Headquarters
Department of the Army
Washington, DC.

UNMANNED AERIAL VEHICLE AIRCREW TRAINING MANUAL

CONTENTS

CONTENTS

PREFACE

This training circular is the Aircrew Training Manual (ATM) for Unmanned Aerial Vehicles (UAVs). Battle-Focused Training principles outlined in FM 25-101, will help commanders at all levels develop, implement, and administer a comprehensive aircrew training program.

This manual encompasses individual and collective training and establishes operator qualification, refresher, mission, and continuation training requirements. Based on unit flying hours, it also gives guidance on tailoring training to meet individual, crew, and unit needs. It ensures the commander gets the greatest possible training value out of every flying hour. This manual applies to all unit commanders who have UAV assets.

Planning, preflight, and in-flight tasks involve the cooperative effort of all crew members. The prescribed tasks, conditions, standards, and descriptions explain each crew member's responsibility for the successful completion of maneuvers. Each crew member must understand the actions and directives of the other crew members. This enhances crew coordination and unit inter-operability and helps to prevent accidents caused by crew error.

The crew coordination descriptions in this publication do not focus exclusively on individual training. They blend individual training with collective training and provide a link to field manuals, ARTEP mission training plans, and other doctrinal and training material. The goal is to develop cohesive, combat-ready UAV units.

The proponent of the publication is Headquarters, Training Army Doctrine Command. Send comments and recommendations on DA Form 2028 through the aviation unit commander to Commander, US Army Intelligence Center and Fort Huachuca, ATTN: ATZS-TDL-D, Fort Huachuca, AZ 85613.

NOTE: Unless this publication states otherwise, masculine nouns and pronouns do not refer exclusively to men.

NOTE: This publication has been reviewed for operations security considerations.

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CHAPTER 1

INTRODUCTION

The focus of the Aircrew Training Program (ATP) is on individual, crew, and collective training. The design and management of an effective training program requires the commander to analyze each of these elements. The mission essential task list (METL) identifies collective training and defines the unit as a member of the combined arms team. To ensure the combat proficiency and absolute efficiency of Army UAV units, in the combined arms effort, the crew must function as a unit. Individual proficiency in tasks required to operate a UAV is essential to the training effort. As the commander's primary training document, TC 34-212 links individual, crew, and unit collective tasks.

1-1. RESPONSIBILITIES

a. Commander. The UAV unit commander is the primary ATP manager and is responsible for the unit ATP.

b. Standardization Instructor Pilot (SIP). The UAV standardization instructor pilot is the commander's technical advisor. He helps the commander develop, implement, and manage the ATP.

c. Evaluators/Unit Trainers. (UT) These individuals are the SIPs, Instructor Pilots (IP) and UTs who help the commander administer the ATP. They evaluate, train, and provide technical supervision for the UAV standardization program as specified by the commander.

d. Mission Commanders (MC). These individuals are responsible for coordinating all external needs as well as crew coordination. They maintain command and control over all flight operations from pre-mission through post-mission, to include information dissemination.

e. Crew Members. These individuals perform duties that are essential to the operation of the UAV. The four types of crewmembers are the Air Vehicle Operator (VO), External Pilot (EP), Mission Payload Operator (PO), and Flight Line Operator (FLO).

1-2. CREW COORDINATION

Aircrew training must emphasize crew coordination as a vital part of the overall training program. It is a set of principles, attitudes, procedures, and techniques that transforms individuals into an effective crew.

a. The inclusion of crew coordination in ATM task descriptions reflects the philosophy that no task is an individual undertaking. Coordinated effort by the entire crew ensures safety and effective performance. ATM revisions will include individual and crew-coordinated actions written in the descriptions. All crew members perform crew coordination actions. Individual and crew-coordinated actions apply to all modes of flight, day and night. The following paragraphs discuss these actions.

(1) Individual actions. These are actions the individual crew member must accomplish within a crew task.

(2) Crew-coordinated actions. These are actions all crew members must cooperatively accomplish to execute a crew task safely and efficiently.

b. Research conducted by the United States Army Aviation Center, United States Army Safety Center, and United States Army Research Institute show the importance of good crew coordination. The following are examples of identified crew coordination errors:

(1) Failure of the vehicle operator to properly utilize direct assistance from other crew members.

(2) Failure of a crew member to announce a decision or action that affected other crew members' ability to perform their duties properly.

(3) Failure of crew members to communicate positively (verbally and nonverbally).

(4) Failure of the MC to assign crew responsibilities properly before and during the mission.

(5) Failure of the VO to offer assistance or information needed or requested previously by the EP.

(6) Failure of the operator flying to execute flight actions in proper sequence with the actions of other crew members.

c. Crew coordination is the interaction (communication) between crew members and actions (sequence and timing) that are necessary in order to perform tasks efficiently, effectively, and safely. The following elements are essential to achieving crew coordination as defined:

(1) Communicate positively. Good teamwork requires positive communication between crew members. Communication is positive when the sender directs, announces, requests, or offers; the receiver acknowledges; and the sender confirms. Crew members must use positive communication procedures for essential crew coordination actions identified in the description of each task. Positive communication is quickly and clearly understood. It permits timely actions. Due to multiple crew locations and other environmental factors, crew members should use a limited vocabulary of explicit terms and phrases to improve understanding.

(2) Direct assistance. A crew member will direct assistance when he cannot maintain UAV control, position, clearance or properly operate UAV systems without help from another crew member. Directives are necessary when one crew member cannot reasonably be expected to know when or what assistance is needed by another crew member. Directives are not normally needed when the assistance required is part of an individual's assigned responsibility in the task description.

(3) Announce actions. To ensure effective and well-coordinated actions all crew members must be aware of expected UAV movements and unexpected individual actions. Crew members will announce any actions that affect the actions of other crew members. Such announcements are essential when a decision or action is unexpected and calls for supporting action from other crew members to avoid a potentially hazardous situation.

(4) Offer assistance. A crew member will provide assistance or information requested. He will also offer assistance when he sees another crew member needs help. All crew members must be aware of the flight situation. The non-flying crew member must know when the flying crew member deviates from normal or expected actions. He must never assume the flying crew member always recognizes a hazard or the need for assistance.

(5) Acknowledge actions. Communications must include supportive feedback to ensure that all crew members correctly understand announcements and directives. Acknowledgments need to be short and positively indicate that the crew member received and understood message. "Roger" or "Okay" may not be sufficient. The preferred method is to repeat critical parts of the message in the acknowledgment.

d. Figure 1-1 is an example of positive communication between crew members.

VO:	"Crew chief (FLO), ready for engine start."
FLO:	"Roger, ready for engine start."
VO:	"EP, coordinate engine start with crew chief."
EP:	"Roger, coordinating engine start."
EP:	"Crew chief, ready to start aft engine."
FLO:	"Roger, ready for aft engine start."

Figure 1-1. Example crew member communication.

CHAPTER 2

TERMS AND POLICIES

The ATM has added many terms to the UAV vocabulary. Familiarity with these terms is necessary to understand and use this publication. Therefore, this chapter contains the definition of terms, rather then the glossary, and policy information, where appropriate, to explain the terms.

2-1 AIRCREW TRAINING PROGRAM (ATP)

The Aircrew Training Program applies to the following UAV operators in designated operational positions; VO, EP, and PO.

a. Integration of Operators into the Aircrew Training Program. Upon signing into the unit, operators in an operational status are members of the unit's ATP. Operators must present their Individual Training Folders (ITF), if applicable, to the commander or the commander's designated representative within 14 consecutive days after signing into the unit. Determination of Readiness Level (RL) status is by a records check or by the commander's evaluation. The commander's evaluation will be completed within 45 consecutive days of the operator signing into the unit.

b. Implementation of the Aircrew Training Program. This publication is the commander's guide for implementing the ATP.

2-2 AIRCREW TRAINING PROGRAM TRAINING YEAR

The ATP training year has two semiannual training periods. The first training period begins the first day following the end of the operator's birth month and continues for six months. The second training period begins the first day of the seventh month and continues through the end of the operator's birth month. For example, the first training period for an operator born on 15 April begins 1 May and ends 31 October. The second training period begins 1 November and ends 30 April.

2-3 COMMANDER'S EVALUATION

a. The commander's evaluation integrates the newly assigned operator into the unit ATP. The commander, or his designated representative, conducts the evaluation and determines the operator's initial readiness level. This evaluation consists of a review of the ITF to determine the operator's proficiency.

The commander, or his representative, should review the operator's previous training to determine if the operator is proficient in training and in the mission of his current unit. If a records review cannot determine proficiency, then the commander will require a proficiency flight evaluation. The commander will select tasks to evaluate based on the crew member's assigned duty position. The evaluation should include tasks from each flight mode the crew member will or could perform. The results of the proficiency flight evaluation determine the

crew member's readiness level. The commander's evaluation is documented on DA Form 7122-R for a proficiency flight evaluation. Upon completion, the commander signs the form.

b. When conducting a proficiency flight evaluation, the evaluator will identify any tasks that the crew member fails to accomplish to standard. To correct those deficiencies, the commander will adjust the training program for the crew member. When the commander adjusts the crew member's training program, he will:

(1) Set training objectives for each task in which the crew member is deficient.

(2) Determine the order in which the objectives are taught.

(3) Select the appropriate training methods to accomplish each objective; for example, programmed texts, a simulation device, or an actual flight.

(4) Estimate the number of flight or simulation hours required.

(5) Establish the number of training days required.

(6) Assign trainers or evaluators.

(7) Ensure the availability of training resources such as films, training extension courses, and training hardware.

(8) Schedule and monitor training.

2-4 READINESS LEVELS (RL)

a. Individual Progression.

(1) Readiness levels are the training status classifications of the individual operator. They identify the training phase in which the operator is participating and measure readiness to perform assigned missions. The readiness levels provide a logical progression of UAV training based on task proficiency. A crew member may be at more than one RL at a time; i.e., RL3 (refresher training) as PO and RL1 (continuation training) as EP.

(2) Operators will progress readiness levels by completing tasks in all areas of the UAV system (VO, PO and EP). Once the operator meets the criteria to advance to the next readiness level he will have 90 consecutive days to advance to the next readiness level. If the operator does not meet the criteria to advance to within 90 days he will drop to RL3. Once at RL1 the operator will have to perform the minimum requirements to maintain RL1. Readiness level progression will exclude days lost because of:

(a) Temporary Duty.

(b) Medical or non-medical suspension from operations.

(c) Leave approved by the unit commander.

(d) Grounding of UAV.

(3) If the exclusion period exceeds 45 consecutive days, the operator must restart his/her current RL progression. He will have 90 consecutive days to progress to the next readiness level.

(4) An operator may progress to the next RL in less time than prescribed in paragraph 2-4a (2) by demonstrating proficiency to an IP or an SIP.

(5) When an operator has not progressed within the required period, the unit commander will investigate, and based on his/her findings take action IAW appropriate directives.

b. Readiness Level 3 (Qualification/Refresher Training). An operator is RL 3 while undergoing qualification or refresher training. Refresher training is for an operator to regain proficiency in all base tasks for his duty position. (See Chapter 4 Section II) An operator progresses from RL 3 by demonstrating proficiency in all base tasks to an IP or an SIP.

(1) An operator may also be RL 3 when returning to an operational position after having been prohibited or excused from operation for more than 90 consecutive days. If an operator enters the unit's ATP with fewer than 90 days of non-operational time, the commander may require the operator to undergo refresher training.

(2) There are no task or iteration minimums, or APART requirements while an operator is designated RL3. However, to smoothly transition from RL3 to RL2, minimum hours and iterations may be established by the commander with assistance from the IP/SIP.

c. Readiness Level 2 (Mission Training). An operator who has completed RL 3 training or been initially designated RL 2, based on the commander's evaluation, will begin
training on mission and additional tasks as designated by the unit commander. Mission training programs help RL2 operators to verify and develop their ability to perform specific tasks (selected by the commander) that support the unit's METL. Because the goal is proficiency in mission-related tasks, commanders should tailor their task list to meet specific unit needs. An operator progresses from RL2 to RL1 by demonstrating proficiency in all selected mission and additional tasks to an IP or an SIP. An operator has 90 consecutive days to progress to RL1. There are no task or iteration minimums, or APART requirements while an operator is designated RL2. However, to smoothly transition from RL2 to RL1, minimum hours and iterations will be established by the commander with assistance from the IP/SIP.

d. Readiness Level 1 (Continuation Training). An operator who has completed RL2 training is considered mission ready and designated RL 1. The operator must perform those tasks designated by the unit commander for the operator's TOE or TDA position. Once designated RL1 the operator must complete APART requirements during the 3 month period ending the last day of the crew member's birth month.

2-5 PRORATION

a. Flying hour Proration.

(1) Prorate flying hour minimums when an UAV operator is:

(a) Newly designated RL1.

(b) Having his primary duty position redesignated.

(2) The minimum will be one-sixth of semiannual requirements and/or one-twelfth of annual requirements for each full month remaining in the training period. Any previous flying-hour requirements no longer apply.

b. Determination that minimums have been Met.

(1) At the end of the training period, determine if the crew member's minimums have been met. Reduce minimums by one month for each thirty days the crew member was unable to fly for the reason listed below. Add the total number of days lost because of

(a) TDY.

(b) Medical suspension.

(c) Nonmedical suspension.

(2) Days in different categories may be added together for thirty-day totals. Concurrent days (for example, simultaneous medical suspension and TDY) will not be added together.

c. Removal from RL 1.

(1) Training deficiency. A crew member removed from RL 1 for a training deficiency must still meet all RL 1 ATP requirements. ATP requirements met while RL 2/3 will be applied to RL 1 requirements.

(2) Other than a training deficiency. A crew member has until the end of the training period of complete ATP requirements. If a crew members is removed from RL 1 for other than training deficiency before the end of the training period (for example, a PCS departure), his ATP requirements no longer apply.

(3) An UAV operator who is RL 1 and fails a hands-on performance test will be redesignated RL2 or 3 and authorized additional training. Those hours and task iterations completed will be credited to the UAV's ATP requirements.

d. Task and Iteration Proration.

(1) During his training year, each RL 1 crew member must complete at least one iteration of each task on his list in each of the modes indicated. The commander may increase these requirements as training and proficiency requirements if a crew member is initially designated RL 1 as follows:

(a) If more than six months remain in his training year, he must complete at least one iteration of each task in each of the modes indicated on his list. The commander may increase his requirements.

(b) If less than six months remaining in his training year, the crew member will have no task and iteration requirements unless specified by the commander.

NOTE: A task iteration performed at night may be substituted for a day task iteration.

e. If the crew member is removed from RL 1, the provisions of paragraph 2-5c (1) above apply.

NOTE: Commander has overall approval of flying hour prorations.

f. An RL1 UAV operator must complete flying hour requirements during his initial semiannual training period as shown in Figure 2-1.

MONTHS	FRACTIONAL REQUIREMENTS
First	Five-sixths
Second	Two-thirds
Third	One-half
Fourth	One-third
Fifth	One-sixth
Sixth	None

Figure 2-1 Semiannual flying hour requirements

CHAPTER 3

EVALUATION

The conduct of flight evaluations is a principal means of assessing flight standardization and operator proficiency and is a key part of the Army standardization process.

3-1. EVALUATION PRINCIPLES

The value of any evaluation depends on strict adherence to fundamental principles; anything less than strict adherence makes the evaluation meaningless. These principles are described below.

a. The basis for selection of evaluators (IPs and SIPs) must not be only technical qualifications. It should also include demonstrated performance, objectivity, powers of observation, and ability to provide constructive comments.

b. The basis for the method of evaluation must be uniform and standard objectives. In addition, it must be consistent with the unit's mission and adhere to the appropriate Standard Operating Procedures (SOP) and regulations.

c. Complete understanding of the purpose of the evaluation, by all concerned, is essential. Moreover, the evaluation must be conducted in a manner that is purpose-oriented.

d. Cooperation by all participants is necessary to guarantee fulfillment of the evaluation objectives. The emphasis is on all of the participants, not just the examinee.

e. The evaluation must produce specific findings to identify training needs. Everyone affected by the evaluation wants and needs to know what was done wrong, what might be done better, and how to make improvements. General comments do not always provide the direction and guidance essential for improvement. The evaluation must pinpoint both strengths and weaknesses.

