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**U.S. Army Research Institute
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Research Report 1526

**Army Aviation Ammunition and
Gunnery Survey.
Volume II: Final Report**

D. Michael McAnulty and Kenneth D. Cross
Anacapa Sciences, Inc.

and

Dickle J. DeRoush
Directorate of Gunnery and Flight Systems
Fort Rucker, Alabama

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June 1989

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EDGAR M. JOHNSON
Technical Director

JON W. BLADES
COL, IN
Commanding

Research accomplished under contract
for the Department of the Army

Anacapa Sciences, Inc.

Technical review by

Joan N. Blackwell
Gabriel P. Intano



Accession For	
NTIS	CRA&I <input checked="" type="checkbox"/>
DTIC	TAB <input type="checkbox"/>
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REPORT DOCUMENTATION PAGE				Form Approved OMB No. 0704-0188	
1a. REPORT SECURITY CLASSIFICATION Unclassified			1b. RESTRICTIVE MARKINGS ---		
2a. SECURITY CLASSIFICATION AUTHORITY ---			3. DISTRIBUTION / AVAILABILITY OF REPORT Approved for public release; distribution is unlimited.		
2b. DECLASSIFICATION / DOWNGRADING SCHEDULE ---					
4. PERFORMING ORGANIZATION REPORT NUMBER(S) ASI690-317-88			5. MONITORING ORGANIZATION REPORT NUMBER(S) ARI Research Report 1526		
6a. NAME OF PERFORMING ORGANIZATION Anacapa Sciences, Inc.		6b. OFFICE SYMBOL (if applicable) ---	7a. NAME OF MONITORING ORGANIZATION U.S. Army Research Institute Aviation Research and Development Activity		
6c. ADDRESS (City, State, and ZIP Code) P.O. Box 489 Fort Rucker, AL 36362-5000			7b. ADDRESS (City, State, and ZIP Code) ATTN: PERI-IR Fort Rucker, AL 36362-5354		
8a. NAME OF FUNDING / SPONSORING ORGANIZATION U.S. Army Research Institute for the Behavioral and Social Sciences		8b. OFFICE SYMBOL (if applicable) PERI	9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER MDA903-87-C-0523		
8c. ADDRESS (City, State, and ZIP Code) 5001 Eisenhower Ave. Alexandria, VA 22333-5600			10. SOURCE OF FUNDING NUMBERS		
	PROGRAM ELEMENT NO.	PROJECT NO.	TASK NO.	WORK UNIT ACCESSION NO.	
	63007A	795	411	C6	
11. TITLE (Include Security Classification) Army Aviation Ammunition and Gunnery Survey Volume II: Final Report					
12. PERSONAL AUTHOR(S) McAnulty, D. Michael and Cross, Kenneth D. (Anacapa Sciences, Inc.), and DeRoush, Dickie J. (U.S. Army Aviation Center, Directorate of Gunnery and Flight Systems)					
13a. TYPE OF REPORT Interim		13b. TIME COVERED FROM 87/02 TO 88/02		14. DATE OF REPORT (Year, Month, Day) 1989, June	15. PAGE COUNT 129
16. SUPPLEMENTARY NOTATION All research on this project was technically monitored by Mr. Charles A. Gainer, U.S. Army Research Institute Aviation Research and Development Activity (ARIARDA), Fort Rucker, AL.					
17. COSATI CODES			18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number)		
FIELD	GROUP	SUB-GROUP	Army aviation Aerial Gunnery		
05	08		Attack helicopters Standards in Training Commission		
			National Guard aviators (STRAC) (Continued)		
19. ABSTRACT (Continue on reverse if necessary and identify by block number) This research compiled an empirical data base on the current training of active U.S. Army (AA) and National Guard (NG) attack helicopter units and estimated the resource require- ments for qualifying and sustaining adequate levels of aviator gunnery proficiency. Separate versions of the Ammunition and Gunnery Survey were distributed to a sample of AA and NG aviators (Form A) and unit commanders (Form B). The aviators returned 810 usable Form A surveys (41% return rate). The unit commanders returned 127 usable Form B surveys (35% return rate). This report presents a summary of the major results of the survey data analy- ses. The primary conclusions drawn from the results are that (a) a substantial number of attack helicopter units are unable to meet the training standards with resources currently available to them, (b) gunnery ranges are not readily available to many units or have inade- quate scoring methods, (c) flight simulators are being used only to a moderate extent by AA aviators for gunnery training, and (d) the current ammunition authorizations approximate the minimum number of rounds needed to qualify and sustain the average aviator's gunnery skills. (Continued)					
20. DISTRIBUTION / AVAILABILITY OF ABSTRACT <input checked="" type="checkbox"/> UNCLASSIFIED/UNLIMITED <input type="checkbox"/> SAME AS RPT. <input type="checkbox"/> DTIC USERS			21. ABSTRACT SECURITY CLASSIFICATION Unclassified		
22a. NAME OF RESPONSIBLE INDIVIDUAL Charles A. Gainer, COTR			22b. TELEPHONE (Include Area Code) (205) 255-4404	22c. OFFICE SYMBOL PERI-IR	

ARI Research Report 1526

18. SUBJECT TERMS (Continued)

Gunnery ranges

Target effect scoring

Gunnery qualification

Gunnery skill sustainment

Training readiness condition (TRC)

Flight and weapons simulator (FWS)

Combat mission simulator (CMS)

19. ABSTRACT (Continued)

The limitations of the survey data and the need for experimental studies of training effectiveness are also discussed.

Research Report 1526

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D. Michael McAnulty and Kenneth D. Cross

Anacapa Sciences, Inc.

and

Dickie J. DeRoush

Directorate of Gunnery and Flight Systems

Fort Rucker, Alabama

ARI Aviation R&D Activity at Fort Rucker, Alabama

Charles A. Galner, Chief

Training Research Laboratory

Jack H. Hiller, Director

U.S. Army Research Institute for the Behavioral and Social Sciences

5001 Eisenhower Avenue, Alexandria, Virginia 22333-5600

Office, Deputy Chief of Staff for Personnel

Department of the Army

June 1989

Army Project Number
2Q263007A795

Training and Simulation

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FOREWORD

The Army Research Institute Aviation Research and Development Activity (ARIARDA) at Fort Rucker, Alabama, is an operational unit of the Army Research Institute Training Research Laboratory and provides research support in aircrew training to the U.S. Army Aviation Center (USAAVNC). Research is conducted in-house and is augmented by on-site contract support as required. This report documents contract work performed by ARIARDA in support of the Directorate of Gunnery and Flight Systems (DGFS) of the USAAVNC. Following a directive from the Commanding General of the USAAVNC, DGFS requested ARIARDA research support for this project on 28 January 1987.

The successful accomplishment of the U.S. Army attack helicopter mission depends on the effectiveness of the unit helicopter gunnery training programs. In turn, the effectiveness of the training programs depends on the optimal utilization of the expensive resources required to train and sustain attack aviator proficiency: personnel, flight hours, ammunition, gunnery ranges, and training devices. This report documents the results of a survey of active Army and National Guard aviators and unit commanders conducted to address three primary gunnery training issues: (a) the minimum requirements for and current utilization of ammunition, (b) the availability and utilization of gunnery ranges, and (c) the availability and utilization of helicopter simulators. In addition, the survey addresses other areas of interest in the management of the attack aviation force.

The results of the Ammunition and Gunnery Survey are being reported in two volumes. Volume I is a summary of the major results of the research and Volume II is a detailed final report on the survey data. In addition, the results have been briefed to the Deputy Commanding General for Training, Training and Doctrine Command (June 1988); the Director of Training, Department of the Army Management Office (December 1987 and January 1988); the Commanding General, USAAVNC (December 1987); Director, DGFS (November 1987); and at the Helicopter Gunnery Manual User's Conference (November 1987). In addition, the results were used January through May 1988 to revise the Army's Helicopter Gunnery Manual.


EDGAR M. JOHNSON
Technical Director

ACKNOWLEDGMENTS

The work reported herein was performed at Fort Rucker, Alabama, by personnel from the Directorate of Gunnery and Flight Systems (DGFS), the Army Research Institute Aviation Research and Development Activity (ARIARDA), and Anacapa Sciences, Inc. The authors would like to thank the following individuals who have contributed to the accomplishment of this research effort.

From DGFS, COL Merwyn L. Nutt, the former director of DGFS, participated in the initial development and pretesting of the Ammunition and Gunnery (A&G) Survey. CW3 Samuel S. Sill assisted in the development and pretesting process. SFC Arthur Miller assisted in the development, pretesting, data collection, and data entry effort before transferring to another division of DGFS. Finally, SSG Christian Rummel coordinated the completion of the data entry effort and provided research support in tabulating open-ended responses.

Mr. Charles A. Gainer, ARIARDA chief, served as the Contracting Officer's Technical Representative throughout the project and provided guidance on many aspects of the research. Mr. Larry Murdock, ARIARDA computer programmer analyst, developed the data entry programs, supervised the data entry and verification, and conducted the required analyses of the data base.

Dr. George L. Kaempf, Anacapa senior scientist, conducted a critical review of an earlier draft of this report and provided a number of insights into the training of attack aviators, particularly on range and gunnery operations and on the use of simulators for training. Finally, Ms. Nadine McCollim, Anacapa technical documentation specialist, has had the responsibility for producing all the survey originals, briefing materials, and reports for the entire project.

ARMY AVIATION AMMUNITION AND GUNNERY SURVEY
VOLUME II: FINAL REPORT

EXECUTIVE SUMMARY

Requirement:

In recent years, the Army has attempted to control the escalating costs and diminishing supply of ammunition by standardizing the gunnery training requirements for each combat branch. In December 1986, the Department of the Army (DA) advised the U.S. Army Aviation Center (USAAVNC) of an impending reduction in ammunition authorizations for the Aviation Branch. In January 1987, the Commanding General of the USAAVNC directed that a worldwide survey of attack helicopter aviators and unit commanders be conducted to determine the type and amount of resources needed for active Army (AA) and National Guard (NG) aviators to acquire and sustain the required gunnery skills.

Procedure:

Two questionnaires, Form A for aviators and Form B for unit commanders, were developed to collect data about aviation gunnery training. The questionnaire items address the following topic areas:

- personal, military, and flight data about the respondent;
- suitability of current gunnery training publications;
- ammunition allocated and fired during Fiscal Year 1987 (FY87);
- utilization of gunnery range facilities; and
- utilization of flight simulators for gunnery training and qualification.

Form A was distributed to 1996 attack aviators and Form B was distributed to 362 attack helicopter unit commanders. The aviators returned 810 usable questionnaires (41% return rate) and the unit commanders returned 127 usable questionnaires (35% return rate).

Findings:

The primary conclusions drawn from the results of the survey are as follows:

- The AA aviators are relatively young and inexperienced. The NG aviators are older and more experienced, but they must maintain their skills in aging and less effective attack aircraft.
- The average AA aviator flew slightly more than the minimum number of hours required to maintain his flying skills in FY87, but fired less than the authorized amount of ammunition. The average NG aviator logged fewer flight hours and fired less ammunition than his AA counterpart.
- A substantial number of attack helicopter units were unable to meet the gunnery training standards with the resources available to them. The lack of training resources resulted in substantially lower crew qualification levels for the NG than for the AA.
- Gunnery ranges are not readily available to many units or have inadequate scoring methods. Many units are located at considerable distances from the closest range, and aviation units must compete with units from other branches for range time. Very few ranges are designed specifically for aviation gunnery.
- Flight simulators are being used only to a moderate extent by AA aviators for gunnery training. The simulators are rated as having utility for training some types of tasks but not for other types. Very few NG units have access to flight simulators for training.
- A majority of unit commanders and aviators agree on the need for standardized gunnery tables to support the development of training programs. However, the unit commanders want to retain the flexibility to design training programs that meet their specific unit mission requirements.
- The current ammunition authorizations approximate the minimum number of rounds needed to qualify and sustain the average aviator's gunnery skills. However, the units must have access to ranges and the operational aircraft and weapon systems needed to expend the ammunition if they are to meet the current gunnery training standards.

- Finally, further research is needed to evaluate and improve the training of attack helicopter aviators. The results of this survey have generated numerous hypotheses that should be tested experimentally.

Utilization:

The results of this survey will be used for several purposes. First, the results provide senior Army managers with valuable information about the composition and training of the attack helicopter force. Second, the results will be used to develop and justify realistic ammunition and range requests for the Aviation Branch. Third, the results will be used to revise the current gunnery training manual. Fourth, the results have generated hypotheses about the utilization of flight simulators that can be tested experimentally. Finally, the survey results provide a baseline that can be used to evaluate changes in the (a) gunnery training strategies and (b) ammunition and other resources allocated for helicopter gunnery training.

ARMY AVIATION AMMUNITION AND GUNNERY SURVEY
VOLUME II: FINAL REPORT

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GLOSSARY OF ACRONYMS AND ABBREVIATIONS

AA	- Active Army
A&G	- Ammunition and Gunnery
ARIARDA	- Army Research Institute Aviation Research and Development Activity
ASI	- Anacapa Sciences, Inc.
CALFEX	- Combined Arms Live-Fire Exercise
CMS	- AH-64 Combat Mission Simulator
DA	- Department of the Army
DA CIR	- Department of the Army Circular
DAMO-TR	- Department of the Army Management Office - Director of Training
DGFS	- Directorate of Gunnery and Flight Systems
ECAS	- Enhanced Cobra Armament System
EUSA	- 8th U.S. Army
FFAR	- Folding Fin Aerial Rocket
FM	- Field Manual
FORSCOM	- Forces Command
FS	- Flight Simulator
FWS	- AH-1 Flight and Weapons Simulator
FY	- Fiscal Year
HE	- High Explosive
HELLFIRE	- Helicopter Launched Fire and Forget
IP	- Instructor Pilot
IQR	- Interquartile Range
JAAT	- Joint Air Attack Team
MC	- Modernized Cobra
MOD	- AH-1S Modified Model
MPRC	- Multi-Purpose Range Complex
NG	- National Guard
NVD	- Night Vision Device
PROD	- AH-1S Production Model
SME	- Subject Matter Expert
STRAC	- Standards in Training Commission
TO&E	- Table of Organization and Equipment
TOW	- Tube-Launched, Optically-Tracked, Wire-Guided
TRC	- Training Readiness Condition
UH1FS	- UH-1 Flight Simulator
USAAVNC	- U.S. Army Aviation Center
USAREUR	- U.S. Army, Europe
UT	- Unit Trainer

ARMY AVIATION AMMUNITION AND GUNNERY SURVEY
VOLUME II: FINAL REPORT

INTRODUCTION

The successful accomplishment of the U.S. Army attack helicopter mission is heavily dependent upon the effectiveness of the unit helicopter gunnery training programs. Effective unit training requires careful planning and execution, as well as a large expenditure of resources (e.g., ammunition, flight hours, and gunnery range time). Currently, the Army delegates to each unit commander the responsibility for developing, implementing, and evaluating a training program to qualify and sustain the unit aviators' proficiency in aerial gunnery at specified levels. That is, each unit commander is required to tailor a gunnery training program to meet the specific needs of the unit's personnel and to fulfill the unit's mission. One consequence of this policy is that the gunnery training programs vary in content and quality from one unit to another.

In response to the need to standardize training and to conserve limited training resources, the Army formed the Standards in Training Commission (STRAC) in 1982 to (a) develop standards for training on all Army weapons systems, (b) develop national training programs to meet the standards, (c) integrate existing simulators and other training devices into the training programs, and (d) determine the amounts of ammunition required to support the training programs for each branch (FY86 STRAC Evaluation Final Report, 1987).

In 1985, STRAC published the "Standards in Weapons Training" manual as Department of the Army Circular (DA CIR) 350-85-4. This manual established the training standards for units on the basis of their Training Readiness Condition (TRC A, B, or C) and specified the amount of ammunition that should be expended to meet the standards. For example, Table 1 presents an adaptation of DA CIR 350-85-4 Table 7-8, the annual training strategy and ammunition authorization for the AH-1S modernized Cobra/enhanced Cobra armament system (MC/ECAS) helicopter models in TRC C units. As an example of the differences in ammunition authorizations between TRC levels, DA CIR 350-85-4 authorized 160 rounds of 2.75-inch Folding Fin Aerial Rockets (FFARs) per airframe for TRC A units, 150 FFARs per airframe for TRC B units, and 80 FFARs per airframe for TRC C units.

Table 1

Annual Training Strategy and Ammunition Authorization for
AH-1S MC/ECAS (TRC C)

Event/Table	Freq	How/Level	2.75 HE	2.75 Ill	TOW	20-mm
Commanders	a	FWS/Ind				
Commanders	1	Live, FWS ^b /Ind	30	4	.9	64
Crew	1	Live, FWS ^b /Crew	44	2		448
Total per airframe X 21			74	6	.9	512
Battalion total per year			1554	126	18.9	10752

Note. Table 1 is adapted from Table 7-8 of DA CIR 350-85-4 as an example and does not include all the details presented in the original. TRC C units are not required to conduct team or combined arms training. The following abbreviations are used in Table 1: MC/ECAS = modernized Cobra/enhanced Cobra armament system; TRC = training readiness condition; Freq = frequency; HE = high explosive; Ill = illumination; TOW = tube-launched, optically-tracked, wire-guided missile; mm = millimeter; FWS = Flight and Weapons Simulator; Ind = individual.

^aPrior to live fire. ^bSome tasks can be fired in the FWS at the commander's discretion.

In October 1986, the U.S. Army Aviation Center (USAAVNC) prepared Field Manual (FM) 1-140 entitled "Helicopter Gunnery" to assist unit commanders in establishing an effective gunnery training program. The manual explains fundamentals of ballistics and gunnery techniques, describes the aerial weapons systems on all attack helicopters, and discusses the administrative and logistical considerations required for the training program. Within the constraints imposed by STRAC, FM 1-140 established the gunnery tasks and performance criteria for aviators to acquire and to sustain individual, crew, team, and Combined Arms Live-Fire Exercise/ Joint Air Attack Team (CALFEX/JAAT) proficiency. The manual presents flexible gunnery tables that delineate the flight conditions, types of targets, ranges to targets, type and amount of ammunition to be fired, and the desired target effect for each level of qualification. For example, Table 2 presents an adaptation of the second day of the AH-1 crew gunnery training table in FM 1-140. Because the tables are flexible, the unit commander can select target arrays that

Table 2

Attack Helicopter Battalion AH-1 Crew (Second Day) Gunnery Table

Target Array	Range (m)	Ammunition	Mode	Condition	Effect
2 Armored Vehicles	500-1500	1 TOW	Terrain Flight/	Moving Column	Destroyed IAW Table 4-2
4 Wheeled	2000-3000	8 2.75 HE	Hovering	Attacking	Neutralized
3 Dismounted Infantry	3000-4000	750 20-mm		Stationary Column or Assembled Unit	Suppressed IAW Table 4-2
		1000 7.62			Exposure Time IAW Chart 4-1
		32 40-mm			

Note. Table 2 is presented as an example and does not include all the details presented in Table 4-6 of FM 1-140. The table and chart referred to in the target effect column are from FM 1-140. The following abbreviations are used in Table 2: m = meters; TOW = tube-launched, optically-tracked, wire-guided missile; IAW = in accordance with; HE = high explosive; mm = millimeter.

are appropriate for his unit's aircraft, mission, and gunnery resources in developing the unit's gunnery training program.

Despite the attempt by STRAC to standardize the gunnery training requirements for each branch of the Army, the escalating costs and diminishing supply of ammunition have resulted in an ongoing evaluation of ammunition allocations. In December 1986, USAAVNC representatives participated in a meeting at Department of the Army (DA) Headquarters in an attempt to obtain the DA Management Office Director of Training's (DAMO-TR) approval of the STRAC ammunition standards and strategies for the Aviation Branch. The initial indication from the DAMO-TR was that the FFAR authorization would be reduced by approximately 50%; however, the DAMO-TR agreed to delay the reduced ammunition allocation for one year to permit the Aviation Branch to collect the data needed to justify its ammunition requests. In January 1987, the Commanding General of the USAAVNC directed that a worldwide survey of attack helicopter aviators and unit commanders be conducted to determine the type and amount of resources

needed for active Army and National Guard aviators to acquire and sustain the required gunnery skills.

Survey Purpose

The survey research was designed to provide an empirical data base for addressing three major problem areas. The first problem area is the lack of empirical data about current gunnery training programs and training requirements. Therefore, the survey research was designed to document the current utilization of ammunition in aviation gunnery training, to evaluate the success of the gunnery training, and to compile estimates of the amount of ammunition required to maintain specified STRAC readiness conditions. In addition to its use in formulating ammunition allocation requirements, the resulting survey data was intended to be used in the development of a new gunnery training manual.

The second major problem area is the putative lack of adequate ranges for training and qualifying unit aviators. Many unit commanders complain that the ranges presently available to their aviation units lack the targetry, scoring devices, and space required for effective training. Furthermore, the aviation units report that limited access to the ranges at desirable training times or for sufficient periods of time inhibits the gunnery training and makes it difficult to maintain the required readiness conditions. The survey research was intended to document the availability, type, and utility of gunnery ranges currently in use by Army aviation units.

The final major problem area is the lack of empirical data about the utilization of flight simulators and their effectiveness for weapon systems training. Theoretically, flight simulators can reduce the impact of the first two problems. That is, weapons training can be conducted without live-fire ranges and without incurring ammunition costs. However, there are no systematic data that identify the tasks that can be trained effectively in simulators, the amount of simulator training that is most cost-effective, or the extent to which flight simulator training can offset the need for weapon firing in the aircraft. This problem is compounded by the fielding of a single configuration of the AH-1 Flight and Weapons Simulator (FWS) that is used by aviators who fly different configurations of AH-1 helicopters (e.g., AH-1G, AH-1S Modified, and AH-1S Production). The FWS is configured

like the AH-1S Fully Modernized (MC)¹ helicopter. The survey research was designed to collect information about the utilization of flight simulators for conducting aerial weapons training.

In addition to the three major problem areas, the survey was designed to compile information about the management of the attack aviation force (e.g., aviator demographic characteristics) and about ancillary gunnery issues (e.g., door gunnery).

Report Organization

The results of the survey are reported in two volumes. Volume I, the Executive Summary (McAnulty & DeRoush, 1988), presents an overview of the major results and is intended for early distribution. Volume I presents a sample of data tables and figures to show the types of information contained in Volume II, the final report. Volume II presents a detailed description of the survey procedures, instruments, and results. It is intended for audiences interested in in-depth analyses of the data. Volume II presents complete data tables and figures and includes copies of the survey materials as appendixes.

The final report of the gunnery survey research, is organized into the following sections:

- questionnaire development,
- survey sample,
- survey results and discussion, and
- summary and conclusions.

¹Since the survey questionnaire was administered, the AH-1S (MC) has been redesignated the AH-1F.

QUESTIONNAIRE DEVELOPMENT

Questionnaire development began with a review of the current aerial gunnery training manual (FM 1-140), the STRAC manual (DA CIR 350-85-4), a previous STRAC questionnaire (STRAC, 1987), and other relevant literature. The USAAVNC Directorate of Gunnery and Flight Systems (DGFS) Study Group then delineated the Essential Elements of Analysis for the survey. Approximately 100 preliminary questionnaire items were drafted in the following ten topic areas covered by the Essential Elements of Analysis:

- personal data about the respondent,
- military experience of the respondent,
- flight experience of the respondent,
- present duty assignment of the respondent,
- suitability of current gunnery training publications,
- weapons system on the aviator's primary aircraft,
- ammunition allocated and fired during the 1987 training year,
- utilization of gunnery range facilities,
- utility of flight simulators for gunnery training and qualification, and
- door gunnery training.

The preliminary questionnaire items were administered to approximately 50 attack aviators by DGFS personnel. The results of this pretest were used to produce a second draft of the Ammunition and Gunnery (A & G) Survey questionnaire. The second draft was divided into two forms: Form A for the unit aviators and Form B for the unit commanders. Items designed to provide personal data and military experience data are the same on both forms of the questionnaire. Most of the remaining items on the two forms are similar in content, but the unit aviator was instructed to respond to the items with respect to himself and the unit commander was instructed to respond to the items with respect to his entire unit.

An extensive pretest of the second draft of the questionnaire was scheduled but had to be cancelled because of administrative problems at the participating installations. A complete pretest could not be rescheduled because of the one-year suspense stipulated by the DAMO-TR. As a consequence, the questionnaire was developed without benefit of further formal pretesting. DGFS personnel, acting as Army aviation and helicopter gunnery subject matter experts (SMEs), and Army Research Institute Aviation Research and

Development Activity (ARIARDA) personnel, acting as survey development and analysis SMEs, reviewed and edited the final versions of the questionnaire forms and prepared the required ancillary materials (e.g., letters of instruction). Subsequently, the questionnaires were approved by the U.S. Army Soldier Support Center and reproduced for administration.

