

AD-A146 776

REQUIRED OPERATIONAL CAPABILITY (ROC) FOR A 40MM HIGH
VELOCITY PRACTICE ROUND NUMBER INS 109(U) MARINE CORPS
WASHINGTON DC 24 SEP 84

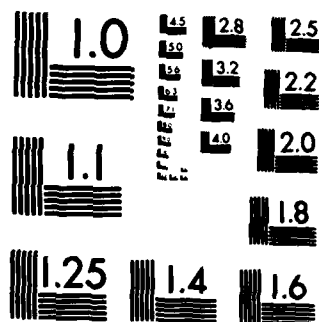
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DEPARTMENT OF THE NAVY
HEADQUARTERS UNITED STATES MARINE CORPS
WASHINGTON, D.C. 20380

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AD-A146 776

OCT 23 1984

IN REPLY REFER TO
RDD21-47-rf
3900
24 SEP 1984

From: Commandant of the Marine Corps
To: Distribution List

Subj: REQUIRED OPERATIONAL CAPABILITY (ROC) FOR A 40MM HIGH
VELOCITY PRACTICE ROUND NO. INS 1.09

Ref: (a) MCO 3900.4B

Encl: (1) U.S. Army Training Device Letter Requirement (TDLR)
for a 40mm High Velocity Practice Round

1. The enclosure, the TDLR for a 40mm High Velocity Practice Round, meets the Marine Corps requirement with the following modifications:

a. Paragraph 4c, the first sentence shall read, "Initial training for...of both service and practice rounds."

b. Paragraph 5a shall read, "Have the basic...following service rounds:"

c. Paragraph 5c the second sentence shall read, "It is essential...visible at 1500 meters with..."

d. Paragraph 5d shall read, "cause barrel wear ... than that of service rounds."

e. Paragraph 5e shall read, "Provide a ballistics match to the service rounds."

f. Paragraph 5f shall read, "Provide a muzzle...that of service rounds."

g. Paragraph 5h shall have two sentences added as the first sentences which will read, "A self destruct mechanism is desired in order to render nonfunctioning projectiles inert. In the event a self destruct mechanism is not adopted, or if adopted does not function, minimum hazard to troops is desired."

h. In place of Table 1 to Annex B, the following annual training requirements apply:

395,208	rounds	HEDP M430 x \$18.50	= \$7,311,348
681,408	rounds	Practice x \$10.29	= \$7,011,688
1,076,616	rounds	per year costing	\$14,323,036

Cost of training using service round only =
1,076,616 rounds x \$18.50 = \$19,917,396.
The source for training rates is MCO P8011.4G

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1. Table 2 of Annex B under column "COST ITEM," the eighth line shall read, "Annual Savings = \$9,690,000" vice "8,361,000."

2. In accordance with the procedures set forth in the reference, ROC No. INS 1.09 for a 40mm High Velocity Practice Round is hereby established and promulgated.

3. The sponsor at this Headquarters is the Deputy Chief of Staff for Plans, Policies and Operations (CMC (POG-33)).

Raymond H. Smith
COLONEL, FRANKLIN
BRIGADIER GENERAL, U.S. MARINE CORPS
DEPUTY CHIEF OF STAFF FOR AD&S

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ATTENTION OF:

ATIC-DST-PM

28 March 1983

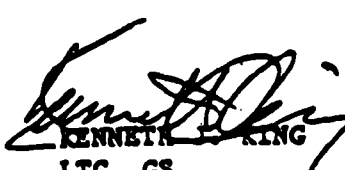
SUBJECT: Tri-Service Training Device Letter of Requirement (TDLR) for
40mm High Velocity Practice Round

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1. Reference Army Regulation 71-9, Materiel Objectives and Requirements, 16 April 1979.
2. Subject TDLR was approved by TRADOC 15 Nov 82 and by DARCOM 7 Feb 83, Enclosure 1. The following information is applicable to the document:
 - a. System Designation: Nonmajor.
 - b. Materiel Developer: DARCOM.
 - c. Combat Developer: TRADOC.
 - d. User Representative: TRADOC.
 - e. Trainer: TRADOC.
 - f. Logistician: USALEA.
 - g. Cards Reference Numbers: 1900R.
 - h. Operational Tester: TRADOC.
 - i. TRADOC Proponent: USAMPS.
3. Subject requirement document is forwarded to major Army commands, other services, and other DOD agencies for appropriate action. It is forwarded to other addressees for information.

