. 2. Repl. assigned to crew loosing Senior GN or Senior DV. 3. Repl. fills DV position. - or - 4. LD fills GN position.
UNTRAINED	CONDITION: CO assigns repl. to plat. PL assigns repl. to TC. ACTION: 1. Repl. fills DV vacancy.	CONDITION: CO assigns repl. to plat. PL assigns repl. to TC. ACTION: 1. DV fills LD vacancy. 2. Repl. fills DV position.	CONDITION: CO assigns repl. to plat. PL assigns repl. to TC. ACTION: 1. Test DV and LD for GN vacancy. 2. If DV fills vacancy repl. fills DV position. 3. If LD fills vacancy repl. fills LD position.	CONDITION: CO retains repl. for assignment. ACTION: 1. CO tests Senior Gunners and Senior Drivers for TC vacancy. 2. Repl. assigned to crew loosing Senior GN or Senior DV. 3. Repl. fills DV position. - or - 4. LD fills GN position and repl. fills LD position.
	CONDITION: CO assigns repl. to plat. PL assigns repl. to TC. ACTION: 1. Repl. fills DV vacancy.	CONDITION: CO assigns repl. to plat. PL assigns repl. to TC. ACTION: 1. DV fills LD vacancy. 2. Repl. fills DV position.	CONDITION: CO assigns repl. to plat. PL assigns repl. to TC. ACTION: 1. Test DV and LD for GN vacancy. 2. If DV fills vacancy repl. fills DV position. 3. If LD fills vacancy repl. fills LD position.	CONDITION: CO retains repl. for assignment. ACTION: 1. CO tests Senior Gunners and Senior Drivers for TC vacancy. 2. Repl. assigned to crew loosing Senior GN or Senior DV. 3. Repl. fills DV position. - or - 4. LD fills GN position and repl. fills LD position.

Figure 1. Selection process for crew vacancies.

Table 11

TASKS FOR SCREENING TESTS AND HANDS-ON
READINESS TEST CROSS REFERENCE

POSITION	TASK	RT CRS. REF.	POSITION	TASK	RT CRS. REF.
DRIVER:			LOADER (CONT'D.):		
	1. Place M24(IR) periscope into opn.	DV-B		13. Determine corrective action required by replenisher tape reading.	LD-F
	2. Start tank engine.	DV-B		14. Load main gun in response to fire commands.	LD-F
	3. Place tank in motion.	DV-B		15. Unload misfired main gun round.	LD-F
	4. Operate tank intercom system.	DV-B		16. Load coax.	LD-F
	5. Perform main gun prepare-to-fire procedures.	DV-B		17. Apply immediate action to reduce coax stoppage.	LD-F
	6. Locate and identify targets in the area.	DV-D		18. Change coax barrel.	LD-F
	7. Drive over varied terrain.	DV-E		19. Locate and identify targets in the area.	LD-H
	8. Drive to defilade firing position upon enemy contact.	DV-E			
	9. Observe and sense rounds.	DV-E			
LOADER:					
	1. Disassemble the coax.	LD-B			
	2. Assemble the coax.	LD-B			
	3. Disassemble main gun breechblock.	LD-B			
	4. Assemble main gun breechblock.	LD-B			
	5. Perform before opns checks and services on engine and transmission oil levels.	LD-D			
	6. Check track tension.	LD-D			
	7. Prepare tank for boresighting.	LD-D			
	8. Check boresight alignment of main gun.	LD-D			
	9. Boresight zero coax.	LD-D			
	10. Install and operate tank radio.	LD-D			
	11. Operate tank intercom system.	LD-D			
	12. Perform main gun prepare-to-fire procedure.	LD-D			

Table 11 (Cont'd.)

TASKS FOR SCREENING TESTS AND HANDS-ON
READINESS TEST CROSS REFERENCE

POSITION	TASK	RT CRS. REF.	POSITION	TASK	RT CRS. REF.
GUNNER:			GUNNER (CONT'D.):		
	1. Operate tank intercom system.	GN-C		16. Main gun, BS engagement, moving to a halt, one stationary target, SABOT (1 tank).	GN-I
	2. Change manual elevation system.	GN-C		17. Main gun, precision engagement, moving to a halt, three stationary targets, SABOT (2 tanks and 1 BRDM; TC engages BRDM w/cal. 50)	GN-I
	3. Place turret into power operation.	GN-C		18. Coax and Cal. 50 engagement, moving to a halt, three stationary targets (1 RPG Tm, 1 ATGM Tm, and 1 Inf. Sqd.; TC engages inf. sqd. w/cal. 50.	GN-I
	4. Perform main gun prepare-to-fire procedures.	GN-C		19. Preset HEAT BS information.	GN-I
	5. Operate azimuth indicator.	GN-E		20. Main gun, RCLD engagement, at the halt, three stationary targets, HEAT, GN mached(2 tanks and one Inf. Sqd.; TC engages inf. sqd. w/cal. 50)	GN-I
	6. Operate elevation quadrant.	GN-E		21. Apply immediate actions in case of main gun failure to fire.	GN-I
	7. Boresight GN telescope and apply established zero.	GN-E		22. Apply burst-on-target adjustment.	GN-I
	8. Boresight daylight sight of GN periscope and apply established zero.	GN-E		23. Lay telescope reticle on target properly.	GN-I
	9. Boresight IR sight of GN periscope and apply established zero.	GN-E			
	10. Boresight the coax.	GN-E			
	11. Zero tank main gun.	GN-E			
	12. Zero coax.	GN-E			
	13. Index announced ammunition into computer and conduct computer check.	GN-E			
	14. Locate and identify targets in the area.	GN-E			
	15. Preset SABOT BS information.	GN-I			

Table 11 (Cont'd.)

TASKS FOR SCREENING TESTS AND HANDS-ON
READINESS TEST CROSS REFERENCE

POSITION	TASK	RT CRS. REF.	POSITION	TASK	RT CRS. REF.
TANK COMMANDER:			TANK COMMANDER (CONT'D.):		
	1. Disassemble M85.	TC-B		16. Main gun, precision engagement, moving to a halt, three stationary targets, SABOT (2 tanks and 1 BRDM; TC engages BRDM w/cal. 50).	TC-K
	2. Assemble M85.	TC-B			
	3. Operate tank intercom system.	TC-C		17. Main gun, RCLD engagement, at the halt, three stationary targets, HEAT, GN mashed (2 tanks and one Inf. Sqd.; TC engages inf. sqd. w/cal. 50).	TC-K
	4. Perform main gun prepare-to-fire procedures.	TC-C			
	5. Boresight the range-finder.	TC-E		18. Apply burst-on-target adjustment.	TC-K
	6. Determine range to target with rangefinder.	TC-E			
	7. Zero tank main gun.	TC-E			
	8. Zero coax.	TC-E			
	9. Boresight M85.	TC-E			
	10. Zero M85.	TC-E			
	11. Load M85	TC-G			
	12. Apply immediate action to reduce M85 stoppage.	TC-G			
	13. Locate and identify targets in the area.	TC-I			
	14. Designate crew sectors of responsibility for target acquisition.	TC-K			
	15. Main gun, BS engagement, moving to a halt, one stationary target, SABOT (1 tank).	TC-K			

APPENDIX F

FIGHTING WITH A THREE-MAN CREW

FIGHTING WITH A THREE-MAN CREW

INTRODUCTION

This Annex expands the procedures in FM 17-12 pertaining to three-man crew operations and outlines a training program to accommodate this contingency.