Form A contains 68 items that address nine of the ten topic areas listed above (see Appendix A); no questions are posed to the unit aviators about door gunnery. Form B contains 78 items that address all ten topic areas (see Appendix B). Some of the items ask for objective data that can be obtained from records; other items ask for subjective opinions from the respondent. The surveys are much more comprehensive than the number of items indicates. That is, many items have multiple sections or require a series of responses. Although all items do not apply to all respondents, there are 472 codable responses on Form A and 644 codable responses on Form B. In addition, both forms have several open-ended response items.

SURVEY SAMPLE

The A & G Survey questionnaire was distributed to a sample of active Army (AA) and National Guard (NG) aviators and commanders currently serving in attack helicopter units (see Table 3). Form A was distributed to 1,996 attack aviators; Form B was distributed to 362 attack helicopter unit commanders of varying levels (e.g., troop, company, battalion, and brigade). The majority of the questionnaires were mailed to installation points-of-contact for administration. The remainder of the questionnaires were distributed or administered by DGFS personnel conducting visits to field units, primarily to U.S. Army, Europe (USAREUR) units in the Federal Republic of Germany. Table 3 shows the number of questionnaires distributed to and returned by each major command.

Table 3

Ammunition and Gunnery Questionnaires Distributed and Returned

Command	<u>Form A (Aviators)</u>		<u>Form B (Commanders)</u>	
	Distributed	Returned	Distributed	Returned
FORSCOM	840	316 (38%)	132	47 (36%)
USAREUR	300	220 (73%)	60	34 (57%)
EUSA	50	15 (30%)	10	0 (0%)
NG	806	259 (32%)	160	46 (29%)
<hr style="border-top: 1px dashed black;"/>				
TOTAL	1996	810 (41%)	362	127 (35%)

Note. In addition to the usable questionnaires returned, 184 Form A and 35 Form B questionnaires were returned unused or incomplete. The following abbreviations are used in Table 3: FORSCOM = Forces Command; USAREUR = U.S. Army, Europe; EUSA = Eighth U.S. Army; NG = National Guard.

Response Rates

Considering the length of the questionnaires and the relatively short suspense that was required to meet the DAMO-TR's deadline, the response rate for both forms was as high as could be expected. The return rates and distribution of usable questionnaires are certainly adequate to provide a reliable data base for analysis. Aviators returned 810 usable Form A questionnaires for an overall 41% response rate. The response rate from every major command was at least 30% (see Table 3). The on-site data collection by DGFS personnel probably contributed to the very high USAREUR response rate. Of the 810 aviators who returned usable Form A questionnaires, 39.1% belonged to Forces Command (FORSCOM), 27.2% belonged to USAREUR, 1.9% belonged to the Eighth U.S. Army (EUSA), and 31.9% belonged to the NG.

Unit commanders returned 127 usable Form B questionnaires for an overall response rate of 35%. None of the ten EUSA commanders completed and returned a questionnaire. The response rates for commanders assigned to the other major commands ranged from 29% to 57% (see Table 3). Again, the response rate from USAREUR unit commanders was the highest. The percentages of unit commanders in each major command who responded to the survey are similar to the percentages of aviators who responded: 37.0% belonged to FORSCOM, 26.8% belonged to USAREUR, and 36.2% belonged to the NG.

Item Response Rate Reporting

There are substantial differences in the number of respondents who answered many of the questionnaire items. In some cases, an item did not apply to all respondents (e.g., the item only applied to aviators who fly a specified helicopter or who fire a specified type of ammunition). In other cases, some respondents simply failed to respond to an item that did apply to them. In reporting the data, the number of respondents (e.g., $n = 120$) to a particular item is presented if it is less than the total sample (e.g., 127 unit commanders).

Component Analyses

The data were analyzed separately for the AA and NG respondents because of the major differences in unit mission, the types of aircraft flown, and training resources and standards (e.g., most AA units are TRC A or B while most NG units are TRC C). Of the aviator sample, 545 respondents

identified themselves as AA and 259 identified themselves as NG; 6 respondents failed to identify their component. Of the unit commander sample, 80 respondents identified themselves as AA and 43 identified themselves as NG; 4 respondents failed to identify their component.

Aviator Demographics

The demographic characteristics of the Form A respondents are presented in Table 4. Most of the aviators are warrant officers rather than commissioned officers. Among the AA aviators, the majority are in grades WO1 and CW2; the NG aviators are more evenly divided among the warrant officer grades. The majority of 542 AA and 259 NG aviators reported their present duty position to be attack helicopter pilot (60.1% and 74.1%, respectively), followed by instructor pilot (14.6% and 12.7%, respectively), and platoon leader (11.8% and 6.9%, respectively). The remainder held other positions within the unit (e.g., flight operations officer, section leader, and flight safety technician).

With the exception of number of years on active duty, the NG aviators have considerably more experience in terms of age, year on flight duty, total flight hours, time in current unit, and combat experience (see Table 4). However, 85.6% of 536 AA aviators reported themselves as crew qualified while only 61.5% of 247 NG aviators reported themselves as crew qualified. The results were similar, although lower, for self-reports of team qualification: 59.4% of 532 AA aviators and 43.7% of 245 NG aviators reported themselves as team qualified.

Unit Commander Demographics

The demographic characteristics of the Form B respondents are presented in Table 5. The majority of the commander respondents held the rank of Captain or Major. The ranks also reflect the primary duty position held by the majority of the respondents. Among 78 AA respondents, 17.9% were listed as battalion or brigade commanders, 70.5% were listed as company or troop commanders, and 11.5% were listed as holding other positions within the unit (e.g., executive officer, operations officer, platoon leader). Among 42 NG respondents, 7.1% were listed as battalion or brigade commanders, 71.4% were listed as company or troop commanders, and 21.4% were listed as holding other positions.

Table 4-

Aviator Sample Demographic Characteristics

Characteristic	Active Army	National Guard
Rank: Number (Percent)		
WO1 - CW2	347 (63.7%)	111 (42.9%)
CW3 - CW4	116 (21.3%)	116 (44.8%)
2LT - 1LT	66 (12.1%)	19 (7.3%)
CPT - MAJ	16 (2.9%)	13 (5.0%)
Age		
n	540	254
Median	28	38
Range	20 - 46	23 - 51
Years on Active Duty		
n	544	234
Median	7.2	4.5
Range	1.1 - 24.4	0.5 - 26.2
Years on Flight Duty		
n	525	251
Median	4.0	12.2
Range	0.3 - 21.2	0.5 - 29.8
Total Flight Hours		
n	542	252
Median	750	1565
IQR	360 - 1299	655 - 2769
Months in Unit		
n	527	250
Median	14	24
IQR	8 - 25	12 - 91
Combat Experienced		
Number (Percent)	52 (9.5%)	65 (25.1%)

Note. IQR = interquartile range.

Table 5-

Commander Sample Demographic Characteristics

Characteristic	Active Army	National Guard
Rank: Number (Percent)		
2LT - 1LT	8 (10.3%)	7 (16.7%)
CPT - MAJ	56 (71.7%)	32 (76.2%)
LTC - COL	14 (18.0%)	3 (7.1%)
Age		
n	80	43
Median	30	36
Range	23 - 47	23 - 48
Years on Active Duty		
n	80	32
Median	8.3	3.2
Range	2.3 - 25.0	0.9 - 13.7
Years on Flight Duty		
n	78	42
Median	6.0	7.0
Range	1.7 - 21.5	1.3 - 19.7
Total Flight Hours		
n	72	38
Median	780	900
IQR	610 - 1290	600 - 1520
Months in Unit		
n	80	42
Median	17.5	16
IQR	9 - 30	11 - 60
Combat Experienced		
Number (Percent)	14 (17.5%)	8 (18.6%)

Note. IQR = interquartile range.

The differences in experience observed between the AA and NG commanders were much smaller than between the aviators in each component. NG commanders were somewhat older and had slightly more total flight hours, but AA commanders had more than twice as much time on active duty. There were only very small differences in years on flight duty, time in current unit, and the percentage who had combat experience.

Unit Demographics

Of the AA commanders, 61.2% reported that their units were TRC A, 15% reported TRC B, and 1.3% reported TRC C; however, 22.5% did not respond. Of the NG commanders, 4.7% reported that their units were TRC A, 4.7% reported TRC B, and 74.4% reported TRC C; 16.2% did not respond. The relatively large percentage of commanders who did not respond to this item may be attributed to provisions in the new Army Table of Organization and Equipment (TO&E). Under the "J" series TO&E, company commanders are not required to maintain training reporting records and would not necessarily know their TRC status. In addition, many of the respondents who held positions other than unit commander may not know the unit's TRC level.

Nearly all respondents were assigned to either an attack unit or to an air cavalry unit. The percentages of commanders who reported assignment to each type of unit are:

- AA (n = 80): 71.2% attack and 25.0% air cavalry, and
- NG (n = 42): 73.8% attack and 26.2% air cavalry.

The percentages of aviators who reported assignment to each type of unit are:

- AA (n = 545): 69.9% attack and 20.2% air cavalry, and
- NG (n = 259): 79.7% attack and 19.5% air cavalry.

The remainder of the respondents listed "other" as their type of unit. In addition, the commanders were asked to indicate the types of attack aircraft that were assigned to their units; this item permitted multiple responses so the totals add to more than 100%. The number and percentage of AA and NG units assigned each aircraft type and series are shown in Table 6. At the time that the survey data were collected, the AH-1S Production model and the AH-64A Apache were assigned only to AA units.

Table 6-

Number and Percentage of Component Units Assigned Each Aircraft-Type and Series

Aircraft Type and Series	Active Army (n = 78)		National Guard (n = 41)	
	Nr	%	Nr	%
AH-1G	0	0	1	2.4
AH-1S (ECAS)	8	10.3	1	2.4
AH-1S (MC)	45	57.7	1	2.4
AH-1S (MOD)	15	19.2	16	39.0
AH-1S (PROD)	8	10.3	0	0
AH-64A	8	10.3	0	0
UH-1 C/M	1	1.3	23	56.1
UH-1H	14	17.9	11	26.8

Note. The following abbreviations are used in Table 6: Nr = number of commanders responding who indicated that each type of aircraft was assigned to their unit; ECAS = enhanced Cobra armament system; MC = modernized Cobra; MOD = modified; PROD = Production. The percent (%) column may total to more than 100 since a unit may be assigned more than one type or series of aircraft.

SURVEY RESULTS AND DISCUSSION

An extremely large number of analyses of the A & G Survey data could be conducted because of the hundreds of codable items on each form and the many ways in which this extensive data base can be partitioned. One of the benefits of establishing a data base is that it permits the researchers to address secondary issues without collecting additional data. The results of the A & G Survey that address the major issues of this project (see Survey Purpose, page 4) and the ancillary issue of door gunnery are presented in the following sections:

- Fiscal Year 1987 (FY87) training characteristics,
- gunnery ranges,
- flight simulators,
- estimated training requirements, and
- door gunnery training.

The results are presented using the appropriate descriptive or inferential statistics for each variable. For items that are categorical (e.g., items that provide only a yes or no response), only the number and percentage of respondents are reported. For many of the items that are not categorical, the median (Mdn) and interquartile range (IQR) are reported as measures of central tendency and dispersion because of the highly skewed distributions of responses. The median is the 50th percentile (i.e., middle) score and the interquartile range includes the 25th and 75th percentiles (i.e., the endpoints of the middle half of scores) of a distribution. These statistics describe the responses without being highly biased by extreme scores. An example of an extreme score for all aviators would be the number of flight hours of an instructor pilot (IP).

If appropriate and interpretable, the arithmetic mean and standard deviation (SD) are reported instead of the Mdn and IQR; for example, ratings of the training value of a simulator on a seven-point scale are reported using the mean and SD of the responses. Finally, statistical tests are used to determine if significant differences exist in a variable between two or more subsamples of respondents. For example, a t-test is used to determine if there are significant differences in the perceived training value of the FWS between aviators who fly different AH-1S models. More complex analyses are conducted using the Analysis of Variance (ANOVA) with appropriate post hoc procedures (either the Tukey or Newman-Kuels tests; see Winer, 1971).

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FY87 Training Characteristics

This section presents the results of the survey responses to questions about the number of flight hours flown and the rounds of ammunition fired during FY87, and the reported results of the FY87 training activities.

Flight hours. Table 7 shows the number of respondents who flew each type of helicopter during FY87, and the median number of flight hours that were logged in each aircraft type. Respondents were instructed to indicate the number of flight hours that they logged in their primary aircraft and in their secondary aircraft, if any. Unit commanders logged the most flight hours in OH-58 Aeroscouts, AA aviators flew the most hours in the AH-1S MC/ECAS or MOD/PROD attack helicopter models, and NG aviators flew the most hours in the UH-1C/M or AH1S MOD/PROD helicopters. As expected, the median number of flight hours was generally much higher for

Table 7

Flight Hours Logged by Respondents during FY87 in each Helicopter Type

Helicopter	<u>Commanders</u>				<u>Aviators</u>			
	<u>Active Army</u>		<u>National Guard</u>		<u>Active Army</u>		<u>National Guard</u>	
	n	Mdn	n	Mdn	n	Mdn	n	Mdn
AH-1G	0	0	2	80	0	0	11	45
AH-1S (MC/ECAS)	10	135	0	0	301	123	37	120
AH-1S (MOD/PROD)	4	113	7	50	122	120	78	90
AH-64A	8	124	0	0	81	150	2	94
OH-58	45	120	12	80	11	145	10	123
UH-1C/M	0	0	8	71	0	0	104	100
UH-1H	7	75	8	87	7	111	22	88

Note. The following abbreviations are used in Table 7: n = number of aviators responding to each item; Mdn = the median number of flight hours logged; MC/ECAS = modernized Cobra/enhanced Cobra armament system; MOD/PROD = modified/production.

the AA respondents than for the NG respondents. The number of flight simulator training hours is reported in a later section of the report.

Ammunition fired. Table 8 shows the number of aviators who fired each type of ammunition and the median number of rounds of each ammunition type that was fired during FY87. Unit commanders were asked about the amounts of ammunition that were fired by the unit, but not about ammunition that was fired individually.

As expected from the types of aircraft flown by the component units, the AA aviators fired the 20-mm during FY87 more than any other gun and the NG aviators fired the 7.62-mm more than any other gun. The median number of FFARs fired by the aviators approximates the STRAC authorizations for the respective TRC levels. Only a small number of aviators

Table 8

Rounds of Ammunition Fired by Aviators during FY87

Ammunition	<u>Active Army</u>			<u>National Guard</u>		
	n	Mdn	IQR	n	Mdn	IQR
7.62-mm	80	4250	2000-10000	113	3000	2000-6000
20-mm	329	900	500-1500	31	700	400-1000
30-mm	76	950	500-1500	4	--	--
40-mm	68	200	100-400	58	200	100-400
2.75-in. HE	452	70	40-115	145	35	20-60
2.75-in. Smoke	102	15	10-24	12	6	5-8
2.75-in. Illum.	211	10	6-20	45	10	4-14
TOW Missile	56	1	--	17	1	--

Note. The following abbreviations are used in Table 8: n = number of aviators responding to each item; Mdn = the median number of rounds fired by each aviator for each type; IQR = interquartile range; mm = millimeters; in. = inch; HE = high explosive; illum = illumination; TOW = tube-launched, optically tracked, wire-guided; -- = insufficient data to compute reliable statistics.

indicated that they had fired a TOW missile during FY87, and none had fired a HELLFIRE missile. During most of FY87, however, there was a moratorium imposed on missile firing as a safety precaution. Because of the moratorium, the missile firing data for FY87 are not representative of a normal training year. Table 8 shows that, with few exceptions, the AA aviators fired larger amounts of ammunition than the NG aviators, regardless of ammunition type.

The aviators were also asked if any of the ammunition fired during FY87 was solely for the purpose of demonstrating weapons capabilities to VIPs, to the general public, or to other units. Among 536 AA respondents, 23.1% reported that they had fired demonstration ammunition during FY87. Almost all of the reported demonstration firings used the 20-mm gun ($n = 76$) or the 2.75-in. HE rockets ($n = 100$), or both. The median number of 20-mm rounds fired for demonstration purposes was 450 (IQR = 200 - 600); the median number of 2.75-in. HE rockets fired for demonstration purposes was 40 (IQR = 25 - 60).

The AA aviators who had fired ammunition for demonstration purposes were asked to rate the training value of the demonstration firing exercise on a four-point scale. Among 120 respondents, 45.8% rated the demonstration as having "little or no training value" and 40.8% rated the demonstration as having "moderate training value"; the remaining 13.4% rated the demonstration firings as having either "high" or "very high training value." Nonetheless, 23.3% of 116 AA respondents indicated that they had accomplished weapons system qualification in conjunction with the demonstration firing.

Among NG aviators, only 4.1% of 243 respondents fired any ammunition for demonstration purposes during FY87. This subsample of NG aviators was considered too small ($n = 10$) to provide reliable statistics for the follow-on questions discussed for the AA aviators.

Training results. For each TRC level, the DA CIR 350-85-4 standards specify the percentages of airframes that must be manned by crew, team, and CALFEX/JAAT qualified aviators. For example, TRC A units must have 75% of their airframes manned by crew qualified aviators and 66% of their airframes manned by team and CALFEX/JAAT qualified aviators. Only 22.7% of the 60 AA commanders who responded indicated that their unit met the DA CIR 350-85-4 standards, and 40.0% indicated their unit did not meet the standards. Only 5.1% of 38 NG commanders indicated that their unit met the standards and 64.1% indicated that their unit did not meet

the standards. The other respondents reported that they did not know if their unit met the standards. These results corroborate the findings of an earlier STRAC survey (STRAC, 1987).

The commanders of the 29 AA and 24 NG units that did not meet the standards indicated that the lack of ammunition was the most common reason for not meeting the standards (see Table 9). Only 23.1% of 52 AA commanders and 33.3% of 27 NG commanders indicated that their unit's ammunition allocation was adequate to maintain their TRC level. Furthermore, 58.3% of 60 AA and 76.9% of 26 NG commanders indicated that they could not achieve the 75% crew qualification criterion with their current ammunition allocation.

However, an insufficient allocation of ammunition was not the only problem faced by the units in their gunnery training program; 32.3% of 65 AA and 44.4% of 36 NG respondents indicated that their unit had returned ammunition unfired in FY87. For both components, the most common reason for returning unfired ammunition was aircraft armament problems, although there were several other problems that were frequently cited by the AA and NG unit commanders (See Table 10). Aircraft maintenance problems, inclement weather, and

Table 9

Reasons Cited by Unit Commanders for not Achieving the 350-85-4 Standards

Reason	% Active (n = 29)	% Guard (n = 24)
Lack of Ammunition	82.8	62.5
Lack of Available Ranges	48.3	33.3
Inadequate Armament Maintenance	34.5	37.5
Range not Suitable	34.5	25.0
Wrong Type of Ammunition	44.8	8.3
Too Many Aviators to Train	6.9	29.2

Note. The total adds to more than 100% because respondents could cite as many reasons as applied.

Table 10

Reasons Cited by Unit Commanders for Ammunition Turn-in

Reason	% Active (n = 22)	% Guard (n = 15)
Armament Problems	36.4	53.3
Improper Type for Unit	18.2	20.0
Lack of Range Priority	22.7	20.0
Range Scheduling Problems	18.2	26.7
Aircraft Maintenance Problems	9.1	26.7
Inclement Weather	4.5	33.3
Inadequate IPs/UTs	0.0	20.0

Note. The total adds to more than 100% because respondents could cite as many reasons as applied.

an inadequate number of IPs and unit trainers (UTs) posed greater problems for the NG commanders than for the AA commanders.

Gunnery Ranges

As noted above, the availability of gunnery ranges was a problem for many units. Only 38.0% of 71 AA commanders and 31.3% of 32 NG commanders indicated that sufficient range time was available for all essential operations. Furthermore, the types of available ranges were not optimal. Only 12.1% of 533 AA aviators and 3.2% of 251 NG aviators indicated that they had fired on a fully instrumented, multi-purpose range complex (MPKC). The most common types of ranges used by the units were designed for armor or artillery gunnery, or were general purpose impact ranges (see Table 11). Only a small percentage of the ranges used for aerial gunnery training were designed for or specifically adapted for helicopter gunnery.

Table 11

Primary Purpose of Unit Gunnery Ranges (Commanders Survey Only)

Range Type	% Active	% Guard
Closest Range	(n = 71)	(n = 35)
Armor	43.7	11.4
Armor Adapted for Aircraft	12.7	11.4
Artillery	7.0	25.7
General Purpose Impact	32.4	31.4
Air Force	1.4	8.6
Helicopter Gunnery	2.8	11.4
Second Closest Range	(n = 49)	(n = 22)
Armor	49.0	18.2
Armor Adapted for Aircraft	8.2	13.6
Artillery	0.0	31.8
General Purpose Impact	26.5	27.3
Air Force	14.3	9.1
Helicopter Gunnery	2.0	0.0

On the ranges used by the respondents, the most common method of scoring target effect was an airborne observer (see Table 12). The respondents were asked to rate the adequacy of the target effect scoring at the gunnery ranges used by their units on a scale of 1 - highly inadequate to 7 - highly adequate. The highest mean rating for the adequacy of target effect scoring was by AA aviators for the closest range, but it was still below the midpoint of the scale (see Table 13). The scoring adequacy ratings by the other respondents and the ratings for the second closest ranges were slightly lower than the AA aviator ratings for the closest range. A large majority of all respondents indicated there was a need to improve the scoring equipment and methods on their ranges.

The median number of trips that the aviators made to the closest range and the number of times that they practiced live-fire gunnery in FY87 was two for both the AA and NG aviators. The IQR for the number of trips and live-fire opportunities was one to three. Of the 437 AA aviators responding, 95% made four or fewer trips to the closest range

Table 12

Percentage of Target Area Effect Scoring Types

Type	% Active	% Guard
Closest Range	(n = 70)	(n = 34)
Aircraft Observer	67.1	88.2
Ground Observer With Scope	27.1	0.0
Unaided Ground Observer	14.3	2.9
Other	17.1	11.8
Second Closest Range	(n = 45)	(n = 24)
Aircraft Observer	80.0	95.8
Ground Observer With Scope	13.3	0.0
Unaided Ground Observer	6.7	4.2
Other	15.6	0.0

Note. The respondents could check as many types as applied.

Table 13

Means and Standard Deviations of Aviator Range Scoring Adequacy Ratings

Group	<u>Closest Range</u>			<u>2nd Closest Range</u>		
	Mean	SD	n	Mean	SD	n
Commanders						
Active Army	3.1	1.49	68	2.9	1.59	43
National Guard	2.6	1.50	32	2.5	1.35	24
Aviators						
Active Army	3.4	1.59	488	3.3	1.58	236
National Guard	3.1	1.71	198	2.8	1.70	110

Note. The rating scale ranges from 1 = highly inadequate to 7 = highly adequate.

during FY87. Of the 163 NG aviators responding, 92% made three or fewer trips to the closest range. The median distance to the closest gunnery range was 35 air miles (IQR = 10 - 100) for 463 AA aviator respondents and 80 air miles (IQR = 50 - 134) for 163 NG aviator respondents. The second closest range was generally much farther away from the units (medians = 60 and 200 air miles for 216 AA and 127 NG aviators, respectively) and were used approximately half as many times as the closest range.

Flight Simulators

There are substantial differences between the AA and NG units in their use of flight simulators for training. Among 79 AA commanders, 88.6% indicated that their units used flight simulation as part of their gunnery program. In contrast, only 38.5% of 39 NG commanders indicated that their unit used simulation for gunnery training. The major reasons for this difference are that (a) many of the NG aircraft (e.g., UH-1C/M) do not have a field simulator that is suitable for gunnery training, and (b) NG access to the AH-1 FWS simulator is limited. None of the NG units had a simulator located at their installation while 40.3% of the 72 AA commanders responding reported having a flight simulator available at their installation.

Of 32 AA and 11 NG commanders that were not collocated with a flight simulator, the median distance to the closest simulator was 60 (IQR = 35-350) and 240 (IQR = 140-350) surface miles, respectively. Among the respondents who received training in a simulator during FY87, the median number of trips made to the simulator was 5 (IQR = 2 to 11) for 412 AA aviators and 1 (IQR = 1 to 2) for 99 NG aviators. Because of their limited utilization, no further data on simulator training by the National Guard are presented in this report.

The AA aviators were asked a series of questions about the training they accomplished in flight simulators. When asked which training device simulated their primary aircraft, 416 indicated the FWS, 87 indicated the AH-64 Combat Mission Simulator (CMS), and 6 indicated the UH-1 Flight Simulator (UH-1FS); the remaining aviators either did not respond or indicated that a simulator did not exist for their primary aircraft.