FOR THE COMMANDER:

1 Encl
as


KENNETH L. KING
LTC, GS
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40mm High Velocity Practice Round

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USACHLS (ATZN-CM-D/ATZN-CM-CT)

USATSCH (ATSP-TD-PT)

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40mm High Velocity Practice Round

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TRI-SERVICE TRAINING DEVICE LETTER OF REQUIREMENT

for

40mm HIGH VELOCITY PRACTICE ROUND

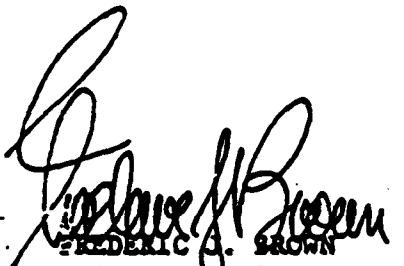
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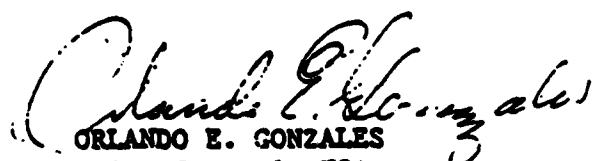
Commander, US Army Training and Doctrine Command

and

Commander, US Army Materiel Development and
Readiness Command

1. The undersigned agree that a program should be initiated forthwith to meet the requirement outlined in the inclosure. Validated cost data has been provided in the TDLR.
2. The TDLR is subject to review at any time, but annually as a minimum, at the request of either consignatory.


FREDERIC J. BROWN
Major General, GS
Deputy Chief of Staff
for Training
Date 15 Nov 82


ORLANDO E. GONZALES
Major General, USA
Director, Development,
Engineering and Acquisition
Date 4 Feb 83

Encl 1

TRI-SERVICE TRAINING DEVICE LETTER REQUIREMENT (T-STDLR)

1. Title of the Item: Forty Millimeter High Velocity Practice Round (40mm HVPR).

2. Statement of Need:

a. There is currently no effective 40mm High Velocity Practice Round. The use of service ammunition in training is not always desirable due to cost and range limitations. The 40mm HVPR is needed in order to maintain training proficiency on 40mm high velocity systems at a minimum cost to the US Government.

b. CARDS Reference Number:

3. Justification:

a. The MK19 MOD 3 40mm grenade machinegun will be fielded in FY 85. The weapons will be employed by combat, combat support, and combat service support units of the Army, the Air Force Security Police, and within US Marine Divisions. The weapons will be used to support land combat in static and mobile modes of operation. Training for personnel employing the weapon will consist of initial qualification training and periodic familiarization training. The use of service ammunition, high explosive, makes it very difficult for units to locate adequate range facilities for training. Additionally, the service round creates a "dud" hazard on a range, which severely restricts the training on the weapon and the range. A training round is needed to provide an effective, low cost alternative to using service ammunition for training on the 40mm grenade machinegun.

b. Military Occupational Specialty Code (MOSC) device supports a wide variety of MOSC personnel from within DOD.

4. Basis of Issue:

a. Air Force: The 40mm HVPR will be used in lieu of service ammunition for initial and recurring qualification training. Service ammunition may still be used for portions of qualification training where adequate range facilities are available. It will be used by units tasked under Air Base Ground Defense and Ground Launched Cruise Missile (GLCM) programs. Initial qualification will be conducted at the Security Policy Academy, Lackland AFB, Texas or designated Tactical Air Command (TAC) ranges. Recurring training would be conducted at these locations and at others designated by using Major Air Force Commands.

b. Army: The 40mm HVPR will be used in lieu of service ammunition for portions of qualification and familiarization training. Training practice rounds will be used in support of the Army Training Evaluation Program (ARTEP) tasks requiring high explosive projectiles. The 40mm HVPR will be used in institutional training.

c. Marines: Initial training for MK19 guncrews will be accomplished through current training establishments with a mix of both standard combat and practice rounds. Subsequent training and requalification will also utilize both types of ammunition, dependent upon the nature and availability of range facilities.

