TC 3-04-34 (TC 1-240)

Aircrew Training Manual, Cargo Helicopter, CH-47D/F

April 2013

Headquarters Department of the Army

*TC 3-04.34 (TC 1-240)

Training Circular
No. 3-04.34

Headquarters
Department of the Army
Washington, DC, 5 April 2013

AIRCREW TRAINING MANUAL CARGO HELICOPTER, CH-47D/F

Contents

***This publication is superseded by TC 1-240, dated 24 October 2007.**

Tasks

Figures

Tables

Preface

Training circular (TC) 3-04.34 standardizes aircrew training programs (ATPs) and flight evaluation procedures. This aircrew training manual (ATM) provides specific guidelines for executing CH-47D/F aircrew training. It is based on training principles outlined at the Army Training Network, located on the web at https://atn.army.mil/index.aspx, under the Training Management tab. This ATM establishes crewmember qualification training, refresher training, mission training, and continuation training and evaluation requirements. It applies to all CH-47 crewmembers and their commanders in the active Army, the Army National Guard Bureau/United States Army National Guard (ARNG), and the United States Army Reserve (USAR). The CH-47D is a similar aircraft to the CH-47F; the CH-47F is series grouped with the MH-47G.

This manual is not a stand-alone document;all requirements of Army regulation (AR) 600-105, AR 600-106, National Guard Regulation (NGR) AR 95-210, and TC 3-04.11 to the ATP must be met. The operator's manual is the authority for operation of the aircraft. If differences exist between the maneuver descriptions in Technical Manual (TM) 1-1520-240-10 or TM 1-1520-271-10 and this publication, this publication is the governing authority for training and flight evaluation purposes. Implementation of this publication conforms to AR 95-1 and TC 3-04.11. If a conflict exists between this publication and TC 3-04.11, the ATP commander determines the method of accomplishment based upon the requirement and the unit's mission as to which manual takes precedence.

This manual, in conjunction with the ARs and TC 3-04.11, will help develop a comprehensive ATP. Using this ATM ensures that individual crewmember and aircrew proficiency is commensurate with the unit's mission and aircrews routinely employ standard techniques and procedures.

Crewmembers will use this manual as a "how to" source for performing crewmember duties. It provides performance standards and evaluation guidelines so that crewmembers know the level of performance expected. Each task has a description of the proper procedures to meet the standard.

Standardization officers, evaluators, and unit trainers (UTs) will use this manual and TC 3-04.11 as the primary tools in assisting commanders with development and implementation of their ATP.

The proponent of this publication is the United States (U.S.) Army Training and Doctrine Command (TRADOC). Send comments and recommendations on Department of the Army (DA) Form 2028 (Recommended Changes to Publications and Blank Forms) or automated link: http://www.apd.army.mil through the aviation unit commander to: Commander, United States Army Aviation Center of Excellence (USAACE), ATTN: ATZQ-TDT-F, (Flight Training Branch) Building 4507, Andrews Avenue, Fort Rucker, AL 36362-5000 or direct e-mail questions to: usarmy.rucker.avncoe.mbx.ATZQ-TDT-F@mail.mil or online at: https://www.us.army.mil/suite/page/432. Recommended changes may also be e-mailed to: usarmy.rucker.avncoe.avncoe.mbx.ATZQ-ES@mail.mil.

This publication implements portions of standardization agreement (STANAG) 3114 (Edition Eight)

This publication has been reviewed for operations security considerations.

Chapter 1
Introduction

The tasks in this ATM enhance training in individual and aircrew proficiency. The training focuses on tasks supporting the unit's mission. The mission essential task list (METL) will dictate the scope and level of training to be achieved individually by crewmembers and collectively by aircrews. Commanders must ensure aircrews are proficient in the METL.

1-1. **CREW STATION DESIGINATION**. The commander will designate a crew station(s) for each crewmember. The individual's commander's task list (CTL) must clearly indicate all crew station designations. Training and proficiency sustainment for rated crewmembers (RCMs) are required in each designated crew station with access to the flight controls. Standardization instructor pilots (SPs), instructor pilots (IPs), instrument examiners (IEs), and maintenance test pilot evaluators (MEs) must maintain proficiency in both seats. Nonrated crewmember (NCM) training and proficiency sustainment are required in each designated crew station. Except for flight activity category (FAC) 3, aviators designated to fly from both pilots' (PIs) seats will be evaluated, in each seat, during each phase of readiness level (RL) progression and annual proficiency and readiness test (APART) evaluations. This does not mean that both standardization and instrument flight evaluation need to be completed in both seats. As long as both seats have been evaluated during some portion of the above evaluations, the requirements for "both seat evaluation" have been met. Maintenance test pilots (MPs)/MEs will follow chapter 5 for crew station requirements and evaluations. However, not all tasks must be evaluated in each seat. Sustainment training for NCMs is required in each designated crew station. NCMs are required to be evaluated from the cabin door position and the left ramp position in the aircraft during the APART, but are not required to be evaluated in all tasks from both positions. Commanders will develop a program to meet this requirement.

1-2. **SYMBOL USAGE AND WORD DISTINCTIONS.**

a. **Symbol usage.**

(1) The diagonal (/) is used to indicate "and" or "or" which means one or, the other, or both. For example, IP/SP may mean IP or SP or it may mean IP and SP. For NCMs, SI/flight instructor (FI) may mean SI or FI; or it may mean SI and FI.

(2) P* indicates pilot on the controls. P indicates pilot not on the controls. The symbol "D" indicates a CH-47D model specific item or task to be completed or briefed. The symbol "F" with an "**F**" indicates a CH-47F model specific item or task to be completed or briefed.

b. **Word distinctions**.

(1) Warnings, cautions and notes. These words emphasize important and critical instructions.

(a) Warning. A warning is an operating procedure or a practice that, if not correctly followed, could result in personal injury or loss of life.

(b) Caution. A caution is an operating procedure or a practice that, if not strictly observed, could result in damage to or destruction of equipment.

(c) Note. A note highlights essential information of a non-threatening nature.

(2) Will, shall, must, should, may and can. These words distinguish between mandatory, preferred, and acceptable methods of accomplishment.

(a) "Will," "shall," or "must" indicate a mandatory requirement.

(b) "Should" is used to indicate a non-mandatory but preferred method of accomplishment.

(c) "May" or "can" is used to indicate an acceptable method of accomplishment.

c. **Night vision devices (NVDs).**

(1) Night-vision system (NVS) refers to components that are attached to the aircraft and are an integral

component of the aircraft.

(2) Night vision goggles (NVG) refers to any image intensifier system; for example, the AN/AVS-6.

(3) NVD refers to NVS and/or NVG.

d. **Personnel terminology, descriptions, and responsibilities.**

(1) The RCM is an aviator/DAC; therefore, the terms "rated crewmember," "aviator," and "pilot" are used synonymously.

(2) Pilot in command (PC). The PC has overall responsibility for the operation of the aircraft from pre-mission planning to mission completion and assigns duties to the crew, as necessary. Additionally, the PC is the primary trainer of pilots in the development of experience and judgment.

(3) PI. The PI will complete all tasks assigned by the PC.

(4) UT. The UT is a specialized trainer (RCM or NCM) appointed by the commander to assist with unit training. The UT trains RL 2 and RL 1 crewmembers in mission/additional tasks in accordance with (IAW) this ATM and unit METL. To be qualified as an UT, the crewmember must demonstrate a higher level of knowledge, proficiency and the ability to train other crewmembers IAW this ATM and the IP handbook.

(5) IP. The IP trains and evaluates RCM and NCM, as appointed by the commander to assist with unit training. The IP may evaluate an IP/SP during proficiency flight evaluation (PFE) resulting from a lapse in aircraft or NVD currency.

(6) IE. The IE trains and evaluates instrument tasks, as directed by AR 95-1 and local requirements.

(7) SP. The SP trains and evaluates RCMs and NCMs and supervises and maintains the standardization program.

(8) MP. The MP conducts maintenance test flight (MTF) procedures IAW chapter 5.

(9) ME. The ME trains and evaluates MPs and MEs IAW chapter 5.

(10) NCM. The NCM is a non-aviator who performs operation-essential duties aboard an aircraft.

(11) Crew chief (CE). The CE assists the flight engineer (FE) with maintaining his or her assigned aircraft and performs NCM duties.

(12) Flight engineer (FE). The FE maintains his or her assigned aircraft and performs NCM duties. The FE is the supervisor and primary trainer for the CE and mechanics assigned to that aircraft. They will also maintain their assigned aircraft and perform NCM duties. The commander selects NCMs to perform FE duties based on proficiency and experience.

Note. Unless otherwise specified, the abbreviation CE or NCM in the task description refers to either the CE or the FE.

---

(13) NCM flight engineer instructor (FI). The NCM FI trains and evaluates NCMs in aircraft tasks IAW this ATM and unit METL. To qualify as an FI, the crewmember must meet the requirements of AR 95-1.

(14) NCM standardization instructor (SI). The SI trains and evaluates NCMs, FIs, and other SIs. The SI assists the unit SP with supervising and maintaining the standardization program. To qualify as an SI, the crewmember must meet the requirements of AR 95-1.

(15) Non-crewmember. These individuals perform duties directly related to the inflight mission of the aircraft, but not essential to the operation of the aircraft. AR 600-106 lists the categories for non-crewmember positions and the number authorized in each unit. Non-crewmembers may perform CE/FE/UT/FI/SI duties while on non-crewmember flight status, if they are military occupational specialty (MOS) qualified and fully integrated into the commander's ATP. Additionally, non-crewmembers are trained and designated to perform those duties for NCMs who are unable to fly.

Chapter 2

Training

This chapter describes requirements for qualification, RL progression, refresher, mission, and continuation training. Crewmember qualification requirements will be IAW AR 95-1, TC 3-04.11, and this ATM. Training will follow a logical progression sequence. Aviators/crewmembers will demonstrate proficiency in all base tasks in all appropriate modes as noted and be properly progressed prior to being trained on mission tasks.

2-1. **QUALIFICATION TRAINING.** Crewmembers complete qualification training by demonstrating proficiency in all tasks required to an SP, IP, ME, SI, or FI, as appropriate. Crewmembers undergoing qualification training in the aircraft must fly with a SP, IP, ME, SI, or FI, as appropriate.

Note. Trainers who are evaluating/training NCMs must be at a station without access to the flight controls.

---

a. **Aircraft qualification.**

(1) RCM. Initial qualification training in the CH-47D/F will be conducted at USAACE, Eastern Army Aviation Training Sites (EAATS), or at DA-approved training sites IAW the new equipment training team flight training guide or with an USAACE-approved program of instruction (POI).

(2) NCM. MOS qualification is conducted at DA-approved training sites. Aircraft qualification training for NCMs (15U [CH-47 helicopter repairer]) is conducted at the unit IAW this ATM, applicable regulations, and the commander's ATP. The NCMs must complete academic and flight training and pass the required written examinations within 90 consecutive days from the start of training (Reserve Components, 1 year) ARNG refer to appropriate regulations.

b. **NVG Qualification**. Initial NVG qualification and aircraft NVD qualification will be IAW TC 3-04.11, the USAACE NVG training support package (TSP), and this ATM. The NVG TSP may be obtained by writing to: Commander, USAACE, ATTN: Chief, NVD Branch, 110th Aviation Brigade Fort Rucker, AL 36362-5000 or via e-mail to usarmy.rucker.avncoe.mbx.ATZQ-ATB-NS@mail.mil. The NVG TSP may be obtained through AKO from the NVD Branch Knowledge Center at https://www.us.army.mil/suite/page/504538. For all other concerns and support information, visit the following website: www.rucker.army.mil/usaace/nvd.html.