The AA aviators ($n = 466$) reported logging a median of 20 hours (IQR = 10 - 30) in the flight simulator for their primary aircraft during FY87. The annual simulator training requirements are 20 hours for UH-1 and AH-1 aviators and 30

hours for AH-64 aviators, although these requirements may be reduced or waived (e.g., for IPs or if there is no simulator at the installation). In addition, 440 aviators reported spending a median of 50% (IQR = 20 - 70) of their simulator hours on weapons system training. Finally, 160 of 448 AA aviators reported using the simulator to qualify on their primary aircraft's weapons system.

The respondents also were asked to rate the training value of the flight simulator for the following 12 types of training tasks and procedures:

- weapons system switchology,
- compensating for interior ballistics,
- compensating for exterior ballistics,
- compensating for terminal ballistics,
- target detection,
- target identification,
- estimating range to targets,
- target handover techniques,
- normal flight tasks,
- instrument flight tasks,
- emergency flight tasks, and
- weapons system emergency procedures.

The respondents used a scale that ranged from 1 (very low training value) to 7 (very high training value) to rate each type of task.

The ratings of training value were combined across simulators (FWS, CMS, and UH1FS) and the mean of the commander ratings was compared with the mean of the aviator ratings. The commanders rated the training value of the simulators higher (mean = 4.51, $n = 52$) than the aviators (mean = 4.19, $n = 475$). Although statistically significant ($F[1, 525] = 4.87$, $p < .03$), the difference in mean ratings between the commanders and aviators is relatively small (.32 on a seven-point scale). There were also significant differences in the rated training value of the simulators for the 12 training tasks ($F[11, 5775] = 214.43$, $p < .0001$). The Newman-Keuls test at $p < .01$ (see Winer, 1971) was used to determine which training tasks were rated as significantly higher or lower in training value, with the following results.

- The emergency flight tasks, weapons system switchology, and instrument flight tasks had mean ratings of 6.21, 6.18, and 6.14, respectively. The training value of the simulators for these three tasks was rated as significantly higher than the other nine tasks, but they were not significantly different from each other.

- The mean ratings for weapons system emergency procedures (mean = 5.78), normal flight tasks (mean = 5.16), and target handoff procedures (mean = 4.07) were significantly different ($p < .01$) from the mean ratings for all the other training tasks.
- The remaining six tasks had mean ratings less than 3 and were rated significantly lower than the other six tasks, but they were not significantly different from each other.

Finally, there was no significant interaction between the duty position of the respondents and the type of training task.

In general, both the commanders and aviators rated the simulators as having relatively high training value for procedural tasks such as weapons system switchology (see Figure 1), but relatively low training value for perceptual tasks, such as estimating range to the target (see Figure 2), that are dependent upon the cues provided by the simulator's visual system. For other types of training tasks, the respondents' ratings did not exhibit a clear consensus about the simulators' training value. For example, the ratings on target handover techniques (see Figure 3) are approximately evenly distributed across the rating categories for both commanders and aviators. The lack of consensus probably reflects differences in the manner in which different units use the simulators, rather than the inherent value of the

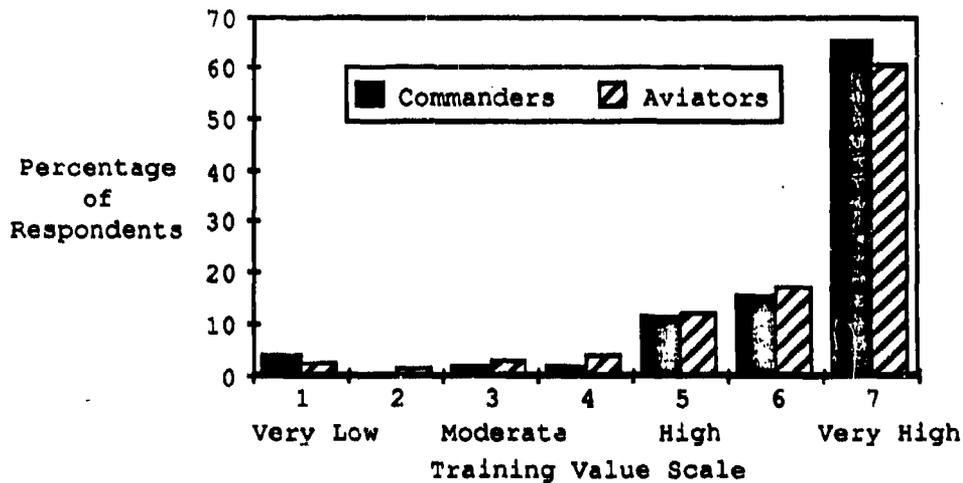


Figure 1. Active Army ratings of the training value of simulators for weapons system switchology.

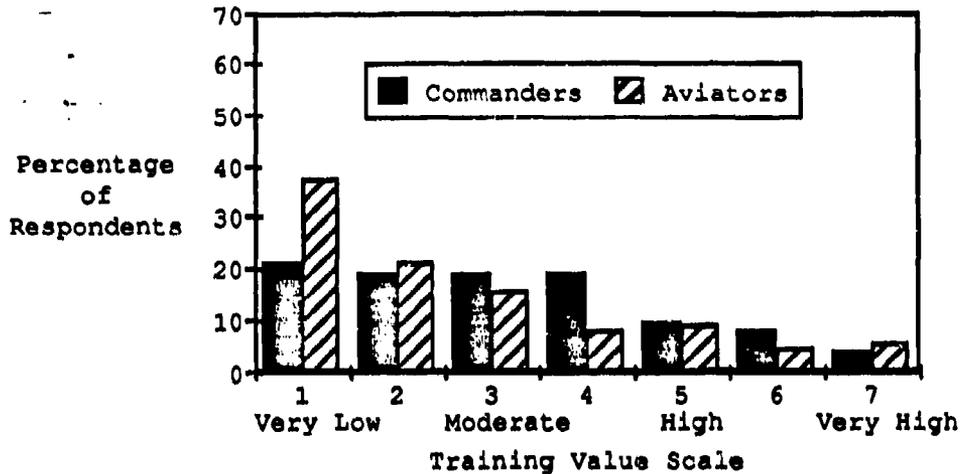


Figure 2. Active Army ratings of the training value of simulators for estimating range to the target.

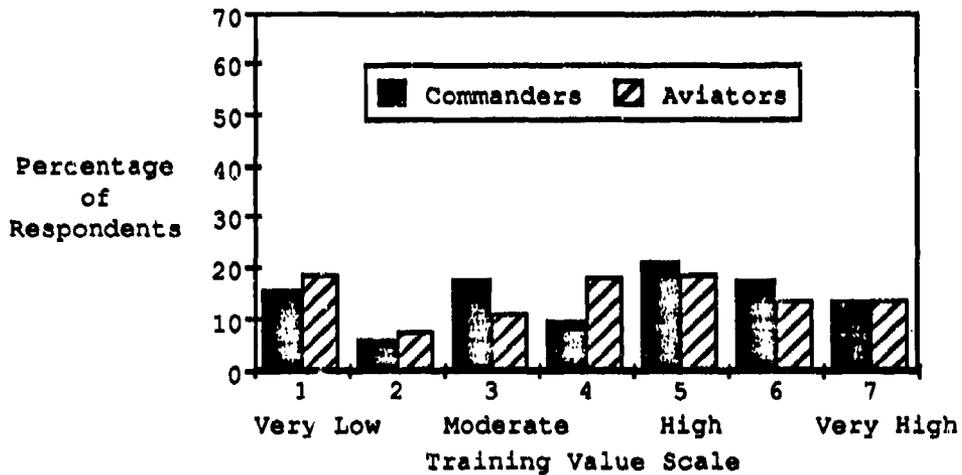


Figure 3. Active Army ratings of the training value of simulators for target handover techniques.

simulators for training (G. L. Kaempf, personal communication, January 1988). Empirical transfer-of-training research, rather than subjective opinions based on personal experience, will be required to determine the inherent training value of the simulators for these tasks. Figures showing the training value rating distributions for the other nine types of training tasks are presented in Appendix C.

The training value ratings were analyzed separately for the FWS and the CMS simulators. Overall, the training value of the CMS (mean = 4.89, $n = 87$) was rated significantly higher ($F[1, 508] = 50.27$, ($p < .0001$) than the training value of the FWS (mean = 4.09, $n = 423$). Significant differences ($F[11, 5588] = 259.04$, ($p < .0001$) between the training tasks paralleled the results of the first ANOVA. There was also an interaction ($F[11, 5588] = 43.60$, ($p < .0001$) between the simulators and the type of training task. As shown in Table 14, there are no significant differences in the ratings between the two simulators on four types of training: normal flight tasks, emergency flight tasks, weapons system switchology, and weapons system emergency

Table 14

Means and Standard Deviations of the CMS and FWS Training Value Ratings for Twelve Training Tasks

Task	CMS ($n = 87$)		FWS ($n = 423$)		p^a
	Mean	SD	Mean	SD	
WS Switchology	6.52	0.83	6.13	1.40	ns
Interior Ballistics	3.84	1.95	2.75	1.72	.01
Exterior Ballistics	4.00	1.88	2.76	1.68	.01
Terminal Ballistics	3.98	1.89	2.62	1.64	.01
Detect Targets	4.90	1.73	2.44	1.61	.01
Identify Targets	4.89	1.69	2.40	1.74	.01
Estimate Range	3.52	1.94	2.51	1.71	.01
Target Handover	4.77	1.83	3.92	2.00	.01
Normal Flight	5.20	1.62	5.20	1.49	ns
Emergency Tasks	6.06	1.17	6.24	1.17	ns
WS Emergency Tasks	5.70	1.42	5.83	1.55	ns
Instrument Tasks	5.34	1.58	6.31	1.16	.01

Note. The following abbreviations are used in Table 14: CMS = AH-64 Combat Mission Simulator; FWS = AH-1 Flight Weapons Simulator; WS = weapons system; ns = not significant.

^aThe post hoc analysis of the interaction effect was conducted using the Newman-Keuls procedure with the harmonic mean of the cells as the sample size. The FWS was rated higher on instrument flight tasks and the CMS was rated higher on the other significantly different training tasks.

procedures. The FWS was rated as significantly better than the CMS on instrument flight tasks and the CMS was rated as significantly better than the FWS for the remaining seven types of training tasks.

The instrument flight training advantage of the FWS can be explained in terms of training requirements. Instrument flight rarely occurs in the AH-64 because of its advanced sensors; consequently, instrument training is not usually conducted in the CMS. Conversely, the AH-1 is not equipped for intentional instrument flight, but it is frequently practiced in the FWS to prepare for inadvertent instrument meteorological conditions.

The greatest CMS advantages in the ratings of training value are for target detection and target identification (see Figures 4 and 5, respectively), which are highly dependent on the simulator's visual system capabilities. Although the ratings are significantly higher for the CMS than the FWS, there is still no strong consensus among the aviators on the training value of the simulator for training target handover techniques (see Figure 6). Figures showing the differences in the training value rating distributions for the CMS and FWS for the other nine types of training tasks are presented in Appendix D.

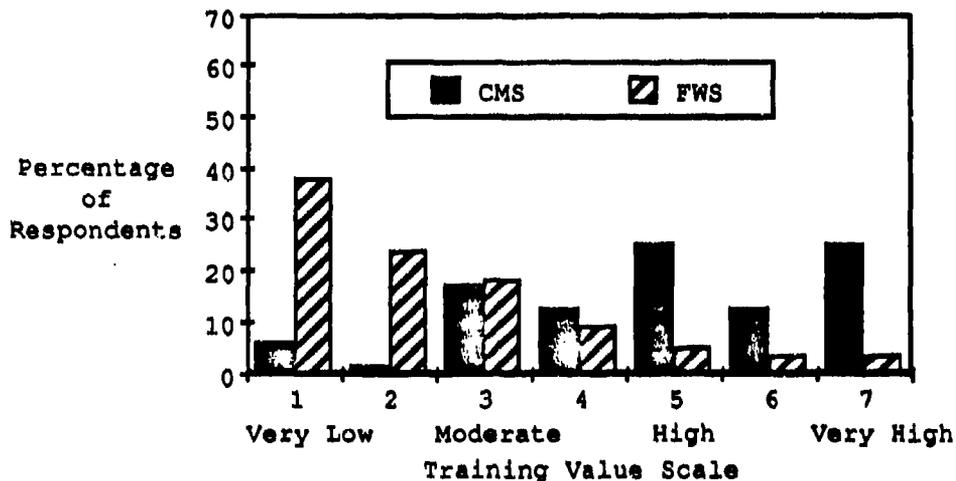


Figure 4. Active Army ratings of the training value of the AH-64 Combat Mission Simulator (CMS) and the AH-1 Flight Weapons Simulator (FWS) for target detection.

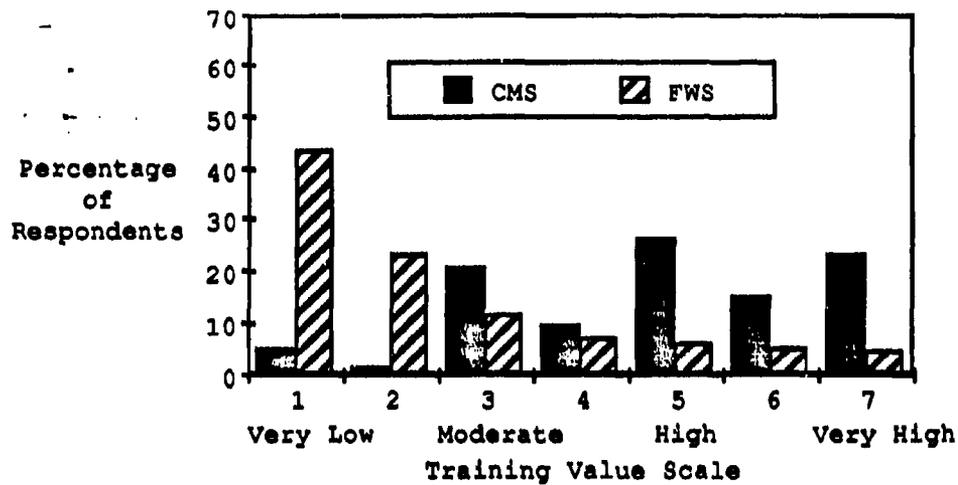


Figure 5. Active Army ratings of the training value of the AH-64 Combat Mission Simulator (CMS) and the AH-1 Flight Weapons Simulator (FWS) for target identification.

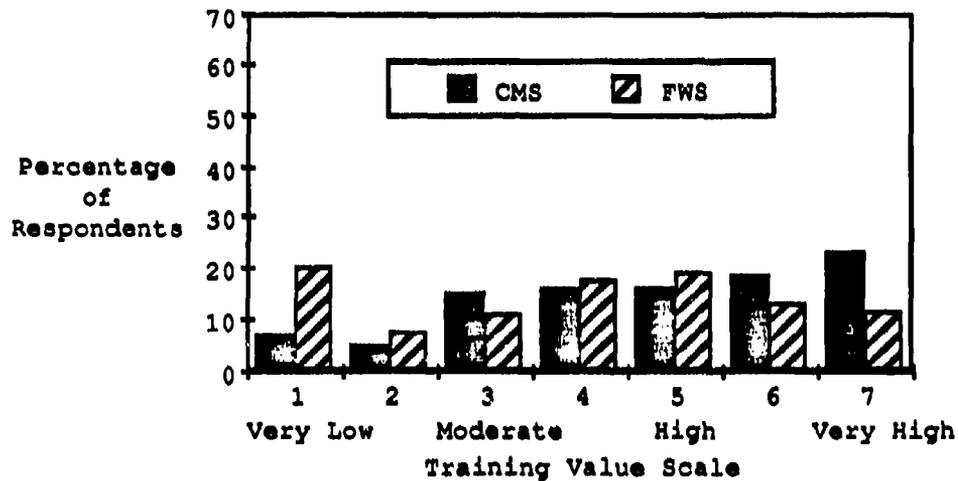


Figure 6. Active Army ratings of the training value of the AH-64 Combat Mission Simulator (CMS) and the AH-1 Flight Weapons Simulator (FWS) for target handover techniques.

Finally, the FWS ratings were analyzed to determine if the simulator's perceived training value differed as a function of the model of AH-1S helicopter that aviators fly as their primary aircraft. The FWS is configured as an AH-1S (MC) helicopter. Aviation units typically fly a combination of the very similar AH-1S (MC) and AH-1S ECAS models or a combination of the very similar AH-1S MOD and AH-1S PROD models.

There was no main effect for primary aircraft (AH-1S MOD/PROD versus MC/ECAS) and the training task effect was similar to the previous two analyses. There was a significant interaction ($F[11,4136] = 5.41, p < .0001$). As shown in Table 15, the ratings provided by the MC/ECAS aviators are

Table 15

Means and Standard Deviations of the FWS Training Value Ratings for the MOD/PROD and MC/ECAS Aviators

Task	MOD/PROD (n = 98)		MC/ECAS (n = 280)		p ^a
	Mean	SD	Mean	SD	
WS Switchology	5.54	1.80	6.33	1.16	.01
Interior Ballistics	2.80	1.75	2.63	1.75	ns
Exterior Ballistics	2.76	1.66	2.69	1.72	ns
Terminal Ballistics	2.64	1.70	2.54	1.65	ns
Detect Targets	2.59	1.79	2.34	1.55	ns
Identify Targets	2.59	1.92	2.23	1.61	ns
Estimate Range	2.51	1.80	2.40	1.66	ns
Target Handover	4.13	2.10	3.88	1.97	ns
Normal Flight	5.06	1.50	5.14	1.52	ns
Emergency Tasks	6.23	1.15	6.21	1.22	ns
WS Emergency Tasks	5.31	1.93	5.95	1.40	.01
Instrument Tasks	6.11	1.37	6.37	1.09	ns

Note. The following abbreviations are used in Table 15: FWS = AH-1 Flight Weapons Simulator; MOD/PROD = modified/production model; MC/ECAS = modernized Cobra/enhanced Cobra armament system; WS = weapons system; ns = not significant.

^aThe post hoc analysis of the interaction effect was conducted using the Newman-Keuls procedure with the harmonic mean of the cells as the sample size. The MOD/PROD aviators rated the training value of the FWS significantly lower on the WS switchology and emergency tasks.

significantly higher than the ratings provided by the MOD/PROD aviators on two training tasks: weapons system switchology and weapons system emergency procedures (see Figures 7 and 8, respectively). For these two types of training, performance is apparently dependent on the degree of physical fidelity between the simulator and the aircraft. There were no significant differences in the ratings between the two groups of aviators on the other ten types of training tasks.

Estimated Training Requirements

The survey respondents were asked several opinion questions about the training requirements for attack helicopter aviators. Three sets of opinion questions are discussed below: (1) the need for gunnery tables, (2) the estimated minimum amounts of ammunition needed for crew qualification, and (3) the estimated minimum amounts of ammunition needed to sustain an aviator's gunnery skills for a 12-month period.

Need for gunnery tables. A majority of the respondents did not desire a standardized gunnery training program, but agreed on the need for standardized gunnery tables to support the development of unit training programs. That is, the respondents want the flexibility to tailor their own unit gunnery training programs, but most respondents recognize the need for training program guidelines.

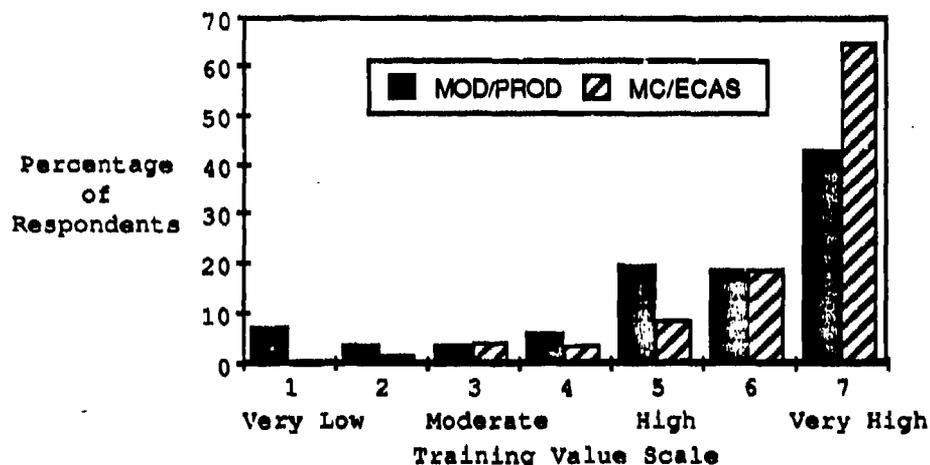


Figure 7. Active Army ratings by MOD/PROD and MC/ECAS aviators of the training value of the FWS for weapons system switchology.

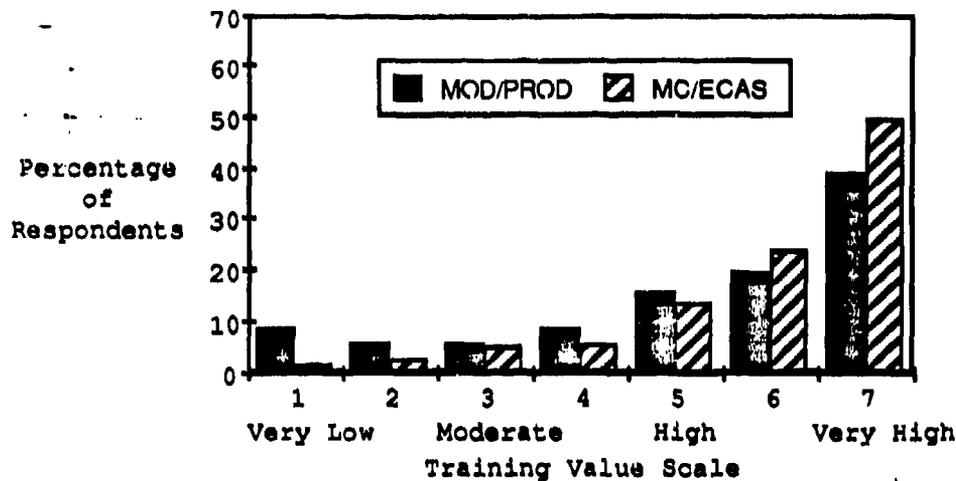


Figure 8. Active Army ratings by MOD/PROD and MC/ECAS aviators of the training value of the FWS for weapons system emergency procedures.

Tables 16 through 18 show the percentage of respondents who agreed and disagreed on the need for standardized individual, crew, and unit mission gunnery tables, respectively. The response distributions were very similar for each type of table: the majority agreed on the need for the tables. However, a smaller percentage of the NG than the AA respondents agreed on the need for the tables and a smaller percentage of the aviators than the unit commanders agreed on the need for the tables. A large majority of respondents also wanted live-fire practice tables: the percentage wanting practice tables ranged from 61.6 for 229 NG aviators to 79.2 for 77 AA commanders. A majority of aviators (69.2% of 214 NG and 57.2% of 528 AA) believed that flight simulation gunnery tables should be mandatory even though they rated the flight simulation gunnery tables in FM 1-140 as being only moderately effective (see Table 19).

Crew qualification ammunition requirements. The respondents were asked to estimate the minimum number of rounds of each type of ammunition needed to achieve day, night-unaided, and night vision device (NVD) crew qualification. Each unit commander estimated the ammunition requirements for crew qualification for the "average" aviator in his unit. Each aviator estimated the ammunition requirements that would be needed for himself to achieve crew qualification. Differences in unit TRCs and in aviator experience levels are expected to be reflected in large IQRs for the estimates of

Table 16

Percentage of Active Army (AA) and National Guard (NG)
 Respondents Agreeing on the Need for Standardized Individual
 Tables

Group (n)	<u>Strongly Agree</u>	<u>Moderately Agree</u>	<u>Moderately Disagree</u>	<u>Strongly Disagree</u>
Commanders				
AA (76)	36.9	28.9	18.4	15.8
NG (37)	21.6	48.7	18.9	10.8
Aviators				
AA (525)	27.8	35.0	22.3	14.9
NG (223)	20.6	38.2	24.2	17.0

Table 17

Percentage of Active Army (AA) and National Guard (NG)
 Respondents Agreeing on the Need for Standardized Crew Tables

Group (n)	<u>Strongly Agree</u>	<u>Moderately Agree</u>	<u>Moderately Disagree</u>	<u>Strongly Disagree</u>
Commanders				
AA (76)	47.4	25.0	19.7	7.9
NG (37)	21.6	51.4	16.2	10.8
Aviators				
AA (524)	35.0	32.7	20.6	11.8
NG (221)	22.6	40.8	24.4	12.2

Table 18

Percentage of Active Army (AA) and National Guard (NG) Respondents Agreeing on the Need for Standardized Unit Mission Tables

Group (n)	<u>Strongly Agree</u>	<u>Moderately Agree</u>	<u>Moderately Disagree</u>	<u>Strongly Disagree</u>
Commanders				
AA (74)	32.4	25.7	21.6	20.3
NG (37)	16.2	46.0	24.3	13.5
Aviators				
AA (520)	31.5	34.5	19.6	14.4
NG (220)	22.3	39.9	22.3	15.5

Table 19

Percentage of Aviators Rating the Effectiveness of the FM 1-140 Flight Simulation Gunnery Tables

Group	<u>Highly Effective</u>	<u>Somewhat Effective</u>	<u>Somewhat Ineffective</u>	<u>Highly Ineffective</u>
Active Army (n = 505)	3.0	52.1	24.2	12.1
National Guard (n = 196)	2.0	45.9	20.9	4.6

Note. The percentages do not add to 100 because the aviators could indicate that the flight simulation tables were not used.

ammunition requirements. However, the median estimate for each weapon should reflect the "best estimate" of the ammunition requirements for the average AA and NG aviator to achieve crew qualification.

