4 December 1970

U. S. ARMY TEST AND EVALUATION COMMAND
COMMON SERVICE TEST PROCEDURE

TRACKING AND HITTING PERFORMANCE, MOVING GUN MOUNT - STATIONARY TARGET

1. OBJECTIVE

The objective of this Materiel Test Procedure (MTP) is to outline procedures for determining the tracking and hitting performance of crews employing the weapon system against stationary targets from a moving gun mount.

2. BACKGROUND

The final acceptability of a weapon system is largely governed by its ability to deliver effective fire rapidly and accurately on a target. The need for improving target hit capabilities from a moving gun mount has increased in direct proportion to the increase in battlefield mobiltiy and the number of armored combat vehicles in modern armies. Stabilization is required for the rapid delivery of main armament (single shot) fire from a moving combat vehicle and greatly increases the hit potential of automatic weapons. In the absence of stabilization, experience indicates that it is better to stop the vehicles to fire (single shot) and when traveling over extremely rough terrain this mode of firing may be preferable with a stabilized system. The primary criterion is, which mode of firing will produce a target hit in the shortest time.

Gun stabilization can be visualized as a means for keeping a vehicle mounted weapon pointed in a fixed direction while the vehicle itself is subjected to erratic motions from traveling over rough terrain. An integrated stabilization system must provide gun stabilization during vehicle movement and firing, in addition to meeting the requirements of a non-stabilized gun control system, and must be compatible with all fighting compartment operations.

The purpose of this test is to determine the extent to which the design potential and military requirements for the various weapon systems are realized under service test conditions.

3. REQUIRED EQUIPMENT

a. Appropriate moving vehicle-stationary target range facilities
b. Appropriate combat vehicles
c. Appropriate area where non-firing exercises can be conducted over smooth and rough surfaces.
d. Appropriate targets
e. Appropriate ammunition
f. Camera(s), Still, Motion or Video as available with necessary Film and Video Recorder when applicable

g. Pullover gage or other equipment as required to measure gun and gun barrel wear

h. Meteorological Equipment as required for measuring:

1) Wind speed and direction
2) Ambient temperature
3) Relative humidity

i. Boresighting devices as required
j. Gridded Target
k. Ambulance with medical aid personnel and equipment
l. Forms for recording data
m. Qualified M1A1 Gunner's Quadrant

4. REFERENCES

A. USATECOM REG 385-6, Verification of Safety of Materiel During Testing
B. MTP 10-3-501, Operator Training and Familiarization
C. Applicable Range Regulations and Standing Operating Procedures
D. MTP 3-3-505, Speed and Precision of Lay
E. MTP 3-3-507, Tracking and Hitting Performance, Stationary Gun Mount - Moving Target
F. MTP 2-3-500, Preoperational Inspection and Physical Characteristics
G. MTP 3-3-500, Preoperational Inspection and Physical Characteristics (Armament and Individual Weapons)
H. MTP 4-3-500, Preoperational Inspection and Physical Characteristics
I. MTP 3-3-503, Boresight and Zero
J. Qualitative materiel requirement (QMR), small development requirement (SDR) or other appropriate document
K. Pertinent technical publications
L. FM 17-12, Tank Gunnery

5. SCOPE

5.1 SUMMARY

This MTP describes the following:

a. Preparation for Test. A review of the safety release. A determination of the availability of service personnel and that test materiel is in satisfactory condition for testing. Preparation of the range site and boresighting and zeroing the weapon systems.

b. Nonfiring Exercises. Tracking tests to evaluate basic performance characteristics of weapon controls and stabilization systems at varying vehicle speeds and angles of target presentation of:

1) Combat vehicles with direct fire artillery class main armament
2) Combat vehicles with automatic type main armament
3) Flexible mounted automatic weapons on combat vehicles

c. Firing Exercises. A test to determine the hitting capability and time required to hit targets at different vehicle speeds over varying terrain conditions with those weapon systems described in paragraph b above.

5.2 LIMITATIONS

None

6. PROCEDURES

6.1 PREPARATION FOR TEST

6.1.1 Safety

The test officer shall ensure that a safety release has been received from HQ USATECOM in accordance with reference 4A and is understood prior to commencing testing.

6.1.2 Personnel

a. Ensure the avilability of service personnel, representative of those that will operate the test item in the field, who have been trained in accordance with the procedures of MTP 10-3-501 (ref 4B) and are cognizant of:

1) Pertinent technical publications for the test items
2) Applicable range regulations and standing operating procedures (ref 4C)
3) Objectives of the test
4) Pertinent data required
5) Method of obtaining observations
6) Method of recording data
7) Safety hazards

b. All gunners should have completed the pertinent manipulation exercises outlined in MTP 3-3-505 (ref 4D) and done some firing of the test weapon at moving targets as described in MTP 3-3-507 (ref 4E).

c. Record data shown in paragraph 6.3.1.2

6.1.3 Inspection

a. Subject the weapon and fire control systems, the vehicle on which they are mounted and the test ammunition to applicable portions of MTP 2-3-500 (ref 4F) and MTP 3-3-500 (ref 4G).

b. Subject all ammunition to applicable portions of MTP 4-3-500 (ref 4H).

c. Record data shown in paragraph 6.3.1.2.

6.1.4 Pre-Testing Conditions

a. Arrange for the use of moving vehicle-stationary target (non-firing) range facilities suitable for the weapon system being tested to include various angles of approach and departure from the target (see appendix A) with:

1) Driving surface graded to the extent necessary to permit all weather use as depicted by the heavy line for each course.
2) Rough (ungraded) terrain driving surface which should be approximately parallel to and along either side of the graded course.

NOTE: Rough ungraded driving surface will vary from day to day over the same terrain due to changes caused by weather/soil conditions and use of the course. Marker flags should be placed on each side of the course at intervals frequent enough to make it clearly visible to the vehicle operator. The course should be wide enough to allow maneuvering of the vehicle by the operator in order to avoid "bad spots" and provide the most stable platform possible for the gunner.

b. Arrange for the use of moving vehicle-stationary target (firing) range facilities suitable for the weapon system being tested to include various angles of approach and departure from the target. See sample courses at appendix B, C and D. When possible, these courses should include:

1) Driving surface graded to the extent necessary to permit all weather use.
2) Rough (ungraded) driving surface.

c. Prepare targets similar to the one shown in appendix E for use in non-firing exercises and erect as shown in appendix A.

d. Prepare targets to be used in the firing phase of this test.

