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

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IN REPLY REFER TO

RDD21-1-16-dmb
27 SEP 1983

AD-A135 885

From: Commandant of the Marine Corps
To: Distribution List

Subj: Required Operational Capability (ROC) No. INS 1.07 for Machine Gun, 40mm (Grenade), CARDS Reference Number 0253

Ref: (a) MCO 3900.4B

Encl: (1) Army Approved ROC for a Machine Gun, 40mm (Grenade)

1. The enclosure, the Army approved ROC for a Machine Gun, 40mm (Grenade), meets the Marine Corps requirement subject to the following:

a. Change Paragraph 1 to incorporate USMC requirements documents as follows:

"1. Statement of Need.

a. A need has been identified and documented by three separate studies for a weapon which will deliver accurate, intense and decisive firepower against enemy personnel and light armored vehicles during combat operations at ranges to 2,000 meters or more. The weapon will be used in both offensive and defensive operations.

b. Supporting Documents:

(1) USA Combined Arms Center, Rear Area Security Support, Threat Annex, April 1978.

(2) USMC Development Center, Marine Infantry Battalion, 1980-1990, 8 October 1980.

(3) USMC Development Center, Mission Area Analysis of Infantry Aspects of Close Combat, Volume I, 9 October 1980.

c. CARDS Reference Number: 0253."

b. Change Paragraph 2 to read, ". . . IOC 2QFY84."

c. Add to Paragraph 3: "c. Introduction of this weapon will provide U.S. Marine infantry units a capability, during both offensive and defensive operations, to engage and defeat high

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concentrations of personnel, light armored vehicles, and other hardened targets at extended ranges without significantly impairing mobility."

d. Change Paragraph 4b. to read as follows: "Organization concept. In the Army the weapon will be employed by selected combat, combat service, and combat service support units. The weapon will be a replacement for M2 .50 caliber machine guns in selected engineer units and for M60 machine guns in selected combat support/combat service support units. In the Marine Corps the weapon will be manned in the heavy machine gun section, weapons company and the headquarters and service company of the infantry battalion, the combat engineer battalion and other selected, combat and combat support units. Its primary employment includes the tactical environment of the offense, defense, retrograde, patrolling, rear area security, and special operations including military operations in urban terrain (MOUT) in all climates and geographical areas of the world. No additional operator personnel will be required. The Basis of Issue for the weapon and mount is documented in BOIP #79-0078-F."

e. Change Paragraph 5a (14) to read, "Weigh no more than 75.6 lbs unloaded."

f. Add to Paragraph 5a: "(19) Be capable of using the AN/TVS-5 Night Sight with a modified reticle."

g. Change Paragraph 6a, line 5 to read, "Of the weapons acquired and tested, U.S. Navy MK19 MOD 3 Machine Gun, using the M430 40mm High Velocity Rounds, meets the stated requirements."

2. In accordance with the procedures set forth in the reference, ROC No. INS 1.07 for a Machine Gun, 40mm (Grenade), is hereby established and promulgated.

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Eugene B. Russell

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DEPARTMENT OF THE ARMY
HEADQUARTERS UNITED STATES ARMY TRAINING AND DOCTRINE COMMAND
FORT MONROE, VIRGINIA 23651

ATCD-SA 21 July 1980

SUBJECT: Required Operational Capability for Machine Gun, 40mm (Grenade)

SEE DISTRIBUTION

1. Reference AR 71-9.

2. Subject ROC (Incl) was approved on 16 May 1980. The following information is applicable to this document:

a. System designation: Nonmajor (DA IPR approval).

b. Materiel Developer: USADARCOM.

c. Combat Developer: USATRADOC.

d. User Representative: USATRADOC.

e. Trainer: USATRADOC.

f. Logistician: USALEA.

g. CARDS Reference Number: 0253.

h. Operational Test Responsiblity: USATRADOC.

i. USATRADOC Proponent Activity: USAMPCMLSCH/TNG CTR.

3. Subject requirements document is forwarded to major Army commands, other services and other DOD agencies for harmonization and to all other addressees for information.