Combat losses, administrative losses, and failure of the replacement system frequently necessitates tank crews to function with only three men. Whenever the loss of a crew member occurs the tank commander must rapidly reorganize his personnel into an effective three-man crew. Although the ability to fight with a three-man crew is primarily a battle contingency, crews in units which are maintained in a high state of readiness and who frequently "move out" and occupy forward positions in peacetime must also be capable of operating with only three men.

U.S. Army. Tank Gunnery, FM 17-12. Author, 1977.

TRAINING CONSIDERATIONS

It is axiomatic that three men cannot perform as efficiently as four in a tank designed for a four-man crew. The engineering configuration and location of fire control instruments degrades their operation. To develop a training program to maximize the efficiency of three-man crew engagements the developer must be familiar with the capabilities of a four-man crew and identify--crew and vehicle preparations for three-man crew operations--constraints of three-man crew operations, and optimum engagement capabilities of a three-man crew.

FOUR-MAN CREW CAPABILITIES

A four-man crew can engage stationary, moving, point, and area targets during daylight or darkness. It can engage multiple target arrays and conduct simultaneous engagements. The tank commander can deliver fire on a target by using either the main gun, coax, or caliber .50 machinegun. The gunner can engage targets with either the main gun or the coax. The various types of engagements include:

- . Main gun battlesight
- . Main gun precision
- . Coax battlesight
- . Coax non-precision
- . Caliber .50 non-precision
- . Range card
- . Range card lay to direct fire

CREW AND VEHICLE PREPARATIONS FOR THREE-MAN CREW OPERATIONS

Whenever circumstances dictate implementation of three-man crew operations the actions by the tank commander should be automatic and should follow a prescribed standard operating procedure. If three-man crew operations are required as the result of enemy action and the tank is operable, it should be moved to a defilade position. From this position casualties can be treated and evacuated, the crew reorganized, fire control equipment pre-set for future operations, and modified fire commands reviewed.

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HUMAN RESOURCES RESEARCH ORGANIZATION ALEXANDRIA VA
TANK CREWMAN (M60A1) TRAINING MODULES.(U)

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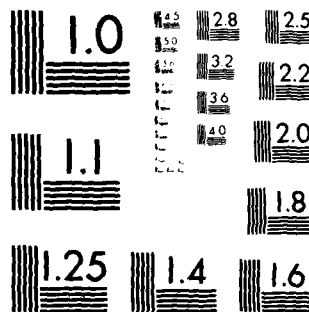
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Crew Reorganization

Regardless of which crew member becomes unavailable three key positions must be filled--tank commander, loader, and driver. Various options for reorganizing the crew are shown below.

A. TC casualty--

GN becomes TC
LD remains LD
DV remains DV

C. LD casualty--

TC remains TC
GN becomes LD
DV remains DV

B. GN casualty--

TC remains TC
LD remains LD
DV remains DV

D. DV casualty--

TC remains TC
LD remains LD
GN becomes DV

Tank Preparation

After the crew has been reorganized actions must be taken to prepare the tank for three-man operations.

- . Index battlesight ammunition into ballistic computer.
- . Place TURRET POWER, MAIN GUN and MACHINEGUN switches in the ON position.
- . Place machinegun mechanical safety in the SAFE position.
- . Place the turret in the STABILIZED MODE (tanks equipped with stabilization).
- . Remove backrest from gunner's seat.

Review Modified Fire Commands

The last preparatory task before moving out of the defilade position is to review modified fire commands.

- . The word GUNNER is deleted.
- . The word BATTLESIGHT becomes the alert element in main gun battlesight engagements.
- . The word LOAD, followed by the type of ammunition becomes the alert element in main gun precision engagements.

- . The word COAX becomes the alert element for coaxial machinegun engagements.
- . Fire commands for caliber .50 engagements are unchanged.

CONSTRAINTS OF THREE-MAN CREW OPERATIONS

Some gunnery engagements cannot be performed by a three-man crew. Other engagements can be performed but at such a slow pace as to make them ineffective and the crew vulnerable to enemy fire. These constraints are:

- . Simultaneous engagements (impossible)
- . Main gun precision engagement with HEP ammunition beyond 1200 meters (slow pace)
- . Range card lay to direct fire engagements (slow pace)
- . Range card engagements (slow pace)

ENGAGEMENT CAPABILITIES OF THREE-MAN CREW

Although some gunnery engagements are not practical for a three-man crew, others are because of the fire control capability of the tank commander. These engagements are:

- . Main gun battlesight engagement
- . Main gun precision engagement with SABOT or HEAT ammunition
- . Coax engagements
- . Caliber .50 engagements

PROGRAM DEVELOPMENT

When developing a three-man crew training program it is assumed that crew members are skilled in their original duty position tasks. Therefore, the crewmen making up the three-man crew need only to learn those tasks which are peculiar to three-man operations and those tasks required to function in the new position.

Developing a three-man crew training program involves: identifying new tasks for each crew position, clustering tasks to fit varying conditions, structuring modified fire commands, developing sequential crew duty matrixes, and preparing standard operating procedures and crew drills.

PRIORITY TASKS

These are tasks which are required for three-man crew operations and which are new to a crew member moving to a different crew position. Table 12 lists the tasks for each crew position under varying conditions. Tasks which a crew member performs during four-man crew operations are not included.

CONDITIONAL TASK CLUSTERING

Tables 13a through 13d are priority task clusters for each three-man crew condition. The tables include new tasks required whenever the TC, gunner, loader, or driver is unavailable. The tasks listed are from the priority task list (Table 12) with cross reference numbers.

Table 12

PRIORITY TASK LIST FOR THREE-MAN CREW OPERATIONS

	DV as DV	LD as LD	GN as DV	GN as LD	GN as TC	TC as TC
1.* Index battlesight ammunition into ballistic computer.					X	X
2.* Place TURRET POWER, MAIN GUN, and MACHINEGUN switches in the ON position.					X	X
3.* Place turret in STABILIZED MODE (tanks so equipped).					X	X
4.* Remove backrest from gunner's seat.					X	X
5.* Alert crew of modified fire commands.					X	X
6.* Alert driver of added responsibility for target acquisition and sensing rounds.					X	X
7.* Place coax mechanical safety in SAFE position.				X		
8.* Move to TC station.					X	
9.* Move to LD station.				X		
10.* Move to DV station.			X			
11. Issue modified fire commands.					X	X
12. Issue regular fire commands.					X	
13. Respond to modified fire commands.	X	X	X	X		
14. Respond to regular fire commands.			X	X		
15. Operate tank radios.				X		
16. Acquire targets from TC station.					X	
17. Estimate range to target.					X	
18. Range to target with rangefinder.					X	
19. Index range into ballistic computer.					X	
20. Index ammunition into ballistic computer.						X

Table 12 (Cont'd.)