NOTE: The size of the target for main armament weapons should be as specified in the QMR or other appropriate criteria or if not specified 2.3 x 2.3 meters (7 1/2 x 7 1/2 feet). The specified basic dimension of targets most prominent to the gunner must be maintained for assessment of target hits. However, in the

interest of realism, target presentation should represent typical combat targets. These targets should be centered on a wire mesh background large enough to obtain projectile strike information on rounds that miss the target. See sample target at appendix F.

e. Survey all non-firing and firing ranges and prepare a scaled plot of each.

NOTE: The distances to targets on sample ranges at appendix B and C can be changed by moving the firing flags or the targets. If either is done a new scaled plot of the range should be prepared.

f. Erect a boresight and zeroing target as described in MTP 3-3-503 (ref 4I) at the required range for the weapon system.

g. Erect a gridded target as described in MTP 3-3-503 (ref 4I) at a convenient range for checking boresight retention.

h. Place available meteorological equipment near firing site.

i. Completely stow the vehicle with prescribed materiel or substitute items of as near the same weight and configuration as possible. Record shortages as described in paragraph 6.3.1.3.4.

j. Perform all prefiring checks.

k. Boresight each weapon at the prescribed ranges as described in MTP 3-3-503 (ref 4I). Record data as shown in paragraph 6.3.1.3.5.

l. Zero each weapon as described in MTP 3-3-503 (ref 4I) using the primary round developed for the weapon. Record data as shown in paragraph 6.3.1.3.6.

m. Upon completion of zeroing, lay the primary sight precisely on the gridded target and mark or record point of alinement for each optical sight and the main gun barrel.

n. Attach movie or video camera to weapon system on an adjustable mount so that camera can be alined on the same point as gunner's sight.

NOTE: If cameras are not available time on target will be measured by another crewman using an alternate sight and stop watch.

6.2 TEST CONDUCT

NOTE: Testing of each weapon system will be divided into two phases, nonfiring and firing. As a minimum both

of these phases should be conducted near the beginning, midway point and completion of testing.

6.2.1 Nonfiring Exercises

6.2.1.1 Combat Vehicles with Artillery Class Main Armament

a. With the weapon system and camera boresighted and the gunner's primary sight alined on the target aiming cross, at least three different crews will make at least three runs over the graded driving surface of each course described in appendix A:

1) With the main armament/coaxial machine gun and rigidly mounted cupola weapons in the following modes as applicable:

   a) Power, unstabilized
   b) Stabilized with and without automatic lead computers, when applicable
   c) Manual

NOTE: The term "rigidly mounted weapons" as used in this text denotes weapons installed in vehicles so as to provide precise gear or hydraulic type control by the gunner in traverse and elevation. The opposite would be a flexible or free mounted weapon either on a skate type ring mount or a pedestal mount where all movement is accomplished by manhandling. These latter types are covered in paragraph 6.2.1.3 below.

2) Unless otherwise specified vehicle speeds will be as follows for each run of each condition described in 1) above:

   a) Five to 10 MPH
   b) Ten to 15 MPH
   c) Fifteen to 20 MPH

NOTE: 1. The nonfiring exercises should always be conducted under more severe conditions than those allowed for the firing phase.
2. For weapon systems that do not have an automatic lead computer or when the automatic lead computer is not being used, the proper lead (in mils) computed on the bases of the vehicle speed, range to target and velocity of ammunition should be given to the gunner and he should keep his sight alined on the target accordingly. Normally this is only done when the vehicle is moving on a perpendicular course to the target.

b. On those vehicles with turret controls for the vehicle commander, repeat runs (exercises) described in paragraph a with the commander manipulating controls for main armament and/or coaxial machine gun.

c. Repeat runs described in a and b above with the commander using the cupola weapon.

d. Measure the total time required for each run with a stop watch. This is the total possible time for the gunner to be on target. Photograph the target throughout each run and include the gunner's name or numerical designation and run number on the film. Review the film frame by frame to determine the time on target. If camera cannot be used, measure the time on target with a stop watch while observing through one of the other optical sights. If this cannot be done, the gunner should make an estimate of the time he was on target, i.e., one-half, one-third, etc. Compute the percentages of time on target by dividing the time on target determined from the film or stop watch by the total possible time on target.

e. Repeat a through d above using night vision devices and each mode of lighting provided by the on vehicle searchlight.

f. For those vehicles providing the gunner with a secondary sight, repeat a and d above, using this sight.

g. Repeat runs described in a through f above, using the ungraded driving surface (paragraph 6.1.4a above) and with vehicle speeds reduced to the extent necessary to obtain a time on target equal to at least 50 percent of the average time on target for all runs conducted over the graded surface for the specific course being run, i.e., Course A, B or C.

h. Each crew should conduct a dry run exercise over the selected firing course just prior to the firing test.

i. Record data as described in paragraph 6.3.2.1.

6.2.1.2 Combat Vehicles with Automatic Type Main Armament

Conduct nonfiring exercises as described in paragraph 6.2.1.1. Record data as described in paragraph 6.3.2.2.

6.2.1.3 Flexible Mounted Automatic Weapons on Combat Vehicles

a. During daylight, move the vehicle over the graded surface of each of the target courses shown in appendix A, with the gunner attempting to keep the weapon alined on the target.

1) Measure the total time for each exercise.
2) Photograph time on target with a motion picture camera, if one can be mounted in conjunction with this weapon.

3) If time on target cannot be recorded on film, have the gunner estimate the time on target, i.e., one-fourth, one-half, etc.

NOTE: It is doubtful if resourses such as a flexible mounted camera or an alternate sight will be available for measuring the time on target for these weapons. However, it is a necessary prefiring training exercise and must be conducted.

b. Repeat the exercise described in a above with at least two gunners.

c. Repeat exercises described in a and b above with the vehicle moving over the rough (ungraded) surface courses described in paragraphs 6.1.4a and 6.2.1.1g above.

d. Record data as described in paragraph 6.3.2.3.

6.2.2 Firing Exercises

NOTE: 1. Check boresight alinement by relaying on the gridded target periodically throughout testing.
2. All gun barrels will be within the prescribed wear limits.

6.2.2.1 Combat Vehicles with Artillery Direct Fire Class Main Armament

a. Upon completion of non-firing exercises boresight and zero or verify the zero of the weapon system as described in MTP 3-3-503 (ref 4I) or other appropriate criteria. Using a firing range similar to that shown in appendix B, at least two gunners will fire the coaxial machine gun at appropriate ranges for the weapon (250 to 800 meters) with the vehicle moving during daylight under the wollowing conditions, as applicable:

1) Driving Surfaces

a) Smooth (graded to the extent necessary to permit all weather use)
b) Rough (ungraded cross-country terrain)

2) Modes of Operation

a) Power, unstabilized
b) Stabilized and using automatic lead computer
c) Stabilized without automatic lead computer
d) Manual

3) Vehicle Speeds

a) Five to 10 MPH
b) Ten to 15 MPH
c) Fifteen to 20 MPH

4) Range Conditions

a) Firing positions and range combinations for the various speeds should be as described in appendix B or similar firing range plot.
b) Every effort should be made to prevent crews from obtaining range information.
c) The targets to be fired at should not be revealed to crews until the vehicle approaches the firing point.