NOTE: All evaluations will be conducted by an IP/SIP. SIPs evaluate IPs and SIPs.

3-2. ANNUAL PROFICIENCY AND READINESS TEST (APART)

The APART measures an operator's readiness status. It consists of a written examination and a hands-on performance test evaluated by an IP/SIP. An RL1 operator must pass each component of the test during his APART period. The APART period is the three month period ending on the last day of the operator's birth month.

At the end of the training year, the commander must certify that each operator has completed all APART requirements. This action serves to re-certify the operator in his designated duty position(s). An operator designated RL1 within the three month APART period must complete all APART requirements. An operator receives credit for written examinations and hands-on
performance tests conducted during RL training for tests completed within the three month APART period. Operators participating in RL3 or RL2 training programs are not subject to the APART. Operators removed from RL 1 status because of a training deficiency are subject to the APART.

a. UAV operator's manual written examination. This open-book examination is part of the APART and should be given before the hands-on evaluation. Preparation of the examination is at the local level. It consists of 50 questions that cover the entire UAV operator's manual. To pass the examination, the operator must obtain a grade of at least 70 percent corrected to 100 percent.

b. Hands-on performance tests. This component consists of oral and job position evaluations. Paragraph 3-7 contains a list of oral subjects. Evaluation tasks are listed in appropriate Appendix under the S column. The operator must successfully complete all requirements during his APART period.

NOTE: APART failures. Operators who fail to meet the APART standards will be processed IAW appropriate directives.

NOTE: Even though an annual physical is not a component of the APART, if a physical is due it will be completed during the APART period.

3-3. NO-NOTICE

Each commander will establish a no-notice evaluation program to measure crew member effectiveness. Evaluations may consist of flight, compatible simulator after flight, oral, or written examination.

3-4. PROFICIENCY FLIGHT EVALUATION

a. The commander directs the proficiency evaluation and administers it using the guidelines established in paragraph 2-3. This evaluation is conducted to determine—

(1) The individual's readiness level upon assignment to the unit if the readiness level cannot be determined through records review.

(2) The individual's proficiency when UAV currency has lapsed IAW
paragraph 6-1.

(3) The individual's proficiency when questioned by the commander.

b. After the evaluation, the examiner will debrief the individual and complete DA Forms 7122-R IAW instructions in Chapter 7.

3-5. POST-ACCIDENT FLIGHT EVALUATION

The commander requires this type of evaluation when an accident or incident occurs. The type and nature of the evaluation will depend on the duties performed by the operator at the time of the accident. Special emphasis should be placed on evaluating the task(s) being performed at the time of the accident and, if possible, evaluate the task(s) under similar conditions. The simulator may be utilized, if applicable. Under no circumstance should safety be sacrificed in an effort to exactly duplicate the conditions at the time of the accident. After the evaluation, the examiner will debrief the individual and complete the DA Form
7122-R IAW instructions in Chapter 7.

3-6. GRADING CONSIDERATIONS

a. Oral Evaluation. The examinee must demonstrate a working knowledge and understanding of the subject areas presented. The evaluator will assess the examinee's knowledge during the oral presentation.

b. Hands-on Test. Performance standards are based on an ideal situation. Grading is based on meeting the minimum standards. The evaluator must consider deviations from the ideal during the evaluation and make appropriate adjustments if other than ideal conditions exist.

3-7. ORAL EXAMINATION/EVALUATION

The oral evaluation measures an operator's knowledge and understanding of his specific area of expertise. As a minimum one question from each of the following subjects or topics will be evaluated.

a. Air Vehicle Operator:

(1) Unit SOPs
(2) Weather limitations
(3) UAV systems
(4) System limitations
(5) Emergency procedures
(6) Preflight
(7) Mission planning
(8) Crew coordination
(9) Aerodynamics

b. External Pilot:

(1) Unit SOPs
(2) Weather limitations
(3) System limitations
(4) Emergency procedures
(5) Preflight
(6) Runway setup procedures
(7) Crew coordination
(8) Aerodynamics
(9) UAV systems

c. Mission Payload Operator:

(1) Unit SOPs
(2) Emergency procedures
(3) Mission planning

(4) Tactical mission procedures
(5) System setup
(6) Camera systems
(7) Map system
(8) Crew coordination

CHAPTER 4

UNIT TRAINING

4-1. GENERAL. Unit Commanders are authorized to conduct refresher training and series qualification at unit level. AVCs receiving the training must have attended the initial AVC qualification course for UAV being flown.

4-2. TRAINING PROGRAM REQUIREMENTS

An AVC entering refresher/series qualification training will have two phases of training to complete before he is designated RL 1.

a. Base Task Training. During this phase, the AVC will be designated RL 3.

(1) He will complete the appropriate academic and base tasks listed in the appropriate appendix for the UAV being flown.

(2) He will be evaluated, as a minimum, on those base tasks listed under a standardization flight evaluation by an IP.

(3) All flight training in RL 3 will be conducted by an IP.

(4) He will complete an one-hour flight (minimum) at night. The training must include all tasks marked with an "X" in the night column. Training in night operations must include locating and operating all lighting systems.

b. Mission Training. The UAV mission and operation of the mission equipment is an integral part of being an AVC qualified in a UAV. This training must be completed before an AVC is qualified in a UAV. An AVC, for administrative purposes, he considered RL 2 during this phase and may fly with a UT to receive mission training. The requirements for mission training are contained in Chapter 5.

SECTION I. Series Qualification

4-3. Series Qualification Training

To become qualified in a different series of a UAV, an AVC must–

a. Receive sufficient academic instruction to ensure that he has a thorough knowledge of the systems in that series UAV.

b. Demonstrate proficiency of base and mission tasks to an IP or SP. The minimum tasks to be demonstrated are the tasks marked for standardization and mission flight evaluation.

Section II. Refresher Training

4-4. TRAINING PREREQUISITES

An AVC returning to an operational AVC position after having been prohibited/excused from flying duties for more than 180 consecutive days will receive refresher training. When an AVC enters the unit's ATP with fewer than 180 days consecutive days of non-AVC duties, the commander may require him to undergo refresher training based on a records check or a proficiency flight evaluation.

4-5. TRAINING REQUIREMENTS

Refresher training may include academic courses and practices of all base tasks. During refresher training, an AVC does not have minimum hour, task, iteration, or annual proficiency and readiness test (APART) requirements in the UAV in which the training is being conducted. The only requirements he has are those designated by the commander.

CHAPTER 5

MISSION TRAINING

An AVC begins mission training after completing the appropriate Chapter 4 training program and progressing to RL 2.

5-1. TRAINING REQUIREMENTS

a. Upon completion of RL 3 series or refresher training, the AVC is authorized to perform AVC duties while undergoing RL 2 training with an UT or IP. However, final UAV qualification will not be entered on the DA Form 759, Individual Flight Record and Flight Certificate-Army, until completing mission training. He must —

(1) Complete the academic and mission tasks training. Commanders will establish a minimum number of missions to be flown.

(2) Complete an evaluation during a mission conducted by an IP.

b. Proficiency in mission-related tasks is the goal of mission training. During mission training, an AVC does not have minimum hour, task, iteration, or APART requirements in the UAV in which the training is being conducted. The only requirements he has are those designated by the commander and any applicable regulations.

c. Unit trainers may be used to conduct mission training.

CHAPTER 6

CONTINUATION TRAINING/OPERATOR TASKS

An operator begins continuation training after completing series or refresher training and any required mission training. The commander may also place him in this phase of training after a records check or proficiency flight evaluation. The appropriate appendix describes those maneuvers and procedures that are essential for maintaining operator skills. Required performance standards are specified in the appropriate appendix as well.

6-1. TRAINING REQUIREMENTS

a. Currency Requirements - per appropriate Appendix

b. Annual Task and Iteration Requirements. Minimum requirements are:

(1) One iteration of all base tasks during the day and one iteration of mandatory night tasks as indicated in appropriate Appendix task list. Mandatory night tasks are those indicated by an "X" in the night column of appropriate Appendix task list.

(2) One iteration of the mandatory base tasks during NBC training as listed in paragraph 6-2.

(3) Any iteration requirements for mission tasks as determined by the commander.

(4) Any iteration requirements for additional tasks as determined by the commander.

NOTE: An iteration performed in a more demanding mode may suffice for an iteration required in a less demanding mode. The commander determines which mode of flight is more demanding, i.e., day or night.

6-2 ANNUAL NBC TRAINING REQUIREMENTS

Annual NBC training is mandatory for all operator positions. Operators must wear full Chemical Protective Over Garments (CPOG) at Mission Oriented Protective Posture (MOPP) level IV during this training.

a. Operators will receive NBC training in the base tasks listed below. The commander may also select additional tasks based on the unit's mission.

(1) Task 1020, Perform preflight inspection.

(2) Task 1025, Perform engine-start/UAV system check.

(3) Task 1030, Perform UAV taxi.

(4) Task 1035, Perform normal takeoff and climb.

(5) Task 1070, Perform normal landing.
(6) Task 1080, Perform after-landing tasks.

b. While conducting NBC training, the commander will ensure that—

(1) Operators use extra care while performing duties or training when wet bulb globe temperatures are above 75 degrees Fahrenheit.

(2) A qualified and current operator, without a protective mask, is monitoring training at all times.

(3) Commanders may waive NBC training requirements for those operators who require corrective lenses and do not have suitable inserts. Operators requiring such inserts must be identified and provided with corrective inserts as soon as possible.

6-3 TASK CONTENTS

a. Task Number and Title. A number and title identify each task. 1000-series tasks are Base Tasks. 2000-series tasks are Mission Tasks which the commander may select. 3000-series tasks are Additional Tasks. They are tasks commander determines are essential to METL accomplishment and are not included in the ATM.

b. Conditions. Perform the task in the situation the conditions specify. They describe the important aspects of the performance environment. Meet all conditions before crediting task iterations.

c. Standards. The standards describe the minimum degree of proficiency or performance for accomplishment of the task under ideal conditions.

d. Description. The description explains how to accomplish the task to meet the standards. It includes the performance of individual and crew-coordinated actions. These actions apply in all modes of operation.

e. Night Considerations. Where applicable, night considerations are included.

f. References. Listed references for each task are sources of information about that particular task.

6-4 TASK CONSIDERATIONS

a. References to the IP in the task conditions include the SIP.

b. When a UT, IP, or SIP is part of a condition, a UT, IP, or SIP will be near the operator position being trained/evaluated.

c. Unless otherwise specified in the conditions, all in-flight training and evaluations will be conducted under visual meteorological conditions (VMC).

d. The operator should know certain emergency procedures well enough to perform the required action from memory. Upon completion of the procedure, the checklist will be used to verify no item(s) were overlooked.

e. Operators will maintain operation within aircraft limitations at all times. Operation outside these limits is unsatisfactory.

CHAPTER 7

AIRCREW GRADING SYSTEM

The operator grading system provides the commander with a complete and continuous performance record on each operator in the unit. These records reflect the performance of individuals at a given time. Poor performance may or may not indicate inadequacy on the part of the operator. The problem may be with the unit training program itself. A detailed analysis of all records should tell the commander where the problem is. Only then should the commander try to fix the problem. There are four separate forms used to record evaluations

and training. The importance of these records as quality control and standardization tools cannot be overstated. They must be filled out completely, carefully, legibly, and in black ink.

7-1 GRADING CONSIDERATIONS

a. Oral Examination. The examinee must demonstrate a working knowledge and understanding of the subject areas presented in paragraph. 3-7. The evaluator will assess the examinee's knowledge during the oral evaluation and enter the appropriate grade on the maneuver/procedure gradeslip.

b. Performance Evaluation. Performance standards are based on an ideal situation. Grading is based on meeting the minimum standards. If other than an ideal situation exists, the evaluator must make appropriate adjustments when grading.

NOTE: An operator who fails to satisfactorily complete an evaluation will be redesignated RL2 or 3 based on the task evaluated. For example, failure of a base task (1000-series) will result in the operator being redesignated RL3.

7-2 DA FORM 7122-R (CREW TRAINING RECORD)

See TC 1-210 (Aircrew Training Program Commander’s Guide To Individual And Crew Standardization) for information on form usage.

7-3 DA FORM 4507-R (CREWMEMBER GRADE SLIP)

See TC 1-210 (Aircrew Training Program Commander’s Guide To Individual And Crew Standardization) for information on form usage.

7-4 DA FORM 4507-1-R (MANEUVER/PROCEDURE GRADE SLIP)

See TC 1-210 (Aircrew Training Program Commander’s Guide To Individual And Crew Standardization) for information on form usage.

7-5 DA FORM 4507-2-R (CONTINUATION COMMENT SLIP)

See TC 1-210 (Aircrew Training Program Commander’s Guide To Individual And Crew Standardization) for information on form usage.

7-6 DA Form 7120-R (Commander's Task Slip)

See TC 1-210 (Aircrew Training Program Commander's Guide To Individual And Crew Standardization) for information on form usage.

7-7 DA Form 7120-1-R (Crew Member Task Performance and Evaluation Requirements)

See TC 1-210 (Aircrew Training Program Commander's Guide To Individual And Crew Standardization) for information on form usage.

7-8 DA Form 7120-2-R (Crew Member Task Performance and Evaluation Requirements Continuation Sheet)

See TC 1-210 (Aircrew Training Program Commander's Guide To Individual And Crew Standardization) for information on form usage.

7-9 DA Form 7120-3-R (Crew Member Task Performance and Evaluation Requirements Remarks and Certification)

See TC 1-210 (Aircrew Training Program Commander's Guide To Individual And Crew Standardization) for information on form usage.

APPENDIX A

RISK MANAGEMENT

A-1 RISK MANAGEMENT

Tough, realistic training conducted to standards is the cornerstone of US Army's warfighting skills. An intense training environment stresses both operators and equipment, creating a high potential for accidents. The potential for accidents increases as training realism increases. Thus realistic training can pose a serious drain on warfighting assets. Commanders must find ways to protect operators and equipment from accidents during realistic training. An accident loss in war is no different in its effect than a peace time loss; the asset is gone. Commanders must compensate for the numerical advantages of the threat by protecting their combat resources from accidental loss. How well they do this could be the decisive factor in winning or losing. Commanders and staffs can use this section as a guide for developing SOPs and managing risk as it applies to their organization and mission.

A-2 CONCEPT

Risk management is a tool leaders can use to make smart risk decisions in tactical operations. It allows leaders to execute more realistic training not otherwise practical because of the high probability of accidents. Risk management is a commonsense way of accomplishing the mission with the least possible risk. It is a method of getting the job done by identifying the areas that present the highest risk and taking action to eliminate, reduce, or control the risk. Risk management thereby becomes a full integrated part of mission planning and execution.

A-3 RESPONSIBILITIES

Risk management is not complex, technical, or difficult. It is a comparatively simple decision making process, a way of thinking through a mission to balance mission demands against risks. Once understood, risk management is a way to put more realism into training without paying a price in deaths, injuries, damaged equipment or all three. Risk management is not limited to STXs. It is performed during actual combat as well as in peacetime. Leaders must learn to assess risks during training events and apply the same techniques during combat actions. During combat, risks may be taken but only after they are evaluated and weighed as they are during training.

a. Commander. As in all other areas, commanders are responsible for the effective management of risk To meet this responsibility, commanders—

(1) Seek optimum, not just adequate performance.

(2) Select from risk reduction options provided by the staff.

(3) Accept or reject residual risk based on the benefit derived.