PRIORITY TASK LIST FOR THREE-MAN CREW OPERATIONS

	DV as DV	LD as LD	GN as DV	GN as LD	GN as TC	TC as TC
21. Operate tank searchlight.					X	
22. Load caliber .50 machinegun.					X	
23. Load main gun.				X		
24. Load coax.				X		
25. Reduce coax stoppage.				X		
26. Determine corrective action required by replenisher tape.				X		
27. Reduce caliber .50 machinegun stoppage.					X	
28. Conduct main gun misfire procedures.				X	X	
29. Identify ammunition by type and location.				X		
30. Start and place tank in motion.			X			
31. Drive over varied terrain.			X			
32. Perform evasive maneuver upon enemy contact.			X			
33. Drive to defilade firing position upon enemy contact.			X			
34. Main gun engagement, moving to a halt.			X			
35. Coax engagement, moving to a halt.			X			
36. Coax engagement, moving.			X			
37. Caliber .50 engagement, moving to a halt.			X			
38. Caliber .50 engagement, moving.			X			
39. Sense rounds.			X		X	
40. Main gun, BS engagement, moving to a halt, stationary target.					X	
41. Main gun, BS engagement, moving to a halt, multiple stationary targets.					X	
42. Main gun, BS engagement, moving to a halt, stationary moving target.					X	

Table 12 (Cont'd.)

PRIORITY TASK LIST FOR THREE-MAN CREW OPERATIONS

	DV as DV	LD as LD	GN as DV	GN as LD	GN as TC	TC as TC
43. Main gun, precision engagement, moving to a halt, stationary target.					X	
44. Main gun, precision engagement, moving to a halt, moving target.					X	
45. Coax engagement, moving to a halt, stationary target.					X	
46. Coax engagement, moving to a halt, moving target.					X	
47. Coax engagement, moving tank, area target.					X	
48. Caliber .50 engagement, moving to a halt, stationary target.					X	
49. Caliber .50 engagement, moving to a halt, moving target.					X	
50. Caliber .50 engagement, moving tank, area target.					X	
51. Adjust fire and subsequent round on target.					X	
52. Acquire targets.			X		X	

NOTE: Tasks with an asterisk are three-man crew pre-operations tasks.

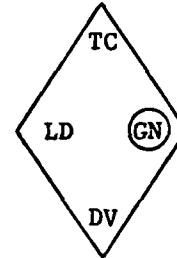
Table 13a

CONDITIONAL TASK CLUSTER

CONDITION: Gunner becomes casualty.

DECISION: Gunner's station remains vacant.

ACTION: Move tank to defilade, reorganize crew, and prepare tank for three-man operation.



PRIORITY
LIST NO.

TASK

1. Index battlesight ammunition into ballistic computer.
2. Place TURRET POWER, MAIN GUN and MACHINEGUN switches in ON position.
3. Place turret in STABILIZED MODE (tanks so equipped).
4. Remove backrest from gunner's seat.
5. Alert crew of modified fire commands.
6. Alert driver of added responsibilities for target acquisition and sensing rounds.
11. Issue modified fire commands.
13. Respond to modified fire commands.
20. Index ammunition into ballistic computer.

TC	(GN)	LD	DV
X			
X			
X			
X			
X			
X			
X			
		X	X
X			

NOTE: Loader places coax mechanical safety in SAFE positions during pre-operations.

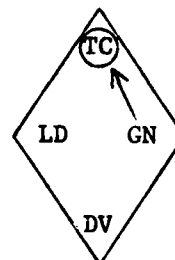
Table 13b

CONDITIONAL TASK CLUSTER

CONDITION: TC becomes casualty.

DECISION: Gunner becomes TC.

ACTION: Move tank to defilade, reorganize crew,
and prepare tank for three-man
operation.



PRIORITY
LIST NO.

TASK

1. Index battlesight ammunition into ballistic computer.
2. Place TURRET POWER, MAIN GUN, and MACHINEGUN switches in ON position.
3. Place turret in STABILIZED MODE (tanks so equipped).
4. Remove backrest from gunner's seat.
5. Alert crew of modified fire commands.
6. Alert driver of added responsibilities for target acquisition and sensing rounds.
8. Move to TC station.
11. Issue modified fire commands.
12. Issue regular fire commands.
13. Respond to modified fire commands.
16. Acquire targets from TC station.
17. Estimate range to target.
18. Range to target with rangefinder.
19. Index range into ballistic computer.
20. Operate tank searchlight.
21. Load caliber .50 machinegun.
22. Reduce caliber .50 stoppage.

TC	GN	LD	DV
	X		
	X		
	X		
	X		
	X		
	X		
	X		
	X		
		X	X
	X		
	X		
	X		
	X		
	X		
	X		

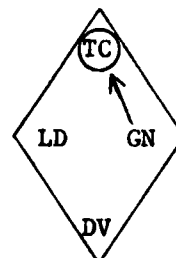
Table 13b (Cont'd)

CONDITIONAL TASK CLUSTER

CONDITION: TC becomes casualty.

DECISION: Gunner becomes TC.

ACTION: Move tank to defilade, reorganize crew, and prepare tank for three-man operation.



PRIORITY
LIST NO.

TASK

23. Conduct main gun misfire procedures.
40. Main gun, BS engagement, moving to a halt, stationary target.
41. Main gun, BS engagement, moving to a halt, multiple stationary targets.
42. Main gun, BS engagement, moving to a halt, moving target.
43. Main gun, precision engagement, moving to a halt, stationary target.
44. Main gun, precision engagement, moving to a halt, moving target.
45. Coax engagement, moving to a halt, stationary target.
46. Coax engagement, moving to a halt, moving target.
47. Coax engagement, moving tank, area target.
48. Caliber .50 engagement, moving to a halt, stationary target.
49. Caliber .50 engagement, moving to a halt, moving target.
50. Caliber .50 engagement, moving to a halt, area target.
51. Adjust and fire subsequent round on target.

(TC)	GN	LD	DV
	X		
	X		
	X		
	X		
	X		
	X		
	X		
	X		
	X		
	X		
	X		

NOTE: Loader places coax mechanical safety in SAFE position during pre-operations.

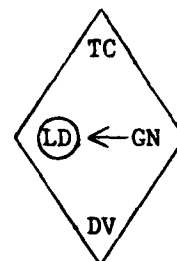
Table 13c

CONDITIONAL TASK CLUSTER

CONDITION: Loader becomes casualty.