Because of the differences in weapons on the various aircraft assigned to the units, there are large differences in the number of respondents to each item. If there were 15 or fewer respondents to an item, the data were considered unreliable and are not reported. Nonetheless, reliable estimates were obtained for most types of ammunition.

Tables 20 through 23 present descriptive statistics for the unit commanders' and aviators' estimates of the minimum number of rounds of ammunition required to achieve crew qualification on four types of weapons: the 7.62-, 20-, and 30-mm guns and the 40-mm grenade launcher, respectively. As expected, the IQRs for the estimates indicate that the respondents within the same groups (e.g., AA aviators) differ greatly in their opinions about the minimum number of rounds required for crew qualification. For example, Table 20 shows that the 7.62-mm IQR for NG commanders is 9,000 rounds of ammunition (3,000 - 12,000 rounds). The estimates of the NG respondents are slightly more variable than their AA counterparts. The unit commanders are slightly less variable than the aviators in their estimates. However, the variability between groups is much smaller than the variability within groups.

As shown in Tables 20, 21, and 23, the median estimates of the commanders are slightly higher than the aviators for the number of 7.62-, 20-, and 40-mm rounds that are needed for crew qualification. The largest differences between the commander and aviator median estimates are for the 7.62-mm day and night-unaided crew qualification requirements (see Table 20). Reliable estimates of the number of 30-mm rounds were obtained only from AA aviators (see Table 22). For each weapon, the median estimate of ammunition required for crew qualification is substantially higher than the median number of rounds fired by aviators during FY87 (see Table 8). For example, the NG aviators fired a median of 3,000 rounds of 7.62-mm ammunition during FY87, but their median estimate is that 9,000 rounds are required for crew qualification. Similarly, the AA aviators fired a median of 900 rounds of 20-mm ammunition during FY87, but their median estimate is that 3,000 rounds are required for crew qualification (see Table 21).

Table 20

Estimated Minimum Number of 7.62-mm Rounds Required for an Average Aviator to Achieve Crew Qualification

Group	Day	Night	NVD	Total
Commanders				
Active Army				
Mdn	--	--	--	--
IQR	--	--	--	--
n	12	10	9	
National Guard				
Mdn	6000	3000	--	--
IQR	3000-12000	1800-6000	--	
n	24	21	11	
Aviators				
Active Army				
Mdn	3000	1500	1500	6000
IQR	1200-4000	1500-3000	1000-3000	
n	80	73	66	
National Guard				
Mdn	4000	2000	3000	9000
IQR	2000-6000	1500-6000	1500-6000	
n	158	145	124	

Note. The following abbreviations are used in Table 20: mm = millimeter; NVD = night vision device; Mdn = median; IQR = interquartile range; -- = insufficient data ($n < 15$) to compute statistics.

Table 21

Estimated Minimum Number of 20-mm Rounds Required for an Average Aviator to Achieve Crew Qualification

Group	Day	Night	NVD	Total
Commanders				
Active Army				
Mdn	750	600	500	1850
IQR	500-1200	300-1000	200-800	
n	40	39	38	
National Guard				
Mdn	--	--	--	--
IQR	--	--	--	
n	1	1	1	
Aviators				
Active Army				
Mdn	600	500	500	1600
IQR	400-1000	300-1000	300-1000	
n	335	322	298	
National Guard				
Mdn	1000	1000	1000	3000
IQR	400-2000	400-1500	400-1500	
n	38	35	33	

Note. The following abbreviations are used in Table 21: mm = millimeter; NVD = night vision device; Mdn = median; IQR = interquartile range; -- = insufficient data (n < 15) to compute statistics.

Table 22

Estimated Minimum Number of 30-mm Rounds Required for an Average Aviator to Achieve Crew Qualification

Group	Day	Night	NVD	Total
Commanders				
Active Army				
Mdn	--	--	--	--
IQR	--	--	--	--
n	8	5	8	
National Guard				
Mdn	--	--	--	--
IQR	--	--	--	--
n	0	0	0	
Aviators				
Active Army				
Mdn	500	500	500	1500
IQR	300-1000	300-750	300-1000	
n	81	56	81	
National Guard				
Mdn	--	--	--	--
IQR	--	--	--	--
n	5	5	5	
<p><u>Note.</u> The following abbreviations are used in Table 23: mm = millimeter; NVD = night vision device; Mdn = median; IQR = interquartile range; -- = insufficient data (n < 15) to compute statistics.</p>				

Table 23

Estimated Minimum Number of 40-mm Rounds Required for an Average Aviator to Achieve Crew Qualification

Group	Day	Night	NVD	Total
Commanders				
Active Army				
Mdn	--	--	--	--
IQR	--	--	--	
n	12	10	8	
National Guard				
Mdn	300	250	--	--
IQR	200-500	100-300	--	
n	19	17	8	
Aviators				
Active Army				
Mdn	300	225	200	725
IQR	150-500	100-400	150-400	
n	76	64	59	
National Guard				
Mdn	300	200	200	700
IQR	100-500	100-500	100-500	
n	128	118	104	

Note. The following abbreviations are used in Table 22: mm = millimeter; NVD = night vision device; Mdn = median; IQR = interquartile range; -- = insufficient data ($n < 15$) to compute statistics.

Table 24 presents the estimated minimum number of High Explosive (HE) FFARS required for day, night-unaided, and night vision device qualification. Compared to the unit commanders, the aviators generally estimate that more FFARS are required for crew qualification. There is close agreement between the AA and NG aviators and between the AA and NG commanders on the number of FFARS needed for crew qualification. The ranges of the estimates indicate there is more

Table 24

Estimated Minimum Number of 2.75-inch HE Rockets Required for an Average Aviator to Achieve Crew Qualification

Group	Day	Night	NVD	Total
Commanders				
Active Army				
Mdn	40	32	32	104
IQR	32-76	20-50	24-50	
n	57	52	52	
National Guard				
Mdn	60	30	--	--
IQR	28-112	20-56	--	
n	25	22	12	
Aviators				
Active Army				
Mdn	50	48	48	146
IQR	30-100	25-100	25-100	
n	486	443	440	
National Guard				
Mdn	50	50	50	150
IQR	36-100	25-76	24-100	
n	185	170	151	

Note. The following abbreviations are used in Table 24: HE = high explosive; NVD = night vision device; Mdn = median; IQR = interquartile range; -- = insufficient data (n < 15) to compute statistics.

agreement among commanders than among aviators on the number of FFARs that are needed. This pattern also occurs in the estimates of the number of TOW missiles that are needed to qualify (see Table 25). There is much closer agreement among all subgroups on the estimated minimum requirements for 2.75-inch smoke and illumination FFARs (see Table 26).

Table 25

Estimated Minimum Number of Missiles Required for an Average Aviator to Achieve Crew Qualification

Group	TOW Missile			HELLFIRE Missile		
	Day	Night	NVD	Day	Night	NVD
Commanders						
Active Army						
Mdn	2	1	1	--	--	--
IQR	1-2	1-2	1-2	--	--	--
n	45	34	26	7	2	7
National Guard						
Mdn	--	--	--	--	--	--
IQR	--	--	--	--	--	--
n	12	9	4	0	0	0
Aviators						
Active Army						
Mdn	2	2	2	2	2	2
IQR	1-3	1-4	1-4	1-4	1-5	1-5
n	358	276	226	69	34	68
National Guard						
Mdn	2	3	4	--	--	--
IQR	1-5	2-5	2-5	--	--	--
n	99	79	65	9	7	7

Note. The following abbreviations are used in Table 25: TOW = tube-launched, optically-tracked, wire-guided; NVD = night vision device; Mdn = median; IQR = interquartile range; -- = insufficient data (n < 15) to compute statistics.

Table 26

Estimated Minimum Number of Smoke and Illumination Rockets
Required for an Average Aviator to Achieve Crew Qualification

Group	Smoke (Day)	Illum (Night)	Illum (NVD)
Commanders			
Active Army			
Mdn	10	12	10
IQR	8-20	10-20	6-16
n	41	47	40
National Guard			
Mdn	--	14	--
IQR	--	7-24	--
n	14	22	9
Aviators			
Active Army			
Mdn	16	18	16
IQR	10-30	10-30	10-30
n	278	348	301
National Guard			
Mdn	12	14	14
IQR	10-25	10-25	10-25
n	90	121	97

Note. The following abbreviations are used in Table 26:
Illum = illumination; NVD = night vision device; Mdn =
median; IQR = interquartile range; -- = insufficient data (n
< 15) to compute statistics.

In all cases, the median estimates of rockets and missiles needed to achieve crew qualification are substantially more than the median rounds fired by the aviators during FY87 (compare Table 8 to Tables 24 - 26). The largest difference is for the 2.75-inch HE rocket. The IQR for HE rockets fired in FY87 is 40 to 115 for AA aviators and 20 to 60 for NG aviators. The median estimates by the AA and NG aviators of HE rockets required for crew qualification are 146 and 150, respectively. That is, the aviators in both components estimate that more HE rockets are required for crew qualification than were fired by 75% of the aviators in FY87. The estimates for the 2.75-inch smoke and illumination rockets are closer to the number fired in FY87. The estimates of missiles required for crew qualification are much higher than the numbers fired in FY87, but the missiles fired data are confounded by the moratorium that was imposed for part of the training year.

Skill sustainment ammunition requirements. In questions that are similar to the crew qualification items, the respondents were asked to estimate the minimum number of rounds of each type of ammunition needed to sustain an average aviator's gunnery skills for a 12-month period. Table 27 presents the estimated sustainment requirements for the 7.62-, 20-, 30-, and 40-mm guns. Where comparisons can be made, there is generally good agreement in the estimates between AA and NG, and between aviators and commanders. With the exception of 30-mm ammunition, the median estimated sustainment requirements are less than the total estimated crew qualification requirements. In all cases, the estimated sustainment requirements are substantially higher than the median number of rounds fired during FY87 (see Table 8).

Table 28 presents the median sustainment estimates for the 2.75-inch HE, smoke, and illumination FFARs. For all three types of FFARs, the aviators generally estimate a higher sustainment requirement than the unit commanders. The generally smaller ranges of estimates indicate a better consensus among the commanders than among the aviators in their opinions about the ammunition requirements for skill sustainment. The estimates are much higher for the AA than the NG, but this result probably reflects the differences in training readiness conditions. The median gunnery skill sustainment estimates approximate the annual STRAC authorizations per airframe for all levels of gunnery training (i.e., individual, crew, team, and CALFEX/JAAT). However, the median number of 2.75-inch rockets fired during FY87 (see Table 8) was much less than the median estimated sustainment requirements.

Table 27

Estimated Minimum Number of Rounds Needed to Sustain an Average Aviator's Skills for 12 Months

Group	<u>7.62-mm</u>	<u>20-mm</u>	<u>30-mm</u>	<u>40-mm</u>
Commanders				
Active Army				
Mdn	--	1000	--	--
IQR	--	600-2000	--	--
n	13	41	8	13
National Guard				
Mdn	6000	--	--	300
IQR	3000-9000	--	--	200-500
n	28	2	0	22
Aviators				
Active Army				
Mdn	6000	1500	2000	500
IQR	4000-12000	1000-2500	1000-3200	300-1200
n	84	357	85	80
National Guard				
Mdn	5000	1000	--	300
IQR	3000-10000	600-2000	--	200-800
n	177	37	6	142

Note. The following abbreviations are used in Table 27: mm = millimeter; Mdn = median; IQR = interquartile range; -- = insufficient data ($n < 15$) to compute statistics.

Table 28

Estimated Minimum Number of 2.75-inch Rockets Needed to Sustain an Average Aviator's Gunnery Skills for 12 Months

Group	HE	Smoke	Illum
Commanders			
Active Army			
Mdn	100	14	20
IQR	50-200	10-30	8-48
n	60	47	54
National Guard			
Mdn	60	14	10
IQR	38-100	6-14	6-14
n	29	17	25
Aviators			
Active Army			
Mdn	160	30	30
IQR	100-300	20-60	20-50
n	514	330	418
National Guard			
Mdn	76	14	14
IQR	50-152	10-40	10-30
n	203	111	146

Note. The following abbreviations are used in Table 28:
 HE = high explosive; Illum = illumination; Mdn = median;
 IQR = interquartile range.

As shown in Table 29, the aviators' estimates for missile skill sustainment are substantially higher than the current authorizations (.9 TOW missiles per airframe and no HELLFIRE missiles). Very little reliable data were obtained from the commanders on skill sustainment requirements for the TOW and HELLFIRE missiles. The missile-firing moratorium during FY87 prevents making any generalizable comparisons between the estimated sustainment requirements and the current levels of missile-firing training.

Table 29

Estimated Minimum Number of Missiles Needed to Sustain an Average Aviator's Skills for 12 Months

Group	TOW	HELLFIRE
Commanders		
Active Army		
Mdn	2	--
IQR	1-3	--
n	49	8
National Guard		
Mdn	--	--
IQR	--	--
n	13	0
Aviators		
Active Army		
Mdn	3	3
IQR	2-5	2-6
n	403	80
National Guard		
Mdn	3	--
IQR	2-5	--
n	109	8

Note. The following abbreviations are used in Table 29: TOW = tube-launched, optically-tracked, wire guided; Mdn = median; IQR = interquartile range; -- = insufficient data (n < 15) to compute statistics.

In a follow-on question, the respondents estimated the ammunition requirements, by type, for sustainment training of typical aviators with 500, 1000, 1500, and 2000 flight hours of experience. The main effect of experience level on estimated sustainment requirements for each type of ammunition was analyzed with ANOVAs. If the main effect was significant, Tukey tests were used to examine differences between each pair of experience levels (see Winer, 1971).

In general, the estimated ammunition requirements showed a significant ($p < .05$) linear decrease as aviator experience increased. That is, the more experienced aviators required less ammunition than the less experienced aviators to maintain their gunnery skills at acceptable levels. The exceptions to this finding for the AA estimates were (a) no significant differences between experience levels for the 30-mm and HELLFIRE missile and (b) a nonlinear function for the 40-mm cannon (no decrease in requirements beyond the 1500 flight hour level). In the NG estimates, there were no significant main effects of experience level for the 20-mm, 40-mm, 2.75-in. smoke rocket, and HELLFIRE missile. The statistical differences between the AA and NG estimates can be attributed to differences in annual ammunition expenditures, unit TRC, and sample size.

Door Gunnery Training

The commanders were asked a series of questions on Form B about door gunnery training in their units. Because of the relatively small number of units that train door gunners, the number of respondents to many of the questions was too small to yield reliable results. In fact, the largest number of respondents to any of the door gunnery questions was 26 for the AA and 19 for the NG. Only three questions about door gunnery met the criterion of 15 or more respondents. The results from these three questions are discussed below.

First, a majority (53.8% of 26 AA and 82.4% of 17 NG) of the responding commanders indicated that their door gunners were not qualified in accordance with FM 1-140. The disparity between the percentage of qualified door gunners in the AA and NG is probably attributable to differences in ammunition authorizations. In response to the second item, 72.7% of 22 AA but only 36.8% of 19 NG commanders indicated that their ammunition authorizations were sufficient to qualify and sustain their door gunners. The discrepancy between the components is important because a larger percentage of the NG units train door gunners than the AA units.

The third question asked whether door gunners should be qualified from both sides of the helicopter because of differences in aiming points. The respondents in both components were approximately evenly divided on the issue: 55.6% of 18 AA and 47.1% of 17 NG commanders indicated that qualification should be required from both sides.

SUMMARY AND CONCLUSIONS

The A & G Survey research was conducted to establish an empirical data base on U.S. Army and National Guard attack helicopter aviators and units. The following types of information are included in the data base:

- the demographic characteristics of the aviators and units,
- the allocation and utilization of ammunition in aviation units,
- the availability and utilization of gunnery ranges for aviation training,
- the availability and utilization of flight simulators for aviation training,
- the estimated resource requirements for effective gunnery training, and
- ancillary issues in aviation gunnery training.

The data base is intended to support the requirements for both current and future Army and National Guard aviation gunnery analyses. The current requirements are to (a) describe the current attack helicopter force in terms of aviator, commander, and unit demographics and training characteristics, (b) formulate justifiable ammunition requirements for helicopter gunnery training, (c) revise the FM 1-140 "Helicopter Gunnery" manual, and (d) evaluate the availability and utility of gunnery ranges and training simulators. Additional analyses of the data base can be conducted as additional questions about attack helicopter training are raised. The information collected during this survey also serves as a baseline for comparison with future data collection efforts.

Several conclusions can be drawn from the survey results, especially with respect to the major problem areas addressed in the current analyses. Each general conclusion is discussed in the following paragraphs.

1. The return rates and distribution across major commands of usable surveys are adequate to provide a reliable data base for analysis, although there are limitations on the number of subsample analyses that can be conducted reliably. The amount and quality of the data collected are especially satisfactory when considering the length and detail of the surveys and the short suspense that was provided for completing them. In addition, some of the current results are corroborated by the findings of a previous, though less comprehensive, ammunition survey (STRAC, 1987).

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2. The AA respondents are, on the average, relatively young and inexperienced in the performance of their occupational specialty. This factor should be considered in determining the types and amounts of training that are provided. The NG aviators generally are older and have more experience than their AA counterparts, and therefore may be able to sustain their skills at acceptable TRC levels with less training resources. However, proportionately more of the NG aviators are maintaining their gunnery skills in aging and less effective attack aircraft (e.g., AH-1G, UH-1C/M, UH-1H). Although slightly younger, the AA commanders have experience levels that are approximately equal to the NG commanders.

3. Although the average AA aviator flew slightly more than the minimum number of hours required to maintain his flight skills in FY87, he fired less than the STRAC-authorized number of rounds of ammunition. The average NG aviator generally logged fewer flight hours and fired less ammunition than his AA counterpart. The median number of NG flight hours is consistent with previous research on the utilization of NG aviator training time (Ruffner & Szabo, 1986). The lower ammunition expenditures are consistent with the lower TRC level of most NG units.

4. A substantial number of AA and NG attack helicopter units are unable to meet the standards for their TRC with the resources that are currently available to them. In many cases, the respondents indicated that their STRAC ammunition allocation was insufficient to meet the training standards; in other cases, the inability to meet the training standards was attributed to other resource limitations such as a lack of suitable gunnery ranges and resource management issues. The lack of training resources and training time resulted in substantially lower crew qualification levels for the NG than for the AA.

5. Gunnery ranges are not readily available to many units or do not have adequate scoring methods. Many of the closest ranges are at a considerable distance from the unit, and aviators must compete with other branches for range time. Only a small percentage of aviators fired on a fully-instrumented MPRC during FY87. Transportable scoring systems that utilize electronic sensing are currently being developed to meet the need for objective evaluations of gunnery proficiency, but they are not yet in widespread use (G. L. Kaempf, personal communication, January 1988). Finally, very few of the ranges that are used by aviation units were designed specifically for aviation gunnery. All of these problems were especially critical for the NG units.

6. Flight simulators are being used to a moderate extent (median of 10 hours during FY87) by the AA aviators for gunnery training. In addition, there are several sub-conclusions that can be drawn about simulator use.

a. Very few NG units have access to flight simulators for training, which exacerbates the problems caused by limited access to ranges.

b. The simulators are perceived to have utility for some types of training but not for other types. In particular, tasks that are dependent on the FWS simulator visual system were not rated high on training value.

c. Aviators who fly the AH-1S(MOD/PROD) configurations rated the training value of the FWS lower on weapons system switchology and weapons system emergency procedures tasks than aviators who fly the AH-1S(MC/ECAS). The lack of physical simulator fidelity was not judged to impair training on the other training tasks.

d. AH-64 aviators rated the training value of the CMS higher than the AH-1 aviators rated the FWS on 7 of the 12 types of training.

When drawing conclusions about the training value of simulators, it is important to remember that the present data are subjective opinions rather than systematic measures of objective performance. It is not possible to determine from the current data base if low training value ratings should be attributed to the simulator hardware and software, to the manner in which the simulators are utilized for training, or to the aviators' preference for training in the aircraft instead of in the simulator. Empirical research is required to determine the absolute training effectiveness of the flight simulators for each type of task.

7. A majority of the unit commanders and aviators agree on the need for standardized gunnery tables to support the development of training programs, although they want to retain the flexibility to design training programs to meet their specific unit mission requirements. The ammunition utilization and estimated ammunition requirements data obtained from the survey respondents constitute a source of information that can be used to revise the FM 1-140 tables.

8. The estimates of ammunition requirements indicate that the current STRAC authorizations approximate the minimum number of rounds needed to qualify and sustain the average aviator's gunnery skills. It is very important to remember, however, that these estimates are based on personal opinions of the aviators and commanders and not on empirical studies in which training resources are systematically varied and

aviator proficiency is objectively measured. The validity of the estimates is supported by the data on the median number of rounds fired and the concomitant percentage of units that do not meet the TRC standards. The median number of rounds fired by the aviators during FY87 is much less than the amounts authorized by STRAC or estimated by the survey respondents.

9. It is not sufficient for the units to receive the full authorization of ammunition; the units must also have adequate access to ranges and the operational aircraft and weapon systems needed to expend the ammunition. Well conceived training and accurate evaluation (i.e., gunnery scoring) programs also are required to ensure that the maximum benefit is received from the gunnery training.

10. Finally, further research is needed to evaluate and improve the training of attack helicopter aviators. Additional analyses can be conducted with the current data base, and longitudinal survey data can be collected to evaluate the effects of changes in resources and training programs. Most importantly, the results of the Ammunition and Gunnery Survey have generated hypotheses that should be tested experimentally (e.g., that flight simulators could be used more effectively than they are currently being employed). ARIARDA currently is planning to conduct experimental studies on the utility of the FWS and the CMS simulators for training gunnery tasks (G. L. Kaempf, personal communication, June 1988). These empirical studies are needed to determine the amount, frequency, and type of training required to ensure that U.S. Army and National Guard attack helicopter units are capable of accomplishing their missions.

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**AVIATION AMMUNITION AND GUNNERY SURVEY
(FORM A: UNIT AVIATORS)**

PERSONAL DATA

1. What is your age?
_____ Years

2. What is your grade? (check one)

- | | |
|------------------------------|-----------------------------|
| <input type="checkbox"/> WO1 | <input type="checkbox"/> O1 |
| <input type="checkbox"/> CW2 | <input type="checkbox"/> O2 |
| <input type="checkbox"/> CW3 | <input type="checkbox"/> O3 |
| <input type="checkbox"/> CW4 | <input type="checkbox"/> O4 |
| | <input type="checkbox"/> O5 |
| | <input type="checkbox"/> O6 |

3. What is your Primary Military Occupational Specialty (Warrant Officers) or your Specialty Skill Identifier (Commissioned Officers)? (check one)

PRIMARY MILITARY OCCUPATIONAL SPECIALTY (WARRANT OFFICERS)

- 152B--Rotary Wing Attack Pilot (OH-58A/C Scout)
- 152C--Rotary Wing Attack Pilot (OH-6 Scout)
- 152D--Rotary Wing Attack Pilot (OH-58D Scout)
- 152F--Rotary Wing Attack Pilot (AH-64)
- 152G--Rotary Wing Attack Pilot (AH-1)
- 153A--Rotary Wing Aircraft Qualified (non-specific)
- 153B--Rotary Wing Utility Pilot (UH-1)
- Other (specify)_____

SPECIALTY SKILL IDENTIFIER

- 15A--General Aviation
- 15B--Combat Aviation
- 15C--Combat Support Aviation
- 15M--Combat Intelligence Aviation
- 71T--Aviation Logistics
- 67J--Aeromedical Evacuation
- Other (specify)_____

MILITARY EXPERIENCE

4. In the spaces provided below, enter the number of years and months you have spent on active duty in the Army and, if applicable, in other services.

_____ years and _____ months active duty in the Army
_____ years and _____ months active duty in the Marine Corps
_____ years and _____ months active duty in the Navy
_____ years and _____ months active duty in the Air Force

5. Have you served as a member of an active reserve unit at any time during your career?

[] No

[] Yes.