(4) Train and motivate leaders at all levels to effectively use risk management concepts.

b. Staff—

(1) Assists the commander in assessing risks and in developing risk reduction options.

(2) Integrates risk controls into plans and orders.

(3) Eliminates unnecessary safety restrictions that diminish training effectiveness.

c. Troop Leaders—

(1) Develop a total commitment to mission accomplishment and welfare of

subordinates.

(2) Consistently apply effective risk management concepts and methods to operations they lead.

(3) Report risk issues beyond their control or authority to their superiors for resolution.

d. Individuals—

(1) Understand, accept, and implement risk reduction guidance.

(2) Maintain a constant awareness of the changing risks associated with the operation.

(3) Make leaders immediately aware of any unrealistic risk reduction procedure.

A-4 RISK MANAGEMENT PROCESS

a. Step 1: Identify Risks - Identify major events of the operational sequence and list them chronologically; then if necessary, display them in a flow chart. This process will aid in the detection of specific risks associated with all specified and implied tasks. Safety can be built into an operation by first seeing the operation in its entirety.

Operations invariably can be broken down into a series of phases, each with special characteristics and considerations. When the commander states the mission and concept, it is usually possible to define key events.

Operations also have a time factor, a beginning to ending series of events in which the timing of events is often as significant as the events themselves. The operations analysis is a useful tool in quickly defining the flow and time sequencing of events in an operation. The objective is to reflect the total operation from the preparatory actions until completion or the next phase of operations is underway. The operations analysis is a simple but highly effective tool. It ensures that risk evaluation in every aspect of the operation. Operational safety techniques are effective to a point, but they do not detect risk with the reliability required to achieve the degree of safety needed in today's military.

b. Step 2: Assess Risks - Determine the magnitude of risks by estimating loss probability and cost. Assess each event, determine whether it is routine, and make an initial risk assessment. Ensure that standards for routine events are adequate to provide an acceptable level of risk.

(1) Consider the value of a risk matrix or decision guide for all or part of the operation. Risk matrices provide a quick and ready method of breaking down an operation into its major operational aspects and eliminating or controlling the risks associated with it. Like other risk assessment tools, risk matrices can be used alone or with other risk analysis techniques to provide a quick overview of the risk situation. Risk matrices are simple enough for routine use by tactical leaders in operational planning. These matrices are nearly always more effective than intuitive methods in identifying the extent of risk. When using risk matrices, the risk assessor should—

(a) Review each situation to ensure that all significant areas of concern are evaluated, even if they are not included in the matrices.

(b) Use the matrices to analyze the risk to target areas of concern for risk-reducing action.

(c) Review the individual areas of concern before recommending an option. (If an area of concern is off the scale in a particular situation, a higher decision level may be required than the risk gauge suggests.)

(2) Consider using the METT-T format as another means to assess risks. Leaders can subjectively determine the likelihood and extent of accidental loss based on this type of analysis. When using the METT-T format, the risk assessor should —

(a) Determine mission complexity and difficulty.

(b) Assess the enemy situation and identify specific hazards.

(c) Consider all aspects of the terrain as well as weather visibility.

(d) Determine the supervision required and evaluate the experience, training, morale, and endurance of troops; also determine availability of equipment.

(e) Determine the time available for planning and executing the mission.

c. Step 3: Make Decisions and Develop Controls - Make risk acceptance decisions by balancing risk benefits against risk assessments. Eliminate unnecessary risks. Reduce the magnitude of mission essential risks by applying controls. Controls range from hazard awareness to detailed operational procedures. Focus on high hazard events not covered by a good set of standards. Complete a preliminary hazard analysis of these events.

(1) The preliminary hazard analysis is the initial examination of the hazards of an operation and their implications. It's normal basis on the mission analysis and data-base review and occurs before the details of an operation are completely defined. The objective of

the preliminary hazard analysis is to define, at the earliest possible point in the operational life cycle, the hazards exist or possibly exist. Doing this early means that these hazards can be addressed when they are still preliminary; that is, when the operation is still being planned.

(2) Based on the preliminary risk analysis and products of analytical aids, develop a roster of options for eliminating or controlling the risks. Select or offer options for command decisions. Once risks are identified and measured as accurately as possible, the leader must act to eliminate or control them. These controls must not unnecessarily interfere with training objectives. The best options often come from reviewing the doctrinal publications relevant to the operation to glean information about the proper procedures for hazard control. Merely reviewing the analysis and assessment will often suggest options. Some options will be more effective than others. In order of priority, commanders should—

(a) Eliminate the hazard totally, if possible. Engineer out the hazard or design equipment to eliminate the hazard or incorporate fail-safe devices.

(b) Guard or control the hazard. Use automatic monitoring or alarming devices. Provide containment or barriers.

(c) Change operational procedures to limit exposure. Modify operational procedures to minimize exposure (numbers and duration) consistent with mission needs.

(d) Train and educate personnel in hazard recognition and avoidance.

(e) Provide protective clothing or equipment that will minimize injury and damage potential.

(f) Use color coding and signs to alert personnel to hazards. Motivate personnel to use hazard avoidance actions.

(3) Leaders can detect and eliminate unnecessary safety restrictions that impede the realism or effectiveness of training. With proper controls, these restrictions can be eliminated or scaled back. Check for residual effects before implementing risk reduction options. Visualize what will happen once the option has been implemented. Sometimes reducing one risk will only introduce others.

d. Step 4: Implement Controls - Integrate specific controls into plans, OPORDs, SOPs, training performance standards, and rehearsals. Knowledge of risk controls down to the individual operator is essential for successful implementation and execution of these controls.

e. Step 5: Supervise - Determine the effectiveness of standards in controlling risk. The commander must enforce controls and standards. This is the key to loss control. The commander may have approved a number of risk reduction procedures, but approval does not mean that the procedures are carried out. Leaders must monitor the situation to ensure that action is actually being taken. The prudent leader then follows up to see that the doers understand and accept the guidance. Leaders should also monitor the effect of risk reduction procedures to verify that they really are good ideas. This is especially true for new and untested procedures.

(1) Leaders must always monitor the operational activities of subordinate elements. Only by seeing the character of operations can leaders fully appreciate risk implications. When monitoring operational activities, leaders should—

(a) Avoid administrative intrusions and not get in the way.

(b) Go where the risks are and spend time at the heart of the action.

(c) Analyze and think through issues, not just watch.

(d) Work with key personnel to improve operational procedures after the action and not hesitate to address imminent effectiveness.

(e) Fix systemic problems that are hindering field effectiveness.

(2) Leaders must be able to balance the cost of the risk involved with value of the outcome desired in an operation. They must consider and manage risk in making decisions. Three general rules apply when leaders select a tactical procedure. They are:

(a) Rule #1 - No unnecessary risk should ever be accepted. The leader who has the authority to accept or reject a risk is responsible for protecting the operators from unnecessary risk. If a risk can be eliminated or reduced and the mission still be accomplished, the risk is unnecessary and must not be accepted.

(b) Rule #2 - Risk decisions must be made at the appropriate level. The leader who will answer for an accident is the person who should make the decision to accept or reject the risk. In some cases, this will be a senior officer. In other cases, it will be the first line supervisor. Small unit commanders and first line supervisors are going to make risk decisions in combat. Therefore, they should learn to make decisions in training.

(c) Rule #3 - The benefits of taking a risk must outweigh the possible cost of the risk. Leaders must understand the risk involved and have a clear picture of the benefits to be gained from taking the calculated risk.

APPENDIX B

INDIVIDUAL TRAINING FOLDER

B-1 INDIVIDUAL AIRCREW TRAINING FOLDER (IATF)

The commander must ensure that the IATF is prepared and maintained for each crew member in an operational duty position assigned or attached to his unit. The IATF will be maintained as shown in Figure B-1.

a. DA Form 3513 will be used. It is prepared by—

(1) Marking through the words "flight records" on the front cover.

(2) Printing, in ink, the word "training" above the marked through words.

b. Each crew member assigned or attached in an operational duty position will present his ITF per paragraph 2-1a.

c. Grade slip forms used to document training and evaluation flights will be completed according to Chapter 7.

B-2 DA FORM 7120-R-E (COMMANDER'S TASK LIST)

See TC 1-210 (Aircrew Training Program Commander’s Guide To Individual And Crew Standardization) for information on form usage.

LEFT SIDE OF FOLDER

File items in the order listed.

1. Current DA Form 7120-R-E (Commander's Task List).

2. Current DA Form 7120-1-R-E (Crew Member Task Performance and Evaluation Requirements).

3. Current DA Form 7120-2-R-E (Crew Member Task Performance and Evaluation Requirements Continuation Sheet) (if used).

4. Current DA Form 7120-3-R-E (Crew Member Task Performance and Evaluation Requirements Remarks and Certification).

5. The preceding DA Forms 7120-R-E, 7120-1-R-E, 7120-2-R-E, and 7120-3-R-E.

RIGHT SIDE OF FOLDER

File items in the order listed.

1. DA Form 7122-R (Crew Member Training Record).

2. Grade slips for qualification, refresher, or mission training. (Remove these grade slips when a summary is posted to the DA Form 7122-R.)

3. Miscellaneous.

Figure B-1 Contents of individual training folder

APPENDIX C

FLYING HOUR PROGRAM (FHP)

UAVs are assigned to TOE units to meet combat requirements. During peacetime, these UAVs are used to train different types of units for combat. UAVs are also assigned to TDA units to meet essential training

missions. This appendix provides guidance for developing FHPs for TOE or TDA units. Computations are based on training and evaluations, mission support, and maintenance.

C-1 RESPONSIBILITIES OF COMMANDER

The high costs associated with UAV operations require that each commander calculate a flying hour program. The FHP must be based on the minimum number of flying hours necessary to maintain individual, crew, and unit proficiency. To achieve the ideal balance of readiness at the lowest cost, the commander must consider—

a. Crew member density.

b. Annual crew member turnover.

c. Number of UAVs assigned.

d. Mission support requirements.

e. Number of hours necessary for UAV maintenance.

f. Current status of unit training.

C-2 FORMATION OF FLYING HOUR PROGRAM FOR TRAINING/EVALUATIONS.

The number of flying hours required for training and evaluations depends on the number of assigned operators. Total training hours required for each operator is listed in Chapter 4. If a simulation device is available, the commander should subtract the hours flown in the simulation device from his total training hour requirements for each operator assigned. The percentage of simulator usage must be determined in order to accurately compute the flying hour program.

a. Example. Flying hours for individual operators were determined based on the sample numbers below. Actual numbers for each unit may vary.

(1) UAV operators assigned—30 (based on current TOE).

(2) Annual operator turnover rate—33 percent (derived from past replacement experience).

(3) Estimated number of newly assigned operators to undergo qualification, refresher, or mission training—10 (33 percent x 30).

(4) Qualification training planning factor—30 hours (based on one operator becoming RL1 at VO - 30 hours, EP- 30 hours, and PO - 12 hours).

(5) Refresher training planning factor—30 hours.

(6) Mission training planning factor—18 hours.

(7) Continuation training planning factor—50 hours.

b. Steps. The steps listed below show how to calculate operator training requirements. Assume that a compatible simulation device is not available.

(1) Determine the number of hours required for newly assigned operators.

(a) Qualification training requirements = operators (2) x qualification training hours (30) = 60 hours.

NOTE: Qualification training requirements will most likely be based on historical data available in the unit.

(b) Refresher training requirements = operators (4) x refresher training hours (30) = 120 hours.

(c) Mission training requirements = operators (8) x mission training hours (18) = 144 hours.

(d) Continuation training requirements = operators (10) x continuation training hours (50) x 1/2 = 250 hours.

NOTE: The fraction of 1/2 is the estimated portion of a training year remaining for newly assigned operators to complete continuation training.

(e) Total hours for newly assigned operators = qualification training (60) + refresher training hours (120) + mission training hours (144) + continuation training hours (250) = 574 hours.

(2) Determine the number of hours required for the remainder of the unit's continuation training. Continuation training hours (100) x operators (20) = 2000 hours.

(3) Add the number of hours in (1) (e) and (2) above to determine the number of training hours required (574 + 2000 = 2574 hours).

(4) Divide number in b.(3) above, by 3 (operators per mission) 2574 : 3 = 858

C-3. FORMULATION OF ANNUAL FLYING HOURS FOR MISSION SUPPORT

a. Operational requirements fall into seven general areas.

(1) Intelligence and classified projects.

(2) Combat/combat support.

(a) Intelligence/reconnaissance.

(b) Command, control, and communications.

(c) Indirect firepower adjustment.

(d) Battle damage assessment (BDA).

(3) Training and training support.

(a) Formal resident flight training.

(b) Support of installation training activities.

(c) Support of Army service schools' programs of instruction.

(d) Technical UAV operations and UAV maintenance training.

(4) Aerial photography and mapping.

(5) Research, development, test, and evaluation.

(6) Search and rescue.

(7) Special missions unique to location or operation.

b. Supported units must project annual support requirements and report them to the UAV commanders. These requirements should identify hours of support necessary in each of the general areas in paragraph a. above.

c. In all UAV units, collective training should be coordinated with operational missions. This normally will not require additional flying hours.

d. Because of safety and standardization considerations, UAV units require some flying hours solely for individual training. They are required for training and evaluating assigned operators and conducting special training that cannot be accomplished during operational and collective training missions.

e. The commander determines how to satisfy both training and support requirements. Once forecast hours for operational and collective training missions are determined, the commander should design missions that can accomplish UAV training and still meet operational requirements. If operational requirements exceed training hours available, the commander may increase his total flying hours requirements or decrease the flying hours available for operational missions or training.

f. Factors that influence the commander's decision include budget constraints, the nature of operational missions, the present level of training readiness, and maintenance support capabilities. The commander should remember that any decrease in individual training hours will result in a loss of individual proficiency and a corresponding decay in unit readiness.

C-4 FORMULATION OF FLYING HOURS FOR MAINTENANCE

In addition to programming hours for training and operational requirements, the commander must estimate hours necessary for maintenance. As a general rule, 5 percent of the total number of hours in the FHP is an appropriate estimate of maintenance hours required. This estimate may be adjusted according to variables such as UAV age and local flying conditions (sand, dust, and so forth).

Mission support hours required	600	
Individual training hours required	+258	
Sub-Total		858
Maintenance support required (2574 x .05)	+ 42	
Total hours required for the fiscal year	900	

Figure C-1 Sample FHP Computation

C-5 EVALUATION OF FLYING HOUR PROGRAM

The UAV unit's desired status should be achieved by training and measured during evaluations. Evaluation results may reveal a need to increase or decrease flying-hour requirements. Commanders must allocate sufficient flying hours to subordinate units to ensure their maximum combat readiness.

C-6 RESOURCE MANAGEMENT

a. Reduced training resources may be brought about by a number of different factors. Flying hours and repair parts allotted to a unit training program may be suddenly taken away because of budget constraints.

b. The commander is expected to manipulate available resources through imaginative and skillful managerial techniques. Within the given constraints, he is expected to maintain an appropriate level of combat readiness. In the reallocation of resources, allowances should be made so that experienced operators may continue to build their skills.

c. Simulation devices should be intensively used and managed to ensure that the maximum training benefit is derived from them. The use of these and other training devices is encouraged in order to reinforce individual and crew skills, reduce training costs, and maintain maximum combat readiness.

APPENDIX D
HUNTER UAR-SR TASKS

CURRENCY REQUIREMENTS

(1) EP

(a) Day (every 45 days)

1. One rolling takeoff.

2. One full stop landing.

3. Thirty minutes of local flight time encompassing touch and go and simulated emergencies.

4. Successfully pass the EP bold face action emergency procedure written exam.

(b) Night (every 90 days)

1. One rolling takeoff.

2. One full stop landing.

3. Thirty minutes of local flight time encompassing touch and go and simulated emergencies.

4. Perform runway set-up for night operations.

NOTE: EP's must perform day currency requirements prior to night flight operations to include one daytime takeoffs/landing within 5 days prior to night flight.