FOR THE COMMANDER:

ROBERT W. WELKER
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ATCD-SA 21 July 1980
SUBJECT: Required Operational Capability for Machine Gun, 40mm (Grenade)

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REQUIRED OPERATIONAL CAPABILITY
FOR
MACHINE GUN, 40MM (GRENADE)

1. State Of The Need.

a. A need has been identified (USA Combined Arms Center, Rear Area Security Support, Threat Annex, April 1978) for a weapon to deliver accurate, intense, decisive firepower against enemy personnel and light armor vehicles in support of combat operations in rear areas. The weapon will be utilized in mobile and static (base defense) missions. → 40 p. D-1

b. CARDS Reference Number: 0253.

2. Timeframe: IOC 1QFY84.

3. Threat/Operational Deficiency.

a. The rear area in the theater of operations is characteristically devoid of combat forces; therefore, combat support/combat service support (CS/CSS) units must be armed to defend themselves and to delay or defeat enemy advances. The threat includes airmobile, airborne, and naval amphibious strike forces equipped with automatic weapons and lightly armored fighting vehicles. The enemy fighting vehicles mount weapons with effective ranges of approximately 1500 meters and anti-Tank Guided Missiles (ATGMs). Current Table of Organization and Equipment (TOE) weapons in CS/CSS units are inadequate against this threat.

b. The introduction of this weapon into US units will help to correct the documented deficiency in the firepower of many CS/CSS units. Its simplicity of design and operation will provide significant increase in unit firepower with minimum amount of initial and repetitive training.

4. Operational/Organizational Concept.

a. Operational concept. The weapon is required during mobile operations which include reconnaissance/surveillance, patrolling, movement of supplies (convoys or infiltration), and unit movements. The weapon is used to deliver immediate suppressive and destructive fires in the event of ambushes and meeting engagements and for suppressing enemy anti-tank guided missile gunners and ambushers. The weapon will enhance offensive capabilities by providing a base of fire for maneuver elements or to conduct fire and movement tactics. Static missions for the weapon include base defense operations and point security. The weapon, with capability to fire HEDP rounds, will be particularly valuable in maximizing unit/elements defensive capability with minimal personnel resources. This aspect especially is advantageous in rear area combat operations in which

CS/CSS must accomplish primary support missions and simultaneously achieve optimum self-defensive capability. The weapon permits otherwise lightly armed support personnel to defend against a wide spectrum of OPFOR ground elements to include dismounted infantry and motorized infantry mounted in lightly armored fighting vehicles.

b. Organization concept. The weapon will be employed by selected Combat, Combat Service, and Combat Service Support units. The weapon will be a replacement for M2 .50 caliber machine guns in selected Engineer units and for M60 machine guns in selected Combat Support/Combat Service Support units. Its primary employment includes the tactical environment of defense, retrograde, patrolling, rear area security, and special operations including Military Operations in Urban Terrain (MOUT) in all climates and geographical areas of the world. No additional operator personnel will be required. The Basis of Issue for the weapon, charger, and adapter are documented in BOIP #79-0078-F.

5. Essential Characteristics.

a. Performance Characteristics. The weapon must:

(1) Be capable of firing from both the High Mobility Multi-Purpose Wheeled Vehicle (HMMWV, NOTE: Tri-Service program of which the Army's XM966, High Mobility Weapons Carrier (CARDS Ref. No. 0243 was incorporated) and the M151 1/4 ton (with M4 pedestal)). The HMMWV will be equipped with a universal type 34" diameter ring mount.

(2) Be capable of being removed from the HMMWV mount and fired from a ground mount by gun crew in less than five minutes. Ground mount shall be the M3 tripod mount.

(3) Fire in both full automatic and semi-automatic modes.

(4) Be self-powered and air cooled.

(5) Be capable of being manually charged by the lower 10th percentile soldier, while the weapon is mounted on the HMMWV.

(6) Fire a cyclic rate of 300-400 rounds per minute.

(7) Be equipped with a graduated leaf/blade sight.

(8) Have a maximum range of at least 2200 meters.

(9) Have a minimum range of 20 meters.

(10) Be capable of defeating lightly armored vehicles upon impact out to the maximum range. This defeat is defined as a mobility or firepower kill.