DECISION: Gunner becomes loader.

ACTION: Move tank to defilade, reorganize crew, and prepare tank for three-man operation.



PRIORITY
LIST NO.

TASK

	TC	GN	LD	DV
1. Index battlesight ammunition into ballistic computer.	X			
2. Place TURRET POWER, MAIN GUN, and MACHINEGUN switches in ON position.	X			
3. Place turret in STABILIZED MODE (tanks so equipped).	X			
4. Remove backrest from gunner's seat.	X			
5. Alert crew of modified fire commands.	X			
6. Alert driver of added responsibilities for target acquisition and sensing rounds.	X			
7. Place coax mechanical safety in SAFE position.		X		
9. Move to LOADER station.		X		
11. Issue modified fire commands.	X			
13. Respond to modified fire commands.		X		X
14. Respond to regular fire commands.		X		
15. Operate tank radios.		X		
20. Index ammunition into ballistic computer.	X			
23. Load main gun.		X		
24. Load coax.		X		
25. Reduce coax stoppage.		X		
26. Determine corrective action required by replenisher tape.		X		
28. Conduct main gun misfire procedures.		X		
29. Identify ammunition by type and location.		X		

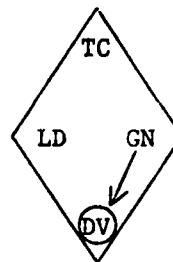
Table 13d

CONDITIONAL TASK CLUSTER

CONDITION: Driver becomes casualty.

DECISION: Gunner becomes driver.

ACTION: Move tank to defilade, reorganize crew, and prepare tank for three-man operation.



PRIORITY
LIST NO.

TASK

1. Index battlesight ammunition into ballistic computer.
2. Place TURRET POWER, MAIN GUN, and MACHINEGUN switches in ON position.
3. Place turret in STABILIZED MODE (tanks so equipped).
4. Remove backrest from gunner's seat.
5. Alert crew of modified fire commands.
6. Alert driver of added responsibilities for target acquisition and sensing rounds.
10. Move to DRIVER station.
11. Issue modified fire commands.
13. Respond to modified fire commands.
14. Respond to regular fire commands.
20. Index ammunition into ballistic computer.
30. Start and place tank in motion.
31. Drive over varied terrain.
32. Perform evasive maneuver upon enemy contact.
33. Drive defilade firing position upon enemy contact.
34. Main gun engagement, moving to a halt.
35. Coax engagement, moving to a halt.
36. Coax engagement, moving.
37. Caliber .50 engagement, moving to a halt.
38. Caliber .50 engagement, moving.
39. Sense rounds.
52. Acquire targets.

TC	GN	LD	DV
X			
X			
X			
X			
X			
X			
	X		
X			
	X	X	
	X		
X			
	X		
	X		
	X		
	X		
	X		
	X		
	X		
	X		
	X		

NOTE: Loader places coax mechanical safety in SAFE position during pre-operations.

The modifications are required for battlesight, precision, and coax engagements. See Table 14 below.

Table 14

MODIFIED FIRE COMMANDS

<u>ENGAGEMENT</u>	<u>REGULAR FIRE COMMAND</u>	<u>MODIFIED FIRE COMMAND</u>	<u>REMARKS</u>
Battlesight	GUNNER-BATTLE- SIGHT-TANK-FIRE	BATTLESIGHT- TANK	Delete words GUNNER and FIRE. BATTLE- SIGHT is new alert element.
Precision	GUNNER-SABOT (or HEAT)-TANK- FIRE	LOAD-SABOT (or HEAT)-TANK	Delete words GUNNER and FIRE. LOAD is new alert element.
Coax	GUNNER-COAX- TROOP-FIRE	COAX-TROOPS	Delete words GUNNER and FIRE. COAX is new alert element.

NOTE: Prior to firing the TC will announce ON THE WAY.

SEQUENTIAL CREW DUTY MATRIX

After priority tasks were identified and clustered for each condition, a matrix was developed to indicate sequential crew duties for each three-man crew engagement. The procedure of showing task performance in a sequential progression lets crewmen know what is being performed, when it is being performed, and by whom. Tables 15a through 15k indicate this procedure.

STANDARD OPERATING PROCEDURES/CREW DRILLS

When battlefield contingencies require three-man crew operations the implementing process must be automatic. The rapid transition from a four-man to a three-man crew configuration can be accomplished by a training program, in which the process is outlined in a unit's tactical standard operating procedures and is practiced by crew drill exercise.

Tactical Standard Operating Procedures (TSOP)

The TSOP in Table 16 includes: security and evacuation of casualties, crew reorganization, and tank preparation. The Table indicates varying conditions and actions required by each crew member.

CREW DRILLS

After the TSOP was completed, a series of crew drills, applicable to various casualty contingencies, were developed. These drills, shown in Tables 17a through 17d, implement the guidance outlined in the TSOP and facilitate automatic reaction to casualty situations.

TABLE 15a. MAIN GUN, BATTLESIGHT ENGAGEMENT
MOVING TO A HALT, STATIONARY TARGET

TANK COMMANDER	LOADER	DRIVER
1. Announce BATTLESIGHT.	Place main gun safety in FIRE position.	Maintain steady rate of speed.
2. Announce TANK, and lay main gun for direction.	Announce UP.	Drive to defilade firing position.
3. Lay crosshair at center of base of target.	Unlock ammunition ready rack.	Bring tank to a smooth gradual halt.
4. Announce ON THE WAY.	Select battlesight ammunition (SABOT or HEAT).	Lock brakes.
5. Fire main gun.	Brace.	
6. Observe for strike of round.	Load second round and announce UP.	Sense round.
7. Announce TARGET.	Place main gun safety in SAFE position.	Unlock brakes.

NOTE: 1. Battlesight round pre-chambered.
2. Announcing BATTLESIGHT alerts crew of a main gun engagement.

TABLE 15b. MAIN GUN, BATTLESIGHT ENGAGEMENT,
MOVING TO A HALT, MULTIPLE STATIONARY TARGETS

TANK COMMANDER	LOADER	DRIVER
1. Announce BATTLESIGHT.	Place main gun safety in FIRE position.	Maintain steady rate of speed.
2. Announce TWO TANKS and lay main gun for direction.	Announce UP.	Drive to defilade firing position.
3. Lay crosshair at center of base of first target.	Unlock ammunition ready rack.	Bring tank to a smooth gradual halt.
4. Announce ON THE WAY.	Select battlesight ammunition (SABOT or HEAT).	Lock brakes.
5. Fire main gun.	Brace.	
6. Observe for strike of round.	Load second round and announce UP.	Sense round.
7. Announce TARGET, SECOND TANK.		
8. Lay crosshair at center of base of target.	Select third round.	
9. Announce ON THE WAY.		
10. Fire main gun.	Brace.	
11. Observe for strike of round.	Load third round and announce UP.	Sense round.