(1) Initial NVG qualification. Initial qualification will be conducted at USAACE or a DA- approved training site, IAW the USAACE-approved POI or locally using the USAACE NVG exportable training package (ETP). Submit written requests for USAACE NVG ETP to: Commander, USAACE, ATTN: ATZQ-TDS-O, Fort Rucker, AL 36362-5000.

(2) Aircraft NVD qualification.

(a) Academic training. The crewmember will receive training and demonstrate a working knowledge of the topics outlined in paragraph 3-4b(7) and (10). All academic training must be completed prior to flight training.

(b) Flight training. The crewmember will receive training and demonstrate proficiency, from the designated crew station, in all base tasks marked with an "**X**" in the NVG column of table 2-3 or table 2-4, pages 2-3 to 2-6, as appropriate. The crewmember will also receive training and demonstrate proficiency in any other base tasks specified for NVG on the task list for the crewmember's position. If designated to perform NVG duties, Task 2081 becomes a mandatory training and evaluation task and will be added to the aviator's commanders task list (CTL). The commander may select additional base tasks.

c. **Minimum flight hours (RCMs)**. There are no minimum flight hour requirements. The qualification is proficiency based, determined by the crewmember's ability to satisfactorily accomplish the designated tasks. NCMs will meet the minimum flight hour requirements outlined in appendix A.

d. **Additional qualifications**. Heads-up display (HUD) system–appendix B.

2-2. REFRESHER TRAINING.

a. **Aircraft refresher training.**

(1) RCM. The RCM completes RL 3 requirements when the criteria in TC 3-04.11 are met. Although DACs do not have RLs, refresher training will be conducted in the same manner.

(a) Academic training. The RCM will receive training and demonstrate a working knowledge of the topics listed in paragraphs 3-4b(1) through (7) and complete an operator's manual written examination. All academic training should be completed prior to flight training.

(b) Flight training. The RCM will receive training from all designated crew station(s) with access to the flight controls. A task that may be performed from either crew station does not need to be evaluated from both stations. Table 2-1 and table 2-2, page 2-3, are guides for developing refresher flight training. Proficiency must be demonstrated in all modes marked with an "X" in the "D" (day flight), "I" (instruments flights) and "N" (night unaided) columns of table 2-3 or table 2-4, pages 2-3 to 2-6, as applicable. Actual hours will be based on individual crewmember proficiency. The evaluation may be continuous. At a minimum under Task 1070, the following emergency procedures (EP) must be conducted during this training in the aircraft while occupying a station with access to the flight controls. These EPs can be performed concurrently:

- Single-engine (SE) failure at altitude.
- ENG or fuselage fire-inflight.
- **D** ENG transmission (XMSN) hot.
- **F** ENG 1 or ENG 2 XMSN warning.

(2) Refresher training as a result of a training or evaluation deficiency. Academic and flight training required as a result of a training deficiency or an unsatisfactory evaluation will consist of the academic training, flight training, and evaluation required to regain proficiency. At a minimum, the evaluation will consist of the deficient task(s) and any other tasks selected by the commander or the evaluator. There is no requirement to complete the entire refresher training program outlined in this ATM as a result of a training or evaluation deficiency. The evaluation may be continuous.

Table 2-1. Refresher flight training guide (rated crewmember)

Flight Instruction	*Hours*
Day and night base task training	6.0
Flight evaluation	2.0
*Instrument base task training (aircraft/flight simulator)	8.0
Instrument evaluation	2.0
Total hours	**18.0**
*Recommend a minimum of 2 hours of instrument base task training be in the aircraft.	

Table 2-2. Refresher flight training guide (nonrated crewmember)

Flight Instruction	*Hours*
Day and night base task training	6.0
Flight evaluation	2.0
Total hours	**8.0**

b. **NVG refresher training**. NVG considerations for each task, when applicable, are covered in chapter 4. The crewmember must complete the training outlined below:

(1) Academic training. The crewmember will receive training and demonstrate a working knowledge of

the applicable topics in paragraphs 3-4b(7) and (10). Academic training should be completed prior to flight training.

(2) Flight training. The crewmember will receive training and demonstrate proficiency in all base tasks marked with an "**X**" in the "**NVG**" column of table 2-3 or table 2-4, pages 2-3 to 2-6, as applicable. During NVG training, base task training must be completed prior to performing mission tasks with the exception of Tasks 2081 and 2086. The commander may select additional base tasks.

(3) Minimum flight hours. There are no minimum flight hour requirements. The training is proficiency based, determined by the crewmember's ability to accomplish the designated tasks satisfactorily.

Table 2-3. Rated crewmember base task list (qualification/refresher training)

Legend

D – Tasks that must be performed during day flight.
I – Tasks that must be performed during instrument flight.
N – Tasks that must be performed during unaided night flight.
NVG – Tasks that must be evaluated at night in the aircraft while the RCM is wearing the NVG.

*Thesetasks apply to CH-47F only.

Task	*Task Title*	*D*	*I*	*N*	*NVG*
1000	Participate in a Crew Mission Briefing	X	X		X
1004	Plan a Visual Flight Rules Flight	X			
1006	Plan an Instrument Flight Rules Flight		X		
1010	Prepare a Performance Planning Card	X			
1012	Verify Aircraft Weight and Balance	X			
1013	Operate Mission Planning System	X			
1014	Operate Aviation Life Support Equipment	X			
1016	Perform Internal Load Operations	X			
1022	Perform Preflight Inspection	X			
1024	Perform Before-Starting Engine Through Before-Leaving Helicopter Checks	X			X
1025*	FPerform Flight Mission Management	X			
1026	Maintain Airspace Surveillance	X	X	X	X
1027	Perform Power Assurance Check	X			
1028	Perform Hover Power Check	X	X	X	X
1032	Perform Radio Communication(s) Procedures	X			
1033*	FPerform Digital Communication Procedures	X			
1034	Perform Ground Taxi	X			X
1038	Perform Hovering Flight	X		X	X
1039*	FPerform Hovering Flight Utilizing Symbology	X		X	X
1040	Perform Visual Meteorological Conditions Takeoff	X		X	X
1042	Perform Cruise Check Procedures	X	X		X
1044	Navigate by Pilotage and Dead Reckoning	X			X
1046	Perform Electronically Aided Navigation	X			X
1052	Perform Visual Meteorological Conditions Flight Maneuvers	X		X	X
1058	Perform Visual Meteorological Conditions Approach	X		X	X
1062	Perform Slope Operations	X			X

Table 2-3. Rated crewmember base task list (qualification/refresher training)

Legend

D – Tasks that must be performed during day flight.
I – Tasks that must be performed during instrument flight.
N – Tasks that must be performed during unaided night flight.
NVG – Tasks that must be evaluated at night in the aircraft while the RCM is wearing the NVG.

*Thesetasks apply to CH-47F only.

Task	*Task Title*	*D*	*I*	*N*	*NVG*
1063	Perform External (Sling) Load(s) Operations	X			X
1064	Perform Roll-On Landing	X		X	X
1068	Perform Go-Around				
1070	Respond to Emergencies	X	X	X	X
1077	Perform Procedures for Two-Way Radio Failure				
1094*	D Perform Flight with Advanced Flight Control System/F Digital Advance Flight Control System-Off	X		X	X
1166	Perform Instrument Maneuvers		X		
1167*	FPerform Instrument Maneuvers using Standby Flight Display		X		
1170	Perform Instrument Takeoff		X		
1174	Perform Holding Procedures		X		
1176	Perform Non-Precision Approach		X		
1178	Perform Precision Approach		X		
1180	Perform an Emergency Global Positioning System Recovery Procedure		X		
1182	Perform Unusual Attitude Recovery	X	X		
1184	Respond to Inadvertent Instrument Meteorological Conditions	X			X
1188	Operate Aircraft Survivability Equipment	X			
1190	Perform/Identify Hand and Arm Signals	X			
1194	DPerform Refueling Operations	X			
1253*	Foperate Common Avionics Architecture System/Control Display Unit/Multi-Function Display	X			
1260*	Foperate Digital Map	X			
1262	Participate in a Crew-Level After Action Review	X	X	X	X
1402	Perform Tactical Flight Mission Planning	X			X
1404	Perform Electronic Countermeasures/Electronic Counter-Countermeasures Procedures	X			
1406	Perform Terrain Flight Navigation	X			X
1408	Perform Terrain Flight	X			X
1411	Perform Terrain Flight Deceleration	X			X
1412	Perform Evasive Maneuvers				
1413	Perform Actions on Contact	X			X
2081	Operate Night Vision Goggles				X

Table 2-4. Nonrated crewmember (15U) base task list (qualification/refresher training)

Legend

D – Tasks that must be performed during day flight.
N – Tasks that must be performed during unaided night flight.
NVG – Tasks that must be evaluated at night in the aircraft while the NCM is wearing the NVG.

Task	*Task Title*	*D*	*N*	*NVG*
1000	Participate in a Crew Mission Briefing	X		X
1002	Conduct a Passenger Brief			
1012	Verify Aircraft Weight and Balance	X		
1014	Operate Aviation Life Support Equipment	X		
1016	Perform Internal Load Operations	X		
1019	Perform Preventive Maintenance Daily Checks (NCM Only)	X		
1022	Perform Preflight Inspection	X		
1024	Perform Before-Starting Engine Through Before-Leaving Helicopter Checks	X		X
1026	Maintain Airspace Surveillance	X	X	X
1027	Perform Power Assurance Check	X		
1028	Perform Hover Power Check	X		
1032	Perform Radio Communication(s) Procedures	X		
1034	Perform Ground Taxi	X		X
1038	Perform Hovering Flight	X	X	X
1040	Perform Visual Meteorological Conditions Takeoff	X	X	X
1042	Perform Cruise Check Procedures	X		
1058	Perform Visual Meteorological Conditions Approach	X	X	X
1062	Perform Slope Operations	X		X
1063	Perform External (Sling) Load(s) Operations	X		X
1064	Perform Roll-On Landing	X	X	X
1070	Respond to Emergencies	X		X
1162	Perform Emergency Egress	X	X	X
1188	Operate Aircraft Survivability Equipment	X		
1190	Perform/Identify Hand and Arm Signals	X		
1194	Perform Refueling Operations	X		
1200	Perform Nonrated Crewmember Duties During Maintenance Test Flight	X		
1202	Perform Auxiliary Power Unit Operations (NCM Only)	X		
1262	Participate in a Crew-Level After Action Review	X	X	X
1406	Perform Terrain Flight Navigation	X		X
1408	Perform Terrain Flight	X		X
1411	Perform Terrain Flight Deceleration	X		X
1413	Perform Actions on Contact	X		X
2081	Operate Night Vision Goggles			X

2-3. **MISSION TRAINING.** Crewmembers are designated RL 2 when they meet the criteria of TC 3-04.11. DACs will receive mission task training IAW their job title.

a. **Training requirements.**

(1) Mission training. Mission training programs help RL 2 crew members develop the ability to perform specific tasks selected by the commander to support the unit's METL.