• If yes, enter the number of years you have served in each of the active reserve components listed below. (enter "0" if none)

_____ years in the Army National Guard

_____ years in the Army Reserve

_____ years in the Army Individual Ready Reserve

_____ years in the Active Reserve Component of another service

6. How much time has elapsed since you graduated from IERW?

_____ years and _____ months since graduated from IERW

7. In the spaces provided below, enter the amount of time that has elapsed since you graduated from the Aircraft Qualification Course (AQC) for each aircraft in which you are now qualified or have been qualified.

_____ years and _____ months since graduated from AH-1 AQC

_____ years and _____ months since graduated from AH-64 AQC

_____ years and _____ months since graduated from UH-60 AQC

_____ years and _____ months since graduated from CH-47 AQC

_____ years and _____ months since graduated from OH-58 AQC

_____ years and _____ months since completed OH-58 unit transition

8. In total, how many years and months have you been on flight duty?

_____ years and _____ months on flight duty

FLIGHT EXPERIENCE

INSTRUCTIONS: Refer to your current DA Form 759 and DA Form 759-1 to ensure complete accuracy of the data you provide on your flight experience.

9. During your career, how many hours have you logged in each of the flight simulators and training devices listed below?

SIMULATOR TYPE	HOURS LOGGED
UH1FS	_____
UH-1M SS-11 Training Device	_____
AH1FWS	_____
UH60FS	_____
CH47FS	_____
AH64CMS	_____
AH64 CWEPT	_____

10. For each rotary-wing aircraft in which you are presently qualified or have been qualified, enter the total hours logged during your career and the number of hours you have logged in combat. Also, check [] the box that indicates the highest qualification you hold or have held in that aircraft.

AIRCRAFT TYPE	HOURS TOTAL	LOGGED COMBAT	HIGHEST QUALIFICATION	HELD
AH-1G	_____	_____	[<input type="checkbox"/>] Pilot	[<input type="checkbox"/>] GUNY UT
AH-1S (MOD/PROD)	_____	_____	[<input type="checkbox"/>] Pilot	[<input type="checkbox"/>] GUNY UT
AH-1S (MC/ECAS)	_____	_____	[<input type="checkbox"/>] Pilot	[<input type="checkbox"/>] GUNY UT
AH-64	_____	_____	[<input type="checkbox"/>] Pilot	[<input type="checkbox"/>] GUNY UT
UH-1H	_____	_____	[<input type="checkbox"/>] Pilot	[<input type="checkbox"/>] GUNY UT
UH-1C/M	_____	_____	[<input type="checkbox"/>] Pilot	[<input type="checkbox"/>] GUNY UT
UH-1V	_____	_____	[<input type="checkbox"/>] Pilot	[<input type="checkbox"/>] GUNY UT
UH-60	_____	_____	[<input type="checkbox"/>] Pilot	[<input type="checkbox"/>] GUNY UT
OH-6	_____	_____	[<input type="checkbox"/>] Pilot	[<input type="checkbox"/>] GUNY UT
OH-58	_____	_____	[<input type="checkbox"/>] Pilot	[<input type="checkbox"/>] GUNY UT
CH-47	_____	_____	[<input type="checkbox"/>] Pilot	[<input type="checkbox"/>] GUNY UT
CH-54	_____	_____	[<input type="checkbox"/>] Pilot	[<input type="checkbox"/>] GUNY UT

PRESENT DUTY ASSIGNMENT

11. Indicate below your primary and, if applicable, your additional aircraft in your present duty position. Also, enter the number of hours logged in both your primary and additional aircraft during FY 1987.

PRIMARY AIRCRAFT	HOURS LOGGED (FY 1987)	ADDITIONAL AIRCRAFT	HOURS LOGGED (FY 1987)
[<input type="checkbox"/>] AH-1G	_____	[<input type="checkbox"/>] AH-1G	_____
[<input type="checkbox"/>] AH-1S (MOD/PROD)	_____	[<input type="checkbox"/>] AH-1S (MOD/PROD)	_____
[<input type="checkbox"/>] AH-1S (MC/ECAS)	_____	[<input type="checkbox"/>] AH-1S (MC/ECAS)	_____
[<input type="checkbox"/>] AH-64	_____	[<input type="checkbox"/>] AH-64	_____
[<input type="checkbox"/>] UH-1H	_____	[<input type="checkbox"/>] UH-1H	_____
[<input type="checkbox"/>] UH-1C/M	_____	[<input type="checkbox"/>] UH-1C/M	_____
[<input type="checkbox"/>] UH-1V	_____	[<input type="checkbox"/>] UH-1V	_____
[<input type="checkbox"/>] UH-60	_____	[<input type="checkbox"/>] UH-60	_____
[<input type="checkbox"/>] OH-58	_____	[<input type="checkbox"/>] OH-58	_____
[<input type="checkbox"/>] CH-47	_____	[<input type="checkbox"/>] CH-47	_____
[<input type="checkbox"/>] Fixed Wing (Specify)	_____	[<input type="checkbox"/>] Fixed Wing (specify)	_____
[<input type="checkbox"/>] Other (specify)	_____	[<input type="checkbox"/>] Other (specify)	_____

12. What is the Unit Identification Code (UIC) of the unit to which you are currently assigned? Contact your unit commander if you are not certain about your UIC.
Unit Identification Code: _____

13. To which major command are you presently assigned? (check one)
- WESTCOM
 - FORSCOM
 - SOUTHCOM
 - USAREUR
 - EUSA
 - Other (Specify)_____
14. In which component of the Army are you currently serving? (check one)
- Active Army
 - Army National Guard
15. In the spaces provided below, enter the location of the unit to which you are presently assigned.
- Name of post/facility_____
 - Name of state (if CONUS)_____
 - Name of country_____
16. Check the type of aviation unit to which you are presently assigned. (check one)
- Attack Helicopter Company/Troop/Battalion
 - Air Cavalry Troop/Squadron
 - Combat Support Aviation Company/Battalion
 - Other (specify)_____
17. How long have you served in the unit to which you are presently assigned?
 _____ years and _____ months in present unit.
18. In the unit to which you are presently assigned, how long have you served in your present MTOE or TDA duty position?
 _____ years and _____ months in present duty position.
19. What is your present MTOE or TDA duty position? (check as many as apply)
- Battalion/Brigade Staff Officer
 - Executive Officer (Company/Troop)
 - Operations Officer (Company/Troop)
 - Flight Operations Officer (Company/Troop)
 - Company Armament Officer
 - Platoon Leader
 - Section Leader
 - Team Leader
 - Instrument Examiner
 - Instructor Pilot
 - Flight Safety Technician
 - Aircraft Maintenance Technician
 - Attack Helicopter Pilot (AH and UH-1C/M)
 - Observation Helicopter Pilot (OH-58 and OH-6)
 - Other (specify)_____

22. During FY 1987, did your unit achieve the standards listed in DA CIR 350-85-4?
(obtain information from file records)

Don't know

Yes.

No

• If no, indicate the reasons that your unit was unable to meet the standards listed in DA CIR 350-85-4. (check as many as apply)

Lack of ammunition (explain)_____

Wrong type of ammunition (explain)_____

Lack of availability of range (explain)_____

Range facilities not suitable (explain)_____

Too many inclement weather days (explain)_____

Range too dry for safe live fire (explain)_____

Too many personnel in unit to train (unit size) (explain)_____

Too many personnel in unit to train (personnel turnover) (explain)_____

Inadequate number of IPs/UTs (explain)_____

Inadequate aircraft maintenance (explain)_____

Inadequate armament maintenance (explain)_____

Too many aviators had to be transitioned into new unit series aircraft (explain)_____

Other (specify)_____

Other (specify)_____

FM 1-140

23. Check the statement that best describes your access to a copy of FM 1-140, entitled "Helicopter Gunnery." (check one)

I have my own copy of FM 1-140

A copy of FM 1-140 is available in my unit

I must go to a location outside my unit to gain access to a copy of FM 1-140

I don't know how to gain access to a copy of FM 1-140

24. Have you read FM 1-140?

- No
- Yes

- If yes, how understandable are the requirements listed in FM 1-140?
 - Very difficult to understand
 - Moderately difficult to understand
 - Moderately easy to understand
 - Very easy to understand

25. Has your unit used FM 1-140 for developing a weapon system training and qualification program?

- No
- Yes

- If yes, what problem areas were associated with implementation of the tables listed in FM 1-140?

26. If standardized aviation gunnery tables were mandated, should those tables be similar to the standardized armor tables?

- No
- Yes

27. Is a standardized gunnery program more desirable than the flexible program set forth in FM 1-140?

- No (explain why not) _____
- Yes (explain why) _____

28. Would standardized gunnery tables pose a problem with the range facilities available to your unit?

] No

] Yes.

• If yes, indicate below the reasons that it would be difficult for you to adhere to standardized gunnery tables.

] Unit does not have access to an aerial gunnery range

] Gunnery ranges available to unit do not have moving targets

] Gunnery ranges available to unit do not have moving targets that can be fired upon at realistic ranges for HELLFIRE and TOW

] Lack of an adequate scoring system

] Inappropriate ammunition for fully instrumented range

] Overscheduling of range facilities or conflicting range schedules

] Lack of training funds

] Other (specify) _____

] Other (specify) _____

29. Indicate whether you agree or disagree with each of the following statements about standardized gunnery tables for attack aviators, attack aviator crews, and unit missions.

• Standardized gunnery tables should be developed for individual attack aviators

] Strongly agree

] Moderately agree

] Moderately disagree

] Strongly disagree

• Standardized gunnery tables should be developed for attack aviator crews

] Strongly agree

] Moderately agree

] Moderately disagree

] Strongly disagree

• Standardized gunnery tables should be developed for each attack unit

mission

(e.g., heavy attack, light attack, heavy cavalry, light cavalry)

] Strongly agree

] Moderately agree

] Moderately disagree

] Strongly disagree

30. In your opinion, should FM 1-140 include practice tables that specify the type and amount of live fire practice that should be conducted as a warm-up immediately prior to live fire qualification?

No

Yes

• If yes, check below the types of practice tables that should be included in FM 1-140.

practice tables for individual aviators

practice tables for aviation crews

practice tables for aviation teams

practice tables for CALFEX/JAAT

31. During FY 1987, did your unit use flight simulators as part of the unit's gunnery training program?

No

Yes

• If yes, check the following statement that best describes the manner in which your unit commander used the FM 1-140 flight simulation tables in developing your unit's simulator training program.

did not use the FM 1-140 flight simulation tables

used the FM 1-140 flight simulation tables only as general guidance

adhered very closely to the FM 1-140 flight simulation tables

• If no, check the reasons why not.

simulator tables are not adequate

flight simulator is not compatible with unit aircraft

inadequate travel funds

Simulator scheduling difficulties

Other (specify) _____

32. In your opinion, how effective are the flight simulation tables listed in FM 1-140?

Highly effective

Somewhat effective

Somewhat ineffective

Highly ineffective

Have not read FM 1-140

33. Check below the additional flight simulation tables you would like to see added to FM 1-140.

Tables that specify practice on scout/attack team tasks/procedures

Tables that specify practice on night vision goggle/device tasks/procedures

Tables that specify practice on switchology

Other (specify) _____

Other (specify) _____

Other (specify) _____

TRANSITION TRAINING

39. At the time you were assigned to your present unit, was it necessary for you to receive transition training (train up or train down) to qualify in your unit series aircraft?

- No
 Yes

• If yes, check below the type of transition training you received. (check one)

TRAINED UP (Transition from older series aircraft to newer series aircraft)

- transitioned from AH-1G to AH-1 MOD
 transitioned from AH-1G to AH-1 PROD
 transitioned from AH-1G to AH-1 ECAS[®]
 transitioned from AH-1G to AH-1 MC
 transitioned from AH-1 MOD to AH-1 PROD
 transitioned from AH-1 MOD to AH-1 ECAS
 transitioned from AH-1 MOD to AH-1 MC
 transitioned from AH-1 PROD to AH-1 ECAS
 transitioned from AH-1 PROD to AH-1 MC
 transitioned from AH-1 ECAS to AH-1 MC

TRAINED DOWN (Transition from newer series aircraft to older series aircraft)

- transitioned from AH-1 MC to AH-1 ECAS
 transitioned from AH-1 MC to AH-1 PROD
 transitioned from AH-1 MC to AH-1 MOD
 transitioned from AH-1 MC to AH-1G
 transitioned from AH-1 ECAS to AH-1 PROD
 transitioned from AH-1 ECAS to AH-1 MOD
 transitioned from AH-1 ECAS to AH-1G
 transitioned from AH-1 PROD to AH-1 MOD
 transitioned from AH-1 PROD to AH-1G
 transitioned from AH-1 MOD to AH-1G
 transitioned from AH-1G ECAS to UH-1M
 transitioned from AH-1 MOD to UH-1M
 transitioned from AH-1 PROD to UH-1M
 transitioned from AH-1 ECAS to UH-1M
 transitioned from AH-1 MC to UH-1M

• If yes, are you currently engaged in transition training to qualify in your unit series aircraft?

- No
 Yes

• If yes, enter below the number of rounds you fired during your transition training. Enter "N/A" if the munition is not fired on the aircraft in which you received transition training.

- _____ 7.62--mm rounds fired during transition training
_____ 40-mm rounds fired during transition training
_____ 20-mm rounds fired during transition training
_____ 2.75-inch FFAR fired during transition training
_____ SS-11 missiles fired during transition training
_____ live TOW missiles fired during transition training
_____ simulator TOW missiles fired during transition training

AMMUNITION

40. In the spaces provided below, enter the number of rounds of ammunition that you fired during FY 1987 and the number you have fired during your entire Army career. (Don't include flight simulator firing.) (enter "0" if none)

**FIRED DURING
FY 1987**

**FIRED DURING
ENTIRE CAREER**

7.62-mm rounds
 40-mm rounds
 30-mm rounds
 20-mm rounds
 2.75-inch FFAR
 2.75-inch smoke rockets
 2.75-inch illumination rockets
 SS-11 missiles
 TOW missiles
 HELLFIRE missiles

41. During FY 1987, did you fire any rounds, rockets, or missiles on a fully instrumented range (MPRC)?

- No
 Yes

- If yes, enter below the number of each type of munition you fired on a fully instrumented range as part of a crew, team, CALFEX, or JAAT training exercise. (Don't include ammunition fired in support of demonstrations.)

MUNITION TYPE	CREW	TEAM	CALFEX	JAAT
7.62-mm rounds	_____	_____	_____	_____
40-mm rounds	_____	_____	_____	_____
30-mm rounds	_____	_____	_____	_____
20-mm rounds	_____	_____	_____	_____
2.75-inch FFAR	_____	_____	_____	_____
2.75-inch smoke rockets	_____	_____	_____	_____
2.75-inch illumination rockets	_____	_____	_____	_____
SS-11 missiles	_____	_____	_____	_____
TOW missiles	_____	_____	_____	_____
HELLFIRE missiles	_____	_____	_____	_____

42. During FY 1987, did you fire any rounds, rockets, or missiles on a partially instrumented or uninstrumented range?

- No
 Yes.

• If yes, enter below the number of each type of munition you fired on a partially instrumented or uninstrumented range as part of a crew, team, CALFEX, or JAAT training exercise. (Don't include ammunition fired in support of demonstrations.)

MUNITION TYPE	CREW	TEAM	CALFEX	JAAT
7.62-mm rounds	_____	_____	_____	_____
40-mm rounds	_____	_____	_____	_____
30-mm rounds	_____	_____	_____	_____
20-mm rounds	_____	_____	_____	_____
2.75-inch FFAR	_____	_____	_____	_____
2.75-inch smoke rockets	_____	_____	_____	_____
2.75-inch illumination rockets	_____	_____	_____	_____
SS-11 missiles	_____	_____	_____	_____
TOW missiles	_____	_____	_____	_____
HELLFIRE missiles	_____	_____	_____	_____

43. Indicate below the minimum number of rounds/rockets/missiles that you think are required for you to achieve day crew qualification and night (both unaided and with a night vision device) crew qualification on your aircraft's weapon systems. Answer both parts whether or not night qualification is a requirement for your aircraft. (enter "N/A" if the munition listed is not fired on your aircraft)

DAY (CREW)	NIGHT UNAIDED (CREW)	NIGHT WITH NIGHT VISION DEVICE (CREW)	MUNITION TYPE
_____	_____	_____	7.62-mm rounds
_____	_____	_____	40-mm rounds
_____	_____	_____	30-mm rounds
_____	_____	_____	20-mm rounds
_____	_____	_____	2.75-inch FFAR
_____	_____	_____	2.75-inch smoke rockets
_____	_____	_____	2.75-inch illumination rockets
_____	_____	_____	SS-11 missiles
_____	_____	_____	TOW missiles
_____	_____	_____	HELLFIRE missiles

44. Does your unit's mission require the firing of illumination rockets?

- No
 Yes

- If yes, how many illumination rockets did you fire during FY 1987?
 _____ illumination rockets fired during FY 1987
- If yes, what is the minimum number of illumination rockets you must fire per year to remain proficient on their use?
 _____ illumination rockets must be fired per year to remain proficient

45. Does your unit's mission require the firing of smoke rockets?

- No
 Yes

• If yes, how many smoke rockets did you fire during FY 1987?
_____ smoke rockets fired during FY 1987

• If yes, what is the **minimum number** of smoke rockets you must fire per year to remain proficient on their use?
_____ smoke rockets must be fired per year to remain proficient

46. In your opinion, what is the **minimum number** of rounds of ammunition required for **you** to sustain your skills on your aircraft's weapon systems during a typical 12-month training period? (Enter "N/A" if the munition listed is not fired on your aircraft.)

- _____ 7.62-mm rounds required for sustainment training
_____ 40-mm rounds required for sustainment training
_____ 30-mm rounds required for sustainment training
_____ 20-mm rounds required for sustainment training
_____ 2.75-inch FFARs required for sustainment training
_____ 2.75-inch smoke rockets required for sustainment training
_____ 2.75-inch illumination rockets required for sustainment training
_____ SS-11 missiles required for sustainment training
_____ TOW missiles required for sustainment training
_____ HELLFIRE missiles required for sustainment training

47. In your opinion, is there a need for an allotment of ammunition to be used for live fire practice (practice tables) for warm-up immediately prior to live fire qualification?

- No
 Yes

• If yes, indicate below the number of rounds **per attack aircrew** that you think should be made available for pre-qualification practice. (Enter "N/A" if the munition listed is not fired on your aircraft.)

- _____ 7.62-mm rounds required for pre-qualification practice
_____ 40-mm rounds required for pre-qualification practice
_____ 30-mm rounds required for pre-qualification practice
_____ 20-mm rounds required for pre-qualification practice
_____ 2.75-inch FFARs required for pre-qualification practice
_____ 2.75-inch smoke rockets required for pre-qualification practice
_____ 2.75-inch illumination rockets required for pre-qualification practice
_____ SS-11 missiles required for pre-qualification practice
_____ TOW missiles required for pre-qualification practice
_____ HELLFIRE missiles required for pre-qualification practice

48. During FY 1987, did you fire any ammunition solely for the purpose of demonstrating weapons capabilities to VIPs, to the general public, or to units in your DIV/CORPS?

- No, all ammunition was expended for training and qualification
 Yes

- If yes, indicate below the total number of rounds that you fired solely for demonstration purposes. (Enter "N/A" if the munition listed is not fired on your aircraft.)

_____ 7.62-mm rounds fired for demonstration purposes
_____ 40-mm rounds fired for demonstration purposes
_____ 30-mm rounds fired for demonstration purposes
_____ 20-mm rounds fired for demonstration purposes
_____ 2.75-inch FFARs fired for demonstration purposes
_____ 2.75-inch smoke rockets fired for demonstration purposes
_____ 2.75-inch illumination rockets fired for demonstration purposes
_____ SS-11 missiles fired for demonstration purposes
_____ TOW missiles fired for demonstration purposes
_____ HELLFIRE missiles fired for demonstration purposes

- If yes, indicate below the total number of additional rounds that was provided for demonstration purposes and specify the source of the additional rounds received.

_____ additional 7.62-mm rounds (specify source)_____

_____ additional 40-mm rounds (specify source)_____

_____ additional 30-mm rounds (specify source)_____

_____ additional 20-mm rounds (specify source)_____

_____ additional 2.75-inch FFARs (specify source)_____

_____ additional 2.75-inch smoke rockets (specify source)_____

_____ additional 2.75-inch illumination rockets (specify source)_____

_____ additional SS-11 missiles (specify source)_____

_____ additional TOW missiles (specify source)_____

_____ additional HELLFIRE missiles (specify source)_____

- If yes, indicate the training value of the demonstration firing that you performed.

- Little or no training value
 Moderate training value
 High training value
 Very high training value

- If yes, did you accomplish weapon systems qualification in conjunction with the demonstration firing?

- No
 Yes

49. In the spaces provided below, (a) enter the number of rounds that you fired during FY 1987 and (b) estimate the number of rounds that you needed to fire to remain proficient on your primary aircraft's weapon systems. (Enter "N/A" if the munition listed is not fired on your primary aircraft.)

FIRED DURING FY 1987	NEEDED TO FIRE DURING FY 1987	
_____	_____	7.62-mm rounds
_____	_____	40-mm rounds
_____	_____	30-mm rounds
_____	_____	20-mm rounds
_____	_____	2.75-inch FFAR
_____	_____	2.75-inch smoke rockets
_____	_____	2.75-inch illumination rockets
_____	_____	SS-11 missiles
_____	_____	TOW missiles
_____	_____	HELLFIRE missiles

50. Currently, DA CIR 350-85-4 requires 75% aircrew qualification for TRC A units. Do you think 75% aircrew qualification is achievable with current ammunition allocation?

No

Yes

- Do you think it would be to the Army's advantage to change the percent crew qualification for TRC A units?

No

Yes

- If yes, what do you think would be the ideal percent aircrew qualification for TRC A units?

_____ percent

- Is the ideal percentage aircrew qualification you proposed above achievable with current ammunition allocation?

No

Yes

Don't know

51. In FY 1987, did you meet the standards listed in DA CIR 350-85-4 for your unit's TRC?

No

Yes

Don't know

52. It is generally recognized that aviators require some amount of practice firing during the year to meet the standards listed in DA CIR 350-85-4. In your opinion, what is the minimum number of practice rounds that a typical 500-hour, 1,000-hour, 1,500-hour, and 2,000-hour aviator must fire per year to meet these standards?

500-Hr Aviator	1,000-Hr Aviator	1,500-Hr Aviator	2,000-Hr Aviator	
_____	_____	_____	_____	7.62-mm rounds per year
_____	_____	_____	_____	40-mm rounds per year
_____	_____	_____	_____	30-mm rounds per year
_____	_____	_____	_____	20-mm rounds per year
_____	_____	_____	_____	2.75-inch FFARs per year
_____	_____	_____	_____	2.75-inch smoke rockets per year
_____	_____	_____	_____	2.75-inch illumination rockets per year
_____	_____	_____	_____	SS-11 missiles per year
_____	_____	_____	_____	TOW missiles per year
_____	_____	_____	_____	HELLFIRE missiles per year

RANGE FACILITIES

53. In the spaces provided below, enter the names of the gunnery ranges at which your unit accomplishes gunnery training. Enter the name of the closest range first, the name of the second closest range next, and so on.

_____ (name of closest range)
 _____ (name of second closest range)
 _____ (name of third closest range)
 _____ (name of fourth closest range)

54. In the spaces provided below, enter the travel distance (air miles) and travel time (air minutes) to the gunnery ranges at which your unit accomplishes gunnery training. Enter travel distance/time to the closest range first, the second closest range next, and so on.

_____ air miles and _____ air minutes to closest range
 _____ air miles and _____ air minutes to second closest range
 _____ air miles and _____ air minutes to third closest range
 _____ air miles and _____ air minutes to fourth closest range

55. For each gunnery range at which your unit accomplishes gunnery training, check the alternative that best describes the characteristics of the range.

- **CLOSEST RANGE (check one)**
 - multi-purpose range complex
 - instrumented range with remote engagement target system
 - range with stationary hulls/hulks as targets
- **SECOND CLOSEST RANGE (check one)**
 - multi-purpose range complex
 - instrumented range with remote engagement target system
 - range with stationary hulls/hulks as targets
- **THIRD CLOSEST RANGE (check one)**
 - multi-purpose range complex
 - instrumented range with remote engagement target system
 - range with stationary hulls/hulks as targets
- **FOURTH CLOSEST RANGE (check one)**
 - multi-purpose range complex
 - instrumented range with remote engagement target system
 - range with stationary hulls/hulks as targets

56. For each gunnery range at which your unit accomplishes gunnery training, indicate the manner in which **area target effect** is scored. (check as many as apply)

- **CLOSEST RANGE**
 - effect scored by an observer in the aircraft
 - effect scored by a ground observer using a B.C. scope
 - effect scored by an unaided ground observer
 - other (specify) _____
- **SECOND CLOSEST RANGE**
 - effect scored by an observer in the aircraft
 - effect scored by a ground observer using a B.C. scope
 - effect scored by an unaided ground observer
 - other (specify) _____
- **THIRD CLOSEST RANGE**
 - effect scored by an observer in the aircraft
 - effect scored by a ground observer using a B.C. scope
 - effect scored by an unaided ground observer
 - other (specify) _____
- **FOURTH CLOSEST RANGE**
 - effect scored by an observer in the aircraft
 - effect scored by a ground observer using a B.C. scope
 - effect scored by an unaided ground observer
 - other (specify) _____

57. Use the seven-point scale shown below to rate the adequacy of the methods and equipment used to score **area target effects** at each of the gunnery ranges at which your unit accomplishes gunnery training. Enter a rating value (1 - 7) for each range.