TABLE 15b. (Cont'd.) MAIN GUN, BATTLESIGHT ENGAGEMENT
MOVING TO A HALT, MULTIPLE STATIONARY TARGETS

TANK COMMANDER	LOADER	DRIVER
12. Announce TARGET.	Place main gun safety in SAFE position.	Unlock brakes.

NOTE: 1. Battlesight round pre-chambered.
2. Announcing BATTLESIGHT alerts crew of a main gun engagement.

TABLE 15c. MAIN GUN, BATTLESIGHT ENGAGEMENT,
MOVING TO A HALT, MOVING TARGET

TANK COMMANDER	LOADER	DRIVER
1. Announce BATTLESIGHT.	Place main gun safety in FIRE position.	Maintain steady rate of speed.
2. Announce MOVING TANK and lay main gun for direction.	Announce UP.	Drive to defilade firing position.
3. Lay crosshair leadline at center of base of target.	Unlock ammunition ready rack.	Bring tank to a smooth gradual halt.
4. Announce ON THE WAY.	Select battlesight ammunition (SABOT or HEAT).	Lock brakes.
5. Fire main gun.	Brace.	
6. Observe for strike of round.	Load second round and announce UP.	Sense round.
7. Announce TARGET.	Place main gun safety in SAFE position.	Unlock brakes.

NOTE: 1. Battlesight round pre-chambered.
2. Announcing BATTLESIGHT alerts crew of a main gun engagement.

TABLE 15d. MAIN GUN, PRECISION ENGAGEMENT
MOVING TO A HALT, STATIONARY TARGET

TANK COMMANDER	LOADER	DRIVER
1. Announce LOAD, SABOT (or HEAT).	Unlock ammunition ready rack.	Maintain steady rate of speed.
2. Announce TANK and lay main gun for direction.	Select SABOT (or HEAT).	Drive to defilade firing position.
3. Range to target.	Load main gun.	Bring tank to a smooth gradual halt.
4. Lay crosshair at center of target.	Place main gun safety in FIRE position and announce UP.	Lock brake.
5. Announce ON THE WAY.		
6. Fire main gun.	Brace.	
7. Observe for strike of round.	Load second round and announce UP.	Sense round.
8. Announce TARGET.	Place main gun safety in SAFE position.	Unlock brakes.

NOTE: 1. Announcing LOAD alerts crew of a main gun engagement.

TABLE 15e. MAIN GUN, PRECISION ENGAGEMENT
MOVING TO A HALT, MOVING TARGET

TANK COMMANDER	LOADER	DRIVER
1. Announce LOAD, SABOT (or HEAT).	Unlock ammunition ready rack.	Maintain steady rate of speed.
2. Announce TANK and lay main gun for direction.	Select SABOT (or HEAT).	Drive to defilade firing position.
3. Range to target.	Load main gun.	Bring tank to a smooth gradual halt.
4. Lay crosshair leadline at center of target.	Place main gun safety in FIRE position and announce UP.	Lock brakes.
5. Announce ON THE WAY.		
6. Fire main gun.	Brace.	
7. Observe for strike of round.	Load second round and announce UP.	Sense round.
8. Announce TARGET.	Place main gun safety in SAFE position.	Unlock brakes.

NOTE: 1. Announcing LOAD alerts crew of a main gun engagement.

TABLE 15f. COAX ENGAGEMENT
MOVING TO A HALT, STATIONARY TARGET

TANK COMMANDER	LOADER	DRIVER
1. Announce COAX.	Place coax mechanical safety in FIRE position.	Maintain steady rate of speed.
2. Announce TRUCK and lay main gun for direction.	Full load coax and announce UP.	Bring tank to a smooth gradual halt.
3. Lay crosshair at center of target.		
4. Announce ON THE WAY.		
5. Fire coax.		
6. Observe strike of tracer rounds.		Sense rounds.
7. Move tracers into target by manipulating and elevating traversing controls.		
8. Announce TARGET.	Place coax mechanical safety in SAFE position.	

TABLE 15g. COAX ENGAGEMENT
MOVING TO A HALT, MOVING TARGET

TANK COMMANDER	LOADER	DRIVER
1. Announce COAX.	Place coax mechanical safety in FIRE position.	Maintain steady rate of speed.
2. Announce MOVING TRUCK and lay main gun for direction.	Full load coax and announce UP.	Bring tank to a smooth gradual halt.
3. Lay crosshair leadline at center of target.		
4. Announce ON THE WAY.		
5. Fire coax.		
6. Observe strike of tracer rounds.		Sense rounds.
7. Move tracer into target by manipulating and elevating traversing controls.		
8. Announce TARGET.	Place coax mechanical safety in SAFE position.	

TABLE 15h. COAX ENGAGEMENT
MOVING, AREA TARGET

TANK COMMANDER	LOADER	DRIVER
1. Announce COAX.	Place coax mechanical safety in FIRE position.	Maintain steady rate of speed.
2. Announce TROOPS and lay main gun for direction.	Full load coax and announce UP.	
3. Lay crosshair at front edge of target.		
4. Announce ON THE WAY.		
5. Fire coax.		
6. Observe strike of tracer rounds.		
7. Lay "Z" pattern on target by manipulating and elevating traversing controls.		
8. Announce TARGET.	Place coax mechanical safety in SAFE position.	

TABLE 151. CALIBER .50 ENGAGEMENT
MOVING TO A HALT, STATIONARY TARGET

TANK COMMANDER	LOADER	DRIVER
1. Announce DRIVER, MOVE TO DEFILADE POSITION.	Observe sector.	Maintain steady rate of speed.
2. Announce CALIBER FIFTY.		Move to defilade position.
3. Unlock cupola.		
4. Place cupola power switch in ON position, place caliber .50 safety in FIRE position, insure rate of fire selector is in LOW (L) position.		
5. Lay rangeline crosshair on center of target.		
6. Announce ON THE WAY.		
7. Fire caliber .50.		
8. Observe for strike of tracers.		Sense rounds.
9. Announce END OF MISSION.		
10. Place cupola power switch in OFF position, place caliber .50 switch in SAFE position, and lock cupola.		

TABLE 15j. CALIBER .50 ENGAGEMENT
MOVING TO A HALT, MOVING TARGET

TANK COMMANDER	LOADER	DRIVER
1. Announce DRIVER, MOVE TO DEFILADE POSITION.	Observe sector.	Maintain steady rate of speed.
2. Announce CALIBER FIFTY.		Move to defilade position.
3. Unlock cupola.		
4. Place cupola power switch in ON position, place caliber .50 safety in FIRE position, and insure rate of fire selector is in LOW (L) position.		
5. Lay rangeline crosshair leadline at center of target.		
6. Track target.		
7. Announce ON THE WAY.		
8. Fire caliber .50		
9. Observe for strike of tracers.		Sense rounds.
10. Announce END OF MISSION.		
11. Place cupola power switch in OFF position, place caliber .50 switch in SAFE position, and lock cupola.		