(a) Academic training. The crewmember will receive training and demonstrate a working knowledge of the topics listed in paragraphs 3-4b(8) and (9).

(b) Flight training. The training will consist of those mission tasks in table 2-5, page 2-7, as selected by the commander and additional tasks necessary to complete the unit's mission. This training may be conducted by a UT. The crewmember will receive training from all designated crew station(s). A task that may be performed from either crew station does not need to be evaluated from both stations. Flight mission-training hour requirements are based on demonstrated proficiency. The evaluation must be conducted by a SP, IP, SI, or FI and may be continuous.

(2) NVG mission training. NVG mission training will be IAW the commander's training program, TC 3-04.11, and this ATM. When commanders determine a requirement for using NVG in mission profiles, they must develop a mission training program and specify mission/additional NVG tasks as required to support the unit's METL. Before undergoing NVG mission training, the RCM must complete qualification or refresher training (RL 3 base tasks from table 2-5, page 2-7) and must be NVG current in the CH-47D/F helicopter.

(a) Academic training. The crewmember will receive training and demonstrate a working knowledge of the subject areas listed in paragraphs 3-4b(7) through (10) and additional subject areas selected by the commander in this ATM.

(b) Flight training. The crewmember will receive flight training and demonstrate proficiency in the mission/additional NVG tasks, as specified by the commander on the individual's DA Form 7120-1-R (Crew Member Task Performance and Evaluation Requirements)/DA Form 7120-2-R (Crew Member Task Performance and Evaluation Requirements Continuation Sheet) for the crewmember's position.

Table 2-5. Mission training task list (rated/nonrated crewmember)

Task	*Task Title*
2010	Perform Multiaircraft Operations
2050	Develop an Emergency Global Positioning System Recovery Procedure
2052	Perform Water Bucket Operations
2054	Perform Fast-Rope Insertion and Extraction
2056	Perform Rappelling Operations
2058	Perform Special Patrol Infiltration/Exfiltration Operations
2059	Perform Rescue-Hoist/Winch Operations
2064	Perform Paradrop Operations
2066	Perform Extended Range Fuel System Procedures
2068	Perform Shipboard Operations
2074	Perform Forward Arming and Refueling Point Operations
2076	Perform Caving Ladder Operations
2078	Perform Helocast/Soft Duck Operations
2079	Perform Amphibious Operations
2081	Operate Night Vision Goggles
2086	Operate Heads-Up Display System
2112	Operate Armament Subsystem
2125	Perform Pinnacle/Ridgeline Operations

Table 2-5. Mission training task list (rated/nonrated crewmember)

Task	*Task Title*
2127	Perform Combat Maneuvering Flight

(3) MP and ME mission training. Due to the complexity of the CH-47F, MPs and Mes should be limited to duties in one primary and one alternate (or additional) aircraft. The MP/ME will be required to complete tasks outlined in table 2-9, page 2-14, and should be required to complete those mission/additional tasks selected by the commander. Crewmembers undergoing training in the aircraft must fly with an ME for maintenance training. Commanders are not authorized to delete any MP tasks.

(a) Academic training. The MP will receive training and demonstrate a working knowledge of the topics listed in paragraph 3-4b(11).

(b) Flight training. The MP/ME will receive flight training and demonstrate proficiency in all tasks in table 2-9, page 2-14. Refer to chapter 5 for more guidance.

b. **Minimum flight hours.** There are no minimum flight hour requirements. The training is proficiency based, determined by the crewmember's ability to accomplish the designated tasks satisfactorily. NVG mission training may be included as part of refresher training.

c. **HUD Qualification.** RCM will be HUD qualified prior to progressing to NVG RL 1.

2-4. **CONTINUATION TRAINING.** Crewmembers are designated RL 1 when they meet the criteria of TC 3-04.11. ATP commanders will designate continuation training requirements for DACs on DA Form 7120-1-R.

Note. Uts and evaluators may credit those hours they fly while performing assigned duties, regardless of their crew station, toward their semi-annual flying-hour requirements.

a. **Semi-annual flying-hour requirements–aircraft.** The minimum requirements for crewmembers are as follows:

(1) RCMs.

(a) FAC 1–45 hours, which must be flown while occupying a crew station with access to the flight controls.

(b) FAC 2–33 hours, which must be flown while occupying a crew station with access to the flight controls.

I FAC 3–no flying-hour requirements.

(2) NCMs–24 hours, in the aircraft while performing crew duties.

b. **Semi-annual flying-hour requirements–NVG.** NVG RL 1 RCMs will have a minimum requirement of 9 hours NVG in their primary aircraft. RCM will complete the requirements in the aircraft while occupying a crew station with access to the flight controls. The commander will determine NCM semi-annual flying-hour requirements for NVG. The requirement will be tailored to the individual NCM based on proficiency and experience. NCMs will complete the requirements while performing crew duties.

c. **Annual flight simulator (FS)/transportable flight proficiency simulator (TFPS) device flying-hour requirements.** All aviators within 200 statute miles (SMs) of a compatible synthetic flight training system (SFTS) device will complete the following number of hours in the SFTS. The commander will determine FS requirements for RCMs outside of 200 SM. RCMs may apply 12 hours of CH-47D FS or in the CH-47F TFPS time toward their semi-annual flying-hour requirement. Time flown in non-compatible FS/TFPS will not be credited towards the minimum annual flying hour or FS/TFPS requirements (AR 95-1, paragraph 4-11d). The only compatible FS/TFPS are the CH-47D (2B31) and CH-47F, TFPS (2B47F). ARNG RCMs refer to NGR 95-1.

(1) CH-47D requirements:

(a) FAC 1-18 hours annually.

(b) FAC 2-12 hours annually.

I FAC 3-10 hours semi-annually regardless of distance from a CH-47D FS.

(2) CH-47F requirements:

(a) FAC 1-24 hours annually.

(b) FAC 2-18 hours annually.

I FAC 3-18 hours semi-annually regardless of distance from a CH-47F TFPS.

Note. FS requirements are based on the individual's primary aircraft designation.

d. **Annual task and iteration requirements.** The minimum requirements are as follows:

(1) FAC 1 and FAC 2. Each crewmember must perform at least one task iteration annually in each required flight mode as indicated in table 2-6 or table 2-7, pages 2-10 to 2-13; the tasks selected from table 2-5, page 2-7; and additional tasks on the CTL. One iteration of each task must be performed in the aircraft. Tasks performed at night (or while using NVG) may be counted for day iterations. The crewmember is responsible for maintaining proficiency in each task. The commander may require additional iterations of specific tasks. ATP commanders will designate DAC annual task and iteration requirements on DA Form 7120-1-R, DA Form 7120-2-R, and DA Form 7120-3-R (Crew Member Task Performance and Evaluation Requirements Remarks and Certification).

(2) FAC 3. Each crewmember must perform annually at least one iteration of each task annotated on the CTL in the FS or TFPS. The crewmember is responsible for maintaining proficiency in each task. The commander may require additional iterations of specific tasks.

(3) MPs and Mes. In addition to the required minimum annual tasks and iterations, MPs and Mes will perform a minimum of four iterations of MTF tasks listed in table 2-9, page 2-14, annually. Mes will perform a minimum of two of the four iterations mentioned above from each flight crew station with access to the flight controls.

e. **Hood/weather requirements.** All aviators will complete hood or weather requirements as determined by the commander. This requirement may be completed in the aircraft or FS/TFPS.

2-5. TASK LIST.

a. **Performance tasks.** For the purpose of clarifying mode and conditions, a performance task is differentiated from a technical task. An ATM performance task is a task that is significantly affected by the conditions and mode of flight. The mode and condition under which the task must be performed is specified (for example, a visual meteorological conditions (VMC) takeoff, EP flight, or perform external [sling] load]s] operations). These tasks are **bolded** throughout this ATM, but are listed in upper case on DA Form 7120-1-R.

b. **Technical tasks.** Technical tasks are those tasks that measure the crewmember's ability to plan a flight, preflight, participate in crew mission briefing, perform hover (HVR) power (PWR) check, and so forth. These tasks are not significantly affected by the mode of flight and may be performed or evaluated in any mode. These tasks are "plain text" throughout this ATM.

Note. The requirement to perform instrument tasks in additional aircraft, in category, will be at the discretion of the commander.

Note. RCMs required to perform MP or ME duties in the CH-47D/F as an additional or alternate aircraft will perform four iterations of the required tasks.

c. **Base tasks.** Table 2-6, table 2-7, and table 2-8 (pages 2-10 to 2-13) list the RCM and NCM, base task requirements.

d. **Mission tasks.** Table 2-5, page 2-8, lists the RCM and NCM mission tasks. The commander will select mission and additional tasks and iterations that support the unit's METL and individual proficiency. The commander will determine the evaluation requirements for all mission tasks and modes of flight and annotate the air crewmember's CTL accordingly.

e. **MP tasks.** Refer to chapter 5.

f. **Evaluation guidelines.** Aviators designated to fly from both pilot seats are evaluated, in each seat, during APART evaluations; however, not all tasks must be evaluated from each crew station. Sustainment training for

NCMs is required in each designated crew station. NCMs are required to be evaluated from the cabin door position and the left ramp position in the aircraft during the APART, but are not required to be evaluated in all tasks from each position.

(1) Other positions may be evaluated at the discretion of the evaluator. APART and annual evaluation tasks are designated by an "S," "I," and/or "NG" in the "EVAL" column of table 2-6, table 2-7, and table 2-8. During the APART instrument evaluation, one approach must be performed coupled and one approach un-coupled for CH-47F RCMs.

(2) The tasks selected under the "N" column do not need to be evaluated during the standardization evaluation. Tasks evaluated at night (or while using NVG) will suffice for tasks required in day conditions. Mission tasks will be evaluated during the APART, if the task is on the individual's CTL, and designated with an "E". The commander should select mission/additional mission tasks for evaluation based on the unit's METL. Refer to chapter 5 for MP/ME APART requirements.

Table 2-6. Rated crewmember task list

Legend

D – Tasks that must be performed during day flight.
I – Tasks that must be performed during instrument flight.
N – Tasks that must be performed during unaided night flight. The tasks selected under the "**N**" column do not need to be evaluated during the standardization evaluation. If tasks are evaluated at night, it will suffice for tasks required in day conditions.
NVG – Tasks that must be performed during NVG flight. Tasks evaluated while using NVGs will suffice for tasks required in day conditions.
S, **I,** or **NG** in the "**EVAL**" column – Tasks that are mandatory for standardization, instrument or annual NVG flight evaluations, respectively.

*These tasks apply to **CH-47F** only.