(2) VO/PO (every 90 days) - One local flight of 30 minutes duration including preflight, launch, traffic pattern flight, emergencies and landing (VO only).

NOTE 1: At a minimum the bold face action emergencies will be done as outlined in this ATM. Other emergencies as the IPs/SIPs directs.

NOTE 2: Tasks which maybe accomplished in the simulator maybe utilized for currency requirements. The simulator will not be utilized for two consecutive currency flights.

b. Semiannual Hour Requirements. Minimum requirements are

(1) EP — 12 hours.

(2) VO — 10 hours.

(3) PO — 10 hours.

NOTE 1: If qualified as both VO and PO, semiannual hour requirements are 5 hours VO and 5 hours PO.

NOTE 2: UTs, IPs, and SIPs may credit those hours in which they perform assigned duties toward their semiannual hour requirements.

HUNTER UAV-SR TASK LIST

		EP	VO	PO	N	S
1000	Determine total mission time and fuel consumption		X	X		X
1005	Prepare DD Form 365-4		X	X		X
1010	Conduct crew mission briefing		X	X		X
1015	Perform pre-flight mission brief		X	X		X
1020	Perform Pre-Flight inspection	X	X	X	X	X
1025	Perform Before Engine Start/UAV systems	X	X		X	X
1030	Perform UAV taxi	X	X		X	X
1035	Perform normal take-off and climb	X	X		X	X
1040	Perform UAV flight in position sticks	X	X		X	X
1045	Perform touch-and-go landing	X	X		X	
1050	Perform procedures for two-way radio failure	X	X	X		X
1055	Perform radio communication procedures	X	X	X		X
1060	Perform transfer procedures	X	X			X
1065	Perform go around	X	X			
1070	Perform normal landing	X	X		X	X
1075	Perform short field landing	X	X		X	
1080	Perform after landing tasks	X	X			X
1085	Conduct post-flight inspection					X
1090	Perform flight in knob control		X			X

1105	Describe or Perform Emergency Procedure					X
1110	Perform uncontrollable flight emergency procedures	X	X	X	X	X
1115	Perform mission control unit failure	X	X	X		X
1120	Perform takeoff abort procedures	X	X	X	X	X
1125	Perform glide emergency procedures	X	X	X	X	X
1130	Perform missed arresting cable emergency procedures	X	X	X	X	X
1135	Perform runway departure emergency procedures	X	X	X		X
1140	Perform or simulate emergency procedures for engine failure during take-off	X	X	X	X	X
1145	Perform emergency procedures for engine failure during final approach	X	X	X	X	X
1155	Perform dual engine fail recovery	X	X	X	X	X
1165	Perform Procedures and Track Static Target		X	X		X
1170	Conduct Straight, Curved, Hidden Road Search			X		X
1175	Perform Area Search		X	X		X
1180	Perform an Artillery on adjustment on a given Target		X	X		X
1185	Perform flight utilizing automatic flight mode		X	X		X
1190	Navigate by pilot and dead reckoning		X	X		
2010	Perform airborne data relay mission					
2020	Turbulence and thunderstorm operations					
2025	Desert operations					
2030	Cold weather operations					
2035	Mountain operations					
2040	Perform RATO launch procedures					
2045	Perform RATO launch abort emergency producers					
2050	Perform Single Engine go-around					
2055	Perform RATO Misfire Emergency Procedures					

TASK 1000

TASK: Determine total mission time and fuel consumption.

CONDITIONS: Given an appropriate scale map with mission route denoted, altitude, weather conditions, takeoff weight of UAV, and airspace available.

STANDARDS:

1. Determine total mission flight time within ±5 minutes.

2. Determine fuel consumption within ±10 liters.

DESCRIPTION:

1. The VO calculates flight time by totaling the distance from the launch site, to and between all targets, and back to recovery site. Use the mission planning charts found in TM 9-5895-692-10-1 to determine total mission time.

2. The VO calculates maximum amount of flight time by determining number of liters of fuel expended per hour. The VO must take into account fuel necessary for launch and recovery.

3. The VO calculates mission fuel by using mission planning charts found in TM 9-5895-692-10-2 Operator's Manual for controlling shelter.

REFERENCES:

TM 9-5895-692-10-2
Operational Procedures Checklist
Unit SOP

TASK 1005

TASK: Prepare DD Form 365-4.

CONDITIONS: Given UAV configuration, UAV weight and balance information, UAV operator's manual, a blank copy of the DD Form 365-4, and performance charts.

STANDARDS:

1. Correctly compute the takeoff gross weight and center of gravity (CG).

2. Correctly compute the landing gross weight and CG.

3. Determine if UAV takeoff or landing CG or UAV gross weight imposes limitations on the proposed flight.

4. Correctly perform crew coordination actions.

DESCRIPTION:

1. The MC/VO will compute or direct the other crew member(s) to compute the data needed to complete DD Form 365-4 according to the references listed below. The MC/VO will verify the UAV will remain within the allowable limits for the entire flight.

2. The MC and other crew member(s) will confirm and acknowledge the elements of the completed DD Form 365-4.

REFERENCES:

AR 95-3
TM 9-5895-692-10-2
Unit SOP

TASK 1010

TASK: Conduct Crew Mission Briefing.

CONDITIONS: Prior to flight of a Hunter UAV, with all crew members present, and given a Mission Briefing Form and checklist.

STANDARDS:

1. Mission Commander.

a. Without error, brief mission items detailed on Mission Brief Form.

b. Assign crew member duties, shelter duties, and responsibilities.

2. Crew Members. Orally acknowledge a correct understanding of the mission briefing.

DESCRIPTION:

1. MC. In performing this task, the MC will brief the mandatory items from the Mission Briefing Form and checklist. He briefs the crew on expected and possible unexpected events from takeoff to recovery. This covers all factors of the flight including the actions, duties, and responsibilities of each crew member.

2. Crew Members. At the end of the briefing, the crew member will orally acknowledge they understand the assigned actions, duties, and responsibilities for the entire mission.

REFERENCES:

TM 9-5895-692-10-1
Operational Procedures Checklist
Unit SOP

TASK 1015

TASK: Perform pre-flight mission brief.

CONDITIONS: Given Hunter UAV system, mission requirements, and weather report.

STANDARDS:

1. VO:

   a. Without error brief launch and recovery information and weather.

   b. Assign EP and Crew chief mission duties and responsibilities.

2. EP and Crew Chief: Orally acknowledges a correct understanding of pre-flight mission briefing.

DESCRIPTION:

1. VO in performing this task will brief at a minimum.

   a. Weather at takeoff and landing.

   b. Air vehicle configuration and fuel.

   c. Takeoff time.

   d. Recovery time.

e. Channels and frequency.

f. Return Home coordinates in relation to the runway.

g. Takeoff weight and type

h. Risk assessment.

2. Crew members. At the end of the brief the EP, back up EP (if available), and crew chief will orally acknowledge they understand assigned actions, duties, and responsibilities for entire mission.

REFERENCES:

TM 9-5895-692-10-2
Operational Procedures Checklist
Unit SOP

TASK 1020

TASK: Perform pre-flight inspection.

CONDITIONS: Given a Hunter UAV system, operator's manual, and the pre-flight checklist.

STANDARDS:

1. Without error, perform the pre-flight inspection according to the checklist.

2. Correctly enter the appropriate information on DA Forms 2408-12 and 2408-13.

3. Correctly perform crew coordination actions.

DESCRIPTION:

1. The VO will ensure that proper pre-flight checks are verified using the checklist. He will ensure the appropriate information is entered on DA Forms 2408-12 and 2408-13.

2. The crew member(s) will complete the pre-flight inspection as directed, and ensure the pre-flight of the aircraft meets the required pre-flight inspection criteria.

NIGHT CONSIDERATIONS: If time permits, accomplish the pre-flight inspection during daylight hours. During the hours of darkness, use a flashlight with an unfettered lens to supplement available lighting. Oil leaks and other defects are difficult to see using a flashlight with a colored lens.

REFERENCES:

TM 9-5895-692-10
Operational Procedures Checklist
Unit SOP

TASK 1025

TASK: Perform engine start/UAV systems check.

CONDITIONS: Given a Hunter UAV system, operator's manual, and checklist.

STANDARDS:

1. Without error, perform procedures and checks according to the checklist.

2. Ensure that engine(s) and systems are operating within prescribed tolerances.

3. Correctly perform crew coordination actions.

DESCRIPTION:

1. Crew Actions. Each crew member will complete the required checks or procedures pertaining to his crew duties according to the checklist and the preflight briefing.

2. Procedures. Crew members will position the UAV properly for run-up. They will complete the engine(s) and systems checks and ensure that the engine(s), related systems, and equipment are operating properly. The checklist will be used to verify that all checks are completed. The VO should read the checklist and insure all the checklist items are completed.

WARNING: Exercise extreme caution during limited visibility and night operations.

REFERENCES:

TM 9-5895-692-10
Operational Procedures Checklist
Unit SOP

TASK 1030

TASK: Perform UAV taxi.

CONDITIONS: Given a Hunter UAV and checklist.

STANDARDS:

1. Correctly perform procedures and checks according to the checklist.
2. Comply with taxi clearances.
3. Follow taxi lines with minimum deviation. (No more than ½ the wingspan.)
4. Properly use power to maintain a safe taxi speed.
5. Correctly use controls as required by wind conditions.
6. Maintain proper power settings when the UAV is stopped.
7. Correctly perform crew coordination actions.

DESCRIPTION:

1. Crew Actions. Each crew member will complete the required checks or procedures pertaining to his crew duties according to the checklist and the preflight briefing.

2. Procedures. The crew member will perform the following actions:

a. After verifying completion of all pre-taxi checks with the checklist, clear the immediate area and, if required, have the chocks removed. If required to initiate taxi, increase power slightly until the UAV starts to move. Maintain a safe taxi speed compatible with airfield and environmental conditions. Apply controls as required by wind conditions. Complete the required taxi checks, and verify the checks with the checklist. While taxiing the UAV, follow taxi areas. When the UAV is stopped, maintain power as required to ensure sufficient electrical output, proper engine cooling, and prevent fouling the spark plugs. Use taxi guides when operating in closely restricted areas.

b. The VO should read the checklist and assist the Flight Line Operator(s) (FLO) clear the area. He should complete all designated crew member checks and assist the crew member as required.

NIGHT CONSIDERATIONS: Due to limited visibility at night, taxi speeds should be reduced to allow a greater margin of safety. Outside guidance should be requested whenever taxiing in areas where obstacles are difficult to see.

REFERENCES:
TM 9-5895-692-10-2
Operational Procedures Checklist

TASK 1035

TASK: Perform normal takeoff and climb.

CONDITIONS: Given a Hunter UAV system, operator's manual and checklist.

STANDARDS:

1. Without error, complete before-takeoff, takeoff and after-takeoff checks.

2. During the takeoff roll, maintain a predetermined track (normally runway centerline) within 1/2 wingspan of centerline.

3. Initiate Rotation at 50 kts.

4. Perform initial climb after take-off at the appropriate airspeed ±3KT KIAS.

5. Climb as rapidly as possible until single-engine maneuvering altitude is reached.

6. Correctly perform crew coordination actions.

DESCRIPTION:

1. Crew Actions.

a. While initiating power application, the VO will monitor engine instruments carefully and be prepared for an abort procedure if aircraft performance is not satisfactory. The VO should maintain a cross check of his flight instruments. EP will rotate at the correct airspeed and establish the proper takeoff pitch attitude. All crew members will acknowledge all emergency calls.

b. The VO will assist by verifying the flight instruments' settings, monitoring engine instruments, and reading the checklist. He will make the required radio transmissions, maintain the flight log, and perform all designated actions requested.

2. Procedure. The crew members will perform the following actions:

a. Normal takeoff.

(1) Complete the before-takeoff check. Align the UAV with the runway heading. Verify the before takeoff checks with the checklist. Smoothly apply takeoff power.
During the takeoff, monitor engine instruments to ensure that they show the proper RPM indications. Maintain directional control with nosewheel steering and rudder so that the track is within ½ the wing span of runway centerline. As the UAV approaches rotation speed, increase aft pressure on the elevator to establish an attitude that will make the UAV leave the ground to attain a positive rate of climb.

(2) Adjust pitch to attain climb airspeed. At 60 kTS select Flt mode. Retract flaps at 63 knots, and adjust pitch as required. Use maximum power during climb.

(3) As cruise-climb airspeed is attained, complete the after-takeoff check and verify the checks with the checklist.

(4) Throughout the maneuver, the VO will assist the EP by monitoring the engine instruments and advising him of any abnormal condition. He will ensure that UAV and engine limitations are not exceeded. He should complete all designated checks and read the checklist.

b. Crosswind Takeoff. As the nosewheel comes off the ground, use the rudder as necessary to prevent turning (crabbing) into the wind. As main gear come off ground use allerons as necessary to maintain runway centerline. To prevent damage to the landing gear if the UAV settles back onto the runway, remain in slipping flight until the UAV is well clear of the ground. Then crab into the wind to continue a straight flight path.

NOTE : Single-engine maneuvering altitude is the altitude at which a UAV can safely clear all obstacles around the airfield while maneuvering for a landing.

CAUTION: Due to visual conditions at night the UAV may appear closer than it really is.

REFERENCES:

TM 9-5895-692-10-2
Operational Procedures Checklist
Unit SOP

TASK 1040

TASK: Perform UAV flight in position sticks.

CONDITIONS: Given a Hunter UAV system, or simulator, operator's manual, and checklist.

STANDARDS:

1. Maintain heading ± 10 degrees (unless turning).
2. Maintain airspeed ± 5 KIAS.
3. Maintain power within the prescribed limits.
4. Correctly perform crew coordination actions.

DESCRIPTION:

1. Crew Actions.
    a. The VO's main focus will be on the flight instruments.
    b. The EP will keep his area of observation cleared.
2. Procedure. The crew members will perform the following actions:

a. Climbs. Establish the climb by selecting max power and adjusting pitch attitude to obtain climb airspeed. Monitor instruments to ensure that operating limitations are not exceeded. Trim the UAV as required throughout the maneuver.

b. Descents. Establish the descent by reducing power and adjusting pitch to maintain the desired airspeed and the desired rate of descent. During the descent, control airspeed by adjusting pitch attitude. The rate of descent will depend on the amount of power reduced. Trim the UAV as required throughout the maneuver.

c. Constant Altitude Flight. Establish a constant altitude cruise ± 100 feet by adjusting power and pitch attitude to maintain airspeed ± 5 knots. Execute right and left turns 30 degree or less angle of bank. Trim UAV as required throughout maneuver. Use pilot's window to verify and cross check with instruments if necessary.

NIGHT CONSIDERATIONS: The EP may require Instrument information more frequently from the VO.

CAUTION: Due to visual conditions at night the UAV may appear closer than it really is.

REFERENCES
TM 9-5895-692-10-1
Operational Procedures Checklist
Unit SOP

TASK 1045

TASK: Perform touch-and-go landing.

CONDITIONS: Given a Hunter UAV system, checklist, suitable runway, and clearance by Air Traffic Control (ATC).

STANDARDS:

1. Maintain required altitudes ±100 feet.

2. Maintain appropriate airspeeds ±3 KIAS.

3. Maintain required ground track.

4. Complete before-landing checks no later than at the designated points during the approach.

5. Attain landing approach speed ±3 KIAS.

6. Execute touchdown on a predetermined zone 150 feet from arresting gear cable (± 100), with the desired runway track between 1/2 wingspan during loading and rollout.

7. Correctly perform crew coordination actions.

DESCRIPTION:

1. Crew Actions. Each crew member will complete the required checks or procedures pertaining to his crew duties according to the checklist. The VO will read the checklist and monitor flight and engine instruments. The EP will keep his area of observation cleared, and perform actions requested.