5. Principal Characteristics:

a. Have the basic configuration as the following standard 40mm high velocity rounds:

- (1) M383, 40mm HE Cartridge
- (2) M384, 40mm HE Cartridge
- (3) M430, 40mm HEDP Cartridge

b. Be capable of firing from the following weapon systems:

- (1) MK19 MOD 1 40mm Grenade Machinegun
- (2) MK19 MOD 3 40mm Grenade Machinegun
- (3) M129 40mm Grenade Launcher (Helicopter)

c. Upon impact, provide flash, sound, and visual signature to simulate impact of a high velocity projectile for day and night firings. It is essential that the projectile produce sufficient noise and flash to be audible and visible at 1,500 meters standard atmospheric conditions on level terrain.

d. Cause barrel wear no greater than that of standard high velocity rounds.

e. Provide a ballistics match to the service round.

f. Provide a muzzle signature and weapon recoil similar to that of standard service rounds.

g. The training round should offer no danger to the firer in the event of premature functioning of the projectile

h. All nonfunctioning projectiles are desired to be stable to permit removal from the range facility for destruction. As a minimum, the non-functioning projectiles must present a minimum hazard if functioning occurs when stepped upon by troops engaged in training activities within the impact area. This minimum hazard is defined as the probability that injury received from the practice cartridge will cause permanent physical injury. The goal for the minimum hazard is one in 1,000,000.

1. Color coding and marking of the round must be in accordance with MIL STD 709C and MIL STD 1168A.

j. Be linked and packaged similar to the service rounds.

k. Be safe to transport, handle, and store.

l. Cause no additional environmental impacts beyond that of the standard service rounds. A goal for this cartridge is to reduce the environmental impacts caused by training on the 40mm machinegun. The cartridge and packing material will not include any substance known to have carcinogenic properties.

m. Reliability, Availability and Maintainability (RAM):

(1) Reliability. The Minimum Acceptable Value (MAV) over the life of the system is 300 mean rounds between operational mission failure. The Best Operational Capability (BOC) over the life of the system is 400 mean rounds between operational mission failure.

(2) Maintainability and Availability Parameters. These parameters are determined to be noncritical for the training cartridge.

n. A desirable feature of the HVPR is to produce it at no more than 50% of the cost of producing the service round (for large production quantities).

6. Testing Required: Planned development schedule for the 40mm HVPR is as follows:

FY 83	FY 84	FY 85	FY 86
AD	AD	ED	
			DT/OT II
			DEVA-IPR
			TC-Standard

Applicable Milestones are:

TDLR Approved	3Q FY 82
Advanced Development Initiated	4Q FY 83
DT/OT II Initiated	3Q FY 86
DT/OT II Completed	3Q FY 86
VR/DEVA-IPR	4Q FY 86
TC-Standard	4Q FY 86

7. Logistics Support Implications:

a. Logistic Concept: 40mm HVPR rounds will be designed to simulate as close as possible the same features and characteristics as the respective service rounds so that the training value using 40mm HVPR will be identical to the service ammunition. The logistic concept to support and maintain

40mm HVPR should be the same as that of the service ammunition, to include accountability, handling, resupply, and maintenance. Future allocations of training unique and service ammunition will be within guidelines of TRADOC Circular 25-3, Training Ammunition.

b. Potential Logistic Problems. There should be minimal logistic problems related to the total quantity of ammunition for training in the logistic system, as the 40mm HVPR will be substituted for the service ammunition.

c. Preferred limits on the need for logistic support element resources: 40mm HVPR maintenance will be performed by the same organizations which maintain the service ammunition. This is currently the TOE 9-64 and TOE 9-74, Conventional Ammunition Companies.

d. The round must be provided with a suitable maintenance package to include operation and maintenance instructions in appropriate Skill Performance Aids (SPAS) format.

8. Training Assessment: There should be no impact on operator and maintenance personnel training since the 40mm HVPR is to be designed to simulate the service round.

9. Manpower/Force Structure Assessment: The 40mm HVPR will be a substitute item for the service cartridge in normal weapon training. While procurement of the 40mm HVPR may not reduce the buy quantity of service cartridges, the only impact would be associated with storage space for the training cartridge. The marginal increase in manpower for the practice cartridge as opposed to the service cartridge would be associated with inventory control and accountability.

10. Other Service or Allied Nation Interest: This is a Tri-Service program. No known training cartridge of this type exists in the free world which could meet this requirement.

11. Life Cycle Cost Assessment: See attached Appendix 1, LCCA for the Tri-Service Training Device Letter Requirement.

APPENDIX 1

LIFE CYCLE COST ASSESSMENT

for

THE TRI-SERVICE TRAINING DEVICE LETTER REQUIREMENT

a. Summary of estimated life cycle costs as expressed in constant FY-82 dollars and current (inflated) (\$M-Millions).

