UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE

DTIC FILE COPY

(3)

OCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

AD-A195 888

1b. RESTRICTIVE MARKINGS

3. DISTRIBUTION/AVAILABILITY OF REPORT

Approved for public release; distribution unlimited.

2b. DECLASSIFICATION/DOWNGRADING SCHEDULE

4. PERFORMING ORGANIZATION REPORT NUMBER(S)

Test Operations Procedure 3-2-518

5. MONITORING ORGANIZATION REPORT NUMBER(S)

same as item 4

6a. NAME OF PERFORMING ORGANIZATION
U.S. ARMY COMBAT SYSTEMS TEST ACTIVITY

6b. OFFICE SYMBOL (If applicable)
STECS-AD

7a. NAME OF MONITORING ORGANIZATION
U.S. ARMY TEST & EVALUATION COMMAND

6c. ADDRESS (City, State, and ZIP Code)

ABERDEEN PROVING GROUND, MARYLAND 21005-5059

7b. ADDRESS (City, State, and ZIP Code)

ABERDEEN PROVING GROUND, MD 21005-5055

8a. NAME OF FUNDING/SPONSORING ORGANIZATION
(same as item 7a)

8b. OFFICE SYMBOL (If applicable)
AMSTE-TC-M

9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER

8c. ADDRESS (City, State, and ZIP Code)

(same as item 7b)

10. SOURCE OF FUNDING NUMBERS

PROGRAM ELEMENT NO.	PROJECT NO.	TASK NO.	WORK UNIT ACCESSION NO.
AMC-R	310-6		

11. TITLE (Include Security Classification)

"SUBCALIBER GUNS"

12. PERSONAL AUTHOR(S)

13a. TYPE OF REPORT
Final

13b. TIME COVERED
FROM _____ TO _____

14. DATE OF REPORT (Year, Month, Day)
16 June 1988

15. PAGE COUNT
5

16. SUPPLEMENTARY NOTATION

(cont'd p 2)

17. COSATI CODES		
FIELD	GROUP	SUB-GROUP

18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number)
Large caliber weapons; Subcaliber guns; (cdr)
Parent weapons;
Small caliber weapons;

19. ABSTRACT (Continue on reverse if necessary and identify by block number)

Provides procedures for determining the suitability of subcaliber guns for firing when mounted in/on their "parent" weapons.

DTIC
ELECTE
JUN 24 1988
S D

20. DISTRIBUTION/AVAILABILITY OF ABSTRACT
☒ UNCLASSIFIED/UNLIMITED ☐ SAME AS RPT. ☐ DTIC USERS

21. ABSTRACT SECURITY CLASSIFICATION
UNCLASSIFIED

22a. NAME OF RESPONSIBLE INDIVIDUAL

22b. TELEPHONE (Include Area Code)

22c. OFFICE SYMBOL

DD Form 1473, JUN 86

Previous editions are obsolete.

SECURITY CLASSIFICATION OF THIS PAGE
UNCLASSIFIED

88 6 22 045

U.S. ARMY TEST AND EVALUATION COMMAND
TEST OPERATIONS PROCEDURE

AMSTE-RP-702-102
*Test Operations Procedure 3-2-518 16 June 1988
AD No.

SUBCALIBER GUNS

			Page
Paragraph	1.	SCOPE.	1
	2.	FACILITIES AND INSTRUMENTATION	3
	3.	REQUIRED TEST CONDITIONS	3
	4.	TEST PROCEDURES.	3
	5.	DATA REQUIRED.	4
	6.	PRESENTATION OF DATA	4
Appendix	A.	REFERENCES	A-1

1. SCOPE. This TOP provides procedures for determining the suitability of subcaliber guns for firing when mounted in/on their "parent" larger caliber weapons. (see fig. 1).

A subcaliber gun is usually much smaller caliber than the parent weapon, and is used for the firing phase of troop training programs on the major caliber weapon. Use of the subcaliber gun and ammunition conserves the costlier ammunition and saves wear and tear on the larger weapon, thus permitting more extensive training. Personnel involved in testing subcaliber guns should be aware that these guns are real weapons capable of killing/maiming troops in training. Subcaliber devices may be simple or as complicated as the main armament they simulate.

Externally mounted subcaliber guns use the traversing, elevating, and fire control mechanisms of the larger weapon. Tests are conducted to determine the parallelism of the bore axes of both weapons and their ability to remain aligned. When gun crews are being trained, it is desirable that the projectile trajectories and times of flight of both major and subcaliber weapons be related, as it is reasonable to assume that some of the training will be performed at night, and tracer ammunition may be used to familiarize the crews with those features.