2. Procedures. The crew members will perform the following actions:

a. Maneuver the UAV to enter the downwind leg, at traffic pattern altitude between 400-700 AGL and at 70KTS. At mid downwind reduce power, set flaps as required, set elevator trimmer as required, adjust airspeed to 65-68 KTS and begin descent.

Maintain the desired ground track, turn base-leg when appropriate. Adjust pitch and power to maintain 63 - 65 KTS and descent angle.

b. Turn final to complete the turn at or above 100 feet AGL. When established on final approach, start reducing airspeed gradually to 60 KTS +3. The VO will verify all checklist items. As the aircraft nears the runway, coordinate pitch and power as necessary to control the rate of descent and airspeed for a smooth touchdown. Depending on the conditions, reduce power to idle and touch down on the main landing gear at 50 KTS +5 as power is smoothly reduced. After touchdown perform normal take-off and climb (TASK 1035). Maintain directional control during the landing roll with rudders/nosewheel steering.

NOTE: It is the crew member's responsibility to obtain ATC clearance for the touch-and-go landing and to advise ATC if there is a change to a full stop landing.
NIGHT CONSIDERATIONS: Use normal approach and landing techniques at night.

CAUTION: Due to visual conditions at night the UAV may appear closer than it really is.

REFERENCES:

TM 9-5895-692-10
Operational Procedures Checklist
Unit SOP

TASK 1050

TASK: Perform procedures for two-way radio failure.

CONDITIONS: Given an airborne Hunter UAV and established radio communication.

STANDARDS:

1. Implement the correct procedures for two-way radio failure.

2. Correctly perform crew coordination actions.

DESCRIPTION:

1. Crew Actions. Correcting the loss of two-way radio communication is primarily the PO's responsibility while the VO focuses his attention on flying the UAV.

2. Procedures.

a. The PO will advise the VO of the communications problem and attempt to identify and correct the malfunction.

b. If two-way radio communication cannot be established, the crew will perform the following actions:

(1) Visual Flight Rules (VFR) conditions. If two-way radio failure occurs while operating under VFR or if VMC are encountered after the failure, continue the flight under VFR. Land as soon as practical.

(2) Instrument Meteorological Conditions (IMC) conditions

(a) If two-way radio failure occurs while operating in the National Airspace System (NAS) continue the flight according to instructions in the Flight Information Handbook (FIH).

(b) If UHF two-way radio failure occurs while operating outside CONUS, comply with International Civil Aviation Organization (ICAO) rules or applicable host country regulations.

REFERENCES:

Army TM 9-5895-692-10-2
Operational Procedures Checklist
Unit SOP

TASK 1055

TASK: Perform radio communication procedures.

CONDITIONS: Given a Hunter UAV system and established radio communication.

STANDARDS:

1. Without error, adjust system radios to the proper frequencies.

2. Establish radio contract with the appropriate ATC facility.

3. When communicating with ATC facilities, use the correct radio communication procedures and phraseology according to the DOD Flight Information Publication (FLIP).

4. Acknowledge each radio communication with ATC by using the correct aircraft call sign.

5. Acknowledge and comply with ATC instructions to change frequencies.

6. Correctly perform crew coordination actions.

DESCRIPTION:

1. Crew Actions. Radio communication is primarily the VO's responsibility. However, if crew members monitor two frequencies simultaneously, they will keep each other informed of any actions or communications conducted on their respective frequency.

2. Procedures.

a. The crew will use radio communications procedures and phraseology as appropriate for the area of operations. Standard phrases and terms will be used during all transmissions.

b. The VO will adjust the system radios as required and maintain a continuous listening watch on the assigned frequencies. When required, he will establish communications with the appropriate ATC facility. He will monitor the frequency before transmitting and use the correct radio call sign when acknowledging each communication. He will transmit pilot reports, position reports, and flight plan changes (as required).

c. When advised to change frequencies, the VO will acknowledge the transmission before making the change. He will select the new frequency as soon as possible unless instructed to do so at a specific time, fix, or altitude.

NOTE: When the VO performs this task, he will coordinate according to the preflight briefing.

REFERENCES:
Army TM 9-5895-692-10-2
Operational Procedures Checklist
Unit SOP

TASK 1060

TASK: Perform transfer procedures.

CONDITIONS: Given a Hunter UAV system, operator's manual, and checklist.

STANDARDS:

1. Without error, perform procedures and checks according to TM 9-5895-696-10 or checklist TM 9-5895-692-CL.

2. Correctly determine any malfunctions and apply corrective action/troubleshooting procedures.

3. Correctly perform crew coordination actions.

DESCRIPTION:

1. Crew Actions. Controlling and receiving VOs complete the required checks or procedures pertaining to his crew duties according to the checklist, or the TM 9-5895-696-10.

2. Procedures.

a. LRS

(1) Transfer control from EP to VO IAW checklist.

(2) Perform exit from eye contact IAW checklist.

(3) Transfer control to another shelter IAW checklist.

(4) Perform UAV return to eye contact IAW checklist.

(5) Transfer control from VO to EP IAW checklist.

REFERENCES:

TM 9-5895-692-10-1
TM 9-5895-692-10-2
Operational Procedures Checklist
Unit SOP

TASK 1065

TASK: Perform Go-Around.

CONDITIONS: Given a Hunter UAV system, an operator's manual, checklist.

STANDARDS:

1. Maintain airspeed $\pm$ 3KTS.

2. Maintain heading ± 10 degrees.

3. Correctly perform crew coordination actions.

DESCRIPTION:

1. Crew Actions.

a. The VO will monitor flight and engine instruments.

b. The EP will keep his area of observation cleared, and perform necessary actions.

2. Procedures. The crew members will perform the following actions:

a. When it becomes doubtful that a safe landing can be accomplished, apply maximum power and simultaneously increase pitch attitude to stop the descent with minimum loss of altitude. (If in Emer Land flaps

retract to takeoff flaps at 53 KTS). (If in takeoff flaps retract to flight flaps at 63 KTS). Establish positive rate of climb and accelerate to 70 KTS. If in to/land select flight at 60 KTS.

b. Throughout the maneuver, the VO assists the EP by monitoring engine instruments for proper indications and ensures that aircraft and engine limitations are not exceeded. The EP will assist in setting and maintaining the appropriate power setting and advise the VO of any abnormal condition. The crew members should complete all of their designated duties and, when called for, read the checklist.

NOTE 1: If a go-around is initiated in the traffic pattern prior to the landing check, use power as required to climb to, or maintain, the desired altitude and airspeed.

CAUTION: Due to visual conditions at night, the UAV may appear closer than it appears.

REFERENCES:

TM 9-5895-692-10-2
Hunter UAV Operational Procedures Checklist

TASK 1070

TASK: Perform normal landing.

CONDITIONS: Given a Hunter UAV system, operator's manual and checklist.

STANDARDS:

1. Maintain required altitudes ±100 feet.

2. Maintain appropriate airspeeds ±3 KIAS.

3. Maintain required ground track (within ½ wingspan) of runway centerline.

4. Complete before-landing check no later than at the designated points during the approach.

5. Attain landing approach speed 60 KTS ±3 KIAS.

6. Execute touchdown on a predetermined zone 150 feet from arresting gear -100/+100 feet, with the desired runway track between ½ wing span during landing and rollout.

7. Correctly perform crew coordination actions.

DESCRIPTION:

1. Crew Actions. Each crew member will complete the required checks or procedures pertaining to his crew duties according to the checklist and the preflight briefing. The VO will also read the checklist and monitor flight and engine instruments. The EP will keep his area of observation cleared, and perform actions requested.

2. Procedures. The crew member will perform the following actions:

a. Maneuver the UAV to enter the downwind leg , At traffic pattern altitude between 400-700 AGI and at 70KTS. At mid downwind reduce power, set flaps as required, set elevator trimmer as required, adjust airspeed to 65-68 KTS and begin descent. Maintain the desired ground track, turn base-leg when appropriate. Adjust pitch and power to maintain
63 - 65 KTS and descent angle.

b. Turn final to complete the turn at or above 100 feet AGL. When established on final approach, start reducing airspeed gradually to 60 +3 KTS. The VO will verify all checklist items and call out “checks complete” when the last item is verified. As the UAV nears the runway, coordinate pitch and power as necessary to control the rate of descent and airspeed for a smooth touchdown. Depending on the conditions, reduce power to idle and touch down on the main gear at 50 KTS +5 as power is smoothly reduced. After touchdown, gently lower the nosewheel to the runway. Maintain directional control during the landing roll with rudders/nosewheel steering. Engage arresting gear.

c. During crosswind conditions, use the crab-into-the-wind method to correct for drift on all legs of the traffic pattern until short final is reached. Change the crab-into-the-wind method to a slip-into-the-wind method for round out and touchdown. During the after-landing roll, use normal rudder/nosewheel steering for directional control. Perform the after landing procedures.

d. The Crew Chief and crew will be standing by to assist in the recovery. The VO will complete all designated duties and, when called for, read the checklist. Crew members will inform each other upon completion of any designated check.

NOTE 1: Although designated points are given throughout the approach for completing the before-landing checks, the crew members may perform these procedures earlier.

NOTE 2: Normal landings are made with 30 degree flaps. However, in gusting winds or strong crosswinds, a lesser flap setting should be used.

NOTE 3: Traffic considerations, ATC requests, or aircraft-peculiar requirements may require deviation from normal traffic pattern airspeed prior to landing.

NIGHT CONSIDERATIONS: Use normal approach and landing techniques at night.

CAUTION: Due to visual conditions at night the UAV may appear closer than it really is.

REFERENCES:

TM 9-5895-692-10
Operational Procedures Checklist
Unit SOP

TASK 1075

TASK: Perform short field landing

CONDITIONS: Given a Hunter UAV system, operator's manual and checklist.

STANDARDS:

1. Maintain required altitudes ±50 feet.

2. Maintain appropriate airspeeds ±5 KIAS.

3. Maintain required ground track.

4. Complete before-landing checks no later than at the designated points during the approach.

5. Establish and maintain approach speed (V_{ref} plus ½ wind gust speed, +5 KIAS) before intercepting final approach angle.

6. Intercept and maintain a constant approach angle which will safely clear obstacles in the approach path and extend to a predetermined touchdown point.

7. Touchdown on a predetermined point 50 feet from arresting gear ± 01 to 100 feet, with the desired runway track within ½ wing span during landing and rollout.

8. Correctly perform crew coordination actions.

DESCRIPTION:

1. Crew Actions.

a. Each crew member will complete the required checks or procedures pertaining to his crew duties according to the checklist and the preflight briefing. The VO will also read the checklist and monitor flight and engine instruments.

b. The EP will keep his area of observation cleared, and perform actions requested.

2. Procedures. The crew member will perform the following actions:

a. Complete the return to eye contact check before entering the traffic pattern. Maneuver the aircraft into position to enter the downwind leg midfield at a 45 degree angle (or according to local procedures), at traffic pattern altitude, and at the proper air speed. A straight-in or base-leg entry may be used if approved by air traffic control. The crew members will complete the before-landing checks on the down wind leg prior to turning base leg (before reaching 500 feet AGL on a straight-in or an extended base leg). Verify all checklist items.

Reduce power as required to adjust airspeed and begin descent. If using a straight-line or base-leg entry, reduce power at a point that will result in a flight path comparable with that of the 180 degree approach. To maintain the desired ground track, turn base when appropriate. Extend flaps as required. Adjust pitch and power to maintain the required airspeed and descent angle. Trim the aircraft as required.

b. Turn final to complete the turn at or above 300 feet AGL. When established on final approach, start reducing airspeed gradually to arrive at V_{ref} approximately 50 feet above the landing area. The VO will verify all checklist items and call out "checks complete" upon completion. As the UAV nears the runway, coordinate pitch and power as necessary to control the rate of descent and airspeed for a smooth touchdown. Depending on conditions, reduce power to idle and touch down on main gear as power is smoothly reduced.

After touchdown, gently lower the nosewheel to the runway. Maintain directional control during the landing roll with rudders/nosewheel steering. Engage the arresting gear.

c. During crosswind conditions, use the crab-into-the-wind method to correct for the drift on all legs of the traffic pattern until short final is reached. Change the crab-into-the-wind method to a slip-into the-wind method for round out and touch down. During the after landing roll, use normal rudder/nosewheel steering for directional control and position the ailerons as required to correct for the effects of the crosswind. Perform the after landing procedure after full stop of the UAV.

d. Throughout the maneuver, the Crew Chief should assist in clearing the area and perform all actions requested by the EP. He will complete all designated crew member duties and read the checklist when called for. Crew members will inform all other crew members when any designated or required silent check is complete.

NOTE 1: The approach speed for a power approach/precision landing is 1.2 power-off stall speed in landing configuration plus ½ wind gust speed.

NOTE 2: Although designated points are given throughout the approach for completing the before landing checks, the crew members may perform these procedures earlier. If the before landing checks are completed early, the EP maintains airspeed at V_{ref} + 15 KT until he turns base leg.

NOTE 3: Traffic considerations, ATC requests, or aircraft peculiar requirements may require deviation from normal traffic pattern airspeed prior to landing.

NIGHT CONSIDERATIONS: Use normal night landing techniques.

CAUTION: Due to visual conditions at night the UAV may appear closer than it really is.

REFERENCES:

TM 9-5895-692-10
Operational Procedures Checklist
Unit SOP

TASK 1080

TASK: Perform after landing checks.

CONDITIONS: Given a Hunter UAV system, operator's manual, and checklist.

STANDARDS:

1. Without error, perform after landing checks according to the checklist.

2. Correctly perform crew coordination actions.

DESCRIPTION:

1. Crew Actions. After UAV comes to full stop on the active runway, each crew member will complete the required checks or procedures pertaining to his crew duties according to the checklist and the preflight briefing.

2. Procedure. Crew members will perform the following actions:

a. Accomplish after landing actions, as required, to include engine shutdown and UAV checks. Verify all checks with the checklist.

b. The crew chief should assist by directing the checklist steps and assisting in clearing the area.

NIGHT CONSIDERATIONS: Due to limited visibility, taxi speeds should be reduced for a greater margin of safety. Outside guidance should be requested whenever taxing in areas where obstacles are difficult to see.

REFERENCES

TM 9-5895-692-10
Operational Procedures Checklist
DA Pamphlet 738-751
Unit SOP

TASK 1085

TASK: Conduct post flight inspection.

CONDITIONS: Given a Hunter UAV system, operator's manual, and checklist.

STANDARDS:

1. Without error, perform the procedures and checks according to TM 9-5895-692-10-1 or the checklist.

2. Correctly determine any malfunctions or discrepancies, and apply corrective actions/troubleshooting procedures.

3. Correctly perform crew coordination actions.

DESCRIPTION: Each crew member will complete the required checks pertaining to his crew duties. The crew chief will ensure that the post flight inspection is completed according to the checklist.

REFERENCES

TM 9-5895-692-10
Operational Procedures Checklist

TASK 1090

TASK: Perform flight in knob control.

CONDITIONS: Given a Hunter UAV system, or simulator, operator's manual, and checklist.

STANDARDS:

1. Change heading commands to meet mission waypoints.

2. Adjust for winds.

3. Adjust airspeed commands to meet time over target requirements (± 2 min) while staying within operating parameters.

4. Adjust altitude commands to meet waypoint requirements.

5. Correctly perform crew coordination actions.

DESCRIPTION:

1. Crew Actions. The VO's focus will be on the flight instruments; ensuring that the UAV is responding appropriately. The VO will also coordinate with the PO, who cross checks time on target calculations for airspeed.