NOTE: 1. The sequence of firing for the different vehicle speeds shown in appendix C should be switched if the crews have had access to this information.
2. This course is intended to be favorable to the stabilizer. The course should be designed so that maneuver of the vehicle will be such that orientation of the chassis in relation to the gun mount and the target ot be engaged will not exceed 30° right or left at the time of firing.

5) Range Determination

a) Sights will be set on the prescribed battle-sight prior to beginning of each exercise.
b) Initial range determination for each target will be made as prescribed by the test officer.
c) Adjustments, following the firing of the initial burst on each target, will be by observation of tracer and using the burst-on-target method of adjustment unless otherwise directed.

6) The size of the bursts will be 20 to 25 rounds

7) Fire Commands

a) In general these should be as described in Part Four, FM 17-12 (ref 4L).
b) The command, FIRE should not be given until the vehicle reaches the red flag (see appendix B).

c) The command, CEASE FIRING should be given by the time the vehicle reaches the white flag.

NOTE: To the extent practical each firing run should be treated as a tactical exercise with the vehicle commander designating the target as shown in FM 17-12 (ref 4L) and either acquiring it or assisting the gunner as the weapon system permits and ranging when appropriate.

8) Measure the following with stop watches and photographically where possible:

a) Time to fire first burst or round
b) Time to fire each subsequent burst or round
c) Total time used for firing at each target
d) Total time to complete the entire exercise

9) Record the number of rounds fired, targets hit and the number of hits on each target.

b. Repeat the firing exercises described in a above to the extent possible with the cupola mounted weapon at appropriate ranges (250 to 1,600 meters) except that size of burst will be 10 to 20 rounds.

c. Repeat selected portions of firing done with the cupola mounted weapon except that the vehicle will be stopped before the weapon is fired.

d. Repeat the firing exercises described in a above using the main armament and conventional ammunition at appropriate ranges for the weapon and different types of ammunition on ranges similar to those described in appendix B and C. In addition to the measurements and recording described in paragraph a8) and 9) above, record the following:

1) Location of each projectile impact on the target
2) Location of each projectile impact on the wire mesh surrounding the target

e. Repeat the firing exercises described in a and d above using the main armament (conventional ammunition) at appropriate ranges with the following changes:

1) Vehicle will halt to fire
2) Modes of Operation

a) Power, unstabilized
b) Power, stabilized and using automatic lead computer

3) Vehicle Speeds

a) Five to 10 MPH
b) Ten to 15 MPH

4) Smooth driving surface

f. If the main armament has a missile firing capability from a moving vehicle repeat the firing exercises described in a above using inert missiles at ranges up to the maximum specified with the following changes:

1) Modes of Operation

a) Power, unstabilized
b) Power, stabilized

2) Vehicle Speeds

a) Five to 10 MPH
b) Ten to 15 MPH

g. On those vehicles providing a secondary sight for the gunner, conducted a limited sample of firing exercises described in a above using that sight.

h. On those vehicles with main armament and turret controls for the vehicle commander, conduct selected portions of firings described in a above with the commander firing the weapon.

i. Repeat selected parts of testing described in paragraph a through h above using night vision devices and each mode of lighting provided by the on-vehicle searchlight or other artificial light sources prescribed by the QMR or other appropriate criteria.

j. Using a moving vehicle-stationary target range similar to that shown in appendix C repeat selected portions of firing described in a through h above with each type weapon.

k. Using a moving vehicle-stationary target range similar to that shown in appendix D conduct a firing test with each type weapon on the vehicle as described in figure 1 with at least two different crews.

NOTE: 1. Realism should be emphasized in preparation of targets representing materiel as described in NOTE under paragraph 6.1.4d.
2. Ranges shown in figure 1 may be varied as need to meet the requirements of various weapons or ammunition types.

Tgt. No.	Weapon	Target Description	Range (Meters)	No. of Rounds
1	Main Gun	Tank*	900 to 1,100	2
2	Coax MG	Truck**	600 to 800	100
3	Main Gun	Antitank*	1,500 to 2,000	2
4	Main Gun	Tank*	1,500 to 1,800	2
5	Coax MG	Troops (14 E-type)	200 to 400	100
6	Cal .50 MG	Truck+	1,200 to 1,400	50
7	Cal .50 MG	Troops (10 E-type)	1,000 to 1,200	50

*2.3 x 2.3 meters.

**0.91 x 1.52 meters.

+2.3 x 2.3 meters for flexible mounted MG, otherwise 0.91 x 1.52 meters.

FIGURE 1. DATA FOR USE WITH FIRING RANGE AT APPENDIX A.

1. As a minimum, moving vehicle-stationary target firing tests should be conducted near the beginning, midway point and end of testing.

m. Record data as described in paragraph 6.3.3.1.

6.2.2.2 Combat Vehicles with Automatic Type Main Armament

a. Upon completion of non-firing exercises, boresight and zero or verify the zero of the weapon system as described in MTP 3-3-503 (ref 4I) or other appropriate criteria. Using a firing range similar to that shown in appendix B, at least two gunners will fire the main armament and coaxial weapon, if any, under the conditions described in paragraph 6.2.2.1a, d, e, g and i, applicable to the weapon system.

NOTE: 1. The size of targets, vehicle speeds and range to targets should be as specified in the QMR or other appropriate criteria.
2. Depending upon the system being tested and the ammunition being used, firing may be by either the slow or full automatic rate of fire or a combination of the two.
3. Normally the range to the target will be estimated and confirmed or adjusted as required by firing a single shot and followed by a prescribed burst.

b. As a minimum, moving vehicle firing should be conducted near the beginning, midway point and end of the service test.

c. Record data as described in paragraph 6.3.3.2.

6.2.2.3 Flexible Mounted Automatic Weapons

a. Upon completion of nonfiring exercises, conduct firing exercises using at least three gunners with the vehicle moving over the smooth course of the range described in Appendix B.