Internally mounted subcaliber guns use the breech mechanism, firing mechanism, and other components of the major caliber weapon. Weapon bores must be concentric, and back blast upon firing should be minimal. The firing mechanism of the larger weapon, if used, must be properly aligned to detonate the primer of the small round by percussion or electrical means.

*This TOP supersedes MTP 3-2-518 dated 14 May 1968.

Approved for public release; distribution unlimited.

DTIC COPY INSPECTED 6

Distribution/
Availability Codes
Dist | Avail and/or Special
A-1

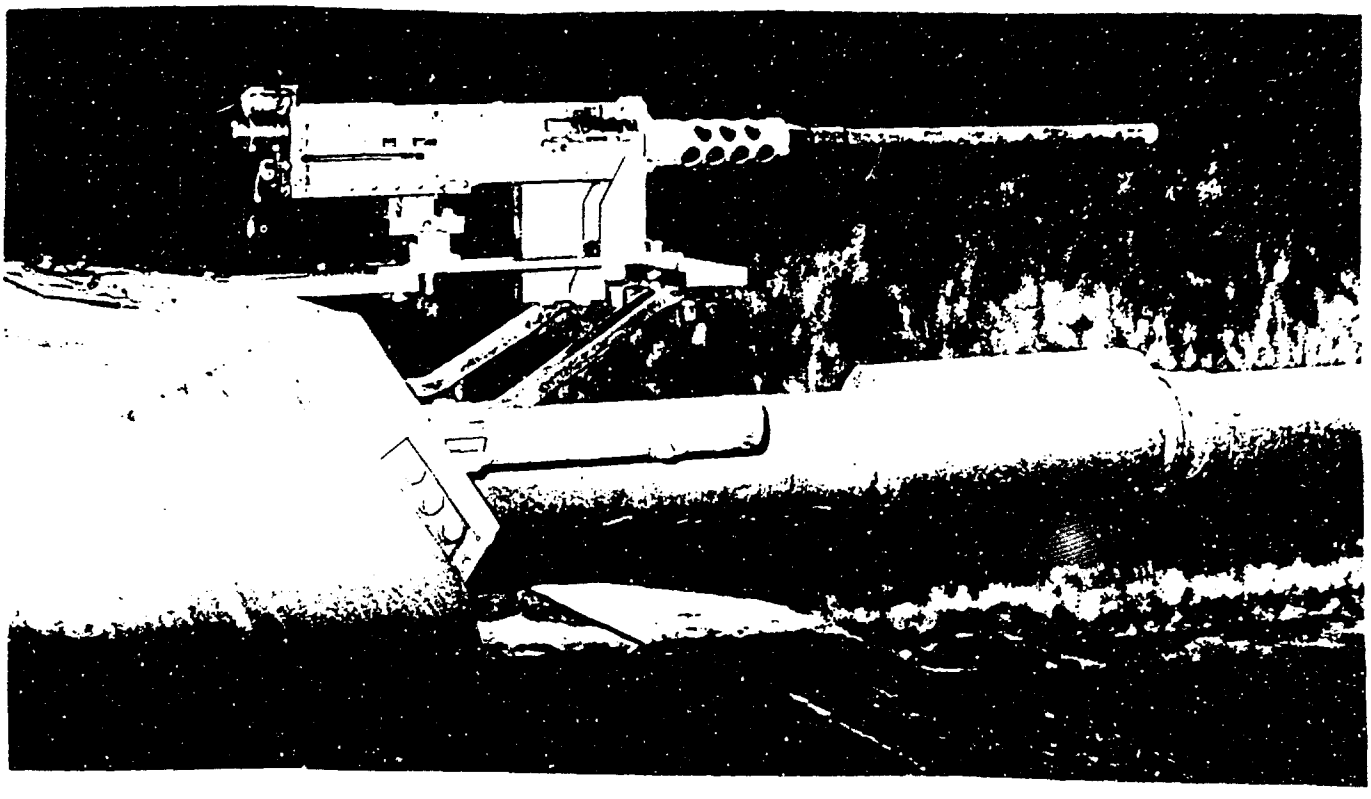


Figure 1. Externally mounted subcaliber gun, cal .50 M2HB machine gun coaxially mounted on main gun of M1 tank.