(11) Be capable of defeating exposed personnel within 12-15 meters of impact out to the maximum range.

(12) Have a range probable error (PE) of less than 4.5 meters, horizontal and 24.5 meters, vertical, from a fixed mount at a range of 1500 meters.

(13) Accept a 50 round ammunition box.

(14) Weigh no more than 56 lbs unloaded, including charger.

(15) Be capable of being stored and operated in climatic design type areas hot, basic, cold, and severe cold as defined in AR 70-38.

(16) Nuclear survivability is not required because the system is not critical to mission accomplishment in a nuclear conflict.

(17) Operable by personnel wearing protective equipment required for the NBC environment and cold weather. Finish of weapon shall not be affected by normal decontamination procedures. No unique decontamination will be required.

(18) There shall be minimum degradation of this weapon when operating in a non-nuclear environment.

b. Reliability and Maintainability. Per AR 702-3, Section VI, the weapon is categorized as a nondevelopmental item and shall be treated accordingly. The weapon shall have, as a minimum, a Mean Round Between Stoppage (MRBS) of 1100 and a Mean Round Between Failure (MRBF) of 3300 rounds over the minimum receiver service life of 25000 rounds. Barrel life shall be 10000 rounds minimum, when fired at a cyclic rate. Weapon shall be capable of having stoppages cleared and changed by operator.

6. Technical Assessment.

a. This acquisition is considered to be of a low risk nature. Testing shall be limited to the minimum required to assure that the weapon conforms to Army requirements for type classification and fielding. Because of the urgent requirement to counter the threat, DOD and friendly nations inventories were surveyed. Of the weapons acquired and tested, US Navy MK 19 MOD 1 Machine gun, using the standard 40mm High Velocity Rounds, meets the stated requirements. This weapon has acceptable human factor characteristics demonstrated through its 10 years of employment by the US Navy and Allied countries.

b. The Cartridge, 40mm: HEDP, M430 is the preferred round of ammunition for the MK 19 MOD 1 Machine gun and is the only Standard A round in this family of munitions. The M430 Cartridge has the anti-personnel capabilities of the M383 Cartridge for suppression with the additional capability to defeat soft targets such as trucks, POL dumps and lightly armored

vehicles. This dual purpose is capable, at any range to its maximum of 2200 meters, of penetrating at least two inches of homogeneous armor plate at 0^{0} angle of obliquity and inflicting personnel casualties in the vicinity of the target. For the M383 and M430 Cartridges, there exists a high degree of commonality and producibility.

7. Logistics Assessment.

a. Existing technical manuals and related material will be revised to conform to current specifications for Skill Performance Aids (SPAS) or publications of tri-service format. The Logistical Support Package will be available for confirmatory testing prior to type classification.

b. Maintenance concept.

(1) Organizational Maintenance. Normal preventive and scheduled maintenance, including periodical disassembly of the weapon to include barrel change, will be performed by the crew/operator. Maintenance tasks, on demand, including replacement of certain components, will be accomplished by the unit armorer, MOS 76Y.

(2) Direct Support and General Support. These levels of maintenance will include repair and/or replacement of components or parts. They will service the overflow of organizational maintenance as required. Repairs will be accomplished by Small Arms Repairmen, MOS 45B.

(3) Depot Support. Depot support will include the overhaul of weapons as required.

(4) US Army Supply Support will conform to that in effect during the life of the weapon.

8. Training Assessment.

a. The materiel developer and TRADOC proponent will develop a complete training subsystem to support the weapon. This training subsystem will include all training devices and materials necessary to provide individual and collective training in both institutes and units. As the results of a Cost Training Effectiveness Analysis, TRADOC will initiate necessary Training Device Requirements for training rounds or subcaliber devices.

b. The materiel developer and combat developer will evaluate adequacy of currently available technical documentation on the weapon. This evaluation will result in a determination that current documentation be converted to (1) Skill Performance Aids (SPAS) format or into Tri-Service format; (2) A list of Critical Tasks.

c. The TRADOC proponent will provide the DARCOM developer with

information on the target user population and will assist the materiel developer in identifying any unusual training requirements inherent in the intended user population.