1) Vehicle Speeds

a) Five to 10 MPH
b) Ten to 15 MPH

2) The size of targets and bursts should be as specified in the QMR, other appropriate criteria or as used for similar weapons mounted coaxially or in a cupola.
3) Adjustment of fire will be by observation of tracer and/or projectile impacts
4) Measure the following with stop watches and photographically where possible.

a) Time to fire first burst
b) Time to fire each subsequent burst
c) Total time used for firing at each target
d) Total time to complete the entire exercise

5) Record the number of rounds fired, targets hit and number of hits on each target

b. Repeat the exercises described in a above, except that the vehicle will be stopped while the weapon is being fired.

c. Record data as described in paragraph 6.3.3.3.

6.3 TEST DATA

6.3.1 Preparation for Test

6.3.1.1 Personnel

a. Record the following for all test personnel:

1) Name
2) Rank or grade
3) Military Occupational Specialty (MOS)
4) Training fime in MOS
5) Experience in MOS

b. Record the following for each gunner:

1) Whether pertinent manipulation exercises in MTP 3-3-505 (ref 4D) has been completed

1) The amount of firing done with the test weapon at moving targets as described in MTP 3-3-507 (ref 4D).

6.3.1.2 Inspection

Record all services, adjustments and repairs to the vehicle and the weapon and fire control systems here and under the Maintenance Evaluation Maintainability subtest. Also record the following for:

a. The weapon

1) Nomenclature and model number
2) Serial number
3) Number of previous rounds fired by type through:

a) The gun
b) The gun barrell

4) Pullover gage readings or other barrel and gun wear measurements

b. Each item of fire control equipment:

1) Nomenclature and model number
2) Serial number

c. Vehicle on which weapon/fire control system is mounted:

1) Nomenclature and model number
2) Serial number
3) Miles operated

d. Ammunition:

1) Number of rounds received by type and lot numbers
2) Discrepancies revealed by inspection

6.3.1.3 Pre-Testing Conditions

6.3.1.3.1 Range Facilities. Retain scaled plots of:

a. Each non-firing range
b. Each firing range

6.3.1.3.2 Targets. Retain drawing or photograph of each type target used for:

a. Non-firing exercises
b. Firing exercises

c. Boresighting and zeroing
d. Boresight alinement retention checks

6.3.1.3.3 Meteorological Equipment. Record the type used.

6.3.1.3.4 Stowage. Record prescribed on-equipment materiel and basic issue items not available for stowing in the driving and fighting compartments of the vehicle.

6.3.1.3.5 Boresighting. Record the following:

a. Equipment used
b. Range to target
c. Setting on each boresight knob or sight upon completion of boresighting

6.3.1.3.6 Zeroing. Record the following:

a. Date and time
b. Nomenclature and serial number of weapon
c. Nomenclature and serial number of vehicle weapon was mounted on
d. Type and size of target used
e. Range to target
f. Angle of site to target
g. Quadrant elevation reading
h. Fire control equipment used
i. Ammunition used by type and lot number
j. Number of rounds fired
k. Final boresight knob or sight settings
l. Horizontal and vertical distance of the strike of each projectile from the aiming point (artillery class weapons)
m. Distance of center of impact (CI) from aiming point
n. Ambient temperature
o. Relative humidity
p. Wind speed and direction
q. Point of alinement of each optical sight and the gun barrel on the gridded target

6.3.2 Test Conduct - Nonfiring Exercises

6.3.2.1 Combat Vehicles with Artillery Class Main Armament

a. Record the following for each tracking exercise conducted during daylight:

1) Date and time
2) Nomenclature and serial number of vehicles on which weapon system is mounted
3) Total test miles accumulated on vehicle

4) Type and size of target used
5) Description of course (attach plot) and whether driving surface was graded or rough
6) Weapon control system mode and weapon sight used
7) Designation of person doing tracking, i.e., gunner or vehicle commander and their name
8) Method used for determining "time on target".
9) Speed of vehicle
10) How target lead was determined, when applicable (automatic lead computer or estimation)
11) Total time to complete exercise
12) Time on target to tenth of minute
13) Percent of time sight was properly alined on target to tenth of minute
14) Description of weather conditions
15) Type, amount and positive identification of movie film or still photographs taken

b. Record data as described in a above and the following for each tracking exercise conducted during darkness:

1) Description of atmospheric light conditions (cloudy, overcast, foggy, starlight, moonlight, etc.)
2) Type of light source used

6.3.2.2 Combat Vehicles with Automatic Type Main Armament

Record data as described in paragraph 6.3.2.1 above.

6.3.2.3 Flexible Mounted Automatic Weapons

Record the following:

a. Date and time
b. Nomenclature of weapon
c. Nomenclature of weapon mount
d. Nomenclature and serial number of vehicle on which weapon is mounted
e. Total test miles accumulated on vehicle
f. Type and size of target used
g. Description of course (attach plot) and whether graded or rough
h. Name of gunner
i. Speed of vehicle
j. Total tracking time
k. Method of recording time on target
l. Percent of time sight was alined on target

6.3.3 Test Conduct - Firing Exercises

6.3.3.1 Combat Vehicles With Artillery Class Main Armament

a. Record the following for each moving vehicle-stationary target firing exercise conducted with each type weapon during daylight:

1) Date and time
2) Location
3) Nomenclature and serial number of vehicle on which weapon system is mounted
4) Total test miles accumulated on vehicle
5) Type and size targets used
6) Description and legth of course (attach plot)
7) Nomenclature and serial number of weapon being used
8) Number of previous rounds fired (by type) through barrel and weapon
9) Name and position of person tracking and firing, i.e., gunner or vehicle commander and sight used
10) Method used to acquire target within gunner's field of view
11) Speed of vehicle or whether vehicle was stopped to fire
12) Type of driving surface (graded or ungraded)
13) Time to acquire target and fire first burst, round or missile or each target engagement
14) Initial range setting used and how determined
15) Size of burst and whether ammunition was all of same type or specified combat mix
16) How lead was determined, i.e., estimated or by use of automatic lead computer.
17) Time to fire second and subsequent burst, round or missile of each target engagement
18) Total time to complete each exercise
19) Method used for adjusting subsequent bursts or rounds
20) Number of targets hit and the number of hits on each target (as determined by observers or photography) and for artillery class rounds the location of projectile impacts on the target and the surrounding wire mesh screen
21) Nomenclature and lot number of rounds fired and nomenclature and serial number of missiles fired
22) Total rounds or missiles fired
23) Type, amount and positive identification of movie or video film or still photographs taken
24) Ambient temperature
25) Pelative humidity
26) Wind speed and direction
27) Whether ammunition had been transported in the vehicle and, if so, the total distance

b. Record data as described in a above and the following for each moving vehicle-stationary target firing exercise conducted with each type weapon during darkness:

1) Description of atmospheric light conditions (cloudy, overcast, foggy, starlight, moonlight, etc.)
2) Type of night sight and/or light source used

6.3.3.2 Combat Vehicles with Automatic Type Main Armament

a. Record applicable data as described in paragraph 6.3.3.1a above and the mode of fire (slow or full automatic) for each firing exercise conducted during the daylight.

b. Record applicable data as described in a above and paragraph 6.3.3.1a and the mode of fire (slow or full automatic) for each firing exercise conducted during darkness.