2. FACILITIES AND INSTRUMENTATION.

2.1 Facilities.

ITEM	REQUIREMENT
Mount assembly	For externally mounted gun
Parent weapon	

2.2 Instrumentation.

DEVICE FOR MEASURING:	PERMISSIBLE ERROR OF MEASUREMENT
Torque	20Nm to 80 Nm (15 ft-lb to 60 ft-lb)

3. REQUIRED TEST CONDITIONS. Conduct initial inspections of subcaliber gun mounted in/or its parent weapon in accordance with TOP 3-2-800.[1]*

3.1 Pre-Firing Tests.

a. Using suitable gauges, check the parallelism of the subcaliber gun's bore axis with that of the major caliber weapon.

*Superscript numbers correspond to reference numbers in Appendix A.

b. Examine the completely assembled system for interference with the normal operation of the parent weapon.

c. Verify that the firing mechanism of the larger weapon is properly aligned to detonate the primer of the small round by percussion or electrical means.

d. Evaluate ease of loading/unloading the subcaliber gun.

3.2 Data Required. Record the following:

a. The parallax of the subcaliber gun with the bore of the parent weapon.

b. The location and type of interference with weapon system operation, if applicable.

c. Any misalignment of the major weapon system firing mechanism with the subcaliber weapon.

d. Any difficulties encountered with loading/unloading the subcaliber round.

4. TEST PROCEDURES. With the subcaliber gun mounted in accordance with paragraph 3.1, conduct applicable tests as specified in the test directive. Typical tests are described on the following pages.

4.1 Safety Test. Conduct this test according to procedures given in TOP 3-2-829[2]. This test is for the purpose of evaluating the safe service life of cannon tubes (37 mm and above) and breech mechanisms by number of equivalent full charge rounds that can be fired before excessive metal fatigue or tube wear occurs.

4.2 Boresight Retention. Conduct this test according to the procedures given in ITOP 3-2-604[3]. This test provides a method of evaluating boresight retention capability of gun control systems mounted in combat vehicles.

4.3 Human Factors Evaluation. Since subcaliber guns are used for troop training programs, it is essential that the soldier-item relationship be assessed. Conduct this test in accordance with TOP 1-2-610[4], MIL-STD 1474B(MI)[5], and TOP 1-2-608.[6]

4.4 Reliability, Availability, Maintainability, and Durability. Conduct this test according to TOP 1-2-502[7] which gives procedures for durability testing and TECOM Supplement 1 to AMC 700-15[8] which covers logistic supportability.

4.5 Accuracy-Dispersion. Conduct this test according to ITOP 4-2-829[9] which provides a method of evaluating accuracy and dispersion characteristics.

4.6 Cant Firing. This test is conducted to determine performance characteristics of a subcaliber gun at various cant angles.

4.6.1 Method.

a. Place the gun in a 15° cant right position.

b. Fire 50 rounds from each mount at maximum and minimum gun elevations.

c. Repeat firings with gun placed in 15° cant left position.

4.6.2 Data Required. Record the following:

a. Any stoppages or failures.

b. Any interference with gun performance due to cant.

c. Safety or human factors problems noted during firings.

5. DATA REQUIRED. Record data as specified in applicable TOP/ITOP.

6. PRESENTATION OF DATA. Evaluate data collected to determine the relationship between the firing table of major and minor caliber weapons.

Recommended changes of this publication should be forwarded to Commander, U.S. Army Test and Evaluation Command, ATTN: AMSTE-TC-M, Aberdeen Proving Ground, MD 21005-5055. Technical information can be obtained from the preparing activity: Commander, U.S. Army Combat Systems Test Activity ATTN: STECS-AD, Aberdeen Proving Ground, MD 21001-5059. Additional copies are available from the Defense Technical Information Center, Cameron Station, Alexandria, VA 22304-6145. This document is identified by the accession number (AD No.) printed on the first page.

APPENDIX A

REQUIRED REFERENCES

1. ITOP 3-2-802, Measurement & Inspection of Gun Tubes (Cannon), May 5, 1988.

2. ITOP 3-2-829, Cannon Safety Tests, 13 December 1984.

3. ITOP 3-2-604, Boresight Retention, 14 October 1983.

4. TOP 1-2-610, Human Factors Engineering (Part I - Procedures, Part II - Hedge), 30 November 1983.

5. MIL-STD-1474B(MI), Noise Limits for Army Materiel, 18 June 1979; Notice 1, 10 October 1980; Notice 2, 20 April 1984.

6. TOP 1-2-608, Sound Level Measurements, 17 July 1981.

7. TOP 1-2-502, Durability, 19 December 1984.

8. TECOM Suppl 1 to AMC-R 700-15, Integrated Logistics Support, 20 June 1980.

9. ITOP 4-2-829, Vertical Target Accuracy and Dispersion, 13 December 1985.