d. The TRADOC proponent will prepare/update the Individual and Collective Training Plan (ICTP) which will describe all system training requirements. The ICTP will specify MOS, skill levels, jobs, and tasks to be trained using SPAS materiels and will also describe the requirements for materiel developer training for service school staff and faculty.

e. The TRADOC proponent will develop training products not included in the SPAS package or developed by the materiel developer as a result of a DARCOM/TRADOC agreement. These products include the ARTEP, SQT, Soldier's Manuals, TEC materials, and motion pictures.

f. TMs and training materials developed by the materiel developer will be made available to the TRADOC proponent school in sufficient time to allow preparation of the Training Test Support Package to support required testing.

g. All elements of the training support package for individual and collective training will be available in final form before IOC.

9. Manpower/Force Structure Assessment.

a. Operators. No significant impact will be experienced by introduction of this weapon into the Army force structure. Under current concepts, weapon will be a replacement for current crew-served weapon in designated units. In these units, crews will retain normal functions to utilize weapon. In those units where the weapon is a new issue, it will be utilized, on demand, by a wide variety of MOS personnel in a self-defense mode. Routine familiarization will be required on an annual or semiannual basis.

b. Maintenance. Based on preliminary QQPRI data, the weapon will require slightly more annual maintenance support than the M60 Machine gun. This is based on Manpower Authorization Criteria (MACRIT) data currently available on the M60. No additional organizational maintenance personnel will be required to support this weapon. For all of the weapons deployed in a corps, the cumulative increase in DS/GS maintenance will equate to one additional MOS 45B.

c. Supply. Introduction of this weapon will increase the workload of ammo resupply units. During peacetime conditions, this increase will equate to an additional .48 short tons (STONS) per day of Class V for all of the weapons in a corps. During combat, it is estimated that this increase will equate to between 33 STONS per day per corps depending on the frequency of attack to rear area assets. As a worse case comparison, the

33 STONS per day per corps equates to less than 1/2 of the 1% of the Class V used per division per day under similar conditions. No additional transportation equipment of personnel will be required. No unique handling procedures will be required as this ammunition has been in the Army inventory for the past 8-10 years.

10. Other Services or Allied Nation Interest. The US Navy's MK 19 MOD 1 is currently in use by the US Navy. The US Coast Guard is procuring the weapon to support various operations. The US Air Force Security Police have provided formal support of this requirement. Air Force employment concept for the weapon is similar to those of the Army. No allied nation has a weapon of this capability in development or production. The US manufactured weapon is currently in use by certain US allies. Interest by the Quadripartite of NATO Armies is probable.

11. COST ASSESSMENT

a. Summary of estimated life cycle costs as expressed in constant FY 80 dollars and current (inflated) ($M-Millions).

	CONSTANT DOLLARS			CURRENT DOLLARS		
	Low	Most Likely	High	Low	Most Likely	High
R&D	---	---	---	---	---	---
INVESTMENT	25.680	27.031	28.383	30.264	33.627	36.594
O&S (20 Yrs)	29.840	31.410	32.981	62.084	65.352	68.620
TOTAL	55.520	58.441	61.364	92.348	98.979	105.214

NOTE 1: Quantity of Prototypes - 0

NOTE 2: Sunk Costs (Excluded from Paragraph a)

a. R&D (Actual) $ 0 . R&D (FY) $ 0 .

b. INVESTMENT (Actual) $ 0 . INVESTMENT (FY) $ 0 .

b. Quantity/unit costs, estimated unit/system flyaway and unit/system procurement costs expressed in constant FY80 dollars (notes).

ITEM	QTY	UNIT FLYAWAY	UNIT PROCUREMENT
		$	$
MACHINE GUN		$	$
40mm (Grenade)	2000	$ 13,114	$ 13,514

c. Recommended funding profile (*) expressed in constant FY 80 dollars and current (inflated) dollars ($M-Millions).

NOTE 3: This estimate does not include $582,000 for 300 M4 Pedestals and 1000 M3 Tripods.

NOTE 4: Air Force anticipates a buy of 1500 each Mark 19 Grenade Launchers.