6.3.3.3 Flexible Mounted Automatic Weapons

Record applicable data as described in paragraph 6.3.2.3 and the mode of fire (slow or full automatic) for each firing exercise conducted.

6.4 DATA REDUCTION AND PRESENTATION

Data in paragraph 6.3 will be consolidated as described below and presented in tabular or graph form so as to indicate whether the test item(s) meet the applicable criteria.

6.4.1 Nonfiring Exercises

Compute the average of the percentage of time-on-target for each gunner in each mode of operation for each sight and each vehicle speed and course under daylight and night conditions at the beginning, midpoint and end of testing. Total the averages for all gunners for each condition and compute the grand average for each condition.

6.4.2 Firing Exercises

6.4.2.1 Artillery Class Armament

Compute the number of targets engaged, hit with first or subsequent round, missed and the time required for each gunner to complete each target engagement in each mode of operation for each sight and each vehicle speed and course under daylight and night conditions at the beginning, midpoint and end of testing. Total the averages for all gunners under each condition and compute the grand average in percentage of hits obtained and time required to obtain a target hit under each condition. Also compute the percentage of misses that actually impacted on the wire mesh surrounding the target.

6.4.2.2 Automatic Weapons

Compute the number of targets engaged, hit with first or subsequent bursts, size of bursts, total rounds fired and number of targets missed and the time required for each gunner in each mode of operation for each target speed and course under daylight and night conditions at the beginning, midpoint and end of testing. Total the averages for all gunners under each condition and compute the grand average of percentage of targets hit under each condition and the percentage of rounds fired which hit the target.

6.4.2.3 Effects of Wear

a. Compare results of non-firing exercises conducted at the beginning, midpoint and end of testing to determine the effect, if any, which vehicle operation had on tracking capabilities.

b. Compare the results of firings conducted at various stages of barrel wear to determine the effects such wear may have on dispersion and hit capabilities.

6.4.2.4 Effects of Transporting

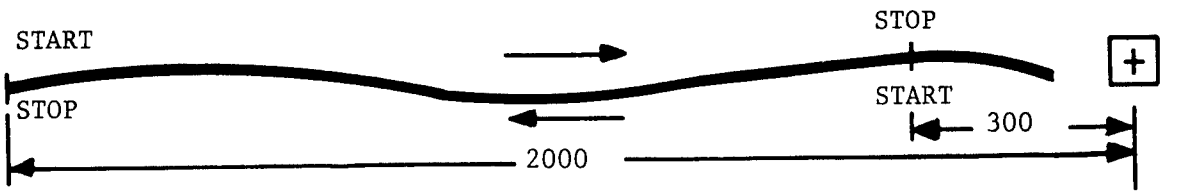
Compare the results obtained with ammunition that had been transported in the firing vehicle for varying distances with ammunition that had not been transported.

APPENDIX A

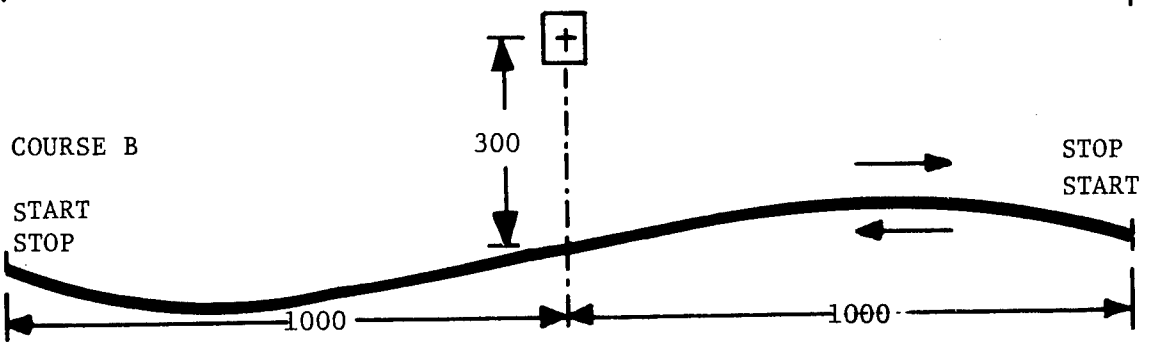
SAMPLE MOVING VEHICLE - STATIONARY TARGET NON-FIRING COURSES

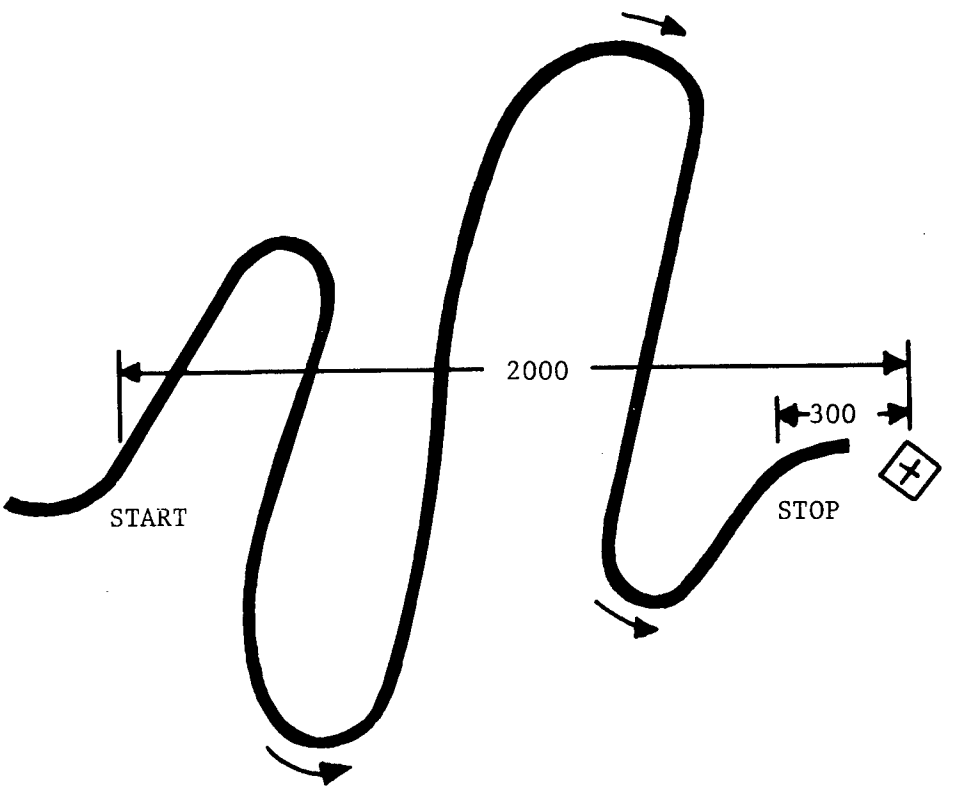
(all dimensions in meters)