	CONSTANT DOLLARS			CONSTANT DOLLARS		
	<u>Low</u>	<u>Most Likely</u>	<u>High</u>	<u>Low</u>	<u>Most Likely</u>	<u>High</u>
R&D	1.44	1.60	1.76	1.48	1.64	1.80
INVESTMENT	7.25	8.05	8.85	9.44	10.48	11.52
O&S (20 Yrs)	-	-	-	-	-	-
TOTAL	8.69	9.65	10.61	10.92	12.12	13.32

NOTE 1: Quantity of Prototype(s) 5000

NOTE 2: Sunk Costs (Excluded from Paragraph a).

a. R&D (Actual) \$ 0. R&D (FY-82) \$ 0

b. INVESTMENT (Actual) \$ 0. INVESTMENT (FY-82) \$ 0

c. Quantity/unit costs, estimated unit/system flyaway and unit/system procurement costs expressed in constant FY82 dollars.

<u>ITEM</u>	<u>QUANTITY</u>	<u>UNIT FLYAWAY</u>	<u>UNIT PROCUREMENT</u>
40mm PRAC.	200,000/yr	\$ <u>6.45</u>	\$ <u>6.45</u>

c. Recommended funding profile expressed in constant FY82 dollars and current (inflated) dollars (\$M-Millions).

3D0401
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	<u>FY-82</u>	<u>FY-83</u>	<u>FY</u>	<u>FY</u>	<u>FY</u>	<u>OYC</u>	<u>TOTAL</u>
<u>R&D PHASE</u>							
ROTE							
APPROVED PROG (CUR)	0	0					0
ESTIMATE (CUR)	1.0	.64					1.64
ESTIMATE (CON)	<u>1.0</u>	<u>.6</u>					<u>1.60</u>

	<u>FY-85</u>	<u>FY-86</u>	<u>FY-87</u>	<u>FY-88</u>	<u>FY-89</u>	<u>OYC</u>	<u>TOTAL</u>
<u>INVESTMENT PHASE</u>							
QTY	200K	200K	200K	200K	200K		1 M
APPROVED PROG (CUR)	0	0	0	0	0		0
ESTIMATE (CUR)	2.99M	1.75M	1.83M	1.91M	2.00M		10.48M
ESTIMATE (CON)	<u>2.49M</u>	<u>1.39M</u>	<u>1.39M</u>	<u>1.39M</u>	<u>1.39M</u>		<u>8.05M</u>

NOTE 3: Source document for QTY is not available.

NOTE 4: Inflation has been incorporated in accordance with DRCCP-ER, HQTS
DARCOM inflation guidance dated 13 Aug 81.

NOTE 5: Cost estimates are validated at level _____

by _____ on _____ and HQ DARCOM on _____.

OYC - Out year costs



ANNEX A
COORDINATION ANNEX

This requirement document has been coordinated with commands and agencies listed below.

<u>Command/Agency</u>	<u>Concur</u>	<u>Nonconcur</u>	<u>Comments</u>		
			<u>Number</u>	<u>Accepted</u>	<u>Not Accepted</u>
WESTCOM	X				
Eighth USA	X				
CINCUSAREUR & Seventh Army	X				
USA Log Ctr	X		2	2	
DARCOM	X				
FORSCOM	X				
USA LEA			9	9	

ANNEX B

TRAINING DEVICE STUDY (TDS)

Cost and Training Effectiveness Analysis (CTEA) for a 40mm High Velocity Practice Cartridge

1. Introduction.

a. The Training Device Requirement for a 40mm High Velocity Practice Cartridge was initiated to provide the Army with a safe, effective and possibly less costly means of conducting training on 40mm high velocity grenade machineguns and launchers. This CTEA will focus primarily on the use of the training cartridge in 40mm grenade machineguns.

b. High Velocity 40mm weapons have been used in numerous roles within the Department of Defense (DOD) over the past 15 years. The most predominate weapons were the M129 grenade launcher mounted on the Army's Cobra attack helicopter and the Navy's MK19 MOD 1 40mm grenade machinegun mounted on selected boats/ships. Familiarization and qualification training was conducted with service ammunition because no high velocity 40mm training cartridge was available.

c. During early 1978, the US Army Military Police School conducted a hands-on evaluation on the Navy's MK19 MOD 1 40mm grenade machinegun as an area suppression weapon for various land combat missions. The success of this evaluation led to the development of a Required Operational Capability (ROC) to adopt the weapon into the Army weapons inventory. The ROC was approved by HQDA in May 1980 and the weapon was subsequently adopted by other Army service schools, the US Air Force Security Police, and the US Marine Corps.

d. During the development of the Army's Individual Collective Training Plan (ICTP) for the MK19 weapon, it was recognized that the training on the weapon would be greatly enhanced with an effective training cartridge. This need was strongly reinforced by the USAF as they cited specific problems associated with firing the service ammunition in various geographic locations.