NOTE 5: Marine Corps anticipates a buy of 2800 ea Machine Gun system (MK19) 40MM Grenade.

R&D PHASE	FY80	FY81	FY82	FY83	FY84	OYC	TOTAL
RDTE							
APPROVED PROG (CUR)	0	0	0	0	0	0	0
ESTIMATE (CUR)	0	0	0	0	0	0	0
ESTIMATE (CON)	0	0	0	0	0	0	0
***VARIANCE ( )	0	0	0	0	0	0	0
	FY80	FY81	FY82	FY83	FY84	OYC	TOTAL
INVESTMENT PHASE							
**QTY	0	25	900	900	175	0	2000
APPROVED PROG (CUR)	0	0	0	0	0	0	0
ESTIMATE (CUR)	.546	1.190	13.851	14.874	3.166	0	33.627
ESTIMATE (CON)	.546	1.085	11.595	11.518	2.287	0	27.031
***VARIANCE ( )	.546	1.190	13.851	14.874	3.166	0	33.627

*All appropriations required in the R&D and Investment phase should be shown (i.e., RDTE, OPA, MGM, OMA, MPA, etc.)

** QTY refers to quantity of major items procured in referenced FY.

***If approved program is in currently (inflated) dollars, insert (CUR), otherwise, insert (CON). Variance should be the difference between the approved program and the cost estimate in the same (i.e., current or constant) type dollars.

NOTE 5: Source document for QTY is USAMPS MSG 272025Z Jun 79.

NOTE 6: Inflation has been incorporated in accordance with DRCCP-ER Ltr issued on 2 May 1980.

OYC - Out Year Cost

ANNEX A

COORDINATION ANNEX

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

Command/Agency	Concur	Nonconcur	COMMENTS Number	Acceptable	Nonacceptable
USAREUR & 7th Army					
USREDCOM					
USA CINCPAC Spt Gp	X		6	5	1
DARCOM	X (LR rewritten into ROC w/DARCOM reps)				
FORSCOM					
USACC					
USAINSCOM					
USARJ					
Eighth USA	X		0		
USA HSC					
USAOTEA	X		10	10	
USACC					
USALEA	X		3	3	
TAC (DRP)					
Dir, MTMC, TEA	X				
Dir, DMATC					
Comdt of the Marines					
CG Marine Corps Dev Ctr					
CNO					
CSAF	X		3	3	

NOTE: All other addressees have not responded and after 45 days concurrence is assumed.

NON-ACCEPTABLE COMMENTS: WESTPAC (ADOP-FD) comment dealing with short barrel length (12") being a hazard if weapon is firing while vehicle is moving.

RATIONALE FOR NON-ACCEPTABLE: The weapon, when seated on the pintle mount, is far enough forward that muzzle blast has not been a problem in informal testing completed to date.

ANNEX B

COEA ANNEX

1. PURPOSE:To analyze the alternatives to meet the Army's requirement for a weapon to be employed by CS/CSS units against the rear area threat.

2. BACKGROUND: Evolution of concepts for Rear Area Combat Operations (RACO) stress an immediate need to upgun combat support/combat service support (CS/CSS) units to provide them a greater degree of self-protection from threat forces.

3. WEAPON CRITERIA: Based on tactical and operational characteristics of CS/CSS units, the primary criteria for the weapon requires it to:

a. Be readily available.

b. Provide the terminal effects to defeat threat personnel and lightly armored vehicles.

c. Be easily maintained and operated.

d. Be readily transportable.

4. ALTERNATIVES:

a. There are currently a number of weapons in the Army inventory that could be rapidly issued to CS/CSS units to increase their organic firepower. Primary candidates include the M2 .50 cal machinegun and the M60 7.62mm. Both of these weapons will suppress enemy personnel but are totally ineffective against lightly armored vehicles.

b. Previous effort to improve the terminal effects of the .50 cal against light armor resulted in a high cost round which possessed marginal effectiveness.

c. A technical assessment of the requirement identified a grenade machinegun as a feasible solution. Currently there are two greanade machineguns in the free world that could meet the stated performance requirement. First is the XM176 40mm prototype weapon. This weapon was developed by the Army from 1968-1974 and would require additional R&D prior to type classification and fielding. The second weapon is the Navy's MK19 MOD 1 40mm (Grenade) machinegun. This weapon is currently being utilized by certain allied nations and other services and has an established production line.