COURSE A

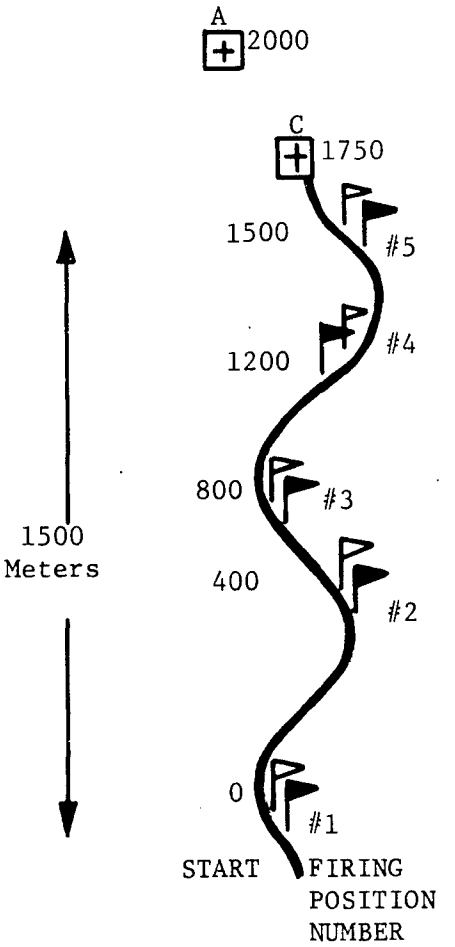


COURSE B





APPENDIX B
SAMPLE MOVING VEHICLE - STATIONARY TARGET RANGE
(Straight-On; Limited Zig-Zag)



POS	TGT	APPROX. RANGE
#1	A	2000
	B	1900
	C	1750
#2	A	1600
	B	1500
	C	1350
#3	A	1200
	B	1100
	C	950
#4	A	800
	B	700
	C	550
#5	A	500
	B	400
	C	250

RED - COMMENCE FIRING

WHITE - CEASE FIRING

(all dimensions in meters)

SPEED (MPH)	POS/TGT RANGE				
5-10	$1/A_{2000}$	$2/B_{1500}$	$3/C_{950}$	$4/A_{800}$	$5/B_{400}$
10-15	$1/B_{1900}$	$2/C_{1350}$	$3/A_{1200}$	$\$/B_{700}$	$5/A_{500}$
15-20	$1/C_{1750}$	$2/A_{1600}$	$3/B_{1100}$	$4/C_{550}$	$5/C_{250}$

APPENDIX C

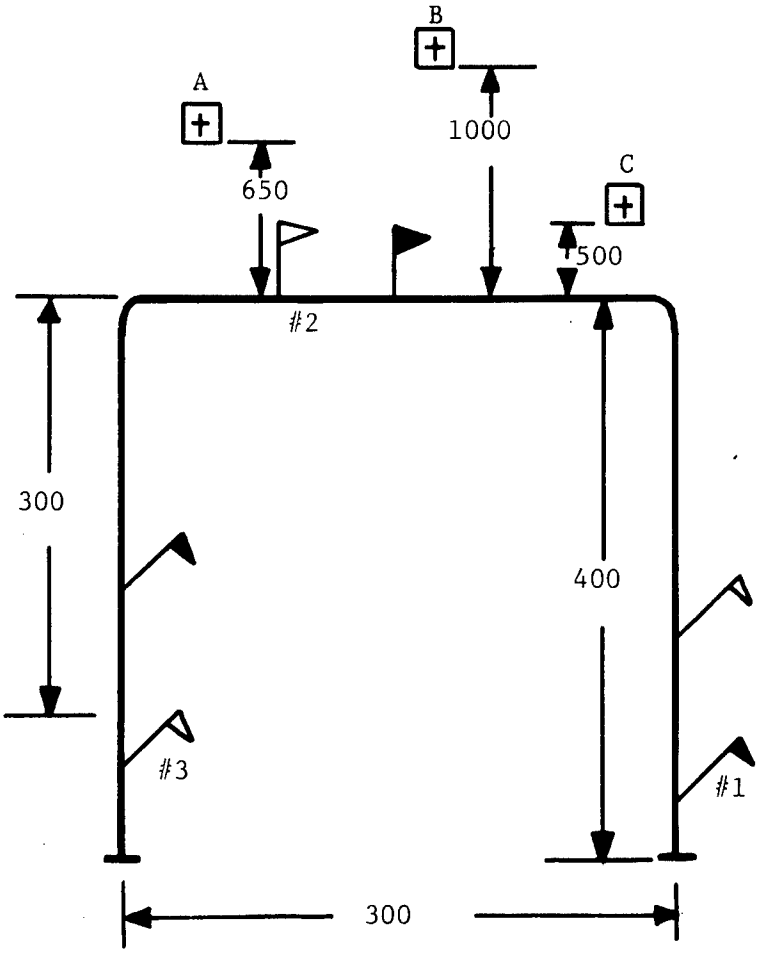
SAMPLE MOVING VEHICLE - STATIONARY TARGET RANGE

(Invert U-Shaped, Closing, Parallel, and Outgoing Legs)

RED - COMMENCE FIRING

(all dimensions in meters)