Task	*Task Title*	*D*	*I*	*N*	*NVG*	*EVAL*
1000	Participate in a Crew Mission Briefing			X		S, I, NG
1001	Admiister Flight Evaluation					
1003	Conduct Flight Instruction					
1004	Plan a Visual Flight Rules Flight			X		S
1006	Plan an Instrument Flight Rules Flight			X		I
1010	Prepare a Performance Planning Card			X		S
1012	Verify Aircraft Weight and Balance			X		S
1013	Operate Mission Planning System			X		S,NG
1014	Operate Aviation Life Support Equipment			X		S
1016	Perform Internal Load Operations			X		S
1022	Perform Preflight Inspection			X		S or I
1024	**Perform Before-Starting Engine Through Before-Leaving Helicopter Checks**	**X**		**X**	**X**	**S, NG**
1025*	Perform Flight Mission Management			X		S, NG
1026	**Maintain Airspace Surveillance**			**X**		**S, NG**
1027	Perform Health Indicator Test/Power Assurance Check			X		S
1028	**Perform Hover Power Check**			**X**		**S, I, NG**
1032	Perform Radio Communication(s) Procedures			X		S, I
1033*	Perform Digital Communication(s) Procedures			X		
1034	**Perform Ground Taxi**	**X**		**X**	**X**	**S, NG**
1038	**Perform Hover Flight**	**X**		**X**	**X**	**S, NG**

1039*	**Perform Hovering Flight Utilizing Symbology**	**X**		**X**	**X**	**S,NG**
1040	**Perform Visual Meteorological Conditions Takeoff**	**X**		**X**	**X**	**S, NG**
1042	Perform Cruise Check Procedures			X		S, I, NG
1044	**Navigate by Pilotage and Dead Reckoning**	**X**		**X**	**X**	**S, NG**
1046	Perform Electronically Aided Navigation			X		S
1052	**Perform Visual Meteorological Conditions Flight Maneuvers**	**X**		**X**	**X**	**S, NG**
1058	**Perform Visual Meteorological Conditions Approach**	**X**		**X**	**X**	**S, NG**
1062	**Perform Slope Operations**	**X**			**X**	**S, NG**
1063	**Perform External (Sling) Load(s) Operations**	**X**			**X**	**S, NG**
1064	**Perform Roll-On Landing**	**X**		**X**	**X**	**S, NG**
1068	**Perform Go-Around**					
1070	**Respond to Emergencies**	**X**	**X**	**X**	**X**	**S, NG**
1077	**Perform Procedures for Two-Way Radio Failure**					
1094*	**Perform Flight with Advanced Flight Control System/ Digital Advanced Flight Control System-Off**	**X**		**X**	**X**	**S, NG**
1166	**Perform Instrument Maneuvers**		**X**			**I**
1167*	**Perform Instrument Maneuvers with Standby Flight Display**		**X**			
1170	**Perform Instrument Takeoff**		**X**			**I**
1174	**Perform Holding Procedures**		**X**			**I**
1176	**Perform Non-Precision Approach**		**X**			**I**
1178	**Perform Precision Approach**		**X**			**I**
1180	**Perform an Emergency Global Positioning System Recovery Procedures**	**X**		**X**		**S, NG**
1182	**Perform Unusual Attitude Recovery**	**X**			**X**	**S, I**
1184	**Respond to Inadvertent Instrument Meterological Conditions**	**X**		**X**	**X**	**S, NG**
1188	Operate Aircraft Survivability Equipment			X		S
1190	Perform/Identify Hand and Arm Signals			X		
1194	Perform Refueling Operations			X		
1253*	**Operate Common Avionics Architecture System/Central Display Unit/Multi-function Display**			**X**		**S,NG**
1260*	Operate Digital Map			X		S,NG
1262	Participate in a Crew-Level After Action Review			X		S, I, NG
1402	Perform Tactical Flight Mission Planning	X			X	S, NG
1404	Perform Electronic Countermeasures/Electronic Counter-Countermeasures Procedures	X			X	S, NG
1406	**Perform Terrain Flight Navigation**	**X**			**X**	**S, NG**
1408	**Perform Terrain Flight**	**X**			**X**	**S, NG**
1411	**Perform Terrain Flight Deceleration**	**X**			**X**	**S, NG**
1413	**Perform Actions on Contact**	**X**			**X**	**S**

Table 2-7. Nonrated crewmember (15U) task list

Legend

D – Tasks that must be performed during day flight.
N – Tasks that must be performed during unaided night flight. These tasks do not need to be evaluated during the standardization evaluation. If tasks are evaluated at night, it will suffice for tasks required in day conditions.
NVG – Tasks that must be performed during NVG flight. Tasks evaluated while using NVG will suffice for tasks required in day conditions.
S or **NG** in the "**EVAL**" column – Tasks that are mandatory for standardization or annual NVG flight evaluations, respectively.

Task	*Task Title*	*D*	*N*	*NVG*	*EVAL*
1000	Participate in a Crew Mission Briefing		X		S
1001	Administer Flight Evaluation				
1003	Conduct Flight Instructions				
1012	Verify Aircraft Weight and Balance		X		
1014	Operate Aviation Life Support Equipment		X		S
1016	Perform Internal Load(s) Operations		X		S
1019	Perform Preventive Maintenance Daily Checks		X		S
1022	Perform Preflight Inspection		X		S
1024	**Perform Before-Starting Engine Through Before-Leaving Helicopter Checks**	**X**	**X**	**X**	**S, NG**
1026	**Maintain Airspace Surveillance**		**X**		**S, NG**
1027	Perform Power Assurance Check		X		S
1028	Perform Hover Power Check		X		S
1032	Perform Radio Communication(s) Procedures		X		S
1034	**Perform Ground Taxi**	**X**	**X**	**X**	**S, NG**
1038	Perform Hovering Flight	X	X	X	S, NG
1040	**Perform Visual Meteorological Conditions Takeoff**	**X**	**X**	**X**	**S, NG**
1042	Perform Cruise Check Procedures		X		S
1058	**Perform Visual Meteorological Conditions Approach**	**X**	**X**	**X**	**S, NG**
1062	**Perform Slope Operations**	**X**	**X**	**X**	**S, NG**
1063	**Perform External (Sling) Load(s) Operations**	**X**		**X**	**S, NG**
1064	**Perform Roll-On Landing**	**X**	**X**	**X**	**S, NG**
1070	**Respond to Emergencies**	**X**	**X**	**X**	**S, NG**
1162	Perform Emergency Egress		X		
1188	Operate Aircraft Survivability Equipment		X		S
1190	Perform/Identify Hand and Arm Signals		X		S
1194	Perform Refueling Operations		X		S
1200	Perform Non-Rated Crewmember Duties during a Maintenance Test Flight		X		
1202	Perform Auxiliary Power Unit Operations		X		S
1262	Participate in a Crew-Level After Action Review		X		S, NG
1406	**Perform Terrain Flight Navigation**	**X**		**X**	**S, NG**

Table 2-7. Nonrated crewmember (15U) task list

Legend

D – Tasks that must be performed during day flight.
N – Tasks that must be performed during unaided night flight. These tasks do not need to be evaluated during the standardization evaluation. If tasks are evaluated at night, it will suffice for tasks required in day conditions.
NVG – Tasks that must be performed during NVG flight. Tasks evaluated while using NVG will suffice for tasks required in day conditions.
S or **NG** in the "**EVAL**" column – Tasks that are mandatory for standardization or annual NVG flight evaluations, respectively.

Task	*Task Title*	*D*	*N*	*NVG*	*EVAL*
1408	**Perform Terrain Flight**	**X**		**X**	**S, NG**
1411	**Perform Terrain Flight Deceleration**	**X**		**X**	**S, NG**
1413	**Perform Actions on Contact**	**X**		**X**	**S**
2081	**Operate Night Vision Goggles**			**X**	**NG**

Table 2-8. Door gunner/non-crewmember task list

Legend

D – Tasks that must be performed during day flight.
N – Tasks that must be performed during unaided night flight. The tasks selected under the "**N**" column do not need to be evaluated during the standardization evaluation. If tasks are evaluated at night, it will suffice for tasks required in day conditions.
NVG – Tasks that must be performed during NVG flight. Tasks evaluated while using NVGs will suffice for tasks required in day conditions.
S or **NG** in the "**EVAL**" column – Tasks that are mandatory for standardization or annual NVG flight evaluations, respectively.

Task	*Task Title*	*D*	*N*	*NVG*	*EVAL*
1000	Participate in a Crew Mission Briefing		X		S
1014	Operate Aviation Life Support Equipment		X		S
1026	Maintain Airspace Surveillance		X		S, NG
1032	Perform Radio Communication(s) Procedures		X		S
1134	Perform Ground Taxi	X	X		S
1162	Perform Emergency Egress	X	X	X	
1190	Perform/Identify Hand and Arm Signals	X			S
1262	Participate in a Crew-Level After Action Review	X	X	X	S, NG
2112	Operate Armament Subsystem	X	X	X	S,NG

Table 2-9. Maintenance test pilot/maintenance test flight evaluator task list

Task	*Task Title*
4000	Perform Prior-to-Maintenance Test Flight Checks
4081	Perform Before-Starting Engine Checks
4088	Perform Starting Engine Checks
4110	Perform Engine Run-Up Checks
4112	Perform Taxi Checks
4113	Perform Before Hover Checks

Table 2-9. Maintenance test pilot/maintenance test flight evaluator task list

Task	*Task Title*
4156	Perform Hover Checks
4193	Perform Inflight Checks
4236	Perform Autorotation Revolutions per Minute Check
4259	Perform Maximum Continuous Power Check/Perform Maximum Power Check
4262	Perform Communications and Navigation Equipment Checks
4276	Perform Special Equipment or Detailed Procedures Checks
4284	Perform After-Landing Through Engine-Shutdown Checks

2-6. **CURRENCY REQUIREMENTS.**

a. **Aircraft currency.** Aircraft currency will be IAW AR 95-1. Crewmembers whose currency has lapsed must complete a PFE, administered by an IP, SP, FI, or SI as appropriate. Commanders should consider selecting tasks from each mode of flight ("D," "N," and "I") and evaluating tasks from each selected mode during the currency evaluation. These requirements will be outlined in the unit standing operating procedure (SOP). The crewmember will demonstrate proficiency in those tasks and modes selected by the commander. If the crewmember fails to demonstrate proficiency, the crewmember will be placed in the appropriate RL. An appropriate training program will be developed to enable the crewmember to regain proficiency in the unsatisfactory tasks.

b. **NVG currency.** To be considered NVG current, crewmembers will participate, at least once every 60 consecutive days, in a 1 hour flight in the aircraft while wearing NVG. RCMs will occupy a crew station with access to the flight controls. NCMs must be performing crew duties.

(1) Crewmember. If a crewmember's currency has lapsed, he or she must complete (at a minimum) a 1-hour NVG PFE, administered at night in the aircraft by a NVG SP, IP, SI, or FI, as appropriate.

(2) RCM. The RCM must occupy a crew station with access to the flight controls during the evaluation.

(3) NCM. The NCM must occupy a crew station in the aircraft while performing crew duties during the evaluation.

(4) Minimum tasks. Minimum tasks to be evaluated are indicated by an "X" in the "NVG" column of table 2-3 or table 2-4, pages 2-3 to 2-6, as applicable. The commander may designate other mission and/or additional tasks.