2. Procedures.

a. Determine Heading: From the correct UAV location, use the Air Vehicle Location Display (AVLD) or appropriate map and determine the correct magnetic heading to the next waypoint or target with corrections for wind.

b. Determine Airspeed: From the current UAV position, determine distance to the next waypoint or target. Calculate the proper airspeed to reach the waypoint/target within the specified time and operational parameters. Initiate new airspeed command on the airspeed knob on the flight control module. Monitor pitch indication and airspeed for proper response.

c. Determine Altitude: Set the altitude command, with the altitude knob on the flight control module, for the correct altitude for the next waypoint/target. Monitor throttles/RPM and engine instruments as well as altitude and rate of climb indicators for proper response.

d. Course Corrections: If the next target is too close to fit within time on target specifications, adjust heading to delay arrival on the waypoint/target.

REFERENCES

TM 9-5895-692-10-1
Operational Procedures Checklist
Unit SOP

TASK 1105

TASK: Describe or perform emergency procedure.

CONDITIONS: Given a Hunter UAV system, simulator, or in a classroom, a specific emergency, operator's manual, and checklist.

STANDARDS:

1. Without error, perform, simulate the performance, or describe the appropriate emergency procedure according to the operator's manual, checklist, and the FIH.

2. Correctly perform or state the appropriate crew coordination actions.

DESCRIPTION:

Crew Actions. The crew members will perform all emergency procedures described in the operator's manual or checklist. They will also state the actions required in performing those emergency procedures that cannot be practiced or simulated. The discussion will include procedures outlined in the operator's manual, the FIH, and the applicable crew coordination actions.

REFERENCES:

TM 9-5895-692-10
Operational Procedures Checklist
Unit SOP

TASK 1110

TASK: Perform uncontrollable flight emergency procedures.

CONDITIONS: Given a Hunter UAV system, operator's manual, checklist, and one of the following situations:

(1) Down range from the controlling shelter.

(2) In the local pattern.

(3) In a classroom environment.

(4) Simulator.

STANDARDS:

1. Perform, from memory, without error, bold face action.

2. Perform IAW the checklist.

DESCRIPTION:

1. Crew Actions. The crew members, upon detecting an unusual attitude, will immediately initiate a recovery to straight and level flight by performing the appropriate actions described below.

2. Procedures. Perform procedures IAW checklist.

NOTE: Winds, updrafts, and turbulence may cause the indications of this emergency to occur.

NIGHT CONSIDERATIONS: VO should give special attention to the flight instruments.

REFERENCES:

TM 9-5895-692-10
Operational Procedures Checklist
Unit SOP

TASK 1115

TASK: Perform mission control unit (MCU) failure

CONDITIONS: Given a Hunter UAV system, operator's manual, and checklist.

STANDARDS:

1. Perform, from memory, without error, bold face action.

2. Perform remaining action steps IAW checklist.

DESCRIPTION:

1. Crew Actions.

a. With MCU failure - LRS - TO/Land mode, the VO will coordinate with the EP to complete the procedure.

b. With MCU failure - LRS - Flight mode, the VO will coordinate with the EP to complete the procedure.

c. With MCU failure - GCS, the VO will coordinate with the PO and EP if applicable to complete the procedure.

2. Procedures. Perform procedures IAW checklist.

REFERENCES:

TM 9-5895-692-10
Operational Procedures Checklist
Unit SOP

TASK 1120

TASK: Perform a takeoff abort.

CONDITIONS: Given a Hunter UAV system, operator's manual, and checklist.

STANDARDS:

1. Perform from memory, without error, bold face action.

2. Correctly perform crew coordination actions.

DESCRIPTION:

1. Crew Actions.

a. Controlling VO completes the required checks and procedures pertaining to his crew duties IAW the checklist.

b. The EP immediately initiate boldface actions.

c. Refer to operator checklist for remaining actions.

2. Procedures. Perform procedures IAW checklist.

CAUTION: Due to visual conditions at night the UAV may appear closer than it really is.

REFERENCES:

TM 9-5895-692-10-2
Operational Procedures Checklist
Unit SOP

TASK 1125

TASK: Perform glide emergency procedures.

CONDITIONS: Given a Hunter UAV system, operator's manual, and checklist.

STANDARDS:

1. Perform from memory, without error, bold face action.

2. Correctly perform crew coordination actions.

DESCRIPTION:

1. Crew Actions.

a. Controlling VO immediately initiate boldface actions.

b. The VO and EP refer to operator checklist for remaining actions.

c. EP set sticks safe for flight as appropriate.

2. Procedures. Perform procedures IAW checklist.

CAUTION: Due to visual conditions at night the UAV may appear closer than it really is.

REFERENCES:

TM 9-5895-692-10-2
Operational Procedures Checklist
Unit SOP

TASK 1130

TASK: Perform missed arresting cable emergency procedures.

CONDITIONS: Given a Hunter UAV system, operator's manual, and checklist.

STANDARDS:

1. Perform from memory, without error, bold face action.
2. Correctly perform crew coordination actions.

DESCRIPTION:

1. Crew Actions.
    a. The VO's main focus will be on the flight instruments.
    b. The EP performs the immediate action steps of the checklist.
2. Procedures. Perform procedures IAW checklist.

CAUTION: Due to visual conditions at night the UAV may appear than it really is.

REFERENCES:

TM 9-5895-692-10
Operational Procedures Checklist
Unit SOP

TASK 1135

TASK: Perform runway departure emergency procedures.

CONDITIONS: Given a Hunter UAV system, operator's manual, and checklist.

STANDARDS:

1. Perform from memory, without error, immediate action.
2. Correctly perform crew coordination actions.

DESCRIPTION:

1. Crew Actions.
    a. The VO's main focus will be on the flight instruments.
    b. The EP performs the immediate action steps of the checklist.
2. Procedures. Perform procedures IAW checklist.

REFERENCES:

TM 9-5895-692-10-2
Operational Procedures Checklist
Unit SOP

TASK 1140

TASK: Perform or simulate emergency procedures for single engine failure during takeoff.

CONDITIONS: Given a Hunter UAV system, operator's manual, and checklist.

STANDARDS:

1. Perform, from memory, without error, bold face action.
2. Maintain heading ± 10 degrees.
3. Obtain and maintain 60 KIAS ±3 KT KIAS.
4. Complete and verify procedures IAW checklist.
5. Correctly perform crew coordination actions.

DESCRIPTION:

1. Crew Actions. In the event of engine failure the crew member will initiate procedures outlined in the checklist. The VO will complete the required checks and procedures IAW the checklist.

2. Procedures. The EP will perform the following actions:

a. If instruments indicate the engine has failed and the UAV has not accelerated to 50 KTS , immediately retard throttles to idle and deploy the arresting hook. Stop the UAV with the arresting gear, if possible. If the UAV is airborne when engine failure occurs and sufficient runway remains for a landing and stop, ensure the arresting hook is deployed, retard throttles, and land.

NOTE: Because determining the distance required to land and stop a UAV immediately after liftoff is difficult, the decision to land should be based on computed performance, the environmental conditions, airspeed, and height above the runway.

b. If engine failure occurs without sufficient runway to land and stop the UAV safely, maintain directional control with rudder and establish a safe climb angle while maintaining 60 KIAS.

If airspeed is below 60, maintain current airspeed until sufficient altitude is obtained to trade off altitude for airspeed to assist in accelerating to 60. Complete the immediate action procedures IAW the checklist for engine failure. If takeoff was made with the flaps extended, ensure that airspeed is above flaps-up stall speed before retracting flaps. Climb to single engine maneuvering speed at 60. Use flaps as required.

NOTE: When operating at high pressure altitude or heavy gross weight, trading off altitude for airspeed while accelerating to 60 may become necessary. For this reason, the decision to go around on a single engine must be made as early as possible. When operating at high density altitude or heavy gross weight, single engine flight may not be possible.

CAUTION: Due to visual conditions at night the UAV may appear closer than it really is.

REFERENCES:

TM 9-5895-692-10
Operational Procedures Checklist
Unit SOP

TASK 1145

TASK: Perform emergency procedures for engine failure during final approach.

CONDITIONS: Given a Hunter UAV system, operator's manual, and checklist.

STANDARDS:

1. Perform from memory, without error, bold face action.

2. Complete and verify the procedures with the checklist.

3. Maintain heading ± 5 degrees (unless in a turn).

4. Maintain airspeed (60 + 3 KTs)

DESCRIPTION:

1. Crew Actions. The VO will complete the required checks or procedures. He will also read the checklist and perform all designated VO actions, such as monitoring flight and engine instruments, and those actions requested by the EP.

2. Procedures. Crew members will perform the following actions:

a. Continue the approach to landing, maintaining UAV control at approach speed. The distance to the runway from the point where the engine fails will determine the extent of corrective procedures. Immediately apply sufficient power to prevent altitude from decaying while maintaining airspeed. If conditions require, perform procedures for single engine landing.

b. The VO should assist by monitoring engine instruments, advising of any abnormal indications, and performing actions requested by the EP.

NOTE: Final approach is a position from final turn where a landing is assured and when time does not permit a complete engine failure procedure. Maintaining control of the UAV is the prime consideration when engine failure occurs in this area.

CAUTION: Due to visual conditions at night the UAV may appear closer than it really is.

REFERENCES:

TM 9-5895-692-10
Operational Procedures Checklist
Unit SOP

TASK 1155

TASK: Perform dual-engine failure recovery.

CONDITIONS: Given a Hunter UAV system, operator's manual , and checklist.

STANDARDS:

1. Perform, from memory, without error, bold face action.

2. Maintain airspeeds ±3 KIAS.

3. Maintain heading ±10 degrees.

4. Calculate glide path and distance ±1 KM.

5. Complete before-landing and landing checks no later than designated points during the approach.

6. Without error, perform the appropriate procedures from memory according to the checklist.

7. Maintain approach speed (65 wind gust speed) ±3 KIAS.

8. Execute touchdown at predetermined touchdown point -0/+200 feet and roll out on the desired runway track between ½ the wing span.

9. Identify safe parachute deployment locations.

10. Correctly perform crew coordination actions.

DESCRIPTION:

1. Crew Actions. Complete boldface procedures for dual engine failure. Refer to operators checklist for remaining actions.

2. Procedures. The crew members will perform the following actions:

a. Fly a normal traffic pattern or as required. Plan for a normal approach, allowing for sufficient straight-away on final so minor alignment, speed, and altitude corrections can be made without excessive low-altitude maneuvering. Extend flaps as required for landing, complete the landing check and procall out items as they are performed. The VO will verify the items with the checklist.

b. Reduce airspeed to attain 60 + 3 KIAS. Avoid abrupt changes in pitch. Make a normal touchdown.

NOTE 1: In the event of abnormal conditions during an actual/simulated emergency, the crew members may deviate from the normal procedures to maneuver the UAV within its performance capabilities.
CAUTION: Due to visual conditions at night the UAV may appear closer than it really is.

REFERENCES:

TM 9-5895-692-10
Operational Procedures Checklist
Unit SOP

TASK 1165

TASK: Perform procedures to locate a target manually and automatically using Point to Coordinate, and track a static target by performing a 360 degree orbit above or to the side of the target.

CONDITIONS: Given a Hunter UAV system or simulator, appropriate maps, an operator's manual and a checklist.

STANDARDS:

1. Maintain orientation within a two kilometer radius.

2. Arrive over the target +/- one minute.

3. Correctly perform crew coordination actions.

4. VO will maintain the UAV in a 40-60 degree depression angle and a 80-100 degree bearing off the nose of the air vehicle.

5. PO will maintain crosshairs centered on the target for a period of five consecutive minutes and coordinate with the VO to maintain the correct depression and bearing angles.

DESCRIPTION:

1. Crew Actions: The VO's main focus will be on the flight instruments to ensure the UAV is responding appropriately to airspeed and heading inputs required to arrive over the target with the time constraints and maintain the proper obit position to maintain the depression and bearing parameters. The PO's main focus will be to coordinate with the VO on flight parameters to arrive over the target within the time constraints and maintain the proper orbit position, and to identify and maintain the crosshairs on the target.

2. Procedures: The crewmembers will perform the following actions:

a. Determine Heading to Target: The PO will determine, from the current location using the Air Vehicle Location Display (AVLD), UAV present position coordinates and/or appropriate maps, the correct magnetic heading to the target and will coordinate the new heading with the VO. The VO will initiate the turn to the desired heading and monitor the flight instruments to ensure rollout occurs on the desired heading.

b. Determine Airspeed to Target: The PO determines the distance from the UAV to the target and calculates the airspeed required to arrive at the target within the specified Time Over Target (TOT). The VO will confirm the airspeed required, adjust the airspeed control and monitor the flight instruments for correct response to the speed adjustment.

c. Identify Target: The PO will brief the VO on the target description and general location. The PO will begin to use the camera to locate the general area of the target by identifying terrain and/or cultural features leading into the target area as well as the camera pointing indicators. The PO will begin to narrow the Field Of View (FOV) of the camera and identify the target through the relationship of the identified features in the target area an the camera indicators. The VO will assist the PO in the target identification process when not monitoring the flight instruments.

d. Establish Orbit Manually: When the target has been identified, the VO will center the heading indicator on the camera bearing indicator. The VO will initiate a turn to a heading 25-35 degrees from the inbound heading when the depression angle reaches 30-40 degrees. When the bearing indicators reaches 90 degrees from the heading indicator, the depression angle should be 55-65 degrees. The VO will then initiate a 10-20 degree angle of bank turn to orbit above the target. The VO will maintain a depression angle of 40-60 degrees by controlling the bank angle of the UAV. The PO will maintain the crosshairs on the target and coordinate with the VO on depression and bearing indicators changes that will require an adjustment to the UAV position to maintain the required orbit parameters. The VO may also use the "Monitor/AV and Camera

Footprint" menu to create a UAV trace to assist in maintaining the UAV position on the orbit once a good orbit has been accomplished.

e. Establish Orbit Using Point To Coordinate: After coordinating the initial heading and airspeed to the target area with the VO, the PO will open the "Utilities/Point to Coordinate" menu and have the VO key in the coordinates of the target. The PO will then verify the coordinates are correct, select "Accept Text Data" and "Send" the data to the UAV. The PO will then enter the Point mode by depressing the "Point" button on the Camera Steering Module. The PO will verify the bearing indicator turns toward the target area. The VO will center the heading indicator on the bearing indicator and monitor the flight instruments and the depression angle. The PO will then, using the Point to Coordinate "T" and the distance arrow on the video graphics, locate and identify the target. The VO will then use the manual procedures to establish the UAV in an orbit above the target.

f. Establish Orbit Using Destination Mode: After coordinating the initial heading and airspeed to the target area with the VO, the PO will open the "Utilities/ Go To Destination" menu and have the VO key in the coordinates of the target. The PO will then verify the coordinates are correct, select "Accept Text Data" and "Send" the data to the UAV. The VO will then enter the Destination mode by depressing the "Dest" button on the Flight Control Module. The VO will verify the UAV is flying to the target coordinates. As the UAV flies over the target coordinates, the VO will verify it enters the Destination Hold mode above the target. The PO will identify the target by steering the camera to a depression of 50 degrees and a bearing of 90 degrees left of the nose of the UAV.

NOTE: Target identification and orbit establishment can be enhanced by performing in both the camera Point mode and the UAV Destination mode.

g. Orbiting to the Side of a Target: Mission requirements may dictate that the UAV orbit to the side of the target. The PO will determine the center point of the orbit by measuring 3.5 km on the required bearing from the target. The PO will then use the camera on the center
point, after the target has been identified, to assist the VO in establishing the orbit using the manual procedures. This maneuver will provide the optimum depression angle (60 degrees) when near the target and a degraded depression when at the furthest point on the orbit.

(1) Manual Figure "8": The PO determines the center point of the Figure "8" by measuring 3.5-4.0 km from the restricted boundary on the desired bearing from the target. The PO will calculate the straight leg by taking the bearing of a line passing through the center point and parallel to the boundary and establishing the initial inbound heading 30 degrees to the target side of the line passing through the center point. The VO will fly the figure by following the leg toward the restricted boundary and turning away from the boundary to ensure the boundary is not violated. With the camera bearing tracking the target, when the bearing reaches a point approximately 90 degrees off the nose, the VO will begin a turn away from the boundary using 10-20 degrees of bank. The VO will then roll out on the required heading to complete the Figure "8". The VO may also use the UAV trace to assist in maintaining the UAV position.