WHITE - CEASE FIRING

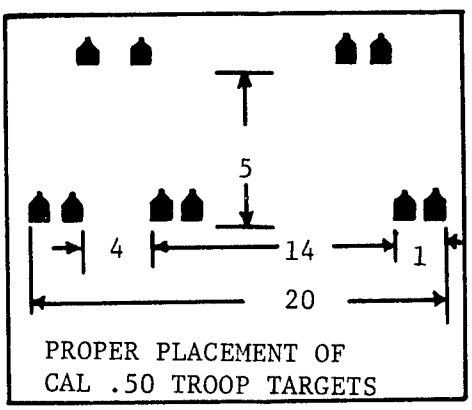


POS	TGT	APPROXIMATE RANGE
#1	A	900
	B	1200
	C	1500
#2	A	550
	B	700
	C	1050
#3	A	850
	B	950
	C	1350

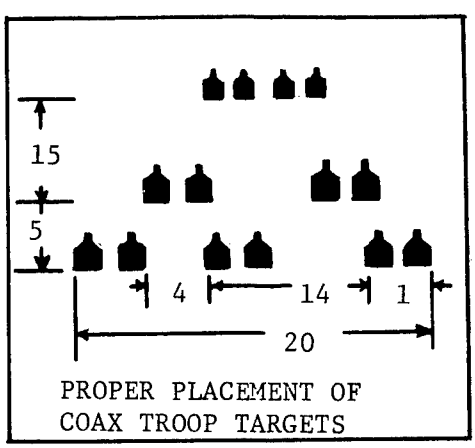
SPEED (MPH)	POS/TGT RANGE		
5-10	$1/A_{900}$	$2/B_{700}$	$3/C_{1350}$
10-15	$1/B_{1200}$	$2/C_{1050}$	$3/A_{850}$
15-20	$1/C_{1500}$	$2/A_{550}$	$3/B_{950}$

APPENDIX D
SAMPLE MOVING VEHICLE - STATIONARY TARGET RANGE
(For Crew Field Firing)

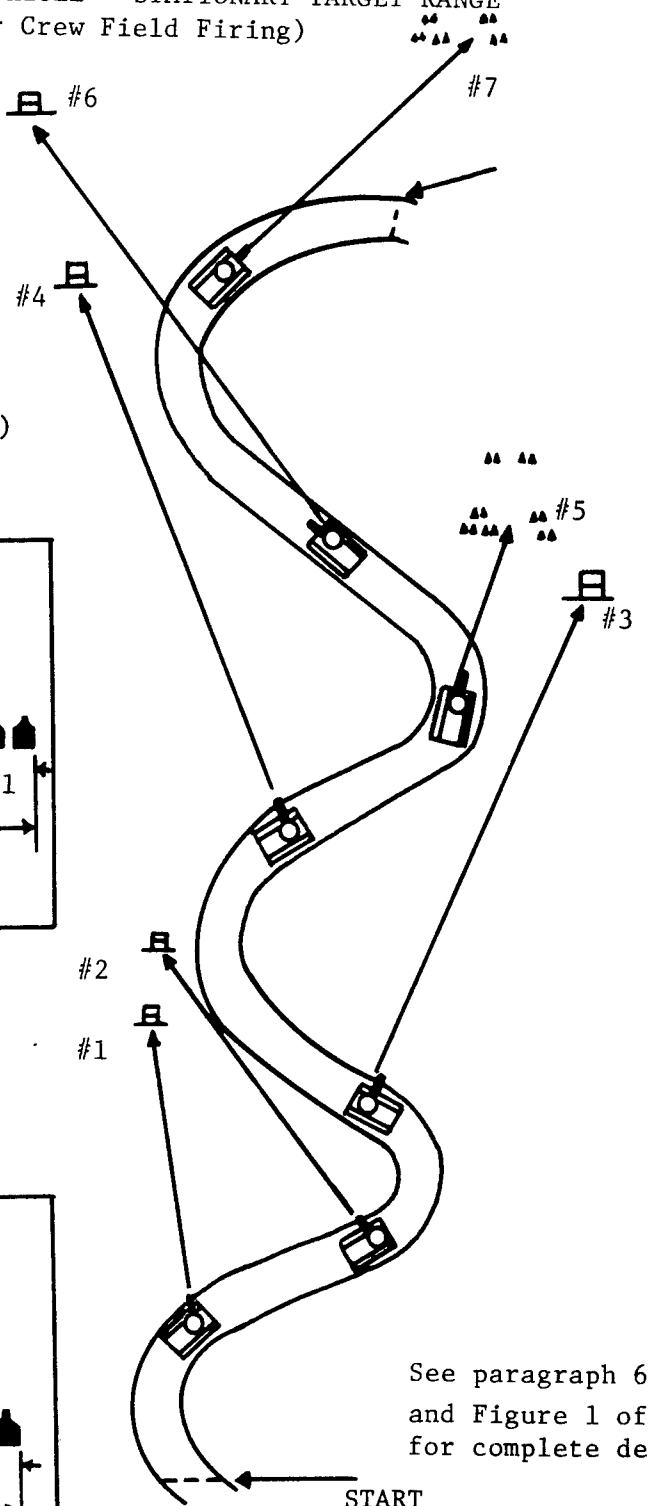
(all dimensions in meters)