Note. Crewmembers qualified in the CH-47D and CH-47F may maintain NVG currency in either aircraft and will be considered NVG current in both aircraft.

2-7. **CHEMICAL, BIOLOGICAL, RADIOLOGICAL, AND NUCLEAR AND HIGH YIELD EXPLOSIVE TRAINING.** IAW TC 3-04.11, crewmembers must wear the complete chemical, biological, radiological, nuclear and high yield explosive (CBRNE) ensemble during CBRNE training. All CBRNE training will be performed in the aircraft. CBRNE training is not required for FAC 3 positions and DACs.

CAUTION

While conducting CBRNE training, the commander will ensure that aircrews exercise caution when performing flight duties when the wet bulb globe temperature (TEMP) is above 75 degrees Fahrenheit.

a. **RCM tasks.** When required, crewmembers will receive CBRNE training in the task(s) listed below. The commander may select other tasks based on the unit mission. Crewmembers will perform at least one iteration of the tasks listed below annually while wearing the CBRNE mask (at a minimum). Task 1028 applies to RCMs only. Performance tasks listed below may be conducted in any mode as specified by the commander. EP

training may be conducted if the IP is not wearing a protective mask IAW this ATM. EP training should be performed in the FS, TFPS, or a static aircraft. CBRNE requirements will be specified in the unit SOP.

(1) Task 1024, Perform Before-Starting Engine Through Before-Leaving Helicopter Checks.

(2) Task 1028, Perform Hover Power Check.

(3) Task 1040, Perform Visual Meteorological Conditions Takeoff.

(4) Task 1058, Perform Visual Meteorological Conditions Approach.

(5) Task 1408, Perform Terrain Flight.

(6) Task 1411, Perform Terrain Flight Deceleration.

b. **NCM tasks.** NCMs will receive CBRNE training in the following base tasks. The commander may select other tasks based on the unit mission.

(1) Task 1024, Perform Before-Starting Engine Through Before-Leaving Helicopter Checks.

(2) Task 1042, Perform Cruise Check Procedures.

c. **CBRNE training.** Commanders may authorize both RCMs to fly while wearing mission-oriented protective posture (MOPP)-4 gear.

2-8. NIGHT UNAIDED TRAINING REQUIREMENTS.

a. Annual night unaided training is mandatory for all aviators. The tasks listed in table 2-3 and table 2-4, pages 2-3 to 2-6, will be evaluated during RL progression/refresher training and a minimum of one iteration of each task will be performed annually.

b. The commander may designate any night tasks for evaluation during the APART period.

Chapter 3
Evaluations

This chapter describes evaluation principles and grading considerations for individual crewmembers. It also contains guidelines for conducting academic and hands-on performance testing. Evaluations are a primary means of assessing flight standardization and crewmember proficiency. Evaluations will be conducted IAW AR 95-1, the commander's ATP, TC 3-04.11, and this ATM.

3-1. **EVALUATION PRINCIPLES**. The value of any evaluation depends on adherence to fundamental evaluation principles. These principles are described below.

a. **Selection of evaluators**. The evaluators must be selected not only for their technical qualifications, but also for their demonstrated performance, objectivity, and ability to observe and to provide constructive comments. These evaluators are SPs, IPs, IEs, MEs, SIs, and FIs who assist the commander with ATP administration.

b. **Method of evaluation**. The method used to conduct the evaluation must be based on uniform and standard objectives. In addition, it must be consistent with the unit's mission and strictly adhere to the appropriate SOPs and regulations. The evaluator must ensure a complete evaluation is given in all areas.

c. **Participant understanding**. All participants must completely understand the purpose of the evaluation.

d. **Participant cooperation**. All participants must cooperate to guarantee the accomplishment of the evaluation objectives. The emphasis is on all the participants, not just the examinee.

e. **Identification (ID) of training needs**. The evaluation must produce specific findings to identify training needs. Any crewmember affected by the evaluation needs to know what is being performed correctly and incorrectly and how improvements can be made.

f. **Purpose of evaluation**. The evaluation determines the examinee's ability to perform essential hands-on/academic tasks to prescribed standards. The flight evaluation will also determine the examinee's ability to exercise crew coordination in completing these tasks.

g. **Aircrew coordination**. The guidelines for evaluating crew coordination are based on a subjective analysis of how effectively a crew performs collectively to accomplish a series of tasks. The evaluator must determine how effectively the examinee employs aircrew coordination, as outlined in chapter 6.

h. **Evaluator role as crewmember**. An evaluator will act as an effective crewmember unless evaluating the examinee on how to respond to the actions of an ineffective crewmember.

(1) In such cases, a realistic, meaningful and planned method should be developed to effectively pass this task back to the examinee. In all other situations, the evaluator must perform as outlined in the task description or as directed by the examinee to determine the examinee's level of proficiency; the evaluator may intentionally perform as an ineffective crewmember. In such cases, a realistic, meaningful, and planned method should be developed to pass this task back to the examinee effectively and avoid compromise of crew safety.

(2) During the flight evaluation, the evaluator will normally perform as outlined in the task description or as directed by the examinee. At some point, the evaluator may perform a role reversal with the examinee. The examinee must be informed of the initiation and termination of role reversals. The examinee must know when he or she is supported by a fully functioning crewmember.

Note. When evaluating a PC, SP, IP, IE, ME, UT, or IE, the evaluator must advise the examinee that, during role-reversal, the evaluator may deliberately perform some tasks or crew coordination outside the standards to check the examinee's diagnostic and corrective action skills.

3-2. GRADING CONSIDERATIONS.

a. **Academic evaluation**. The examinee must demonstrate a working knowledge and understanding of the appropriate subject areas in paragraph 3-4b.

b. **Flight evaluation.**

(1) Academic. Some training and evaluation requirements may be evaluated academically. For these tasks, the examinee must demonstrate a working knowledge of the tasks. Evaluators may use computer-based instruction, mock-ups, or other approved devices (to include the aircraft or FS/TFPS) to determine the examinee's knowledge of the tasks.

(2) Aircraft, FS, or TFPS. These tasks require evaluation in the aircraft, CH-47D FS, or CH-47F TFPS. Task standards are based on an ideal situation. Grading is based on meeting the minimum standards. The evaluator must consider deviations (high wind, turbulence, or poor visibility) from the ideal during the evaluation. If other than ideal conditions exist, the evaluator must make appropriate adjustments to the standards while grading the maneuvers.

3-3. **CREWMEMBER EVALUATION**. Evaluations are conducted to determine the crewmember's ability to perform the tasks on the CTL and check the understanding of required academic subjects. The evaluator will determine the time devoted to each phase. When the examinee is an evaluator/trainer or a UT, the recommended procedure is for the evaluator to reverse roles with the examinee. When the evaluator uses this technique, the examinee must understand how the role reversal will be conducted and when it will be in effect.

Note. Following an additional skill identifier producing course of flight instruction/school (such as the CH-47D/F IP, MP, IE, or FI course) Initial validation of a crewmember's qualifications will be conducted in the aircraft.

---

a. **Recommended performance and evaluation criteria**.

(1) PI. The PI must demonstrate a working knowledge of the subjects in paragraph 3-4b and perform selected tasks to ATM standard while applying aircrew coordination principles. In addition, the PI must be familiar with the individual aircrew training folder (IATF) and understand the requirements of DA Form 7120-R (Commander's Task List).

(2) PC/MP. The PC/MP must meet the requirements in paragraph 3-3a(1). In addition, the PC/MP must demonstrate sound judgment, maturity, and technical/tactical proficiency in the employment of the aircraft, unit mission, crew, and assets.

(3) UT. The UT must meet the requirements in paragraph 3-3a(2) or (8). In addition, the UT must be able to instruct in the appropriate tasks and subjects, recognize errors in performance or understanding, make recommendations for improvement, train to standards, and document training.

(4) IP or IE. The IP or IE must meet the requirements in paragraph 3-3a(2). In addition, the IP/IE must be able to objectively train, evaluate, and document performance of the UT, PC, PI, SI, FI, FE, and CE using role reversal as appropriate. This individual must possess a thorough knowledge of the fundamentals of instruction and evaluation, be able to develop and implement an individual training plan, and possess a thorough understanding of the requirements and administration of the ATP.

(5) SP/IE. The SP/IE must meet the requirements in paragraph 3-3a(2) and (4). The SP/IE must be able to train and evaluate SPs, IPs, IEs, UTs, PCs, PIs, SIs, and FIs using role reversal as appropriate. The SP must also be able to develop and implement a unit-training plan and administer the commander's ATP.

(6) ME. The ME must meet the requirements in paragraph 3-3a(2). The ME must be able to train and evaluate other MEs and MPs using role reversal as appropriate. The ME must possess a thorough knowledge of the fundamentals of instruction and evaluation.

(7) CE. The CE must demonstrate an understanding of conditions, standards, descriptions, and appropriate considerations on the CTL. The CE must perform selected tasks to ATM standards while applying aircrew coordination. The CE must also demonstrate a basic understanding of the appropriate academic subjects listed in paragraph 3-4b, be familiar with the IATF, and understand the requirements of the CTL.

(8) FE. The FE must meet the requirements in paragraph 3-3a(7). In addition, the FE must demonstrate

sound judgment and technical/tactical proficiency in the employment of the aircraft, unit mission, crew, and assets.

(9) FI. The FI must meet the requirements in paragraph 3-3a(8). In addition, the FI must be able to objectively train, evaluate, and document the performance of the NCM UTs, FEs, CEs, and observers (ORs) (aircraft maintenance personnel, technical OR, gunner, or other personnel performing duties requiring flight) as appropriate; be able to develop and implement an individual training plan; and have a thorough understanding of the requirements and administration of the ATP.

(10) SI. The SI must meet the requirements in paragraph 3-3a(10). In addition, the SI must be able to train and evaluate SIs, FIs, UTs, FEs, CEs, and ORs as appropriate; be able to develop and implement a unit-training plan; and administer the commander's ATP for NCMs.

Note. Evaluators/trainers will be evaluated on their ability to apply the fundamentals of instruction as outlined in paragraph 3-4b(12).

Note. During academic evaluations, evaluators should ask questions that address specific topics in each area and avoid those requiring laundry list-type answers. Questions should be developed as described in the IP handbook.

Note. In order for a SI to evaluate an FE, the SI must be a current and qualified FE.

---

b. **Academic evaluation criteria**.

(1) PFE. The SP/IP/SI/FI will evaluate appropriate subject areas in paragraph 3-4b.

(2) APART standardization/annual NVG evaluations. The SP/IP/SI/FI will evaluate a minimum of two topics from each applicable subject area in paragraph 3-4b.

(3) APART instrument evaluation. The IE will evaluate a minimum of two topics from the subject areas in paragraphs 3-4b(1) through 3-4b(5), relative to IFR and flight planning. If the evaluated crewmember is an IP/SP/IE, the IE will evaluate the ability of the IP/SP/IE to instruct instrument-related areas or subjects.

(4) APART MP/ME evaluation. The ME will evaluate a minimum of two topics from the applicable subject areas in paragraph 3-4b, emphasizing how they apply to MTFs.

(5) Other ATP evaluations. The SP/IP/SI/FI will evaluate appropriate subject areas in paragraph 3-4b.