5. COMPARISON OF EFFECTIVENESS:

a. Issue of the grenade machinegun for CS/CSS units will provide a significant increase in effectiveness against threat forces. Its deployment will be a new issue in 55% of the units, a replacement for the M60 in 35% of the units, and replacement for the M2 .50 cal machinegun in 10% of the units.

b. A comparison of the 40mm, M60, and M2 weapons are provided below in Table 1:

	TERMINAL EFFECTS @ 1000m AGAINST:	
WEAPON	PERSONNEL	LIGHTLY ARMORED VEHICLES
40mm Grenade Machinegun	Multiple Kill in 15-M Burst Radius	Kill given a hit
M-60 7.62	Not effective	Not effective
M-2 .50 cal	Kill given direct hit	Not effective

TABLE 1. Comparison of Weapon Characteristics.

c. The effectiveness of the 40mm grenade machinegun was demonstrated in a combined arms wargame of MP forces against representative threat forces. In this analysis, the effectiveness of MP forces was significantly improved when equipped with the M60 machinegun were replaced with 40mm grenade machineguns. Two measures of the increased effectiveness are documented in Table 2 below:

	MEASURES OF EFFECTIVENESS	
ALTERNATIVES	ENGAGEMENTS PER SCENARIO	ENEMY VEHICLES DESTROYED PER SCENARIO
MP Forces w/M60	104	15
MP Forces w/40mm	129	32
% Increase	+23%	+122%

TABLE 2. Comparison of Weapon Effectiveness in a Combined Arms Wargame.

6. COSTS: Based on a FY80 procurement of the M2 .50 cal machinegun, the unit production costs equate to $9323. This compares to $1530 for the M60 and $14,318 for the 40mm grenade machinegun system. The figure for the 40mm is a planning figure and may be significantly reduced through competitive procurement.

7. INTEGRATION OF COSTS AND EFFECTIVENESS: Comparison of the cost effectiveness of the M2, M60, and the grenade machinegun is a highly judgemental task. For the anti-personnel and non-armored vehicles, the M2 and M60 are a cost effective solution. However, when faced with lightly armored vehicles and helicopters (on the ground), the M2 and M60 have reduced effectiveness. This is a highly probable occurrance that necessitates the greater terminal effect of the 40mm grenade.

8. RECOMMENDATION: That the 40mm grenade machinegun be procured and issued to CS/CSS units.

ANNEX C

RATIONALE

1. PRINCIPAL CHARACTERISTICS:

a. Performance characteristics:

(1) to insure vehicle/weapon interfaces with vehicle currently authorized and allow for future vehicle/weapon interface requirements.

(2) To allow speedy relocation of the weapon into a ground defensive/offensive position or allow the gun crew to continue to operate the weapon if the vehicle is damaged.

(3) To allow delivery of accurate, intense, and decisive fire-power against enemy targets.

(4) To minimize support equipment requirements and maximize utilization of the weapon.

(5) To insure adequate operator/machine interface without changing personnel structure of using units.

(6) To bring intense and sustained fire-power on enemy targets.

(7) to facilitate unassisted daylight target sighting. Night firing will either be accomplished by use of existing night vision devices or by directing of fire by an assistant gunner. Ranging estimates will be obtained through the use of the AN/PVS-6 laser range finder.

(8) To allow operator to engage enemy threats at stand-off ranges while minimizing effectiveness of enemy return fire.

(9) To provide a margin of safety for user personnel.

(10) Required terminal effects of round.

(11) To outline Probable Error parameters and insure weapon accuracy.

(12) To provide automatic fire capability and allow ammunition box to be standardized.

(13) To insure gun crew can carry weapon and minimize stress on vehicle because of weapon weight. Weight requirement is for weapon, charger, and adapter.

(14) To meet operation requirements.

(15) Not tactically significant in a nuclear environment.

(16) To allow weapon operation by personnel wearing protective clothing.