TABLE 15k. CALIBER .50 ENGAGEMENT
MOVING, AREA TARGET

TANK COMMANDER	LOADER	DRIVER
1. Announce CALIBER FIFTY.	Observe sector.	Maintain steady rate of speed.
2. Unlock cupola.		
3. Place cupola power switch in ON position, place caliber .50 switch in fire position, and insure rate of fire selector is in LOW (L) position.		
4. Lay rangeline crosshair at front edge of target.		
5. Announce ON THE WAY.		
6. Fire caliber .50.		
7. Elevate and traverse caliber .50 to lay "Z" pattern on target.		
8. Observe for strike of tracers.		Sense rounds.
9. Announce END OF MISSION.		
10. Place cupola power switch in OFF position, place caliber .50 switch in SAFE position, and lock cupola.		

TABLE 16. EXAMPLE: STANDARD OPERATING PROCEDURE (SOP)
PREPARE FOR THREE-MAN CREW OPERATION

This SOP will be followed whenever a crew member becomes a casualty. Tasks 5 and 6 will also be implemented whenever a crew position is vacant and the crew is preparing to move out and occupy readiness positions or conduct tactical training.

NO.	TASK	CAS/VAC				ACTION BY			
		TC	GN	LD	DV	TC	GN	LD	DV
1.	Move tank to a defilade position.	X	X	X	X				X X X
2.	Treat the casualty.	X	X	X	X			X	X X
3.	Request evacuation of casualty.	X	X	X	X		X		X
4.	Remove the casualty from the tank.	X	X	X	X		X	X	X X
5.	Reorganize crew.	X	X	X	X		X		
6.	Prepare tank for three-man crew operation.								
a.	Index BS ammunition into computer.	X	X	X	X		X		
b.	Place TURRET POWER, MAIN GUN and MACHINEGUN switches in ON position.	X	X	X	X		X		

TABLE 16. (Cont'd.). EXAMPLE: STANDARD OPERATING PROCEDURE (SOP)
PREPARE FOR THREE-MAN CREW OPERATION

NO.	TASK	CAS/VAC				ACTION BY			
		TC	GN	LD	DV	TC	GN	LD	DV
	c. Place turret in STABILIZED MODE (tanks so equipped)	X	X	X	X	X	X		
	d. Remove backrest from Gunner's seat.	X	X	X	X	X	X		
	e. Place coax mechanical safety in SAFE position.	X	X	X	X			X	X
	f. Alert crew of modified fire commands.	X	X	X	X	X	X		
	g. Alert Driver of added responsibility for target acquisition and sensing rounds.	X	X	X	X	X	X		

TABLE 17a. CREW DRILL-PREPARE FOR
THREE-MAN CREW OPERATIONS
(Tank Commander Casualty)

CONDITION: M60A1 tank with full crew and in the vicinity of a defilade position. Scorer announces "The tank commander has been hit and is unconscious with a bleeding head wound. Your tank is operational. EXECUTE--PREPARE FOR THREE-MAN CREW OPERATION."

PERFORMANCE STEPS

TC	GN	LD	DV
1. Simulate casualty.	Announce TC WOUNDED, DRIVER MOVE TO DEFILADE POSITION.	Attempt to stop bleeding of round.	Move tank to defilade position.
2.	Direct DV to dismount and provide local security.	Continue to treat TC.	Dismount and provide local security.
3.	Request evacuation of casualty.		
4.	Direct LD to evacuate LD's hatch and help evacuate TC.	Exit through LD's hatch.	
5.	Evacuate TC through TC's hatch.	Evacuate TC through TC's hatch.	
6.	Direct LD to place coax mechanical safety in SAFE position and load round of BS ammunition.	Place coax mechanical safety in SAFE position and load a round of BS ammunition.	

TABLE 17a. (Cont'd.). CREW DRILL-PREPARE FOR
THREE-MAN CREW OPERATIONS
(Tank Commander Casualty)

TC	GN	LD	DV
7.	Index BA ammunition into ballistic computer, place TURRET POWER, MAIN GUN, and MACHINEGUN switches in ON position, and remove backrest from GN's seat.		
8.	Move to TC station and direct DV to mount tank.	Mount tank.	
9.	Alert crew of modified fire commands and DV's added responsibility for target acquisition and sensing rounds.		
10.	Command DRIVER MOVE OUT.		Move out.

	<u>YES</u>	<u>NO</u>
TC(NA)	_____	_____
GN	_____	_____
LD	_____	_____
DV	_____	_____

NOTE: Indicate errors made by each crew member.

TABLE 17b. CREW DRILL-PREPARE FOR
THREE-MAN CREW OPERATION
(Gunner Casualty)

CONDITION: M60A1 tank with full crew and in the vicinity of a defilade position. Scorer announces--"The gunner's right foot has been caught between the turret floor and the turret wall and his right leg is broken. Your tank is operational. EXECUTE --PREPARE FOR THREE-MAN CREW OPERATION."

PERFORMANCE STEPS

TC	GN	LD	DV
1. Announce, GUNNER INJURED, DRIVER MOVE TO DEFILADE POSITION.	Simulate casualty.	Attempt to make GN comfortable.	Move tank to defilade position.
2. Direct DV to dismount and provide local security.		Continues to treat GN.	Dismount and provide local security.
3. Request evacuation of casualty.			
4. Evacuate GN through TC's hatch.		Evacuate GN through TC's hatch.	
5. Direct LD to place coax mechanical safety in SAFE position and load a round of BS ammunition.		Place coax mechanical safety in SAFE position and load a round of BS ammunition.	

TABLE 17b. (Cont'd.) CREW DRILL-PREPARE FOR
THREE-MAN CREW OPERATION
(Gunner Casualty)

TC	GN	LD	DV
6. Index BS ammunition into ballistic computer, place TURRET POWER, MAIN GUN, and MACHINEGUN switches in ON position, and remove back- rest from GN's seat.			
7. Direct DV to mount tank.			Mount tank.
8. Alert crew of modified fire commands and DV's added responsibility for target acquisition and sensing rounds.			
9. Command DRIVER MOVE OUT.			Move out.

	<u>YES</u>	<u>NO</u>
TC	_____	_____
GN(NA)	_____	_____
LD	_____	_____
DV	_____	_____

NOTE: Indicate errors made by each crew member.

TABLE 17c. CREW DRILL-PREPARE FOR
THREE-MAN CREW OPERATION
(Loader Casualty)

CONDITION: M60A1 tank with full crew and in the vicinity of a defilade position. Scorer announces, "The loader has been hit and is unconscious with a bleeding neck wound. Your tank is operational. EXECUTION--PREPARE FOR THREE-MAN CREW OPERATION.