3-4. **EVALUATION SEQUENCE**. The evaluation sequence consists of four phases–introduction, academic evaluation topics, flight evaluation, and debriefing. The evaluator will determine the amount of time devoted to each phase.

a. **Phase 1-Introduction.** In this phase, the evaluator—

(1) Reviews the examinee's individual flight record folder and IATF records to verify that the examinee meets all prerequisites for the designation and has a current DA Form 4186 (Medical Recommendation for Flying Duty).

(2) Confirms the purpose of the evaluation, explains the evaluation procedure, and discusses the evaluation standards and criteria to be used.

b. **Phase 2-Academic oral evaluation topics**.

(1) Regulations and publications. AR 95-1; AR 95-2; Federal Aviation Regulations (FARs); DA Pamphlet [DA Pam] 738-751; Department of Defense Flight Information Publication [DOD FLIP]); TC 3-04.11; TM 1-1500-328-23; TM 1-1520-240-23; TM 1-1520-240-10; TM 1-1520-271-23; TM 1-1520-271-10 chapters 5, 8 and 9; and local and unit SOPs). Topics in this subject area are—

- ATP, IATF/CTL requirements.
- Aircrew coordination.
- Airspace regulations and usage.
- Flight plan (FLPN) preparation and filing.
- Performance planning.
- Inadvertent instrument meteorological conditions (IIMC) procedures.
- Forms, records, and publications required in the aircraft.

- Unit SOP and local requirements.
- DOD FLIPs and maps.
- Visual flight rules (VFR)/IFR minimums and procedures.
- Risk management.
- Fuel requirements.
- Crew endurance (END).
- Weight and balance requirements.
- Maintenance forms and records.
- Aviation life support equipment (ALSE).

(2) Aircraft systems, avionics, mission equipment description and operation (TM 1-1520-240-10, chapters 2, 3, and 4; and TM 1-1520-271-10, chapters 2, 3, and 4). Topics in this subject are—

- Engines (ENGs) and related systems.
- Emergency (EMERG) equipment.
- Transponder.
- Fuel system.
- PWR train system.
- Flight control hydraulic (FLT CONTR HYD) system.
- Utility (UTIL) hydraulic system.
- Rotor system.
- Flight instruments.
- Auxiliary power unit (APU).
- Lighting.
- Aircraft survivability equipment (ASE).
- Servicing, parking, and mooring.
- Cargo handling systems.
- Mission equipment.
- Armament.
- Avionics.
- Advanced flight control system (AFCS)/IF digital advanced flight control system (DAFCS).
- Heating, ventilation, cooling, and environmental control unit.
- Electrical PWR supply and distribution system.

(3) Operating limitations and restrictions (TM 1-1520-240-10, chapters 4, 5, 6, 7 and 8; TM 1-1520-271-10, chapters 4, 5, 6, 7 and 8; IETM EM-0199; TM 1-1560-312-10; and TM 55-1560-307-13&P). Topics in this subject area are—

- Wind limitations.
- Rotor limitations.
- Power limitations.
- Engine limitations.
- Aircraft system limitations.
- Airspeed limitations.
- Temperature limitations.
- Loading limitations.
- Weapon system limitations.
- Maneuvering limits.
- Flight envelope limitations (such as extended range fuel system [ERFS]), cargo/rescue hoist/winch, and external [sling]/internal load[s] operations).
- Weather requirements.
- Environmental limitations/restrictions.

(4) Aircraft EP and malfunction analysis (TM 1-1520-271-10, chapter 9; and TM 1-1520-240-10). Topics in this subject area are—

- Emergency terms and their definitions.

- Engine malfunctions.
- Fires.
- Hydraulic system malfunctions.
- Landing and ditching procedures.
- Mission equipment malfunctions.
- Rotor, transmission and drive-train system malfunctions.
- Emergency exits and equipment.
- Chip detectors (DET).
- Fuel system malfunctions.
- Electrical system malfunctions.
- Flight control malfunctions.
- AFCS/DAFCS malfunctions.

(5) Aeromedical factors (AR 40-8, field manual [FM] 3-04.301, and FM 3-04.203). Topics in this subject area are—

- Flight restrictions due to exogenous factors.
- Stress and fatigue.
- Spatial disorientation.
- Altitude psychology.
- Hypoxia.
- Middle ear discomfort.
- Principles and problems of vision.

(6) Aerodynamics (FM 3-04.203, TM 1-1520-240-10, and TM 1-1520-271-10). This subject area applies only to RCMs. Topics in this subject area are as follows—

- Attitude and heading control.
- Dissymmetry of lift.
- In-ground effect (IGE)/out-of-ground effect (OGE) hovering flight.
- Characteristics of dynamic roll over.
- Retreating blade stall.
- Settling with power.
- Types of drag.

(7) Night mission operations in FM 3-04.203. Topics in this subject area are—

- Unaided night flight.
- Visual illusions.
- Distance estimation and depth perception.
- Dark adaptation, night vision protection, and central night blind spot.
- Night vision limitations and techniques.
- Types of vision.
- Use of internal and external lights.
- Night terrain interpretation, map preparation, and navigation.

(8) Tactical and mission operations (FM 3-04.111; FM 3-04.126; FM 55-450-2; FM 4-20.197; FM 4-20.198; FM 4-20.199; FM 3-52; Army Tactics, Techniques and Procedures [ATTP] 3-18.12; FM 3-04.203; the commander's ATP; TM 1-1520-240-10; TM 1-1520-271-10; and the unit SOP). Topics in this subject area are—

- CBRNE operations.
- ASE employment.
- Downed aircraft procedures.
- Aircraft armament subsystems.
- Communication security (COMMSEC).
- Mission equipment.
- Internal load(s) operations.
- Aviation mission planning.

- Fratricide prevention.
- Evasive maneuvers.
- Cargo/rescue hoist operations.
- External (sling) load(s) operations.
- High-intensity radio transmission area.
- (9) Weapon system operation and deployment (FM 3-04.126, FM 3-04.140, TM 1-1520-240-10, TM 1-1520-271-10, and unit SOP). Topics in this subject area are:
- Weapons initialization, arming and safety.
- Operation and function of the M60D/M240.
- Visual search and target detection.
- Duties of the door gunner (DG).
- Range estimation.
- Fire and employment techniques.
- Weapons employment during night and NVD operations.

(10) NVG operations (FM 3-04.140, FM 3-04.203, TM 1-1520-240-10, TM 11-5855-263-10, TM 1-1520-271-10, NVG TSP, and unit SOP). Topics in this subject area are—

- Nomenclature, characteristics, limitations and operations.
- NVG aircraft modifications.
- Mission planning.
- Effects on distance estimation and depth perception.
- ANVIS HUD operations.
- NVG ground and air safety.
- Tactical operations, to include lighting.
- Use of internal and external lights.
- Terrain interpretation, map preparation, and navigation.

(11) ME and MP systems topics: aircraft systems , avionics, mission equipment description and operation, systems malfunctions analysis and troubleshooting (TM 1-1520-240-10, integrated electronic technical manual (IETM) 1-1520-240-23&P, TM 1-1520-240-MTF, TM 1-1520-271-10, IETM 1-1520-271-23&P, TM 1-1520-271-MTF, TM 1-2840-248-23, TM 11-1520-240-23, TM 11-1520-240-23P, IETM 11-1520-271-23&P, AR 750-1, AR 700-138, TC 3-04.7, DA PAM 738-751, and TM 1-1500-328-23). Topics in this subject area are for MEs and MPs only:

- Local airspace usage.
- Engine start.
- MTF Wx requirements.
- MTF Forms and records.
- Electrical system.
- APU.
- Power plant.
- Powertrain.
- Flight controls.
- Fuel system.
- Maintenance operational checks (MOCs)/MTF requirements.
- Power assurance checks (PACs).
- Communication and navigation equipment.
- D Instrument indications/F CAAS functionality and instrument indication.
- D Master caution panel/F warning, caution and advisory system indications.
- Engine performance check.
- Hydraulic systems (flight and UTIL).
- Vibrations.
- AFCS/DAFCS.
- Hydraulic systems and leak detection isolation.

(12) SP, IP, IE, UT, SI, and FI evaluator/trainer topics (TC 3-04.11 and IP handbook). Topics in this subject area are—

- Learning process.
- Effective communication.
- Teaching methods.
- Flight instruction techniques.
- Human behavior.
- Teaching process.
- The instructor as a critic.
- Planning instructional activity.
- Instructional aides.
- Critique and evaluation.
- Techniques of flight instruction.
- Effective questions.

c. **Phase 3-Flight evaluation.** If this phase is required, the following procedures apply.

(1) Briefing. The evaluator will explain the flight evaluation procedure and brief the examinee in the tasks to be evaluated. When evaluating an evaluator/trainer, the evaluator **must** advise the examinee that during role-reversal, the evaluator may deliberately perform some tasks outside standards to check the examinee's diagnostic and corrective action skills. The evaluator will conduct or have the examinee conduct a crew briefing IAW Task 1000 and the unit's approved aircrew briefing CL.

(2) Preventive maintenance daily (PMD), preflight inspection, Eng-start, run-up procedures, ENG ground operations, and before-takeoff checks. The evaluator will evaluate the examinee's use of TM 1-1520-240-10, TM 1-1520-240-CL, TM 1-1520-240-MTF, TM 1-1520-271-10, TM 1-1520-271-CL, TM 1-1520-271-MTF, and IETM-related maintenance publications, as appropriate. The evaluator will have the examinee identify and discuss the function of at least two aircraft systems.

(3) Flight tasks. At a minimum, the evaluator will evaluate those tasks designated by this ATM, tasks listed on the CTL as mandatory for the designated crew station(s) for the type of evaluation the evaluator is conducting and those mission/additional tasks selected by the commander. During the APART instrument evaluation, one approach must be performed coupled and one approach un-coupled for CH-47F RCMs. In addition to the commander-selected tasks, the evaluator may evaluate any task performed during the evaluation as long as the task is listed on the crewmember's CTL. An IP, SP, ME, IE, UT, FI, and SI must demonstrate an ability to instruct and evaluate appropriate flight tasks. At a minimum under Task 1070, the following EPs must be conducted during this evaluation in the aircraft while occupying a station with access to the flight controls. These EPs can be performed concurrently:

- SE failure at altitude.
- ENG or fuselage fire–inflight.
- **D** ENG XMSN hot.
- **F** ENG 1 or ENG 2 XMSN warning.

Note. During instrument training and instrument flight evaluations, the aviator's vision may be restricted to the aircraft instruments at the discretion of the evaluator when the aircraft is not under actual IMC. The appropriate flight symbol will be logged on DA Form 2408-12 (Army Aviator's Flight Record).

---

(4) ENG shutdown and after-landing tasks. The evaluator will evaluate the examinee's use of TM 1-1520-240-10, TM 1-1520-240-CL, TM 1-1520-240-MTF, TM 1-1520-271-10, TM 1-1520-271-CL, TM 1-1520-271-MTF, and IETM/related maintenance publications as appropriate.

d. **Phase 4-Debriefing.** During this phase of the evaluation, the evaluator will—

(1) Advise the examinee whether they passed or failed the evaluation and discuss any tasks not performed to standards.