PROPER PLACEMENT OF
CAL .50 TROOP TARGETS



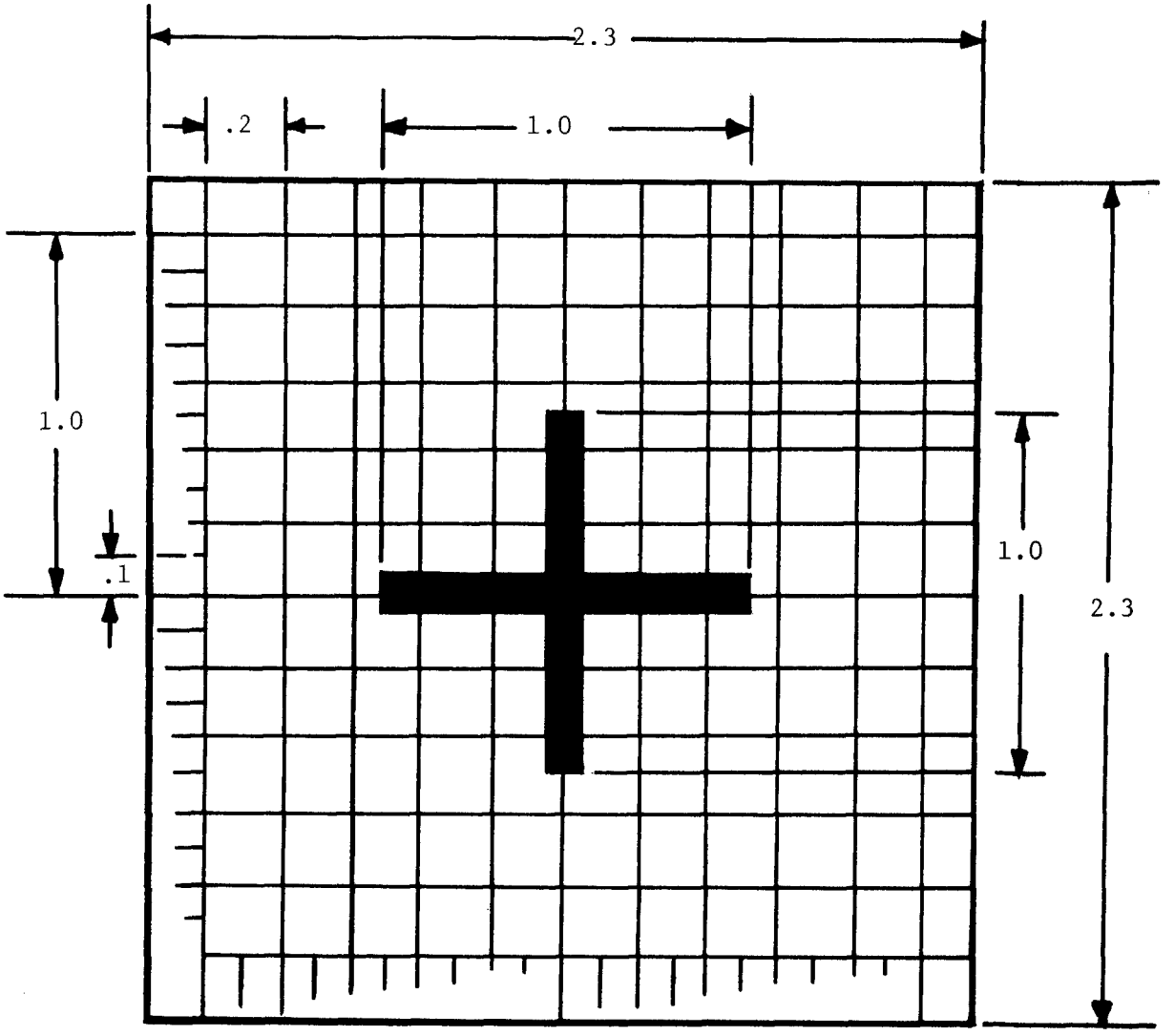
PROPER PLACEMENT OF
COAX TROOP TARGETS



See paragraph 6.2.2.1j and Figure 1 of basic MTP for complete details

APPENDIX E

SAMPLE TRACKING TARGER FOR MOVING VEHICLE - STATIONARY TARGET RANGE



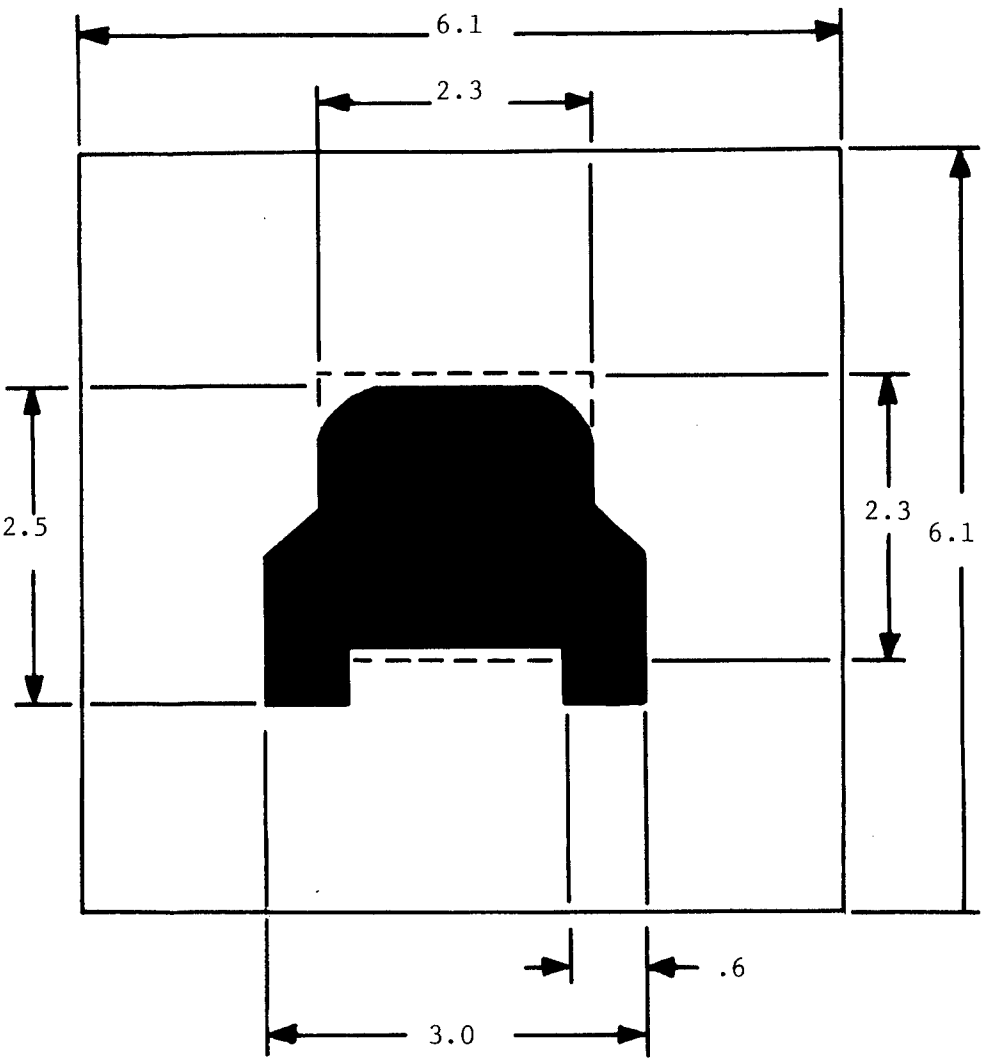
(all dimensions in meters)

Explanatory Notes:

Target of plyboard construction with pattern painted using combination of USAF yellow and black.

Vertical and horizontal scale intervals are 10 cm.

APPENDIX F
SAMPLE HIT PROBABILITY ASSESSMENT TARGET
MOVING VEHICLE - STATIONARY TARGET



(All dimensions in meters)

Explanatory Notes:

Gunner may note outline of target frame but aims at tank silhouette cut from OD target cloth and centered on wire mesh face.

Broken line represents 2.3-m X 2.3-m scoring template.

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13. ABSTRACT

Procedures for determining the accuracy and time required to score hits of direct fire artillery class main armament, combat vehicles with automatic type main armament, and flexible mounted automatic weapons on combat vehicles, at different vehicle speeds over varying terrain on stationary objects are defined.

DD FORM 1 NOV 68 1473 REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

14. KEY WORDS	LINK A		LINK B		LINK C	
	ROLE	WT	ROLE	WT	ROLE	WT
Armament accuracy Tactical firing accuracy Fire control Weapon system accuracy						