2. Statement of Training Effectiveness.

a. Through its inherent design, the training practice cartridge will provide characteristics which will simulate the performance of the service cartridge. While efforts are currently underway within the USAMPS to develop the qualification standards for the 40mm machinegun, the practice cartridge will be used during familiarization firings and selected segments of qualification firing.

b. The training benefit from the practice cartridge should equal or exceed that for the service ammunition. Of prime importance is the fact that

the US Army Armament R&D Command estimates the practice cartridge will cost approximately one-half of the service round. This allows the option of doubling the amount of hands-on training for a fixed dollar expenditure of ammunition consumption.

c. Another aspect of the training effectiveness is that of safety. Historically, training with 40mm grenade launchers and machineguns has been conducted with service ammunition. Due to the "dud" hazard associated with unexploded 40mm projectiles, the impact area is not until cleared by EOD personnel. The 40mm "duds" offer a serious threat to handling by untrained personnel. The training practice cartridge will significantly reduce the safety hazard associated with 40mm ammunition. By design, any unexploded 40mm training practice projectiles shall be safely removed from the impact area for eventual destruction. They will also be inherently safe whereas to provide a minimum hazard if functioning occurs when stepped upon by troops engaged in training activities within the impact area.

3. Cost Analysis.

a. The life cycle cost analysis is based on using the training practice cartridge for all familiarization firings and for selected portions of qualification firings. The analysis includes Active Army and Air Force units. While it is applicable to National Guard and Reserve components, the delayed fielding of the 40mm weapons to these units would make any cost estimates highly subjective.

b. Active Army - Resident:

(1) BCT. No familiarization/qualification training envisioned.

(2) OSUT. MP students (MOS 95B) will receive training and weapon operations, maintenance, and firing. Approximately 25 rounds per student will be fired during the familiarization training. It has been estimated that approximately 10,000 students will receive this training each year for the period FY 84-94. All of this training could be conducted with training cartridges.

$$\text{Annual Consumption} = 10,000 \frac{\text{students}}{\text{year}} \times 25 \frac{\text{training cartridges}}{\text{student}}$$

$$\text{Annual Consumption} = 250,000 \frac{\text{training cartridges}}{\text{year}}$$

(3) Advanced NCO, Officer Basic, and Officer Advanced. Training will concentrate on tactical employment, weapon operation, and weapon maintenance.

c. Active Army - Unit. Qualification on the 40mm machinegun will be a unit responsibility. Personnel that have previously qualified with the weapon will normally be able to complete familiarization and qualification with approximately 100 rounds of ammunition. However, due to turnover of personnel, approximately 25% of those attending the semiannual will not have

completed the qualification training. In those cases, approximately 200 rounds will be required to familiarize and qualify. At least 80% of firings can be accomplished utilizing the training practice cartridge. The semi-annual round expenditure for units is estimated as:

$$\begin{aligned}
 \text{Semiannual Ammo Expenditure} &= \left(\frac{\# \text{Active Army Weapons}}{2500 \text{ wpns}} \right) \left[\left(\frac{\# \text{Gunners Weapon}}{2 \text{ gunners weapon}} \right) \left((.75) 100 \left(\frac{\text{rounds weapon}}{\text{gunner}} \right) + .25 \left(200 \frac{\text{rounds weapon}}{\text{gunner}} \right) \right) \right] \\
 &= \left(\frac{2500 \text{ wpns}}{2500 \text{ wpns}} \right) \left(\frac{2 \text{ gunners weapon}}{2 \text{ gunners weapon}} \right) \left(125 \frac{\text{rounds}}{\text{gunner}} \right) \\
 &= 625,000 \text{ rounds}
 \end{aligned}$$

∴ Annual Ammo Expenditure = 1,250,000

Training Cartridges Consumed = Annual Ammo Expenditure X 80%
= 1,000,000 training cartridges per year

Service Cartridges Consumed = 250,000 cartridges per year

d. USAF Initial and Recurring Qualification Training. The USAF training strategy for the 40mm grenade machinegun does not differ significantly from that for the Army. From the Army estimates of annual consumption, 2,500 weapons would consume 1,025,000 training cartridges per year (25,000 + 1,000,000). Using an analogy, the Air Force's 1,000 weapons should consume approximately 410,000 training cartridges per year for training. Also, 90,000 service cartridges will be consumed.

e. Summary. The projected consumption for the two training strategies is shown at Tables 1 and 2.

f. Recommendation. Based on the projected savings of Table 2 and the improved safety aspects of the training round, that the 40mm high velocity training round be developed and fielded.