(2) Discuss the examinee's strengths and weaknesses.

(3) Offer recommendations for improvement.

(4) Inform the examinee of any restrictions, limitations, or revocations the evaluator will recommend to the commander following an unsatisfactory evaluation.

(5) Complete the applicable forms and ensure the examinee reviews and initials the appropriate forms.

Note. A training plan will be approved by the commander for the crewmember to allow them to regain proficiency in tasks that were evaluated as unsatisfactory.

3-5. ADDITIONAL EVALUATIONS.

a. **CBRNE evaluation.** This evaluation is conducted IAW TC 3-04-11.

b. **Gunnery evaluation.** This evaluation is conducted IAW FM 3-04.140, DA Pam 350-38, or the applicable weapons system manual and the unit SOP.

c. **No-notice, post-mishap flight evaluations, and medical flight evaluations.** These evaluations will be conducted IAW AR 95-1.

Chapter 4

Crewmember Tasks

This chapter describes the tasks, maneuvers, and procedures that are essential for maintaining crewmember skills. It defines the task title, number, conditions, and standards by which performance is measured. A description of crew actions, along with training and evaluation requirements, is also provided. It does not contain all the maneuvers that can be performed in the aircraft.

4-1. TASK CONTENTS.

a. **Task number.** Each ATM task is identified by a 10-digit systems approach to training number. The first three digits of each task - are 011 (U.S Army Aviation School) and 960 (EAATS [NGB]); the second three digits are 240 or 271 (CH-47D or CH-47F cargo helicopter). For convenience, only the last four digits are listed in this TC for task ID and series. The last four digits are as follows:

- Base tasks: 1000-series numbers.
- Mission tasks: 2000-series numbers.
- Additional tasks: 3000-series numbers.
- Maintenance tasks: 4000-series numbers.

Note. Additional tasks designated by the commander as mission essential are not included in this ATM. The commander will develop conditions, standards and descriptions for those additional tasks and assign a 3000-series number.

---

b. **Task title.** The task title identifies a clearly defined and measurable activity. Titles may be the same in several ATMs, but tasks may be written differently for the specific aircraft.

c. **Conditions.** This specifies the common conditions under which the task will be performed. Conditions include common conditions listed below and may include task-specific conditions. Conditions describe important aspects of the performance environment. All conditions must be met before task iterations can be credited. References to CH-47 helicopters apply to both CH-47D and CH-47F series helicopters. Reference will be made to a particular helicopter within a design series, when necessary. Reference to the CH-47 FS or CH-47F TFPS in the conditions does not apply to NCMs.

(1) Common conditions are:

(a) In a mission aircraft with mission equipment and crew, items required by AR 95-1; AR 95-2; FARs; DA Pam 738-751; DOD FLIPs; the commander's ATP; TM 1-1520-240-23; TM 1-1520-240-10; TM 1-1520-271-23; TM 1-1520-271-10, chapters 5, 8, and 9; and local and unit SOPs.

(b) Under VMC or IMC.

(c) Day, night and NVD employment.

(d) In any terrain or climate.

(e) CBRNE (including MOPP-4) equipment employment.

(f) Electromagnetic environmental effects.

(2) Common training/evaluation conditions are:

(a) When a UT, SP, IE, IP, or ME is required for the training of the task, that individual will be at one set of flight controls during training. References to IP in the task conditions include SP. References to FI in the task conditions include SI. Evaluators/trainers who are evaluating/training NCMs must be at a station without access to the flight controls, except when evaluating crew coordination or conducting a local orientation flight.

(b) The following tasks require an SP, IE, or IP for training/evaluation in the aircraft with access to the flight controls. If the IE is not also an IP or SP, the IE may only perform the ENG failure EP and Task 1182 and must be trained and evaluated by an SP or IP on those tasks.

- Task 1070, Respond to Emergencies.
- Task 1182, Perform Unusual Attitude Recovery.

(c) Unless otherwise specified in the conditions, all inflight training/evaluations will be conducted under VMC. IMC denotes flight solely by reference to flight instruments. Wearing a vision-limiting device will be utilized when RCMs are logging hood time on DA Form 2408-12.

(d) Unless specified in the task considerations, a task may be performed in any mode of flight without modifying the standards or descriptions. When personal equipment (NVG, CBRNE/MOPP-4, HUD, and so forth) or mission equipment (water bucket, ERFS, rescue-hoist/winch) is required for the performance of the task, equipment availability becomes part of the conditions.

(e) Base tasks requiring specialized equipment do not apply to aircraft that do not have the equipment.

(f) NVG use may be a condition for any flight task. When NVG are listed as a condition, task standards will be the same as those described for performance of the task without using NVG.

(g) The aircrew will not attempt the tasks or task elements listed below when performance planning and the HVR PWR check indicates that OGE PWR is not available (AVAIL):

- Task 1063, Perform External (Sling) Load(s) Operations.
- Task 1170, Perform Instrument Takeoff.
- Task 1408, Perform Terrain Flight.
- Task 1411, Perform Terrain Flight Deceleration.
- Task 2052, Perform Water Bucket Operations.
- Task 2054, Perform Fast-Rope Insertion and Extraction Operations.
- Task 2056, Perform Rappelling Operations.
- Task 2058, Perform Special Patrol Infiltration/Exfiltration Operations.
- Task 2059, Perform Rescue-Hoist/Winch Operations.
- Task 2068, Perform Shipboard Operations.
- Task 2076, Perform Caving Ladder Operations
- Task 2125, Perform Pinnacle/Ridgeline Operations.
- Task 2127, Perform Combat Maneuvering Flight.
- Any task requiring hovering flight in OGE conditions.

(h) The following actions **cannot** be performed in the aircraft except in an actual emergency:

- Touchdown autorotation.
- Roll-on landing to water.
- SE takeoff from the ground. (MPs/MEs are authorized to conduct torque [TQ] differential check as required by the appropriate MTF.)
- Actual ENG stoppage inflight or while taxiing.
- Power transfer unit (PTU) switches "ON" or "No.1 or No.2 HYD CONTR" switches out of the both position while taxiing or flying.
- Both engine condition levers (ECLs) are out of the flight position while taxiing or flying.
- Bus-tie relay disabled or gang bar placed down.
- APU operations during taxiing or flying.
- Jettison of external (sling) load(s).
- EMERG descent.
- Dual full authority digital engine control (FADEC) primary (PRI) and/or reversionary (REV) failure (dual PRI failure both ENGs operating in REV may be performed by Directorate of Evaluation and Standardization [DES] trained SPs, IPs, or MEs at USAACE, EAATS and other DA-approved training sites).
- ECL(s) out of flight position with No.1 or No.2 ENG FADEC switch(s) in REV.

- ENG shutdown with APU inoperative.
- Dual generator (GEN) failure.
- Dual rectifier (RECT) failure.
- AFCS/DAFCS–OFF/External (sling) Load(s) Hook-up.
- AFCS/DAFCS–OFF/Combat Maneuvering Flight.
- AFCS/DAFCS–OFF/Fast-Rope Insertion and Extraction Operations.
- AFCS/DAFCS–OFF/Rappelling Operations.
- AFCS/DAFCS–OFF/Special Patrol Infiltration/Exfiltration Operations.
- AFCS/DAFCS–OFF/Rescue-Hoist/Winch Operations.
- AFCS/DAFCS–OFF/Caving Ladder Operations.
- AFCS/DAFCS–OFF/Shipboard Operations.
- Embedded GPS–INU (inertial navigation unit) EGI 1 and EGI 2 failure.

d. **Standards.** The standards describe the minimum degree of proficiency or standard of performance to which the task must be accomplished. The terms "without error," "properly," and "correctly" apply to all standards. The standards are based on ideal conditions. Many standards are common to several tasks. Individual trainer, instructor, or evaluator pilot techniques are not standards and are not used. Unless otherwise specified in the individual task, the following common standards apply. Alternate or additional standards will be listed in individual tasks. Standards unique to the training environment for conditions are established in the training considerations section of each task. (F) For the purposes of this publication, flight controls neutralize remains the same as a CH-47D with the exception of cyclic position is 1½ inches aft of zero on the stick position indicator and the use of AFCS and DAFCS are synonymous.

(1) All tasks.

(a) Do not exceed aircraft limitations.

(b) Perform crew coordination actions IAW chapter 6.

(c) Apply the appropriate night and environmental task considerations when performing the task under those conditions.

(2) Takeoff.

(a) Take off from unimproved surfaces, the NCM will call the aircraft altitude from the ground to 10 feet in 1-foot increments.

(b) Takeoff from unimproved surfaces, the P will call the aircraft altitude above highest obstacle (AHO) at 25 feet, 50 feet, 75 feet, and 100 feet.

(3) Hover.

(a) Maintain heading, ±10 degrees.

(b) Maintain altitude, ±3 feet.

(c) Do not allow drift to exceed 5 feet.

(d) Maintain a constant rate of movement appropriate for existing conditions.

(e) Maintain ground track with minimum drift.

(f) NCM(s) will announce all drift/altitude changes.

(4) Inflight.

(a) Maintain heading, ±10 degrees.

(b) Maintain altitude, ±100 feet.

(c) Maintain airspeed, ±10 knots indicated airspeed (KIAS) CH-47D/knots calibrated airspeed (KCAS) CH-47F.

(d) Maintain ground track with minimum drift.

(d) Maintain rate of climb (R/C) or descent, ±200 feet per minute (FPM).

(e) Maintain the aircraft in trim.

(f) F Ensure the flight direct cues are continuously updated and displayed appropriately when utilized.

(5) Approach.

(a) Approaching unimproved surfaces, the P will call the aircraft altitude AHO at 100 feet, 75 feet, 50 feet, 25 feet, and 10 feet.

(b) Landing to unimproved surfaces, the NCM will call the aircraft altitude from 10 feet to the ground in 1-foot increments.

(6) All tasks with the APU/ENGs operating (RCMs and NCMs).

(a) Maintain airspace surveillance (Task 1026).

(b) Apply appropriate environmental considerations.

(c) Perform crew coordination actions IAW chapter 6.

e. **Description.** The description explains the preferred method for accomplishing the task to meet the standards. This manual cannot address all situations; therefore, alternate procedures may be required. Other techniques may be used, as long as the task is accomplished safely and the standards are met. The description applies in all modes of flight during day, night, IMC, NVG, or CBRNE operations. When specific crew actions are required, the task will be broken down into crew actions and procedures as follows:

(1) Crew actions. These define the portions of a task performed by each crewmember to ensure safe, efficient and effective task execution. The designations "Pilot on the controls (P*)" and "Pilot not on the controls (P)" do not refer to PC duties. When required, PC responsibilities are specified. For all tasks, the following responsibilities apply.

(a) All crewmembers perform crew coordination actions; announce malfunctions or emergency conditions, monitors engines/systems operations and avionics (navigation/communication), as necessary. During VMC, crewmembers will focus attention primarily outside the aircraft, maintain airspace surveillance and clear the aircraft. Provide timely warning of traffic and obstacles by announcing the type of hazard, direction, distance and altitude, (relative to the aircraft). Crewmembers also announce when attention is focused inside the aircraft (except for momentary scans) and announce when attention is focused outside the aircraft.