RATING SCALE						
Highly Inadequate						Highly Adequate
1	2	3	4	5	6	7

- _____ closest range
 _____ second closest range
 _____ third closest range
 _____ fourth closest range

58. In your opinion, is there a need to develop improved methods and equipment for scoring **area target effects** on the gunnery ranges at which your unit accomplishes weapon systems training/qualification?

- No
 Yes

- If yes, indicate the benefits that would be realized by improved methods and equipment for scoring **area target effects**. (check as many as apply)

- savings of ammunition
 increase in aviator proficiency
 increase in training realism
 increase in C rating
 justify or validate C rating
 validate weapon systems
 increase ammunition requirements
 increase aviator morale
 promote more unit competition
 decrease IP/UT workload
 increase IP/UT workload
 other (specify) _____
 other (specify) _____
 other (specify) _____

62. For each gunnery range where your unit performs its live fire gunnery operations, indicate the primary purpose for which the range was designed.

• **CLOSEST RANGE** (check one)

- armor
- armor adapted for helicopter gunnery
- artillery
- general purpose impact area
- air force gunnery
- helicopter gunnery

• **SECOND CLOSEST RANGE** (check one)

- armor
- armor adapted for helicopter gunnery
- artillery
- general purpose impact area
- air force gunnery
- helicopter gunnery

• **THIRD CLOSEST RANGE** (check one)

- armor
- armor adapted for helicopter gunnery
- artillery
- general purpose impact area
- air force gunnery
- helicopter gunnery

• **FOURTH CLOSEST RANGE** (check one)

- armor
- armor adapted for helicopter gunnery
- artillery
- general purpose impact area
- air force gunnery
- helicopter gunnery

SIMULATION DEVICES

63. Which of the following flight simulators/devices simulate your primary aircraft (wholly or in part)?

- AH1FWS
- AH64CMS and CWEPT
- UH60FS
- UH1FS
- UH-1M SS-11 Training Device
- no flight simulator in production for my primary aircraft (proceed to Item 66)

64. Is a flight simulator for your primary aircraft available at the installation to which you are presently assigned?

Yes

No

- If no, how far must you travel to reach the nearest flight simulator for your primary aircraft?

_____ air miles

_____ surface miles

65. During FY 1987, did you receive training in the flight simulator for your primary aircraft? Refer to your current DA Form 759 and DA Form 759-1 to ensure complete accuracy of the data you provide on your flight simulator experience.

No

Yes

- If yes, how many hours did you log during FY 1987?

_____ hours logged

- If yes, how many trips did you make to the simulator site for training?

_____ trips to simulator site for training

- If yes, in your estimation, what percentage of the flight simulator hours you logged during FY 1987 was spent on weapon systems training?

_____ percent of total hours spent on weapon systems training

- If yes, enter the name of the installation at which the flight simulator is located.

- If yes, did you use the flight simulator to qualify on any of your primary aircraft's weapon systems?

No

Yes (specify weapon system(s)) _____

66. During FY 1987, did you log time in a flight simulator **other than** the one for your primary aircraft?

No

Yes

- If yes, enter below the number of hours logged during the past 12 months in flight simulators **other than** the one for your primary aircraft.

_____ hours logged in AH1FWS

_____ hours logged in AH64CMS

_____ hours logged in CWEPT

_____ hours logged in UH60FS

_____ hours logged in UH1FS

_____ hours logged in CH47FS

67. Use the seven-point scale shown below, to rate the training value of the flight simulator for your primary aircraft. Rate the flight simulator's training value for each of the training applications listed. If the Army has not acquired a flight simulator for your primary aircraft, place a check in the following box and proceed to item 75.

[] no flight simulator acquired for primary aircraft

RATING SCALE						
Very Low Training Value	Moderate Training Value		High Training Value		Very High Training Value	
1	2	3	4	5	6	7

RATING TRAINING APPLICATION

Enter a rating value (1 through 7) for each of the following:

- _____ training on weapon systems switchology
- _____ training to compensate for interior ballistics in aiming at targets
- _____ training to compensate for exterior ballistics in aiming at targets
- _____ training to compensate for terminal ballistics in aiming at targets
- _____ training to detect targets
- _____ training to identify targets
- _____ training to estimate range to targets
- _____ training on target handoff techniques and procedures
- _____ training on normal flight tasks/procedures
- _____ training on emergency tasks/procedures
- _____ training on weapon systems emergency procedures
- _____ training on instrument tasks/procedures
- _____ other (specify) _____

68. In the space provided below, list the flight simulator design modifications that would increase the effectiveness of the flight simulator for training on the weapon systems on your primary aircraft.

**AVIATION AMMUNITION AND GUNNERY SURVEY
(FORM B: AVIATION UNIT COMMANDERS)**

PERSONAL DATA

1. What is your age?

_____ Years

2. What is your grade? (check one)

01

02

03

04

05

06

3. What is your Specialty Skill Identifier? (check one)

SPECIALTY SKILL IDENTIFIER

15A--General Aviation

15B--Combat Aviation

15C--Combat Support Aviation

15M--Combat Intelligence Aviation

71T--Aviation Logistics

67J--Aeromedical Evacuation

Other (specify) _____

MILITARY EXPERIENCE

4. In the spaces provided below, enter the number of years and months you have spent on active duty in the Army and, if applicable, in other services.

_____ years and _____ months active duty in the Army

_____ years and _____ months active duty in the Marine Corps

_____ years and _____ months active duty in the Navy

_____ years and _____ months active duty in the Air Force

5. Have you served as a member of an active reserve unit at any time during your career?

No

Yes

• If yes, enter the number of years you have served in each of the active reserve components listed below. (enter "0" if none)

_____ years in the Army National Guard

_____ years in the Army Reserve

_____ years in the Army Individual Ready Reserve

_____ years in the Active Reserve Component of another service

6. How much time has elapsed since you graduated from IERW?
 _____ years and _____ months since graduated from IERW
7. In the spaces provided below, enter the amount of time that has elapsed since you graduated from the Aircraft Qualification Course (AQC) for each aircraft in which you are now qualified or have been qualified.
- _____ years and _____ months since graduated from AH-1 AQC
 _____ years and _____ months since graduated from AH-64 AQC
 _____ years and _____ months since graduated from UH-60 AQC
 _____ years and _____ months since graduated from CH-47 AQC
 _____ years and _____ months since graduated from OH-58 AQC
 _____ years and _____ months since completed OH-58 unit transition
8. In total, how many years and months have you been on flight duty?
 _____ years and _____ months on flight duty

FLIGHT EXPERIENCE

INSTRUCTIONS: Refer to your current DA Form 759 and DA Form 759-1 to ensure complete accuracy of the data you provide on your flight experience.

9. During your career, how many hours have you logged in each of the flight simulators and training devices listed below?

SIMULATOR TYPE	HOURS LOGGED
UH1FS	_____
UH-1M SS-11 Training Device	_____
AH1FWS	_____
UH60FS	_____
CH47FS	_____
AH64CMS	_____
AH64 CWEPT	_____

10. For each rotary-wing aircraft in which you are presently qualified or have been qualified, enter the total hours logged during your career and the number of hours you have logged in combat. Also, check [] the box that indicates the highest qualification you hold or have held in that aircraft.

AIRCRAFT TYPE HELD	TOTAL HOURS	COMBAT HOURS	[<input type="checkbox"/>] Pilot	[<input type="checkbox"/>] GUNY UT	[<input type="checkbox"/>] IP
AH-1G	_____	_____	[<input type="checkbox"/>]	[<input type="checkbox"/>]	[<input type="checkbox"/>]
AH-1S (MOD/PROD)	_____	_____	[<input type="checkbox"/>]	[<input type="checkbox"/>]	[<input type="checkbox"/>]
AH-1S (MC/ECAS)	_____	_____	[<input type="checkbox"/>]	[<input type="checkbox"/>]	[<input type="checkbox"/>]
AH-64	_____	_____	[<input type="checkbox"/>]	[<input type="checkbox"/>]	[<input type="checkbox"/>]
UH-1H	_____	_____	[<input type="checkbox"/>]	[<input type="checkbox"/>]	[<input type="checkbox"/>]
UH-1C/M	_____	_____	[<input type="checkbox"/>]	[<input type="checkbox"/>]	[<input type="checkbox"/>]
UH-1V	_____	_____	[<input type="checkbox"/>]	[<input type="checkbox"/>]	[<input type="checkbox"/>]
UH-60	_____	_____	[<input type="checkbox"/>]	[<input type="checkbox"/>]	[<input type="checkbox"/>]
OH-6	_____	_____	[<input type="checkbox"/>]	[<input type="checkbox"/>]	[<input type="checkbox"/>]
OH-58	_____	_____	[<input type="checkbox"/>]	[<input type="checkbox"/>]	[<input type="checkbox"/>]
CH-47	_____	_____	[<input type="checkbox"/>]	[<input type="checkbox"/>]	[<input type="checkbox"/>]
CH-54	_____	_____	[<input type="checkbox"/>]	[<input type="checkbox"/>]	[<input type="checkbox"/>]

PRESENT DUTY ASSIGNMENT

11. Indicate below your primary and, if applicable, your additional aircraft in your present duty position. Also, enter the number of hours logged in both your primary and additional aircraft during FY 1987.

PRIMARY AIRCRAFT	HOURS LOGGED (FY 1987)	ADDITIONAL AIRCRAFT	HOURS LOGGED (FY 1987)
[<input type="checkbox"/>] AH-1G	_____	[<input type="checkbox"/>] AH-1G	_____
[<input type="checkbox"/>] AH-1S (MOD/PROD)	_____	[<input type="checkbox"/>] AH-1S (MOD/PROD)	_____
[<input type="checkbox"/>] AH-1S (MC/ECAS)	_____	[<input type="checkbox"/>] AH-1S (MC/ECAS)	_____
[<input type="checkbox"/>] AH-64	_____	[<input type="checkbox"/>] AH-64	_____
[<input type="checkbox"/>] UH-1H	_____	[<input type="checkbox"/>] UH-1H	_____
[<input type="checkbox"/>] UH-1C/M	_____	[<input type="checkbox"/>] UH-1C/M	_____
[<input type="checkbox"/>] UH-1V	_____	[<input type="checkbox"/>] UH-1V	_____
[<input type="checkbox"/>] UH-60	_____	[<input type="checkbox"/>] UH-60	_____
[<input type="checkbox"/>] OH-58	_____	[<input type="checkbox"/>] OH-58	_____
[<input type="checkbox"/>] CH-47	_____	[<input type="checkbox"/>] CH-47	_____
[<input type="checkbox"/>] Fixed Wing (Specify)	_____	[<input type="checkbox"/>] Fixed Wing (specify)	_____
[<input type="checkbox"/>] Other (specify)	_____	[<input type="checkbox"/>] Other (specify)	_____

12. What is the Unit Identification Code (UIC) of the unit to which you are currently assigned?

Unit Identification Code: _____

13. To which major command are you presently assigned? (check one)
- WESTCOM
 - FORSCOM
 - SOUTHCOM
 - USAREUR
 - EUSA
 - Other (Specify)_____
14. In which component of the Army are you currently serving? (check one)
- Active Army
 - Army National Guard
15. In the spaces provided below, enter the location of the unit to which you are presently assigned.
- Name of post/facility_____
 - Name of state (if CONUS)_____
 - Name of country_____
16. What is the STRAC Training Readiness Condition (TRC) for your unit? (check one)
- TRC-A
 - TRC-B
 - TRC-C
17. Check the type of aviation unit to which you are presently assigned. (check one)
- Attack Helicopter Company/Troop/Battalion
 - Air Cavalry Troop/Squadron
 - Combat Support Aviation Company/Battalion
 - Aviation General Support Company/Battalion
 - Aerial Surveillance Company
 - Air Ambulance Detachment/Company
 - Transportation Company (heavy helicopter)
 - Other (specify)_____
18. How long have you served in the unit to which you are presently assigned?
- _____ years and _____ months in present unit.
19. In the unit to which you are presently assigned, how long have you served in your present MTOE or TDA duty position?
- _____ years and _____ months in present duty position.
20. What is your present MTOE or TDA duty position?
- Battalion/Brigade Commander
 - Company/Troop Commander
 - Other (specify)_____

23. During FY 1987, did your unit achieve the standards listed in DA CIR 350-85-4?
(obtain information from file records)

Don't know

Yes.

No

• If no, indicate the reasons that your unit was unable to meet the standards listed in DA CIR 350-85-4. (check as many as apply and briefly explain each reason)

Lack of ammunition (explain) _____

Wrong type of ammunition (explain) _____

Lack of availability of range (explain) _____

Range facilities not suitable (explain) _____

Too many inclement weather days (explain) _____

Range too dry for safe live fire (explain) _____

Too many personnel in unit to train (unit size) (explain) _____

Too many personnel in unit to train (personnel turnover) (explain) _____

Inadequate number of IPs/UTs (explain) _____

Inadequate aircraft maintenance (explain) _____

Inadequate armament maintenance (explain) _____

Too many aviators had to be transitioned into new unit series aircraft (explain) _____

Other (specify) _____

Other (specify) _____

FM 1-140

24. Check the statement that best describes your access to a copy of FM 1-140, entitled "Helicopter Gunnery." (check one)

I have my own copy of FM 1-140

A copy of FM 1-140 is available in my unit

I must go to a location outside my unit to gain access to a copy of FM 1-140

I don't know how to gain access to a copy of FM 1-140

25. Have you read FM 1-140?

No

Yes

• If yes, how understandable are the requirements listed in FM 1-140?

Very difficult to understand

Moderately difficult to understand

Moderately easy to understand

Very easy to understand

26. Has your unit used FM 1-140 for developing a weapon system training and qualification program?

No

Yes

• If yes, specify the problem areas that were associated with implementation of the tables listed in FM 1-140?

27. If standardized aviation gunnery tables were mandated, should those tables be similar to the standardized armor tables?

No

Yes

28. Is a standardized gunnery program more desirable than the flexible program set forth in FM 1-140?

No (explain why not) _____

Yes (explain why) _____

29. Would standardized gunnery tables pose a problem with the range facilities available to your unit?

- No
 Yes

• If yes, indicate below the reasons that it would be difficult for you to adhere to standardized gunnery tables.

- Unit does not have access to an aerial gunnery range
 Gunnery ranges available to unit do not have moving targets
 Gunnery ranges available to unit do not have moving targets that can be fired upon at realistic ranges for HELLFIRE and TOW
 Lack of an adequate scoring system
 Inappropriate ammunition for fully instrumented range
 Overscheduling of range facilities or conflicting range schedules
 Lack of training funds
 Other (specify) _____
 Other (specify) _____

30. Indicate whether you agree or disagree with each of the following statements about standardized gunnery tables for attack aviators, attack aviator crews, and unit missions.

• Standardized gunnery tables should be developed for individual attack aviators

- Strongly agree
 Moderately agree
 Moderately disagree
 Strongly disagree

• Standardized gunnery tables should be developed for attack aviator crews

- Strongly agree
 Moderately agree
 Moderately disagree
 Strongly disagree

• Standardized gunnery tables should be developed for each attack unit mission (e.g., heavy attack, light attack, heavy cavalry, light cavalry)

- Strongly agree
 Moderately agree
 Moderately disagree
 Strongly disagree

31. In your opinion, should FM 1-140 include practice tables that specify the type and amount of live fire practice that should be conducted as a warm-up immediately prior to live fire qualification?

- No
 Yes

• If yes, check below the types of practice tables that should be included in FM 1-140.

- practice tables for individual aviators
 practice tables for aviation crews
 practice tables for aviation teams
 practice tables for CALFEX/JAAT

32. During FY 1987, did your unit use flight simulators as part of the unit's gunnery training program?

- No
 Yes-

• If yes, check the following statement that best describes the manner in which your unit commander used the FM 1-140 flight simulation tables in developing your unit's simulator training program.

- did not use the FM 1-140 flight simulation tables
 used the FM 1-140 flight simulation tables only as general guidance
 adhered very closely to the FM 1-140 flight simulation tables

• If no, check the reasons why not.

- simulator tables are not adequate
 flight simulator is not compatible with unit aircraft
 inadequate travel funds
 Simulator scheduling difficulties
 Other (specify) _____

33. In your opinion, how effective are the flight simulation tables listed in FM 1-140?

- Highly effective
 Somewhat effective
 Somewhat ineffective
 Highly ineffective
 Have not read FM 1-140

34. Check below the additional flight simulation tables you would like to see added to FM 1-140.

- Tables that specify practice on scout/attack team tasks/procedures
 Tables that specify practice on night vision goggle/device tasks/procedures
 Tables that specify practice on switchology
 Other (specify) _____
 Other (specify) _____
 Other (specify) _____

35. If a flight simulator is easily accessible, should flight simulation tables be mandatory?

- Yes
 No

• If no, explain why not _____

36. How important are flight simulation tables for pre-gunnery exercises?

- Highly important
 Important
 Slightly important
 Not important

WEAPON SYSTEMS

37. Check [-√] the type of aircraft assigned to your unit and the types of weapon systems available on one or more of your unit's aircraft.

AIRCRAFT IN UNIT	WEAPON SYSTEMS
<input type="checkbox"/> AH-1G	<input type="checkbox"/> M-129 (40-mm, AH-1)
<input type="checkbox"/> AH-1S (MOD)	<input type="checkbox"/> M-21 (armament system)
<input type="checkbox"/> AH-1S (PROD)	<input type="checkbox"/> M-22 (missile subsystem)
<input type="checkbox"/> AH-1S (MC)	<input type="checkbox"/> 2.75-inch FFAR
<input type="checkbox"/> AH-1S (ECAS)	<input type="checkbox"/> M-197 (20-mm)
<input type="checkbox"/> AH-64	<input type="checkbox"/> M-35 (20-mm)
<input type="checkbox"/> UH-1H	<input type="checkbox"/> M-65 (TOW)
<input type="checkbox"/> UH-1 C/M	<input type="checkbox"/> M-134 (7.62)
<input type="checkbox"/> UH-1V	<input type="checkbox"/> M-5 (40-mm, UH-1)
<input type="checkbox"/> UH-60	<input type="checkbox"/> PTWS (HELLFIRE)
<input type="checkbox"/> OH-6	<input type="checkbox"/> M-230E1 (30-mm)
<input type="checkbox"/> OH-58	<input type="checkbox"/> M-18 (7.62)
<input type="checkbox"/> CH-47	<input type="checkbox"/> M-28
<input type="checkbox"/> CH-54	<input type="checkbox"/> ARCS
<input type="checkbox"/> []	<input type="checkbox"/> Other (specify) _____

TRANSITION TRAINING

38. In the spaces provided below, enter the number of aviators presently assigned to your unit who fly each type aircraft listed as their primary aircraft. (Enter "0" if none.)

- _____ aviators fly AH-1 MC as their primary aircraft
- _____ aviators fly AH-1 ECAS as their primary aircraft
- _____ aviators fly AH-1 PROD as their primary aircraft
- _____ aviators fly AH-1 MOD as their primary aircraft
- _____ aviators fly AH-1 G as their primary aircraft
- _____ aviators fly UH-1 M as their primary aircraft
- _____ aviators fly AH-64 front seat as their primary aircraft position
- _____ aviators fly AH-64 back seat as their primary aircraft position

39. Indicate below the number of AH-1 aviators assigned to your unit during an average year that must be trained up or trained down to qualify in your unit series aircraft.-

TRAINED UP (Transition from older series aircraft to newer series aircraft)

- A _____ aviators transitioned from AH-1G to AH-1 MOD
- B _____ aviators transitioned from AH-1G to AH-1 PROD
- C _____ aviators transitioned from AH-1G to AH-1 ECAS
- D _____ aviators transitioned from AH-1G to AH-1 MC
- E _____ aviators transitioned from AH-1 MOD to AH-1 PROD
- F _____ aviators transitioned from AH-1 MOD to AH-1 ECAS
- G _____ aviators transitioned from AH-1 MOD to AH-1 MC
- H _____ aviators transitioned from AH-1 PROD to AH-1 ECAS
- I _____ aviators transitioned from AH-1 PROD to AH-1 MC
- J _____ aviators transitioned from AH-1 ECAS to AH-1 MC

TRAINED DOWN (Transition from newer series aircraft to older series aircraft)

- K _____ aviators transitioned from AH-1 MC to AH-1 ECAS
- L _____ aviators transitioned from AH-1 MC to AH-1 PROD
- M _____ aviators transitioned from AH-1 MC to AH-1 MOD
- N _____ aviators transitioned from AH-1 MC to AH-1G
- O _____ aviators transitioned from AH-1 ECAS to AH-1 PROD
- P _____ aviators transitioned from AH-1 ECAS to AH-1 MOD
- Q _____ aviators transitioned from AH-1 ECAS to AH-1G
- R _____ aviators transitioned from AH-1 PROD to AH-1 MOD
- S _____ aviators transitioned from AH-1 PROD to AH-1G
- T _____ aviators transitioned from AH-1 MOD to AH-1G
- U _____ aviators transitioned from AH-1G ECAS to UH-1M
- V _____ aviators transitioned from AH-1 MOD to UH-1M
- W _____ aviators transitioned from AH-1 PROD to UH-1M
- X _____ aviators transitioned from AH-1 ECAS to UH-1M
- Y _____ aviators transitioned from AH-1 MC to UH-1M

40. The purpose of this item is to obtain your best estimate of the average number of rounds, by munition type, required to complete the transitions that must be completed by some aviators in your unit. Spaces are provided below for as many as five types of transitions. Provide estimates of the average number of rounds required for each of the transitions for which you entered data in Item 39. In the boxes at the top of the columns, enter the letters (A through Y) from Item 39 that identify the transitions for which you provided estimates of ammunition requirements.

<input type="text"/>					
_____	_____	_____	_____	_____	7.62-mm rounds
_____	_____	_____	_____	_____	40-mm rounds
_____	_____	_____	_____	_____	20-mm rounds
_____	_____	_____	_____	_____	2.75-inch FFAR
_____	_____	_____	_____	_____	2.75-inch smoke rockets
_____	_____	_____	_____	_____	2.75-inch illumination rockets
_____	_____	_____	_____	_____	SS-11 missiles
_____	_____	_____	_____	_____	live TOW missiles
_____	_____	_____	_____	_____	simulator TOW missiles

AMMUNITION

41. For each type of munition listed below, enter (a) the number of rounds that your unit was allocated (enter your full STRAC allocation, not the authorization) for FY 1987, (b) the number of rounds that your unit actually received during FY 1987, and (c) the number of rounds that was fired during FY 1987. Refer to your unit's records as necessary to provide precise data.

ALLOCATED (FY 1987)	RECEIVED (FY 1987)	FIRED (FY 1987)	
_____	_____	_____	7.62-mm rounds
_____	_____	_____	40-mm rounds
_____	_____	_____	30-mm rounds
_____	_____	_____	20-mm rounds
_____	_____	_____	2.75-inch FFAR
_____	_____	_____	2.75-inch smoke rockets
_____	_____	_____	2.75-inch illumination rockets
_____	_____	_____	SS-11 missiles
_____	_____	_____	TOW missiles
_____	_____	_____	HELLFIRE missiles

42. In the spaces provided below, enter (a) the total number of aviators in your unit during FY 1987, (b) the number of aviators that were crew qualified on gunnery during FY 1987, and (c) the number that were not crew qualified on gunnery during FY 1987.

_____ aviators in unit during FY 1987
 _____ aviators crew qualified in gunnery during FY 1987
 _____ aviators not crew qualified in gunnery during FY 1987

43. For each type of munition listed below, enter (a) the number of rounds that your unit expended on aviators who became crew qualified in gunnery during FY 1987, and (b) the number of rounds that your unit expended for all other purposes. Make sure that the total of (a) and (b) equal the totals you recorded in Item 41.