(2) Manual Racetrack: The PO determines the heading to parallel the target boundary at a distance of 1.5-2.0 km from the boundary. The VO will fly the heading and, with the bearing indicator tracking the target, will initiate a 10-20 degree bank angle turn away from the target when the bearing angle reaches approximately 120 degrees off the nose of the UAV. The VO will roll out of the turn on the reciprocal heading of the base leg of the racetrack. The VO will continue on this heading until the bearing indicator is once again at approximately 120 degrees off the nose of the UAV. A turn back toward the target will be initiated, to the base leg heading, using 10-20 degrees of bank. The VO may also use the UAV trace to assist in maintaining the UAV position.

REFERENCES:

TM 9-5895-692-10-2
Operational Procedures Checklist
Unit SOP

TASK 1170

TASK: Conduct a straight, curved and/or hidden road search, and track any fast or slow moving targets encountered.

CONDITIONS: Given a Hunter UAV system or simulator, appropriate maps, an operator's manual and a checklist.

STANDARDS:

1. Straight Road Search - Search the road only when the depression angle is 45 degrees or lower. Keep the road centered with the video crosshairs and scan the road at a slow, steady rate (approximately 30 - 40 miles per hour). When the depression angle climbs above 45 degrees, stop the scan, hold the position on the road and wait for the VO to maneuver the UAV closer to the road until the depression angle is again below 45 degrees. Stop the scan when a target (either stationary or moving) appears and track the target.

2. Curved/Hidden Road Search - Search the road only when the depression angle is 45 degrees or lower and only when there is a clear, unobstructed view of the road. Keep the road centered with the video crosshairs and scan the road at a slow, steady rate (approximately 30 - 40 miles per hour). If an obstacle obscures the road or the depression angle climbs above 45 degrees, stop the scan, hold the position on the road and wait for the VO to maneuver the UAV to provide a clear unobstructed line of sight of the road and/or the depression angle is again below 45 degrees.

3. Track a stationary target using the same criteria as in the task for locating and tracking a stationary target.

4. Track a slow/fast moving target by maintaining the target centered with the video crosshairs and maintaining a depression angle of no higher than 40 degrees.

DESCRIPTION:

1. Crew Actions: The VO's main focus will be on maintaining datalink with the Ground Data Terminal and monitoring the flight and engine instruments. The VO's second consideration will be to maintain the UAV in

the optimum range of depression angle and bearing from the target to acquire video of the target. The PO's main focus will be to maintain the video crosshairs on the target to provide the VO with a steady, accurate depression angle and bearing to maneuver the UAV around. The PO will also coordinate closely with the VO to maintain the optimum depression angle or bearing drifting away from the desired limits. The PO will also keep the VO informed of any obstructions encountered so the VO can maneuver the UAV to maintain a clear line of sight to the road.

2. Procedures: The crew will perform the following actions:

a. The PO will verify the start point, the direction of the road search, the type of maneuver required to perform the search and coordinate this information with the VO. The PO will verify a low rate of camera movement and a narrow field of view have been selected to

facilitate obtaining satisfactory video of the road and the immediate area. When the VO maneuvers the UAV into a position with the required depression angle of 45 degrees or lower, the PO will begin the road scan. The PO will maintain the video crosshairs centered on the road and perform the road scan until such time as a target is encountered or the UAV no longer is in position to maintain a 45 degree depression angle or lower. At this time, the PO will stop the scan and hold the position on the road until the VO again maneuvers the UAV into a position where the depression angle is 45 degrees or lower. The PO will then resume the road scan. The VO and PO will coordinate any trends in the depression angle, bearing, obstructions or maneuvers that will affect the collection of video.

b. On a straight road search, the VO will maintain a moving racetrack parallel to the road. The VO will maintain the base leg closest to the road and in the direction of the road search at a distance 1.5-2.0 km. (approximately 60 degree depression angle). When the depression angle becomes 45 degrees or higher, the VO will begin a 10-20 degree bank turn away from the road to a reciprocal heading from the base leg heading. When the bearing to the PO's stop point is approximately 120 degrees off the nose of the UAV, the VO will start a turn back to the base leg heading that parallels the road using 10-20 degrees of bank. When the depression once again reaches 45 degrees or lower, the PO will reinitiate the road scan.

c. When a static target is encountered, the PO will maintain the video crosshairs on the target to provide the VO an accurate and stable depression angle and bearing by which to maneuver the UAV around the target. The VO, in coordination with the PO, will establish a UAV maneuver pattern to maintain the target below the desired depression angle of 40 degrees.

d. When a slow/fast moving target is encountered, the PO will maintain the video crosshairs on the target as the target moves along the road. The VO will maintain the UAV in a position to maintain a depression angle of 40 degrees or lower. When the depression angle rises above 40 degrees, the VO will perform the racetrack maneuver being aware that the reciprocal heading leg will be much shorter since the target will be moving away from the UAV. At a bearing of approximately 120 degrees off the nose of the UAV, the VO will begin the turn back the base leg heading paralleling the road.

e. For a curved/hidden road search, the VO and PO must coordinate on which side of the road is best for observation, where obstructions might occur and what maneuvers to perform in the event that obstructions are encountered. The VO may have to maneuver the UAV from one side to the other or fly down the center of the road to avoid obstructions to the road search and maintain a depression of 45 degrees or lower.

REFERENCES:

TM 9-5895-692-10-2
Operational Procedures Checklist
Unit SOP

TASK 1175

TASK: Perform an autonomous area search and/or a manual area search using the camera control stick or the Point to Coordinate mode.

CONDITIONS: Given a Hunter UAV system or simulator, appropriate maps, an operator's manual and a checklist.

STANDARDS:

1. Autonomous (Program Mode) Area Search:

a. The PO will create a mission plan to search a given area and view each area segment of 200-250 meters for at least 15 seconds with a 45-60 degree depression angle.

b. The VO will load the plan to the UAV and fly the mission using the Program Mode.

c. The PO will verify the AVCR recorder is operating normally and will monitor the mission plan execution.

2. Point Mode and Stick Mode Area Search:

a. The PO will create a mission plan to search a given area and view each area segment of 200-250 meters for at least 15 seconds with a 45-60 degree depression angle.

b. The VO will follow the MMP pattern the PO has created as if it were a road search. The VO will maintain a 45-60 degree depression angle for each point searched.

c. The PO will search the area using the appropriate controls and relevant indications to cover the area with 100% accuracy. The PO will use the mouse to mark or accept text functions of the Utilities/Point to Coordinate menu for the Point Mode and/or the MMP Control Stick for the Stick mode.

DESCRIPTION:

1. Autonomous (Program Mode) Area Search:

a. Preplan a mission plan to include flight parameters, camera action point parameters and operations, and AVCR operations for each way point of the flight plan.

b. The mission plan waypoints will be calculated to provide the camera at least a 15 second observation time of the designated camera point at an airspeed of 65 knots. The distance between camera points will not exceed 200-250 meters. The distance between waypoints will not be less than 500 meters. The distance between the UAV leg and the MMP leg will be approximately 1,000 meters at 5,000 feet AGL.

c. The VO will select the Program Mode after the PO sets the Zoom/FOV function to the Medium position. The VO/PO will then load the mission plan to the UAV and verify the AVCR is set to Record mode. The VO and PO will monitor the plan execution.

2. Point Mode Area Search:

a. Prepare a mission plan on the AVLD using the DTED map or no map outlining the area to be searched. Do not load this plan to the UAV. Load it only to the AVLD. Zoom in on the AVLD mission plan area until is measures at least 5x5 cm.

b. The PO will Zoom the MMP sensor in and load the Utility/Accumulated Footprint menu function to the AVLD. Do not Zoom Out beyond the midway point with the MMP sensor while the Footprint function is active.

c. The PO will use the Mouse to Mark function of the Point Mode to mark one of the corners of the planed area and depress; the Point mode button. The PO will observe the video while changing the Zoom/FOV from Narrow to Medium and back to Narrow. The PO will then move to a new point by the last one viewed and use mouse to mark to again move the video crosshairs and observe the new area. Repeat this procedure until the area is covered with the video footprint.

d. The VO will follow the MMP pattern the PO has created as if it were a road search. The VO will maintain a 45-60 degree depression angle for each point searched using the Mouse to Mark function.

3. Stick Mode Area Search:

a. Search an area measuring approximately 1x1 km:

(1) The VO/PO will first plot the area on the appropriate map to check the area and size and then crate a mission plan on the AVLD outlining the area to be searched. Zoom in as far as possible using the Paper Map.

(2) The VO will establish a Hold mode above the center point of the area to be searched and maintain a 45-60 degree depression angle.

(3) The PO will scan the area in a preplanned pattern to cover the entire area. The Utility/Accumulated Footprint function may be used to facilitate complete and accurate coverage of the area to be searched. The PO will use Low rate and Zoom in and out to observe the area to be searched.

b. Search an area measuring larger than 1x1 km:

(1) The VO/PO will first plot the area on the appropriate map to check the area and size and then create a mission plan on the AVLD outlining the area to be searched. Zoom In as far as possible using the paper map.

(2) The VO will follow the MMP pattern the PO has created as if it were a road search. The VO will maintain a 45-60 degree depression angle for each point searched.

(3) The PO will scan the area in a preplanned pattern to cover the entire area. The Utility/Accumulated Footprint function may be used to facilitate complete and accurate coverage of the area to be searched. The PO will use Low rate and Zoom In and Out to observe the area to be searched.
REFERENCES:

TM 9-5895-692-10-2
Operational Procedures Checklist
Unit SOP

TASK 1180

TASK: Perform an Artillery Adjustment on a given target.

CONDITIONS: Given a Hunter UAV system or simulator, appropriate maps, an operator's manual and a checklist.

STANDARDS:

1. The PO will positively identify the target and perform the Artillery Adjustment checklist following the instruction step by step.

2. Upon positive identification of the target, the VO will orbit above or to one side of the target in order to provide a 40-60 degree depression angle to the target.

3. The VO and PO will coordinate who will freeze the video and perform the Artillery Adjustment function to be radioed to the artillery unit (suggest the VO perform the video freeze and adjustment functions to free the PO to maintain the crosshairs on the target at all time).

DESCRIPTION:

1. Crew Actions: The VO's main focus will be on the flight and datalink instruments to ensure the UAV is responding to all inputs correctly and is maintaining continuous link with the Ground Data Terminal. The PO's main focus will be to locate and identify the target. The focus of the VO and PO will then be to coordinate and follow the checklist to accomplish an artillery adjustment on the target.

2. PO Actions: The PO will coordinate the checklist with the VO to ensure all item are accomplished in order. The PO will maintain the video crosshairs on the target, especially prior to the video being frozen, for the Artillery Adjustment function to be performed and during the period the VO's video is frozen.

3. VO Actions: The VO will maintain an orbit above or to the side of the target. The VO will attain a 45-60 degree depression prior to freezing the video. Upon freezing the video, the VO will perform the Artillery Adjustment procedure and provide the data to the firing artillery unit.

REFERENCES:

TM 9-5895-692-10-2
Operational Procedures Checklist
Unit SOP

TASK 1185

TASK: Perform flight utilizing automatic flight modes.

CONDITIONS: Given a Hunter UAV system, or simulator, operator's manual, and checklist.

STANDARDS:

1. Without error load a destination point to the UAV.
2. Without error load a program to the UAV.
3. Without error engage the correct flight mode.
4. Without error verify UAV enters the selected flight mode.
5. Without error verify airspeed, heading and altitude are set to programmed settings.
6. Correctly perform crew coordination actions.

DESCRIPTION:

1. Crew Actions.

a. The VO will announce all flight mode changes. He will verify the UAV enters the selected flight mode by monitoring the flight mode CMD/RPT push button on the flight control module, heading, airspeed and altitude indicators.

b. The PO will verify the UAV payload enters the VO's selected flight mode by monitoring the program CMD/RPT push-button on the camera steering module of the PO workstation.

2. Procedures.

a. Destination. The VO enters the destination coordinates into the system using the AVLD or the mission control unit (MCU). Once entered into the system send coordinates to the UAV. Send the UAV to the destination by pressing the destination button on the flight control module of the VO workstation. CMD/RPT

lights on the destination push-button are monitored to ensure the UAV performance is in accordance with destination flight parameters.
Monitor UAV heading to ensure correct UAV response. Set UAV airspeed and altitude knob control setting in accordance with Task #2000 (perform flight in knob control).

b. Hold. Engage hold mode by depressing the destination push button two (2) times. The destination push-button is monitored to ensure CMD/RPT lights on the button perform in accordance with hold mode parameters. Monitor UAV heading to ensure UAV response is normal for hold mode. Set UAV airspeed and altitude using knob control in accordance with Task # 2000 (perform flight in knob control) and mission briefing.

c. Program. The VO sends a validated program to the UAV using the AVLD or Computer Console Assembly (CCA). Verify the mission is loaded by confirming the "No Mission Plan Loaded" warning is extinguished and the scan enable lighted push-button blinks or "Load OK" message is displayed on the AVLD when mission is loaded from the AVLD. Select "continue after loss of link" and/or "continue after loss of GPS" as required by mission profile. Engage program mode by depressing the PGRM lighted push-button on the flight control module of the VO workstation. Verify UAV airspeed, heading and altitude correspond to program setting for designated waypoint.

REFERENCES:

TM 9-5895-692-10-1
Hunter Operational Procedures Checklist

TASK 1190

TASK: Navigate by pilotage and dead reckoning.

CONDITIONS: Given a Hunter UAV system, appropriate maps, and last known UAV range and azimuth.

STANDARDS:

1. Maintain orientation within ±2,000 meters.

2. Arrive over recovery point ±15 minutes of ETA.

3. Correctly perform crew coordination actions.

DESCRIPTION:

1. Crew Actions. The Air Vehicle Operator's main focus will be on the heading of the aircraft and azimuth of the ground data terminal. The Air Vehicle Operator will monitor flight and engine instruments.

2. Procedures. The crew member will perform the following actions:

a. After obtaining current weather forecasts, plan the flight by marking the route. The other crew members should assist with all planning and computations if available. Compute the time, distance, and heading for each leg of the flight route.

b. During the flight, use ground data terminal azimuth and dead reckoning to maintain UAV position. Adjust estimated times of arrival for subsequent legs of the route using the latest in-flight computed data. The crew member should provide the crew member with heading corrections using the MOSP as necessary to maintain the desired course (ground track).

NIGHT CONSIDERATIONS: Periods of darkness or reduced visibility require more detailed flight planning.

REFERENCES:

TM 9-5895-692-10-2
Operational Procedures Checklist
Unit SOP

TASK 2010

TASK: Perform airborne data relay mission.

CONDITIONS: Given a Hunter UAV system or simulator, operator's manual, and checklist.

STANDARDS:

1. Correctly perform the relay mission.

2. Ensure that the geometry of the air vehicles will support good relay operations.

3. Correctly perform crew coordination actions.

DESCRIPTION:

1. Crew Actions. The crew will identify the mission requirements and coordinate mission planning to ensure accomplishment of the relay mission. The crew should know and understand the factors requiring the mission to be aborted or altered.

2. Procedures.

a. Mission Brief

(1) Determine relay orbit area coordinates.

(2) Consider weather en route and at the mission area.

(3) Note or record the required frequencies/channels.

(4) Note or record the available threat data.

(5) Determine safe areas in the event a threat requires deviation from mission profile.

(6) Note or record the IFF mode and the code for the mission.

b. Preflight. The crew will establish active relay on ground prior to launch.

c. During flight. The VO will perform the following actions:

(1) Fly the aircraft to the entry point of the relay program, and report to the appropriate facility (GCS or LRS).