PERFORMANCE STEPS

TC	GN	LD	DV
1. Announce GUNNER WOUNDED, DRIVER MOVE TO DEFILADE POSITION.	Attempt to stop bleeding of wound.	Simulate casualty.	Move tank to defilade position.
2. Direct DV to dismount and provide local security.	Continue to treat LD.		Dismount and provide local security.
3. Request evacuation of casualty.			
4. Evacuate LD through LD's hatch.	Evacuate LD through LD's hatch.		
5. Direct GN to move to LD's position.	Move to LD's station.		
6. Direct GN to place coax mechanical safety in SAFE position and load a round of BS ammunition.	Place coax mechanical safety in safe position and load a round of BS ammunition.		

TABLE 17c. (Cont'd.). CREW DRILL-PREPARE FOR
THREE-MAN CREW OPERATION
(Loader Casualty)

TC	GN	LD	DV
7. Index BS ammunition into ballistic computer, place TURRET POWER, MAIN GUN and MACHINEGUN switches in ON position, and remove backrest from GN's seat.	Move to LD position.		
8. Direct DV to mount tank.			Mount tank.
9. Alert crew of modified fire commands and DV's added responsibility for target acquisition and sensing rounds.			
10. Command DRIVER MOVE OUT.			Move out.

	<u>YES</u>	<u>NO</u>
TC	_____	_____
GN	_____	_____
LD(NA)	_____	_____
DV	_____	_____

NOTE: Indicate errors made by each crew member.

TABLE 17d. CREW DRILL-PREPARE FOR
THREE-MAN CREW OPERATION
(Driver Casualty)

CONDITION: M60A1 tank with full crew and in the vicinity of defilade position. Scorer announces, "The driver has been hit and is unconscious with a severe laceration on the left side of his head. Your tank is operational. EXECUTE--PREPARE FOR THREE-MAN CREW OPERATIONS.

PERFORMANCE STEPS

TC	GN	LD	DV
1. Announce DRIVER WOUNDED, provide local security with caliber .50, direct LD to traverse turret to expose DV compartment, direct LD to DV compartment.	Traverse turret to expose DV compartment.	Move to DV compartment.	Simulate casualty.
2. Direct LD and GN to evacuate DV to turret compartment.	Assist LD in evacuating DV to turret compartment.	Evacuate DV to turret compartment and attempt to stop bleeding.	
3. Direct GN to DV compartment and move to a defilade position.	Move to DV station and move tank to a defilade position.	Continue to treat DV.	
4. Direct GN to dismount and provide local security.	Dismount and provide local security.		
5. Request evacuation of casualty.			
6. Evacuate DV through LD's hatch.		Evacuate LD through LD's hatch.	

TABLE 17d. (Cont'd.). CREW DRILL-PREPARE FOR
THREE-MAN CREW OPERATION
(Driver Casualty)

TC	GN	LD	DV
7. Direct LD to place coax mechanical safety in SAFE position and load a round of BS ammunition.		Place coax mechanical safety in SAFE position and load a round of BS ammunition.	
8. Index BS ammunition into ballistic computer, place TURRET POWER, MAIN GUN and MACHINEGUN switches in ON position, and remove backrest from GN's seat.			
9. Direct GN to mount tank as DV.		Mount tank.	
10. Alert crew of modified fire commands and DV's added responsibility for target acquisition and sensing rounds.			
11. Command DRIVER MOVE OUT.		Move out.	

	<u>YES</u>	<u>NO</u>
TC	_____	_____
GN	_____	_____
LD	_____	_____
DV(NA)	_____	_____

NOTE: Indicate errors made by each crew member.

THREE MAN CREW TRAINING PROGRAM

Training personnel to operate as a three-man crew includes the mastery of tasks peculiar to this contingency and of tasks peculiar to a different duty position. It also involves a thorough familiarization with the units tactical standard operating procedures (TSOP), appropriate crew drills, and completing a crew operational test.

TSOP FAMILIARIZATION

The TSOP example shown in Table 16 indicates these tasks which the crew must perform whenever a three-man crew contingency arises. The tank commander assembles his crew and goes over in detail the various steps in the TSOP. Then the crew mounts the tank and the tank commander walks the crewmen through the process for each condition. Whenever an obvious lack of knowledge or skill for a particular task is indicated, the crewman concerned is referred to the appropriate readiness test for remedial training. (See Table 18.)

CREW DRILLS

After the crew members become thoroughly familiar with the TSOP, they conduct crew drill exercises shown in Tables 17a through 17d. Initially, this training is conducted by the tank commander. When the crew becomes proficient, an independent scorer administers the battery of drills to determine certification. If the scorer's remarks indicate a lack of knowledge or skill for various tasks, crew member concerned is referred to the appropriate readiness test for remedial training. (NOTE: Crew drills may be integrated with regular training. In addition, during crew drill exercise, self-aid and first-aid procedures should be practiced as appropriate.)

TABLE 18

PRIORITY TASK/READINESS TEST
CROSS REFERENCE TABLE

PRIORITY TASKS	RT PART	DV as DV	LD as LD	GN as DV	GN as LD	GN as TC	TC as TC
1.* Index BS ammunition into ballistic computer.	GN-K					X	X
2.* Place TURRET POWER, MAIN GUN, and MG switches in ON position.	GN-K					X	X
3.* Place turret in STAB MODE (tanks so equipped).(1)	--					X	X
4.* Remove backrest from GN's seat.(1)	--					X	X
5.* Alert crew of modified fire commands.(2)	--					X	X
6.* Alert DV of responsibilities for target acquisition sensing rounds.(1)	--					X	X
7.* Place coax mechanical safety in SAFE position.	LD-F				X		
8.* Move to TC station.(1)	--					X	
9.* Move to LD station.(1)	--				X		
10.* Move to DV station.(1)	--			X			
11. Issue modified fire commands.(2)	--					X	X
12. Issue regular fire commands.	TC-K					X	
13. Respond to modified fire commands.(3)	--	X	X	X	X		
14. Respond to regular fire commands.	DV-E LD-F			X	X		
15. Operate tank radio.	LD-D				X		
16. Acquire targets from TC station.	TC-I					X	
17. Estimate range to target.	TC-I					X	
18. Range to target with rangefinder.	TC-E					X	
19. Index range into ballistic computer.	TC-K					X	

Table 18 (Cont'd)