TABLE 1

**Annual Consumption and Cost of 40mm Cartridges
under Alternative Training Strategies**

<u>Training Type/Location</u>	<u>Training Strategy</u>		
	<u>Combination Training Practice/Service Cartridge</u>		<u>Service Cartridge Only</u>
	<u>Trng Practice</u>	<u>Service</u>	
Active Army-Resident MP OSUT	250,000		250,000
Active Army- Unit	1,000,000	250,000	1,250,000
USAF	<u>410,000</u> <u>1,660,000</u>	<u>90,000</u> <u>340,000</u>	<u>500,000</u> <u>2,000,000</u>

Annual Cost of Training Strategy

$$\begin{aligned}
 \text{Cost of Combination Strategy} &= 340,000 \frac{\text{Service rounds}}{\text{year}} \times \left(\$12.00 \frac{\text{per service round}}{\text{round}} \right)^1 + 4080 \\
 &\quad 1,660,000 \frac{\text{training cartridges}}{\text{year}} \times \left(6.00 \frac{\text{per training cartridge}}{\text{cartridge}} \right)^2 = 9960 \\
 &= \underline{\underline{\$14,040,000 \text{ per year}}}
 \end{aligned}$$

Cost of Service Cartridge Only Strategy =

$$\begin{aligned}
 &2,000,000 \frac{\text{Service Rounds}}{\text{year}} \times (\$12.00 \text{ per Service Round})^1 \\
 &= \underline{\underline{\$24,000,000 \text{ per year}}}
 \end{aligned}$$

¹Cost based on projected cost of M384 Cartridge (FY 81 Constant) Source USARRADCOM

²Cost based on estimate that training cartridge will be produced at 50% of cost of producing service cartridge (FY 81 Constant)

TABLE 2

Life Cycle Cost Analysis

40mm Training Practice Cartridge (TPC) vs Service Cartridge (SC)
 (FY 81 Constant, 10-Year Period, FY 84-94)

Training Strategy

<u>Cost Item</u>	<u>Combination Training Practice/Service Cartridge</u>	<u>Service Cartridge Only</u>
Nonrecurring Costs		
RDTE*	\$ 1,600,000	0
Production/Capital Equip*	1,100,000	0
Recurring Costs		
Ammunition Costs (See Table 1)	\$140,400,000	240,000,000
• Total LC Costs	\$143,100,000	240,000,000

Annual Savings = \$8,361,000

Total 10-Year Savings = \$96,900,000

Annual Savings = \$9.69 MIL

*ARRADCOM Cost Estimates

APPENDIX 1

LIFE CYCLE COST ASSESSMENT

for

THE TRI-SERVICE TRAINING DEVICE LETTER REQUIREMENT

a. Summary of estimated life cycle costs as expressed in constant FY-82 dollars and current (inflated) (\$M-Millions).

	CONSTANT DOLLARS			CONSTANT DOLLARS		
	<u>Low</u>	<u>Most Likely</u>	<u>High</u>	<u>Low</u>	<u>Most Likely</u>	<u>High</u>
R&D	1.44	1.60	1.76	1.48	1.64	1.80
INVESTMENT	7.25	8.05	8.85	9.44	10.48	11.52
O&S (20 Yrs)	-	-	-	-	-	-
TOTAL	8.69	9.65	10.61	10.92	12.12	13.32

NOTE 1: Quantity of Prototype(s) 5000

NOTE 2: Sunk Costs (Excluded from Paragraph a).

a. R&D (Actual) \$ 0. R&D (FY-82) \$ 0

b. INVESTMENT (Actual) \$ 0. INVESTMENT (FY-82) \$ 0

3. Quantity/unit costs, estimated unit/system flyaway and unit/system procurement costs expressed in constant FY82 dollars.

<u>ITEM</u>	<u>QUANTITY</u>	<u>UNIT FLYAWAY</u>	<u>UNIT PROCUREMENT</u>
40mm PRAC.	200,000/yr	\$ <u>6.45</u>	\$ <u>6.45</u>

c. Recommended funding profile expressed in constant FY82 dollars and current (inflated) dollars (\$M-Millions).

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F. W. W. H.
July 3, 1983
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1-23-83 TWX
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