(2) Adjust airspeed and altitude to the desired relay configuration.

(3) Establish relay with the mission UAV and conduct the mission.

(4) Monitor both aircraft instruments and respond appropriately to problems.

NOTE 1: If a threat causes deviation from the planned mission, the Mission Commander should make every effort to continue the mission when the threat has passed.

NOTE 2: "Other UAV Fail/Mal" are unique warnings to relay operations. Follow the specific guidelines in the checklist for proper procedures.

REFERENCES:

TM 9-5895-692-10-1
Checklist

TASK 2020

TASK: Discuss turbulence and thunderstorm operations.

CONDITIONS: Given a Hunter UAV system, or in a classroom environment.

STANDARDS:

1. Correctly perform or describe the appropriate procedures according to the listed references.

2. Correctly perform crew coordination actions.

DESCRIPTION:

1. Crew Actions. When turbulence or thunderstorms are forecast for the route of flight, the Mission Commander will ensure that the crew members are familiar with the procedures for flying in turbulence and thunderstorms.

2. Procedures. If turbulence is encountered, the crew member will immediately establish the appropriate airspeed as described in the aircraft operator's manual. The Mission Commander should direct the VO to request a change of route or altitude from ATC that will provide smoother air, if that option is available.

NOTE 1: Inclusion of this task in the ATM is not intended to imply that the crew member should operate in turbulence and thunderstorms. Avoidance is the best procedure.

NOTE 2: Lightning within 5 nautical miles of the Launch and Recovery Site may preclude flight operations.

REFERENCES:

TM 9-5895-692-10-2
FM 1-202, Environmental Flight
Checklist
Unit SOP

TASK 2025

TASK: Perform desert and hot weather operation.

CONDITIONS: Given a Hunter UAV system, or in a classroom environment.

STANDARDS:

1. Correctly perform or describe the appropriate procedures according to the listed references.

2. Correctly perform crew coordination actions.

DESCRIPTION:

1. Crew Actions.

a. The Crew Chief will direct the crew to complete the designated elements of preflight preparations.

b. FLOs will complete the assigned elements and report the results to the Air Vehicle Operator.

2. Procedures. The crew member will perform the following actions:

a. Before starting engine(s). Check the landing gear struts are free of sand and grit and that the aircraft interior is free of sand and dust.

b. Starting engine(s). Use normal starting procedure. Be aware a higher-than-normal cylinder head temperature (CHT) may occur, and be prepared to abort the start before temperature limitations are exceeded.

c. Warm-up and ground operation. Use normal procedures for warm-up and ground operations.

d. Taxiing. When practical, avoid taxiing over sandy terrain to minimize propeller erosion and engine deterioration.

e. Takeoff. Use normal takeoff procedures.

NOTE: Takeoff should not be attempted during sandstorm or dust storm.

f. During flight. To minimize damage to the aircraft and the related systems, use normal procedures but avoid flying through sands storms or dust storms when possible.

g. Landing. Use normal landing procedures.

h. Before storing the aircraft. Use normal procedures, taking extreme care to prevent sand and dust from entering fuel and oil systems while servicing the aircraft. Install all protective covers to prevent sand and dust accumulation.
NOTE: If fuel tanks are filled completely, expansion may cause fuel to overflow.

REFERENCES:

TM 9-5895-692-10-2
FM 1-202, Environmental Flight
Checklist
Unit SOP

TASK 2030

TASK: Perform cold weather operations.

CONDITIONS: Given a Hunter UAV system, or in a classroom environment.

STANDARDS:

1. Correctly perform or describe the appropriate procedures according to the listed references.

2. Correctly perform crew coordination actions.

DESCRIPTION:

1. Crew Actions.

a. The VO will direct the Crew Chief to complete the designated elements of preflight preparations. He will ensure the tires are not frozen to the ground and the removal of all snow or ice from all surfaces.

b. FLOs will complete the assigned checks and report the results to the Crew Chief.

2. Procedures. The FLOs will perform the following actions:

a. Before starting engine(s). Check all controls for full travel and freedom of movement.

b. Warm-up and ground operation. A higher RPM may be required to reach designated oil temperature and CHT.

c. Taxiing. The Crew Chief will confirm the wheels are turning and not sliding. When possible, avoid taxiing through snow and slush.

d. Before takeoff. If the possibility of ice accumulation on flight control surfaces exists, do not attempt to take off. Accumulations of slush/snow on the runway greatly increase the takeoff distance and should be considered during planning.

e. Takeoff. Before starting the takeoff roll, check all controls for full travel and freedom of movement. Smoothly

f. During flight. If the takeoff was made from a runway covered with snow or slush, refer to the aircraft operator's manual for after-takeoff procedures. Climb at a higher-than normal airspeed to prevent ice accumulation on unprotected surfaces.

g. Landing. Landings on icy runways should be made only when necessary. Refer to the aircraft operator's manual for any limitations and special procedures.

REFERENCES:

TM 9-5895-692-10-2
FM 1-202, Environmental Flight
Operational Procedures Checklist
Unit SOP

TASK 2035

TASK: Perform mountain operations.

CONDITIONS: Given a Hunter UAV system, or in a classroom environment.

STANDARDS:

1. Correctly perform or describe the appropriate procedures according to the listed references.
2. Correctly perform crew coordination actions.

DESCRIPTION:

1. Crew Actions. The VO will ensure he has reviewed the operator's manual regarding line of sight limitations and is familiar with mountain-flying hazards.

2. Procedures. The crew members will perform the following actions:

a. Preflight. Complete a detailed performance evaluation to determine if any operating limitations will be encountered.

b. Starting engine(s): Use normal starting procedures.

c. Taxiing. Use normal taxiing procedures.

d. Takeoff. Use normal takeoff procedures.

NOTE: Many mountain landing strips or runways are not level.

e. During flight. Use normal procedures. Be alert for clear air turbulence that may be encountered because of uneven terrain and wind variations.

f. Landing. Use normal landing procedures.

NOTE: Many mountain landing strips or runways are not level. Unless local conditions dictate otherwise, always land uphill.

g. Before storing the aircraft. Use normal procedures. Ensure the UAV is properly secured. (In mountainous areas, the possibility of severe and rapidly changing weather is greater than normal.)

REFERENCES:

TM 9-5895-692-10-2
FM 1-202, Environmental Flight
Unit SOP

TASK 2040

TASK: Perform Rocket Assisted Take-off (RATO) launch procedures.

CONDITIONS: Given a Hunter UAV system, operator’s manual, and checklist.

STANDARDS:

1. Without error, perform procedures and checks according to checklist.

2. Correctly check and perform all items in sequence.

3. Correctly determine any malfunctions or discrepancies, and apply the corrective actions/troubleshooting procedures.

4. Correctly perform crew coordination actions.

DESCRIPTION:

1. Crew actions. Each crew member will complete the required checks pertaining to his crew duties. The crew chief will ensure the RATO launch operations are completed according to TM 9-5895-692-10-2 or checklist.

2. Procedures. Refer to operator and crew member checklist.

WARNING: Use extreme caution when working with RATO motor.

REFERENCES:

TM 9-5895-692-10-2
Operational Procedures Checklist
Unit SOP

TASK 2045

TASK: Perform RATO launch abort procedures.

CONDITIONS: Given a Hunter UAV system, operator's manual, and checklist.

STANDARDS: Perform all checks and procedures IAW checklist or
TM 9-5895-692-10-2

DESCRIPTION:

1. Crew Actions. Crew members "SAFE" RATO launcher and UAV. Remove RATO motor.

2. Procedure. Refer to operator and crew member checklist.

WARNING: Use extreme caution when working with RATO motor.

REFERENCES:

TM 9-5895-692-10-2
Operational Procedures Checklist
Unit SOP

TASK 2050

TASK: Perform single engine go-around.

CONDITIONS: Given a Hunter UAV system, operator's manual, and checklist.

STANDARDS:

1. Perform single engine go-around according to Unit SOP.
2. Maintain heading with ±10 degrees.
3. Maintain airspeed at V_{yse}, within ± 5KT.
4. Correctly perform crew coordination actions.

DESCRIPTION:

1. Crew Actions.
   a. The VO will monitor flight and engine instruments and perform actions requested.
   b. The EP will keep his observation area clear.
2. Procedures. The crew members will perform the following actions:

a. When a safe landing is doubtful, apply maximum power and adjust pitch as necessary while maintaining heading control. Retract flaps to flight setting, if applicable, and adjust pitch to maintain airspeed. Retract flaps after attaining V_{yse}, then accelerate to V_{yse}, for the approach.

b. Throughout the maneuver the VO should monitor flight and engine instruments and ensure system limitation are not exceeded. The VO should assist the EP should complete all designated checks and read the checklist when called required.

NOTE: When operating at high pressure altitudes or heavy gross weighs training altitude for airspeed while accelerating to V_{yse}, may be necessary. For this reason, the decision to go around should be made as early as possible. Many aircraft have a minimum altitude requirement at which single engine go-around can be successfully completed.

CAUTION: Due to visual conditions at night the UAV may appear closer than it actually is.

REFERENCES:

TM 9-5895-692-10-2
Operational Procedures Checklist
Unit SOP

TASK 2055

TASK: Perform RATO misfire emergency procedures.

CONDITIONS: Given a Hunter UAV system, operator's manual, and checklist.

STANDARDS: Perform all checks and procedures IAW Operational Procedures Checklist or TM 9-5895-692-10-2

DESCRIPTION:

1. Crew Actions.

a. No smoke, no flame visible: Perform IAW checklist or TM 9-5895-6921-10-2.

b. Smoke and/or flame visible: Perform IAW checklist it TM 9-5895-6921-10-2.

2. Procedures. Refer to emergency procedures in the operator's manual and checklist.

WARNING: Use extreme caution when working with RATO motor.

REFERENCES:

TM 9-5895-692-10-2
Operational Procedures Checklist
Unit SOP
TC 1-210, Aircrew Training Program Commander's Guide To Individual And Crew Standardization, 8 January 1996

GLOSSARY

ACA	- Airspace Control Authority
ACFT	- Aircraft
ACP	- Airspace Control Plan
ACO	- Airspace Control Order
ADP	- Automated Data Processing
AGL	- Above Ground Level
A/G	- Arresting Gear
ALT	- Altitude
AOO	- Airspace Operations Officer
APART	- Annual Proficiency and Readiness Test
AR	- Army Regulation
ASO	- Aviation Safety Officer
AT&A	- Air Traffic and Air Space
ATC	- Air Traffic Control
ATIS	- Air Traffic Information System
ATM	- Aircrew Training Manual
ATO	- Air Tasking order
ATP	- Aircrew Training Program
AV	- Air Vehicle
AVC	- Air Vehicle Crew Member
AVCR	- Airborne Video Cassette Recorder
AVLD	- Air Vehicle Location Display
AZ	- Azimuth
A2C2	- Army Airspace Command and Control
BU	- Back up
CAL	- Calibration
CCA	- Computer Console Assembly
CDU	- Console Display Unit
CG	- Center of Gravity
CHT	- Cylinder Head Temperature
CL	- Checklist
CMD/RPT	- Command/Report
COMMO	- Communications
CONFIG	- Configuration
COORD	- Coordinates
CPU	- Central Processing Unit
CTL	- Commander's Task List
DEC	- Decrease
DTED	- Digital Terrain Elevation Display
DUTC	- Department of Defense UAV Training Center
ELEV	- Elevation
EMER	- Emergency
EOC	- Emergency Operating Center

EP - External Pilot
ERT - Emergency Recovery Team
ET - Electronics Technician
ETA - Estimated Time of Arrival

FAA - Federal Aviation administration
FH - Fort Huachuca
FIH - Flight Information Handbook
FLIP - Flight Information Publication
FLIR - Forward Looking Infared
FLO - Flight Line Operator
FLSO - Flight Line Safety Officer
FM - Field Manual/Frequency Modulation
FOD - Foreign Object Damage
FREQ - Frequency
FTS - Flight Termination System
FWD - Forward

GCS - Ground Control Station
GDT - Ground Data Terminal
GEN - Generator
GPS - Global Positioning System
GSE - Ground Support Equipment
GSO - Ground Safety Officer

HDG - Heading
HOIS - Hostile Intelligence Services
HR - Hazard Report

IAS - Indicated Airspeed
ICAO - International Civil Aviation Organization
ICS - Intercommunication System
ID - Identification
IFF - Identification Friend or Foe
IFR - Instrument Flight Rules
IMC - Instrument Meteorological Conditions
INC - Increase
IP - Instructor Pilot
IATF - Individual Aircrew Training Folder

KIAS - Nautical miles/hour (Knots) Indicated Airspeed
KTS - Nautical miles/hour

LRS - Launch Recovery Station
LR/S - Launch Recovery Site
LRT - Launch and Recovery Terminal

MAG - Magnetic
MAL - Malfunction
MB - Mishap Board
MC - Mission Commander
MMF - Mobile Maintenance Facility
MMP - Modular Mission Payload

MOA	- Military Area of Operations
MOSP	- Mutimission Optronic Stabilized Platform
MP	- Maintenance Test Pilot
MPS	- Mission Planning Station
MPU	- Mobile Power Unit
MR	- Mishap Report
MSL	- Mean Sea Level
NA	- Not Applicable
NAS	- National Airspace System
NCS	- Net Control Station
OAT	- Outside Air Temperature
ODO	- Operations Duty Officer
OHR	- Operational Hazard Report
OSIT	- On Site Investigation Team
PCE	- Protective Clothing and Equipment
PMCS	- Preventive Maintenance Checks and Services
PO	- Mission Payload Operator
POL	- Petroleum, Oils, and Lubricants
PRAM	- Preliminary Report of Aircraft Mishap
PREFLT	- Preflight
PRIM	- Primary
PGRM	- Program
RATO	- Rocket Assisted Takeoff
RF	- Radio Frequency
RFA	- Radio Frequency Allocation
RH	- Return Home
RL	- Readiness Level
RNG	- Range
ROC	- Rate of Climb
ROZ	- Restricted Operating Zone
RTB	- Return to Base
RVT	- Remote Video Terminal
SEMA	- Special Electronics Mission Aircraft
SINCGARS	- Single Channel Ground/Airborne Radio System
SME	- Subject Matter Expert
SIP	- Standardization Instructor Pilot
SPINS	- Special Instructions
TAMMS-A	- Functional Users Manual for the Army Maintenance Management System - Aviation
TC	- Training Circular
TM	- Training Manual
TO	- Technical Observer
UAV	- Unmanned Aerial Vehicle
UHF	- Ultra High Frequency
UT	- Unit Trainer

V_a - maximum designed maneuvering speed
V_b - turbulence penetration speed
V_f - design flap speed
V_{fe} - maximum flap extended speed
V_{lof} - lift-off speed (rotation speed +3KT)
V_{ne} - never exceed speed
V_r - rotation speed
V_{ref} - indicated airspeed that the aircraft should have on the approach path when the aircraft is approximately 50 feet higher than the intended touchdown point, in the landing configuration. It is the approach speed shown in the aircraft operator's manual
V_s - power-off stall speed
V_{so} - stall speed in landing configuration
V_x - best angle-of-climb speed
V_y - best rate-of-climb speed
V_{yse} - best rate-of-climb speed, single engine
VFR - Visual Flight Rules
VHS - Very High Frequency
VMC - Visual Meteorological Conditions
VO - Air Vehicle Operator

WT -Weight
WX -Weather

REFERENCES

SOURCES USED

These are the sources quoted or paraphrased in this publication.

DOCUMENTS NEEDED

These documents must be available to the intended users of this publication.

TC 1-120, Aircrew Training Commander's Guide to Individual and Crew Standardization. 3 October 1995.

TM 9-5895-692-CL, Operator's and Crewmember's Checklist Drone, Aircraft: BQM-155A Hunter Unmanned Air Vehicle. 15 December 1995.

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