ROUNDS EXPENDED CREW QUALIFICATION	ROUNDS EXPENDED OTHER	
_____	_____	7.62-mm rounds
_____	_____	40-mm rounds
_____	_____	30-mm rounds
_____	_____	20-mm rounds
_____	_____	2.75-inch FFAR
_____	_____	2.75-inch smoke rockets
_____	_____	2.75-inch illumination rockets
_____	_____	SS-11 missiles
_____	_____	TOW missiles
_____	_____	HELLFIRE missiles

44. In the spaces provided below, enter the number of rounds of ammunition that you fired during FY 1987 and the number you have fired during your entire Army career. (Don't include flight simulator firing.) (enter "0" if none)

FIRED DURING FY 1987	FIRED DURING ENTIRE CAREER	
_____	_____	7.62-mm rounds
_____	_____	40-mm rounds
_____	_____	30-mm rounds
_____	_____	20-mm rounds
_____	_____	2.75-inch FFAR
_____	_____	2.75-inch smoke rockets
_____	_____	2.75-inch illumination rockets
_____	_____	SS-11 missiles
_____	_____	TOW missiles
_____	_____	HELLFIRE missiles

45. During FY 1987, did your unit fire any rounds, rockets, or missiles on a fully instrumented range (MPRC)?

- No
 Yes.

• If yes, enter below the number of each type of munition your unit fired on a fully instrumented range as part of a crew, team, CALFEX, or JAAT training exercise. (Don't include ammunition fired in support of demonstrations.)

MUNITION TYPE	CREW	TEAM	CALFEX	JAAT
7.62-mm rounds	_____	_____	_____	_____
40-mm rounds	_____	_____	_____	_____
30-mm rounds	_____	_____	_____	_____
20-mm rounds	_____	_____	_____	_____
2.75-inch FFAR	_____	_____	_____	_____
2.75-inch smoke rockets	_____	_____	_____	_____
2.75-inch illumination rockets	_____	_____	_____	_____
SS-11 missiles	_____	_____	_____	_____
TOW missiles	_____	_____	_____	_____
HELLFIRE missiles	_____	_____	_____	_____

46. During FY 1987, did your unit fire any rounds, rockets, or missiles on a partially instrumented or uninstrumented range?

- No
 Yes

• If yes, enter below the number of each type of munition your unit fired on a partially instrumented or uninstrumented range as part of a crew, team, CALFEX, or JAAT training exercise. (Don't include ammunition fired in support of demonstrations.)

MUNITION TYPE	CREW	TEAM	CALFEX	JAAT
7.62-mm rounds	_____	_____	_____	_____
40-mm rounds	_____	_____	_____	_____
30-mm rounds	_____	_____	_____	_____
20-mm rounds	_____	_____	_____	_____
2.75-inch FFAR	_____	_____	_____	_____
2.75-inch smoke rockets	_____	_____	_____	_____
2.75-inch illumination rockets	_____	_____	_____	_____
SS-11 missiles	_____	_____	_____	_____
TOW missiles	_____	_____	_____	_____
HELLFIRE missiles	_____	_____	_____	_____

47. Indicate below the minimum number of rounds/rockets/missiles that you think are required for the **average aviator in your unit** to achieve day crew qualification and night (both unaided and aided by a night vision device) crew qualification on his aircraft's weapon systems. Answer both parts whether or not night qualification is a requirement for his aircraft. (Enter "N/A" if the munition listed is not fired on your unit's aircraft.)

DAY (CREW)	NIGHT UNAIDED (CREW)	NIGHT WITH NIGHT VISION DEVICE (CREW)	MUNITION TYPE
_____	_____	_____	7.62-mm rounds
_____	_____	_____	40-mm rounds
_____	_____	_____	30-mm rounds
_____	_____	_____	20-mm rounds
_____	_____	_____	2.75-inch FFAR
_____	_____	_____	2.75-inch smoke rockets
_____	_____	_____	2.75-inch illumination rockets
_____	_____	_____	SS-11 missiles
_____	_____	_____	TOW missiles
_____	_____	_____	HELLFIRE missiles

48. In your opinion, what is the **minimum number** of rounds of ammunition required for the **average aviator in your unit** to sustain his skills on his aircraft's weapon systems during a typical 12-month training period? (Enter "N/A" if the munition listed is not fired on your unit's aircraft.)

_____	7.62-mm rounds required for sustainment training
_____	40-mm rounds required for sustainment training
_____	30-mm rounds required for sustainment training
_____	20-mm rounds required for sustainment training
_____	2.75-inch FFARs required for sustainment training
_____	2.75-inch smoke rockets required for sustainment training
_____	2.75-inch illumination rockets required for sustainment training
_____	SS-11 missiles required for sustainment training
_____	TOW missiles required for sustainment training
_____	HELLFIRE missiles required for sustainment training

49. In your opinion, is there a need for an allotment of ammunition to be used for live fire practice (practice tables) for warm-up immediately prior to live fire qualification?

- No
 Yes

- If yes, indicate below the number of rounds per attack aircrew that you think should be made available for pre-qualification practice. (Enter "N/A" if the munition listed is not fired on your aircraft.)

_____ 7.62-mm rounds required for pre-qualification practice
_____ 40-mm rounds required for pre-qualification practice
_____ 30-mm rounds required for pre-qualification practice
_____ 20-mm rounds required for pre-qualification practice
_____ 2.75-inch FFARs required for pre-qualification practice
_____ 2.75-inch smoke rockets required for pre-qualification practice
_____ 2.75-inch illumination rockets required for pre-qualification practice
_____ SS-11 missiles required for pre-qualification practice
_____ TOW missiles required for pre-qualification practice
_____ HELLFIRE missiles required for pre-qualification practice

50. During FY 1987, did your unit return any ammunition that was received for use during that training year?

- No, all ammunition was expended
 Yes

- If yes, indicate below the percent of the rounds received that you returned during FY 1987. (Enter "N/A" if the munition listed is not fired on your aircraft.)

_____ 7.62-mm rounds returned during FY 1987
_____ 40-mm rounds returned during FY 1987
_____ 30-mm rounds returned during FY 1987
_____ 20-mm rounds returned during FY 1987
_____ 2.75-inch FFARs returned during FY 1987
_____ SS-11 missiles returned during FY 1987
_____ TOW missiles returned during FY 1987
_____ HELLFIRE missiles returned during FY 1987

- If yes, indicate below the reasons that you returned ammunition that you received during the last training year. (check as many as apply)

received more ammunition than needed to qualify personnel
 ammunition returned was an improper type for unit
 unable to fire ammo because of personnel scheduling problems
 unable to fire ammo because of lack of range priority
 unable to fire ammo because of range scheduling problems
 unable to fire ammo because of lack of proper type range
 unable to fire ammo because of inclement weather
 unable to fire ammo because of high fire hazard on range
 unable to fire ammo because of inadequate number of IPs/UTs
 unable to fire ammo because of aircraft maintenance problems
 unable to fire ammo because of aircraft armament problems
 other (specify) _____
 other (specify) _____

51. During FY 1987, did your unit fire any ammunition solely for the purpose of demonstrating weapons capabilities to VIPs, to the general public, or to units in your DIV/CORPS?

[] No
[] Yes.

- If yes, indicate below the total number of rounds that your unit fired solely for demonstration purposes. (Enter "N/A" if the munition listed is not fired on your aircraft.)

_____ 7.62-mm rounds fired for demonstration purposes
_____ 40-mm rounds fired for demonstration purposes
_____ 30-mm rounds fired for demonstration purposes
_____ 20-mm rounds fired for demonstration purposes
_____ 2.75-inch FFARs fired for demonstration purposes
_____ 2.75-inch smoke rockets fired for demonstration purposes
_____ 2.75-inch illumination rockets fired for demonstration purposes
_____ SS-11 missiles fired for demonstration purposes
_____ TOW missiles fired for demonstration purposes
_____ HELLFIRE missiles fired for demonstration purposes

- If yes, indicate below the total number of **additional** rounds that was provided for demonstration purposes and specify the source of the additional rounds received.

_____ additional 7.62-mm rounds (specify source) _____

_____ additional 40-mm rounds (specify source) _____

_____ additional 30-mm rounds (specify source) _____

_____ additional 20-mm rounds (specify source) _____

_____ additional 2.75-Inch FFARs (specify source) _____

_____ additional 2.75-Inch smoke rockets (specify source) _____

_____ additional 2.75-Inch illumination rockets (specify source) _____

_____ additional SS-11 missiles (specify source) _____

_____ additional TOW missiles (specify source) _____

_____ additional HELLFIRE missiles (specify source) _____

- If yes, indicate the training value of the demonstration firing that you performed.

[] Little or no training value

[] Moderate training value

[] High training value

[] Very high training value

- If yes, about how many aviators in your unit accomplished weapon system qualification in conjunction with the demonstration firing?

_____ aviators

52. During FY 1987, did your unit receive the exact ammunition allocation specified in DA CIR 350-85-4?

Yes

No

- If no, indicate below (by munition type) the percent of the full allocation that your unit received. For example, if your unit received 25% less than its STRAC ammunition allocation, enter 75%; if your unit received 25% more than its STRAC allocation, enter 125%. (Enter "N/A" if the munition listed is not fired on your unit's aircraft.)

_____ percent of 7.62-mm round allocation was received
_____ percent of 40-mm round allocation was received
_____ percent of 30-mm round allocation was received
_____ percent of 20-mm round allocation was received
_____ percent of 2.75-inch FFAR allocation was received
_____ percent of 2.75-inch smoke rocket allocation was received
_____ received
_____ percent of 2.75-inch illumination rocket allocation was received
_____ received
_____ percent of SS-11 missile allocation was received
_____ percent of TOW missile allocation was received
_____ percent of HELLFIRE missile allocation was received

53. During FY 1987, was your unit's full STRAC allocation adequate to support your unit's TRC level? (Answer whether or not your unit received its full STRAC allocation.)

Yes

No

- Indicate (by munition type) the number of rounds per attack aircrew your unit was allocated (enter your full STRAC allocation, not the authorization) during FY 1987.

ALLOCATED
(Per Attack Aircrew)

_____ 7.62-mm rounds
_____ 40-mm rounds
_____ 30-mm rounds
_____ 20-mm rounds
_____ 2.75-inch FFAR
_____ 2.75-inch smoke rockets
_____ 2.75-inch illumination rockets
_____ SS-11 missiles
_____ TOW missiles
_____ HELLFIRE missiles

54. During FY 1987, was the ammunition your unit received adequate to support your unit's Training Readiness Condition (TRC)?

- Yes
 No

- Indicate (by munition type) the number of rounds per attack aircrew your unit received and the number of rounds that you believe your unit needed per attack aircrew to support its TRC level during FY 1987. (Enter "N/A" if the munition listed in not fired on your unit's aircraft.)

RECEIVED (Per Attack Aircrew)	NEEDED (Per Attack Aircrew)	
_____	_____	7.62-mm rounds
_____	_____	40-mm rounds
_____	_____	30-mm rounds
_____	_____	20-mm rounds
_____	_____	2.75-inch FFAR
_____	_____	2.75-inch smoke rockets
_____	_____	2.75-inch illumination rockets
_____	_____	SS-11 missiles
_____	_____	TOW missiles
_____	_____	HELLFIRE missiles

55. Currently, DA CIR 350-85-4 requires 75% aircrew qualification for TRC A units. Do you think 75% aircrew qualification is achievable with current ammunition allocation?

- No
 Yes

- Do you think it would be to the Army's advantage to change the percent crew qualification for TRC A units?

- No
 Yes

- If yes, what do you think would be the ideal percent aircrew qualification for TRC A units?

_____ percent

- Is the ideal percentage aircrew qualification you proposed above achievable with the current ammunition allocation?

- No
 Yes
 Don't know

56. In FY 1987, did your unit meet the standards listed in DA CIR 350-85-4?

- No
 Yes
 Don't know

57. Was your FY 1987 ammunition allocation sufficient to maintain your unit's (USR) readiness reporting level (C-level)?

Yes

No

If no, what percent increase in ammunition allocation do you think is required to achieve and maintain readiness reporting level (C-level)?

_____ percent increase in **7.62-mm rounds**

_____ percent increase in **40-mm rounds**

_____ percent increase in **30-mm rounds**

_____ percent increase in **20-mm rounds**

_____ percent increase in **2.75-inch FFARs**

_____ percent increase in **2.75-inch smoke rockets**

_____ percent increase in **2.75-inch illumination rockets**

_____ percent increase in **SS-11 missiles**

_____ percent increase in **TOW missiles**

_____ percent increase in **HELLFIRE missiles**

58. It is generally recognized that aviators require some amount of practice firing during the year to meet the standards listed in DA CIR 350-85-4. In your opinion, what is the minimum number of practice rounds that a typical 500-hour, 1,000-hour, 1,500-hour, and 2,000-hour aviator must fire per year to meet these standards?

500-Hr Aviator	1,000-Hr Aviator	1,500-Hr Aviator	2,000-Hr Aviator	
_____	_____	_____	_____	7.62-mm rounds per year
_____	_____	_____	_____	40-mm rounds per year
_____	_____	_____	_____	30-mm rounds per year
_____	_____	_____	_____	20-mm rounds per year
_____	_____	_____	_____	2.75-inch FFARs per year
_____	_____	_____	_____	2.75-inch smoke rockets per year
_____	_____	_____	_____	2.75-inch illumination rockets per year
_____	_____	_____	_____	SS-11 missiles per year
_____	_____	_____	_____	TOW missiles per year
_____	_____	_____	_____	HELLFIRE missiles per year

RANGE FACILITIES

59. In the spaces provided below, enter the names of the gunnery ranges at which your unit accomplishes gunnery training. Enter the name of the closest range first, the name of the second closest range next, and so on.

(name of **closest** range)
 (name of **second closest** range)
 (name of **third closest** range)
 (name of **fourth closest** range)

60. In the spaces provided below, enter the travel distance (air miles) and travel time (air minutes) to the gunnery ranges at which your unit accomplishes gunnery training. Enter travel distance/time to the closest range first, the second closest range next, and so on.

_____ air miles and _____ air minutes to **closest** range
 _____ air miles and _____ air minutes to **second closest** range
 _____ air miles and _____ air minutes to **third closest** range
 _____ air miles and _____ air minutes to **fourth closest** range

61. For each gunnery range at which your unit accomplishes gunnery training, check the alternative that best describes the characteristics of the range.

- **CLOSEST RANGE** (check one)
 - multi-purpose range complex
 - instrumented range with remote engagement target system
 - range with stationary hulls/hulks as targets
- **SECOND CLOSEST RANGE** (check one)
 - multi-purpose range complex
 - instrumented range with remote engagement target system
 - range with stationary hulls/hulks as targets
- **THIRD CLOSEST RANGE** (check one)
 - multi-purpose range complex
 - instrumented range with remote engagement target system
 - range with stationary hulls/hulks as targets
- **FOURTH CLOSEST RANGE** (check one)
 - multi-purpose range complex
 - instrumented range with remote engagement target system
 - range with stationary hulls/hulks as targets

62. For each gunnery range at which your unit accomplishes gunnery training, indicate the manner in which **area target effect** is scored. (check as many as apply)

- **CLOSEST RANGE**
 - effect scored by an observer in the aircraft
 - effect scored by a ground observer using a B.C. scope
 - effect scored by an unaided ground observer
 - other (specify) _____
- **SECOND CLOSEST RANGE**
 - effect scored by an observer in the aircraft
 - effect scored by a ground observer using a B.C. scope
 - effect scored by an unaided ground observer
 - other (specify) _____
- **THIRD CLOSEST RANGE**
 - effect scored by an observer in the aircraft
 - effect scored by a ground observer using a B.C. scope
 - effect scored by an unaided ground observer
 - other (specify) _____
- **FOURTH CLOSEST RANGE**
 - effect scored by an observer in the aircraft
 - effect scored by a ground observer using a B.C. scope
 - effect scored by an unaided ground observer
 - other (specify) _____

63. Use the seven-point scale shown below to rate the adequacy of the methods and equipment used to score **area target effects** at each of the gunnery ranges at which your unit accomplishes gunnery training. Enter a rating value (1 - 7) for each range.

RATING SCALE							
Highly Inadequate						Highly Adequate	
1	2	3	4	5	6	7	

- _____ closest range
- _____ second closest range
- _____ third closest range
- _____ fourth closest range

64. In your opinion, is there a need to develop improved methods and equipment for scoring **area target effects** on the gunnery ranges at which your unit accomplishes weapon systems training/qualification?

- No
- Yes

• If yes, indicate the benefits that would be realized by improved methods and equipment for scoring **area target effects**. (check as many as apply)

- savings of ammunition
- increase in aviator proficiency
- increase in training realism
- increase in C rating
- justify or validate C rating
- validate weapon systems
- increase ammunition requirements
- increase aviator morale
- promote more unit competition
- decrease IP/UT workload
- increase IP/UT workload
- other (specify) _____
- other (specify) _____
- other (specify) _____

65. For each gunnery range where your unit performs its live fire gunnery operations, indicate the number of times during FY 1987 that you traveled to the range for live fire practice and qualification. (Do not include trips for live fire demonstrations.)

- _____ trips per year to the **closest range**
- _____ trips per year to the **second closest range**
- _____ trips per year to the **third closest range**
- _____ trips per year to the **fourth closest range**

66. During FY 1987, how many times did your unit perform live fire gunnery range operations?

_____ times during FY 1987

67. Is adequate range time available for your unit to perform the live fire gunnery operations that you consider essential?

Yes

No

• If no, list the most important reasons that adequate range time is not available. _____

68. For each gunnery range where your unit performs its live fire gunnery operations, indicate the primary purpose for which the range was designed.

• **CLOSEST RANGE** (check one)

- armor
- armor adapted for helicopter gunnery
- artillery
- general purpose impact area
- air force gunnery
- helicopter gunnery

• **SECOND CLOSEST RANGE** (check one)

- armor
- armor adapted for helicopter gunnery
- artillery
- general purpose impact area
- air force gunnery
- helicopter gunnery

• **THIRD CLOSEST RANGE** (check one)

- armor
- armor adapted for helicopter gunnery
- artillery
- general purpose impact area
- air force gunnery
- helicopter gunnery

• **FOURTH CLOSEST RANGE** (check one)

- armor
- armor adapted for helicopter gunnery
- artillery
- general purpose impact area
- air force gunnery
- helicopter gunnery

SIMULATION DEVICES

69. Which of the following flight simulators/devices simulate your unit's primary aircraft (wholly or in part)?

- AH1FWS
- AH64CMS and CWEPT
- UH60FS
- UH1FS
- UH-1M SS-11 Training Device
- no flight simulator in production for my primary aircraft (proceed to Item 66)

70. Is a flight simulator for your unit's primary attack aircraft available at the installation to which you are presently assigned?

- Yes
- No
 - If no, how far is it to the nearest flight simulator for your unit's primary attack aircraft?
_____ air miles
_____ surface miles

71. During FY 1987, did your unit receive training in the flight simulator for its primary attack aircraft? Refer to your unit records to ensure complete accuracy of the data you provide on your unit's flight simulator experience.

- No
- Yes
 - If yes, how many hours did your unit log during FY 1987?
_____ hours logged
 - If yes, how many trips did your unit make to the simulator site for training?
_____ trips to simulator site for training
 - If yes, in your estimation, what percentage of the flight simulator hours that your unit logged during FY 1987 was spent on weapon systems training?
_____ percent of total hours spent on weapon systems training
 - If yes, enter the name of the installation at which the flight simulator is located.

 - If yes, did your unit use the flight simulator to qualify any aviators on any of your unit's primary aircraft weapon systems?
 - No
 - Yes (specify weapon system(s)) _____

72. During FY 1987, did your unit aviators log time in a flight simulator other than the one for their primary aircraft?

- No
 Yes.

• If yes, enter below the number of hours logged during the past 12 months in flight simulators other than the one for their primary aircraft.

- _____ hours logged in AH1FWS
 _____ hours logged in AH64CMS
 _____ hours logged in CWEPT
 _____ hours logged in UH60FS
 _____ hours logged in UH1FS
 _____ hours logged in CH47FS

73. Use the seven-point scale shown below, to rate the training value of the flight simulator for your unit's primary attack aircraft. Rate the flight simulator's training value for each of the training applications listed. If the Army has not acquired a flight simulator for your unit's primary attack aircraft, place a check in the following box and proceed to item 75.

no flight simulator acquired for primary attack aircraft

RATING SCALE						
Very Low Training Value	Moderate Training Value	High Training Value	Very High Training Value			
1	2	3	4	5	6	7

RATING TRAINING APPLICATION

Enter a rating value (1 through 7) for each of the following:

- _____ training on weapon systems switchology
 _____ training to compensate for interior ballistics in aiming at targets
 _____ training to compensate for exterior ballistics in aiming at targets
 _____ training to compensate for terminal ballistics in aiming at targets
 _____ training to detect targets
 _____ training to identify targets
 _____ training to estimate range to targets
 _____ training on target handoff techniques and procedures
 _____ training on normal flight tasks/procedures
 _____ training on emergency tasks/procedures
 _____ training on weapon systems emergency procedures
 _____ training on instrument tasks/procedures
 _____ other (specify)_____

74. In the space provided below, list the flight simulator design modifications that would increase the effectiveness of the flight simulator for training on the weapon systems on your unit's primary attack aircraft.

DOOR GUNNERY

75. Are the door gunners assigned to your unit qualified through Tables VII as per FM 1-140?

Yes

No

- If no, what percentage of door gunners assigned to your unit are qualified through Tables I-IV or Tables V-VII?

_____ percent qualified through Tables I-IV

_____ percent qualified through Tables V-VII

76. In your opinion, is the ammunition authorized for qualification and sustainment adequate?

Yes

No

- If no, approximately what percentage of increase is needed?

_____ percent

77. During FY 1987, how many door gunnery rounds were allotted and how many were received?

_____ rounds were allotted

_____ rounds were received

78. Currently, there is no requirement to qualify door gunners from both sides of the aircraft. Because of the different aiming points, do you feel that qualification should be required for both sides of the aircraft?

No (explain why not) _____

Yes (explain why) _____

A P P E N D I X C

UNIT COMMANDER (n = 52) AND AVIATOR (n = 475)
TRAINING VALUE RATINGS OF NINE TASKS FOR THE
ATTACK HELICOPTER SIMULATORS

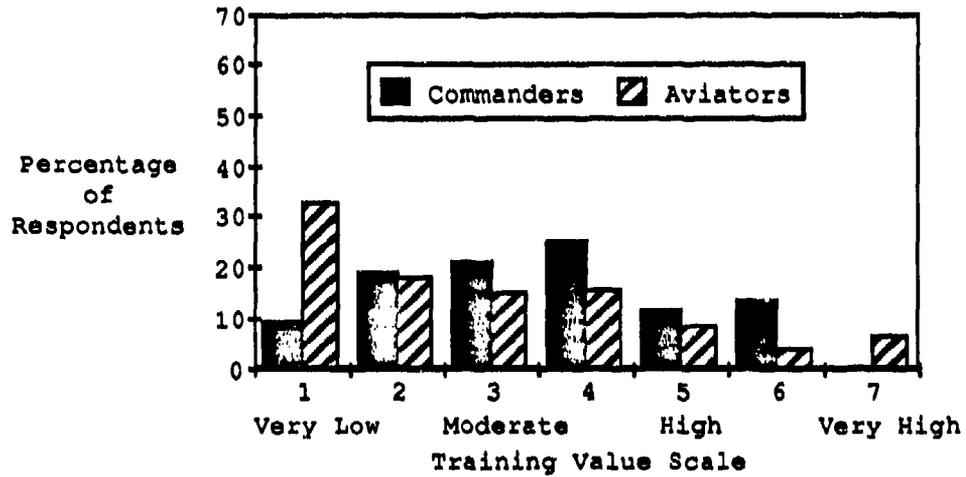


Figure C1. Rated training value of simulators for interior ballistics.

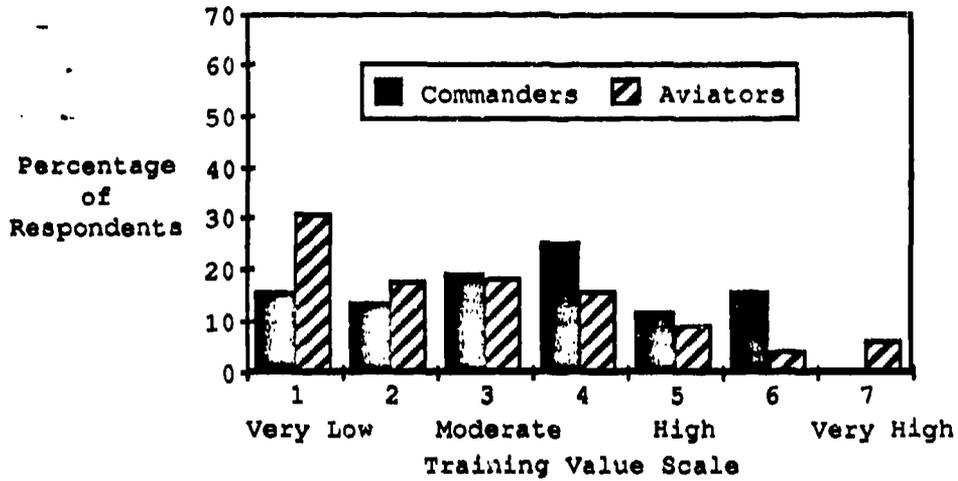


Figure C2. Rated training value of simulators for exterior ballistics.