(17) Statement of requirement for operation of the weapon in a non-nuclear environment.

ANNEX D

MANDATORY RAM RATIONALE ANNEX

1. BACKGROUND.

a. The Navy's MK 19 MOD 1 40mm (grenade) Machinegun has been identified as an ideal candidate weapon for this requirement. This weapon was type classified Standard for the US Navy in 1967 and is currently in production.

b. The weapon is currently in use by the US Navy, US Coast Guard, and certain Allied Forces.

c. The weapon has been subjected to numerous tests and evaluations during the past ten years for a variety of employment roles. A test of the weapon in a role envisioned by this requirement was accomplished with the weapon mounted on the Commander's station on the XM1 tank. The test was conducted by the US Armor Engineer Test Board in January 1977. In this test, the weapon demonstrated a mean rounds between stoppage of 1,100 rounds and a mean rounds between failure (MRBF) of 3,300 rounds. Failure definitions are contained in the above test report.

2. IMPACT ON MISSION ACCOMPLISHMENT.

a. Based on the operational mode summary (OMS) for the weapon at Exhibit 1, the weapon can be expected to fire approximately 270 rounds per mission. The worse case is for the reaction force mode and will require 400 rounds to be fired.

b. Based on the projected missions and test results, the following values were determined:

(1) P (Composite mission completed without failure) = .93

(2) P (Composite mission completed without weapon stoppage) = .78

(3) P (Worse case mission completed without failure) = .88

3. AVAILABILITY AND MAINTAINABILITY. Based on more than 10 years of service in the US Navy, the MK 19 MOD 1 has been assessed as having excellent maintainability characteristics. Its simplicity of design allows rapid field stripping and reassembly with a minimum of tools. Although no formal maintainability demonstration has been conducted on the MK 19 MOD 1, its mean-time-to-repair (MTTR) should be comparable with the M60 machinegun.

OPERATIONAL MODE SUMMARY

TARGETS

THREAT: Air dropped, air landed, or naval infantry conventional forces of up to division size. These forces will be equipped with TOE weapons and equipment. Platoon-sized special operations teams equipped with automatic weapons, small anti-tank weapons, and various explosives.

TASKS: 1. Support forward movement.
2. Rear area combat operations.

WEAPONS POSING THREAT TO SYSTEM (% UTILIZATION)

	CORPS (67%)	DIV REAR (22%)	DIV FWD (11%)
Small Arms	X	X	X
RPG/ATGM	X	X	X
Rcl Rifle	X	X	X
Mortars	X	X	X
Artillery		X	X
AFV	X	X	X
Mines	X	X	X
Tanks			X
Armed Helio	X	X	X
Tnc Air	X	X	X

Operational Mode	Relative % Time Employed	Average Man KM/Veh	% Rqr Fire/ Rnds Rqrd	% on Road Opns	Troops Rqd/Veh(3)	Avg/+2 Std Dev Missions Per Day
1. Circulation Control Posts (1 Veh Tm)(1)	25	21	10/100(4)	95	3	1/NA
2. Recon/Patrol/Security (3 Veh, 1 Sq)(1)	25	150	35/250(4)	80	3	3/5
3. RACO Reaction Force(2)	50(5)	31	90/400(4)	70	3	1/3

MOBILITY: A highly mobile vehicle. Off-road operating capability is essential when required. Operations in urban environment requires movement on roadways obstructed with rubble and having limited turning space, and constitutes 30% of all operational modes.

FIREPOWER: The HMWG, using fire and maneuver, must be able to suppress and reduce (or contain) an enemy force.

VISIBILITY: 30% of mission profile is accomplished in periods of limited visibility.

NOTE 1. These missions may be aborted and one or more vehicles and crew diverted to RACO when required.
NOTE 2. RACO forces are not a reserve. They are those elements which have completed a day's mission in other modes of operation. They are disbursed throughout the AO.
NOTE 3. One vehicle per squad transports the squad leader in addition to the regular 3 MP crew.
NOTE 4. Within basic load for organic weapon.
NOTE 5. RACO mission in normal sustained combat environment. Surge situations will increase the relative weight of the operational mode at the expense (degradation) of all other modes.