PRIORITY TASK/READINESS TEST
CROSS REFERENCE TABLE

PRIORITY TASKS	RT PART	DV as DV	LD as LD	GN as DV	GN as LD	GN as TC	TC as TC
20. Index ammunition into ballistic computer.	GN-E						X
21. Operate tank searchlight.	TC-E					X	
22. Load caliber .50 machinegun.	TC-G					X	
23. Load main gun.	LD-F				X		
24. Load coax.	LD-F				X		
25. Reduce coax stoppage.	LD-F				X		
26. Determine corrective action required by replenisher tape.	LD-F				X		
27. Reduce caliber .50 machinegun stoppage.	LD-G					X	
28. Conduct main gun misfire procedure.	LD-F				X	X	
29. Identify ammunition by type and location.	LD-D				X		
30. Start and place tank in motion.	DV-B			X			
31. Drive over varied terrain.	DV-E			X			
32. Perform evasive maneuvers upon enemy contact.	DV-E			X			
33. Drive to defilade firing position upon enemy contact.	DV-E			X			
34. Main gun engagement, moving to a halt.	DV-E			X			
35. Coax engagement, moving to a halt.	DV-E			X			
36. Coax engagement, moving.	DV-E			X			
37. Caliber .50 engagement, moving to a halt.	DV-E			X			
38. Caliber .50 engagement, moving.	DV-E			X			

Table 18 (Cont'd)

PRIORITY TASK/READINESS TEST
CROSS REFERENCE TABLE

PRIORITY TASKS	RT PART	DV as DV	LD as LD	GN as DV	GN as LD	GN as TC	TC as TC
39. Sense rounds.	DV-E			X		X	
40. MG-BS-MTH-ST	TC-K					X	
41. MG-BS-MTH-MST	TC-K					X	
42. MG-BS-MTH-MT	TC-K					X	
43. MG-PRE-MTH-ST	TC-K					X	
44. MG-PRE-MTH-MT	TC-K					X	
45. CX-NP-MTH-ST	TC-K					X	
46. CX-NP-MTH-MT	TC-K					X	
47. CX-NP-M-AT	TC-K					X	
48. CAL .50-NP-MTH-ST	TC-K					X	
49. CAL .50-NP-MTH-MT	TC-K					X	
50. CAL .50-NP-M-AT	TC-K					X	
51. Adjust fire and subsequent round on target.	TC-K					X	
52. Acquire targets.	TC-K			X		X	

- NOTES: 1. Asterisks indicate pre-operations tasks.
 2. (1) not in readiness tests or training modules.
 3. (2) see Table 2-3, Modified Fire Commands.
 4. Tasks performed by crewmen in their normal duty positions are not included.
 5. Readiness tests are listed in Appendix B, "Duty Position Readiness Test for a Prototype Tank Crewman Skills Training Program," to ARI Research Product (RP-79-), "Tank Crewmen Skills Training (TCST): Trial Implementation in a National Guard Unit."

THREE MAN CREW OPERATIONAL TEST

The last training activity in three-man crew operations is a crew operational test. This is a firing exercise and involves all four crew casualty contingencies. The engagements are:

1. CONDITION: Tank commander casualty.
ENGAGEMENT: Main gun, battlesight, stationary target.
2. CONDITION: Gunner casualty.
ENGAGEMENT: Main gun, battlesight, moving target.
3. CONDITION: Loader casualty.
ENGAGEMENT: Main gun, precision, stationary target.
4. CONDITION: Driver casualty.
ENGAGEMENT: Coax, area target.

Figure 4 is a schematic of the three-man operational test course layout. Figures 5a through 5d are scorer instructions and score sheets. Limitations on training resources preclude crews from firing each engagement for each contingency.

NOTE: When the test begins the tank is assumed to be ready for four-man crew operations. After each engagement the scorer will direct the TC to reorganize his crew back to a four-man configuration and to place weapons, fire control equipment, and other equipment back to their original postures.

CONTINGENCY 1.

CONDITION: Scorer announces, "The tank commander has been hit and is unconscious with a bleeding head wound. The tank is operational."

RESPONSE:	<u>YES</u>	<u>NO</u>
1. Moved tank to defilade position.	___	___
2. Provided local security.	___	___
3. Treated casualty.	___	___
4. Requested evacuation of a casualty.	___	___
5. Removed casualty from tank.	___	___
6. Reorganized crew.	___	___
7. Prepared tank for three-man operation.	___	___

COMMENTS:

ENGAGEMENT: Main gun, battlesight, stationary target.

1. Correct modified fire command.	___	___
2. Engaged target within 5 seconds.	___	___
3. Hit target.	___	___
4. Completed engagement within 15 seconds.	___	___
5. Correct performance of crew duties.	___	___

COMMENTS:

Figure 5a. Scorer's instructions and scoresheet.

CONTINGENCY 2.

CONDITION: Scorer announces, "The gunner's foot has been caught between the turret floor and the turret wall and his right leg is broken. Your tank is operational."

RESPONSE:	<u>YES</u>	<u>NO</u>
1. Moved tank to defilade position.	___	___
2. Provided local security.	___	___
3. Treated casualty.	___	___
4. Requested evacuation of casualty.	___	___
5. Removed casualty from tank.	___	___
6. Reorganized tank.	___	___
7. Prepared tank for three-man operation.	___	___

COMMENTS:

ENGAGEMENT: Main gun, battlesight, moving target.

1. Correct modified fire command.	___	___
2. Engaged target within 5 seconds.	___	___
3. Hit target.	___	___
4. Completed engagement within 20 seconds.	___	___
5. Correct performance of crew duties.	___	___

COMMENTS:

Figure 5b. Scorer's instructions and scoresheet.

CONTINGENCY 3.

CONDITION: Scorer announces, "The loader has been hit and is unconscious with a bleeding neck wound. Your tank is operational."

RESPONSE:	<u>YES</u>	<u>NO</u>
1. Moved tank to a defilade position.	___	___
2. Provided local security.	___	___
3. Treated casualty.	___	___
4. Requested evacuation of casualty.	___	___
5. Removed casualty from tank.	___	___
6. Reorganized crew.	___	___
7. Prepared tank for three-man operation.	___	___

COMMENTS:

ENGAGEMENT: Main gun, precision, stationary target.

1. Correct modified fire command.	___	___
2. Engaged target within 5 seconds.	___	___
3. Hit target.	___	___
4. Completed engagement within 20 seconds.	___	___
5. Correct performance of crew duties.	___	___

COMMENTS:

Figure 5c. Scorer's instructions and scoresheet.

CONTINGENCY 4.

CONDITION: Scorer announces, "The driver has been hit and is unconscious with a severe laceration on the right side of his head. The tank is operational."

RESPONSE:	<u>YES</u>	<u>NO</u>
1. Moved driver to turret compartment.	___	___
2. Gunner moved tank to defilade position.	___	___
3. Provided local security.	___	___
4. Treated casualty.	___	___
5. Requested evacuation of casualty.	___	___
6. Removed casualty from tank.	___	___
7. Reorganized crew.	___	___
8. Prepared tank for three-man operation.	___	___

COMMENTS:

ENGAGEMENT: Coax, area target.

1. Correct modified fire command.	___	___
2. Engaged target within 5 seconds.	___	___
3. 3/5 or more coverage of target.	___	___
4. Completed engagement within 25 seconds.	___	___
5. Correct performance of crew duties.	___	___

COMMENTS:

Figure 5d. Scorer's instructions and scoresheet.

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