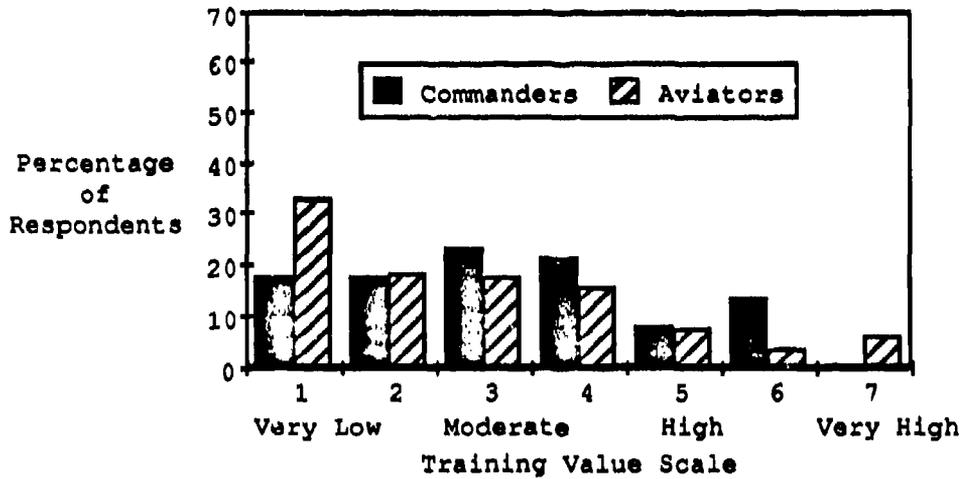


Figure C3. Rated training value of simulators for terminal ballistics.

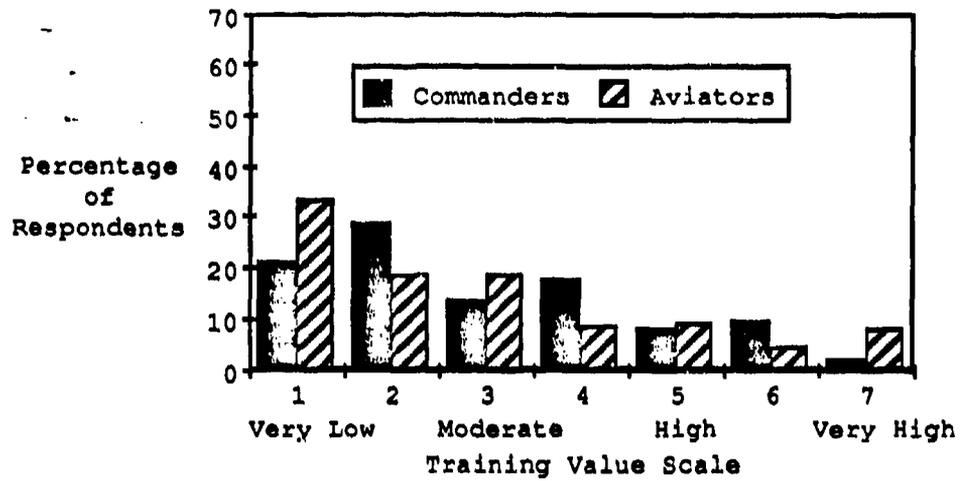


Figure C4. Rated training value of simulators for target detection.

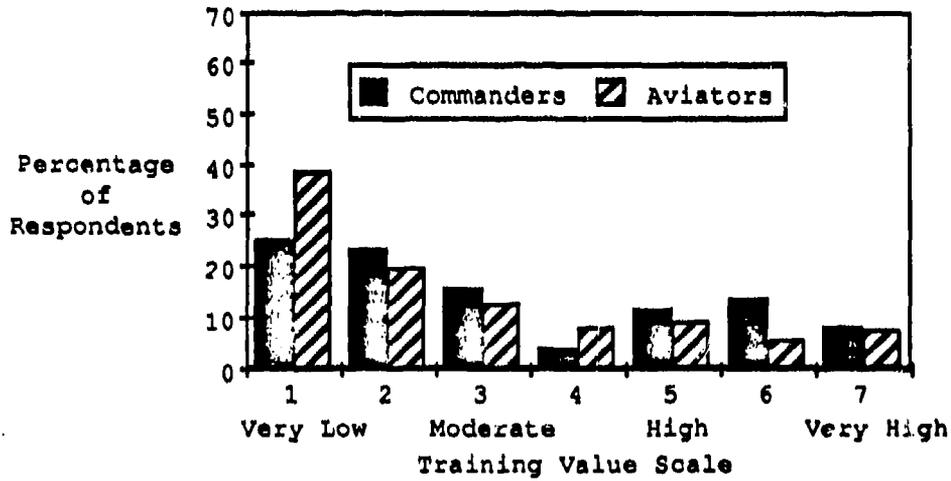


Figure C5. Rated training value of simulators for target identification.

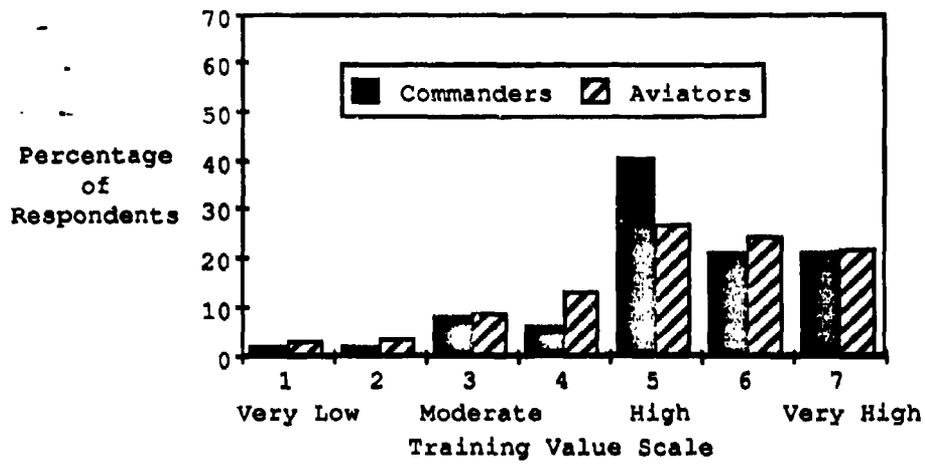


Figure C6. Rated training value of simulators for normal flight tasks.

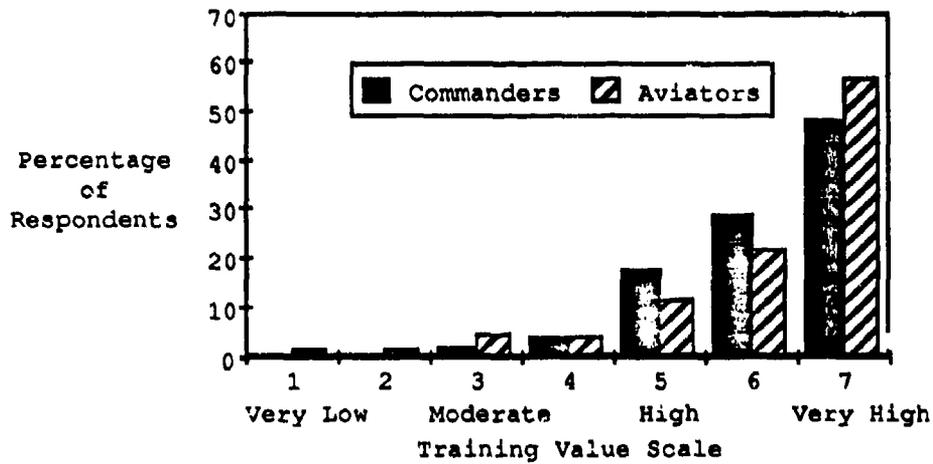


Figure C7. Rated training value of simulators for instrument flight tasks.

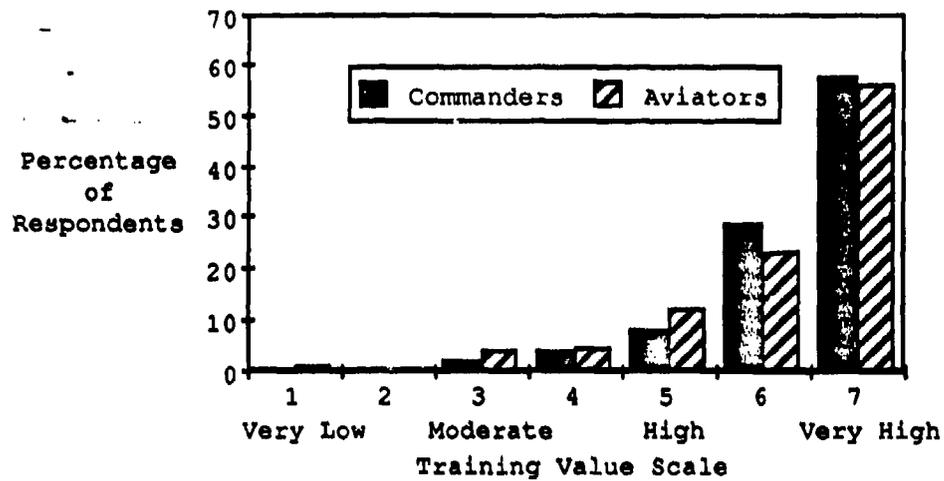


Figure C8. Rated training value of simulators for emergency flight tasks.

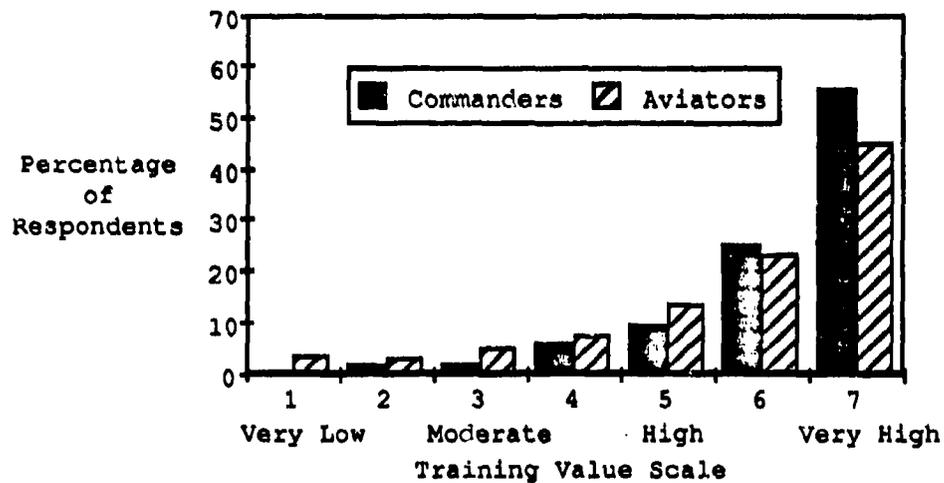


Figure C9. Rated training value of simulators for weapon system emergencies.

A P P E N D I X D

TRAINING VALUE RATINGS OF NINE TASKS FOR THE
AH-64 CMS ($n = 87$) AND THE AH-1 FWS ($n = 423$)

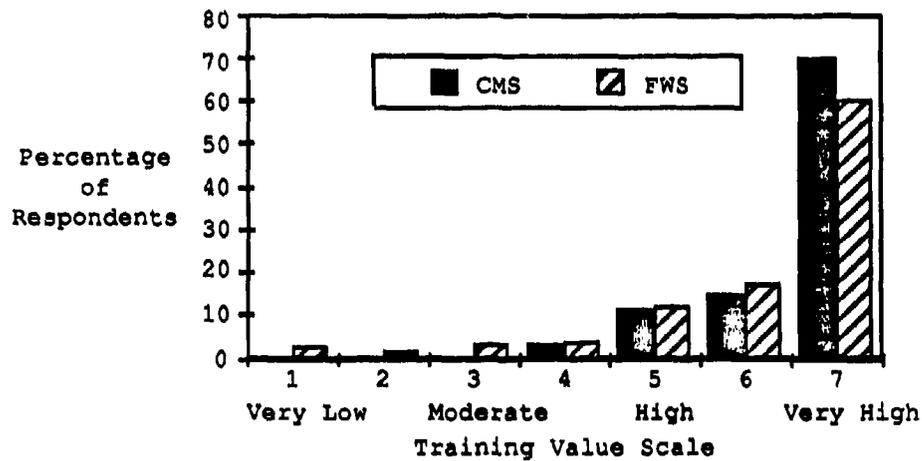


Figure D1. Rated training value of the CMS and FWS for weapons system switchology.

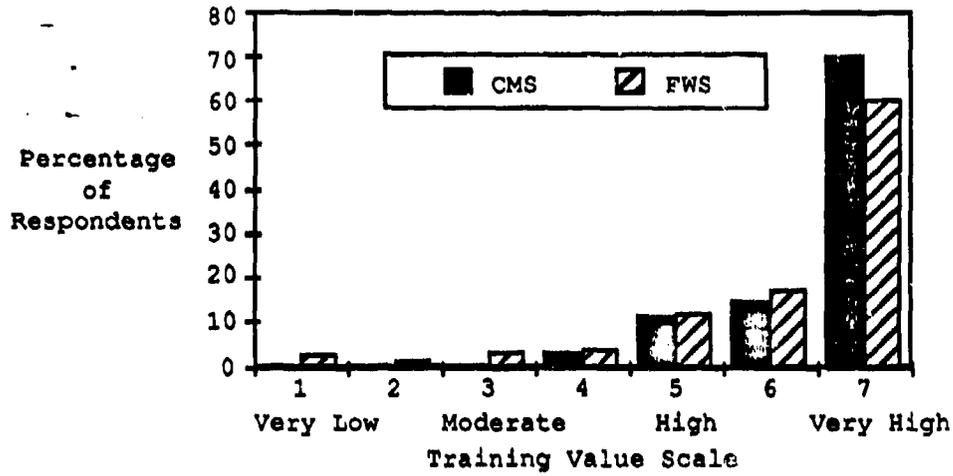


Figure D2. Rated training value of the CMS and FWS for interior ballistics.

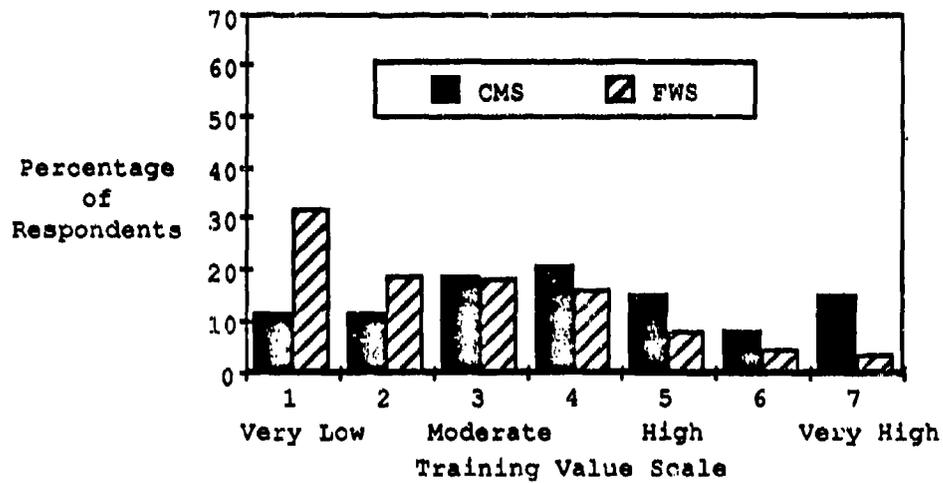


Figure D3. Rated training value of the CMS and FWS for exterior ballistics.

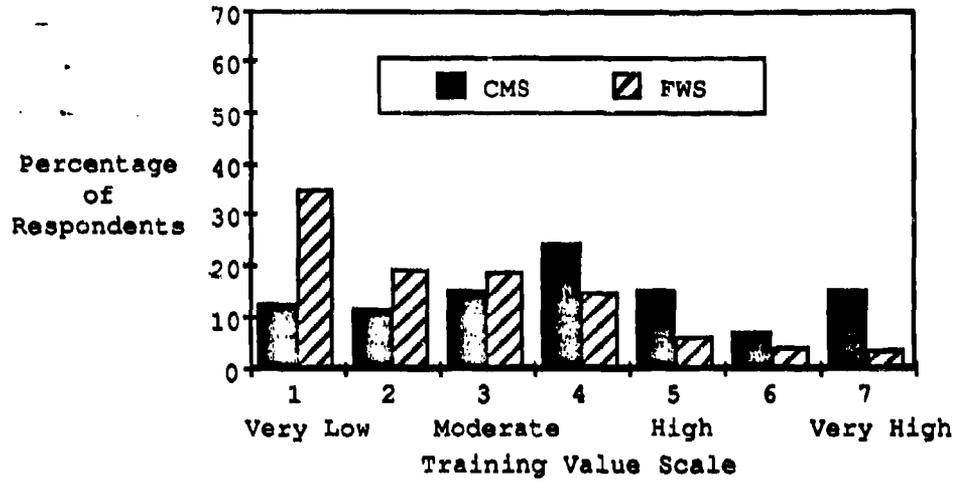


Figure D4. Rated training value of the CMS and FWS for terminal ballistics.

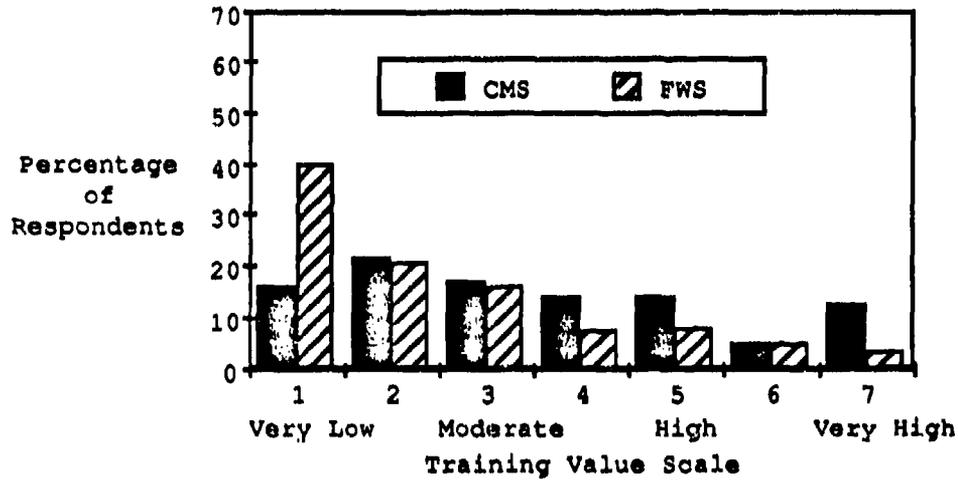


Figure D5. Rated training value of the CMS and FWS for estimating range to target.

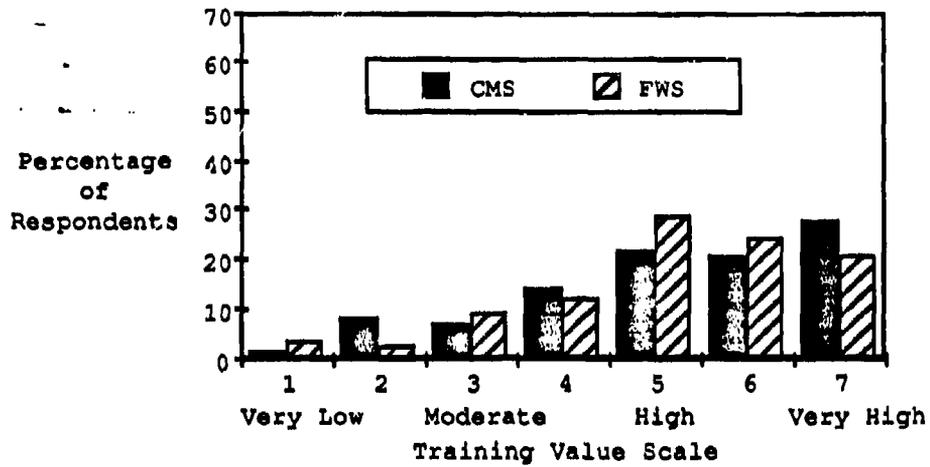


Figure D6. Rated training value of the CMS and FWS for normal flight tasks.

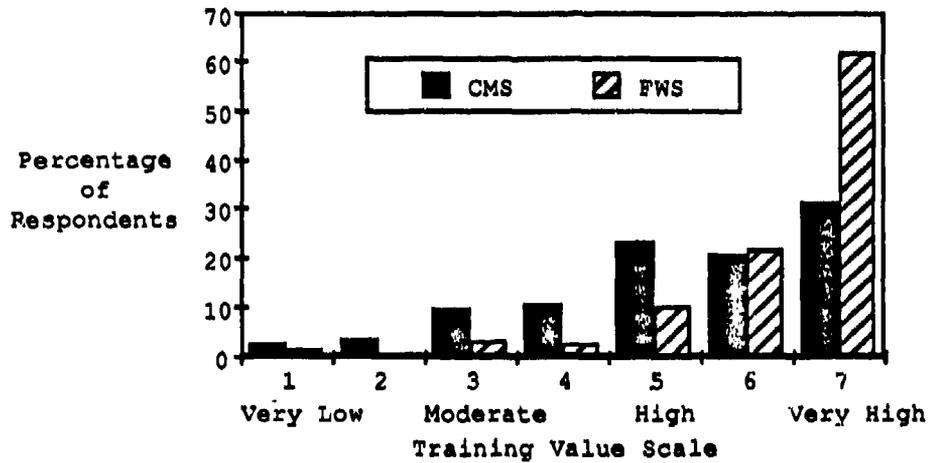


Figure D7. Rated training value of the CMS and FWS for instrument flight tasks.

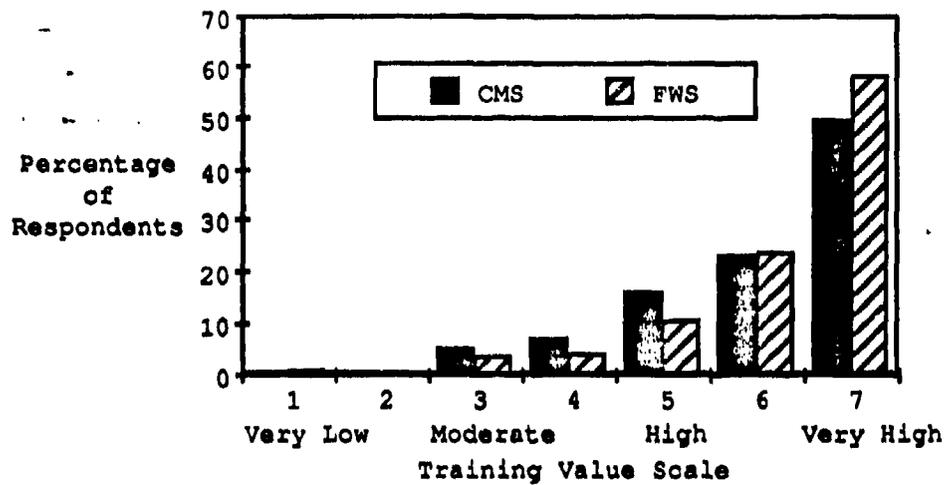


Figure D8. Rated training value of the CMS and FWS for emergency flight tasks.

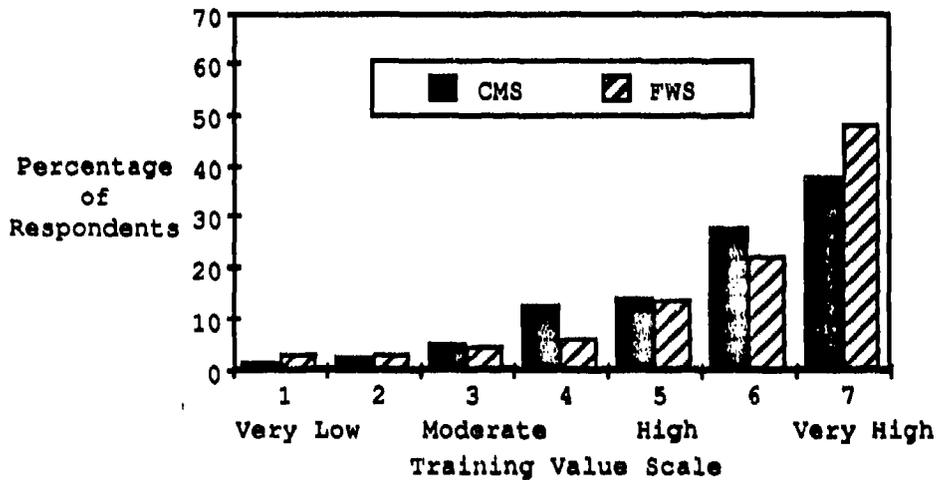


Figure D9. Rated training value of the CMS and FWS for weapon system emergencies.