(b) PC. The PC is responsible for the conduct of the mission and for operating, securing and ensures that the FE/CE has serviced the helicopter. The PC ensures a crew briefing is accomplished, and the mission is performed IAW the mission briefing, air traffic control (ATC) instructions [Federal Aviation Administration (FAA) Order 7110.65R], regulations, and SOP requirements.

(c) PI/FE/CE. The PI/FE/CE is responsible for completing tasks as assigned by the PC.

(d) P*. The P* is responsible for aircraft control, obstacle avoidance, and the proper execution of EPs. The P* will announce any deviations and the reason, from instruction issued. The P* will announce changes in altitude, attitude, airspeed, or direction.

(e) P. The P is the mission manager responsible for navigation, inflight computations, manipulating [F] common avionics architecture system (CAAS), assisting the P* as requested, and the proper execution of EPs. When duties permit, he or she assists the P* with obstacle clearance.

(f) FE(s)/CE(s). The FE(s)/CE(s) are responsible for maintaining airspace surveillance, traffic and obstacle avoidance, safety/security of passengers and equipment, and properly executing EPs. They also provide assistance to the P* and P as required. FE(s)/CE(s) are responsible for the maintenance of their assigned aircraft.

(g) Trainer/evaluator. When acting as pilot during training and evaluations, the trainer/evaluator will act as a functioning crewmember and perform as required, unless he or she is training or evaluating crewmember response to an ineffective crewmember. In the aircraft, the trainer/evaluator will ensure safe landing areas are available for ENG failure training and that aircraft limits are not exceeded.

Note. When the CH-47D/F crew consists of one NCM and two RCMs, the NCM must be an RL 1 FE.

---

(2) Procedures. This section explains the portions of a task accomplished by an individual or crew.

f. **Other considerations.** This section defines considerations for task accomplishment under various flight modes (for example, night or NVG) and environmental conditions (such as snow/sand/dust and mountain/pinnacle/ridgeline operations). Crewmembers must consider additional aspects to a task when performing it in different environmental conditions. The inclusion of environmental considerations in a task does not relieve the commander of the requirement for developing an environmental training program IAW TC 3-04.11. Specific requirements for different aircraft or mission equipment (for example, bucket or ERFS) may also be addressed as a consideration. Training considerations establish specific actions and standards used in the training environment.

(1) Night and NVG. Wires and other hazards are much more difficult to detect and must be accurately marked and plotted on maps. Use proper scanning techniques to detect traffic and obstacles and to avoid spatial disorientation. The P should make all internal checks (such as computations and frequency changes). Visual barriers (so difficult to view that a determination cannot be made whether or not they contain barriers or obstacles) will be treated as physical obstacles. Altitude and ground speed are difficult to detect; therefore, artificial illumination may be necessary. Determine the need for artificial lighting before descending below barriers. Adjust search/landing light for best illumination angle without causing excessive reflection into the cockpit. Entering IMC with artificial illumination may induce spatial disorientation. Cockpit controls will be more difficult to locate and identify; take special precautions to identify and confirm the switches and levers.

(2) Night unaided. Use of white light or weapons flash will impair night vision. The P* should not directly view white lights, weapons flash or impact. Allow time for adapting to dark or, if necessary, adjust altitude and airspeed until adapted. Exercise added caution if performing flight tasks before reaching full dark adaptation. Dimly visible objects may be more easily detected using peripheral vision (off center viewing) and may tend to disappear when viewed directly.

(3) NVD. Use of NVDs degrades distance estimation and depth perception. Aircraft inflight may appear closer than they actually are due to the amplification of external lights and the lack of background objects to assist in distance estimation and depth perception. If possible, confirm the distance unaided. Weapons flash may temporarily impair or shut down NVDs.

g. **Training and evaluation requirements.** Training and evaluation requirements define whether the task will be trained or evaluated in the aircraft, FS/TFPS or academic environment. Listing aircraft/FS/TFPS under the evaluation requirements does not preclude the evaluator from evaluating elements of the task academically to determine depth of understanding or planning processes. Some task procedures allow multiple ways to achieve the standards.

h. **References.** The references are sources of information relating to that particular task. Certain references apply to many tasks. In addition to the references listed with each task, the following common references apply as indicated.

(1) All flight tasks (tasks with APU/ENGs operating).

(a) AR 95-1.

(b) FM 3-04.203.

(c) FM 1-230.

(d) TM 1-1520-240-10/TM 1-1520-240-CL/TM 1-1520-240-MTF.

(e) TM 1-1520-271-10/TM 1-1520-271-CL/TM 1-1520-271-MTF.

(f) DOD FLIP.

(g) FAR/Host country regulations.

(h) Unit/local SOPs.

(i) Aircraft logbook.

(2) All instrument tasks.

(a) AR 95-1.

(b) FM 3-04.240.

(c) FAA-H-8083-15.

(d) DOD FLIPs.

(e) Aeronautical information manual (AIM).

(f) FARs/host country regulations.

(3) All tasks with environmental considerations are address in FM 3-04.203.

(4) All tasks used in a tactical situation.

(a) TC 3-04.11.

(b) TC 21-24.

(c) FM 3-04.113.

(d) FM 3-04.140.

(e) FM 3-04.111.

4-2. TASK LIST.

a. **Standards versus descriptions.** The standards describe the minimum degree of proficiency or level of performance to which the task must be accomplished. Attention to the use of the words "will," "should," "shall", "must", "may" or "can" throughout the text of a task standard is crucial. The description explains one or more recommended techniques for accomplishing the task to meet the standards.

b. **Critical task.** The following numbered tasks are CH-47D/F crewmember critical tasks.

TASK 1000

Participate in a Crew Mission Briefing

CONDITIONS: Prior to flight in a CH-47D/F helicopter and given DA Form 5484 (Mission Schedule/Brief) information and a unit-approved crew briefing CL.

STANDARDS: Appropriate common standards and the following additions/modifications:

1. The PC will acknowledge an understanding of DA Form 5484 and will actively participate in a crew mission briefing.
2. The PC will conduct or supervise a crew mission briefing using table 4-1 or a more detailed unit-approved crew briefing CL.
3. Crewmembers receiving the briefing will verbally acknowledge a complete understanding of the aircrew mission briefing.

Table 4-1. Sample aircrew briefing checklist

1. Crew introduction/qualifications.
2. Required items: Publications, ID tags, ALSE, personnel and mission equipment.
3. Mission overview, flight route, time line, and AR 95-10 DOD notices to airmen (NOTAM) system/air coordination order.
4. Weather (departure, en route, destination and void time).
5. Formation/multi-aircraft operations.
6. Tactical considerations, rules of engagement (ROE), weapon engagement rules, weapon status and ID, friend or foe (IFF), combat search and rescue (CSAR) terms, evasion plan.
7. External (sling) load(s) operations.
8. Airspace surveillance procedures/visual sectors/third pilot duties (Task 1026).
9. Analysis of the aircraft.
   a. F Mission data loaded if required; Logbook and preflight deficiencies.
   b. Performance planning.
      - Re-computation of performance planning card (PPC), if necessary.
      - Single engine capability–Best SE (Maximum [MAX] R/C) indicated airspeed (IAS) and minimum/MAX SE IAS.
      - GO/NO-GO data and validation factor.
   c. Mission deviations required based on aircraft analysis.
10. Crew actions, duties and responsibilities.
   a. Transfer of flight controls, command select and two challenge rules.
   b. Emergency actions.
      - Actions to be performed by P*, P, and NCM.
      - Emergency equipment/first aid kits/survival kits/evasion and escape kits.
      - Egress procedures and rendezvous point.
      - IIMC, NVG failure.
      - Mission considerations. Threat situation EMERG squawk/communication, zeroize equipment, disable aircraft and collect/destroy classified materials, weapons security.
11. General crew duties.
   a. P*.
      - Fly the aircraft–Primary focus outside when VMC, inside when IMC.
      - Avoid traffic and obstacles.

Table 4-1. Sample aircrew briefing checklist

- Cross-check system and instruments.
- Monitor/transmit on radio(s) as directed by the PC.

b. P.

- Assist in traffic and obstacle avoidance.
- Tune radios and set transponder.
- Navigate and (F) perform crew station mission management.
- Copy clearances, automated terminal information service, and other information.
- Cross-check system and instruments.
- Monitor/transmit on radio(s) as directed by the PC.
- Read and complete CL items as required.
- Announce when focused inside.

c. FE, CE, and other assigned crewmembers.

- Complete passenger brief.
- Secure passengers and cargo.
- Assist in traffic and obstacle clearance.
- Perform other duties assigned by the PC.

12. Crew-level after action review (AAR)–Time and location.

13. Crewmembers' questions, comments, and acknowledgment of mission briefing.

DESCRIPTION:

1. Crew actions.

   a. A designated briefing officer will provide a thorough and detailed mission brief to the PC IAW AR 95-1. The PC will acknowledge a complete understanding of the mission brief and initial DA Form 5484.

   b. The PC has overall responsibility for the crew mission briefing. The PC may direct other crewmembers to perform all or part of the brief.

   c. Crewmembers will direct their attention to the crewmember conducting the briefing. They will address questions to the briefer and acknowledge understanding of the assigned actions, duties and responsibilities. Lessons learned from previous debriefings should be addressed during the crew briefing, as applicable. If two or more NCMs will perform flight duties, the PC will brief them on their individual responsibilities.

2. Procedures. Brief the mission using a unit-approved crew mission briefing CL. At the minimum, brief the NCM crew briefing CL using the items shown in table 4-2, page 4-9. Other items may be added as necessary as outlined by unit SOP. Identify mission and flight requirements that will demand effective communication and proper sequencing and timing of actions by the crewmembers.

Note. The FE is responsible for ensuring all NCMs performing crew duties are briefed on their duties.

Note. A safety harness will be worn by all NCM and secured to a 5,000-pound or 10,000-pound tie-down or static line, when performing crew duties. A seat belt will be worn at all times when seated unless it interferes with crew duties.

Table 4-2. Sample nonrated crewmember briefing checklist

1. Power assurance test (PAT) check procedures.
2. Aircraft run-up responsibilities.
    a. Aft NCM responsibilities.
    b. Forward NCM responsibilities.
3. Required items, mission equipment and personnel.
4. Mission task special considerations.
5. Crew actions, duties and responsibilities.
    a. Sectors of responsibility–Assist in traffic and obstacle avoidance.
    b. Cruise check(s) responsibilities.
    c. Emergency actions.
        - Mission considerations.
        - Emergency action with external (sling) load(s).
        - Actions performed by FE and CE.
    d. Perform other duties assigned by the PC.
    e. Hot/closed circuit refueling.
6. Tactical flight.
    a. Terrain flight duties.
    b. Landing area reconnaissance.
    c. Slope operations.
    d. External (sling) load(s) procedures.
7. Shut down procedures.
8. Post flight procedures.
9. NCM questions, comments and acknowledgment of NCM mission briefing.

TRAINING AND EVALUATION REQUIREMENTS:

1. Training will be conducted in the aircraft or academically.
2. Evaluation will be conducted in the aircraft or academically.

REFERENCES: Appropriate common references, FM 3-04.300, and DA Form 5484.

TASK 1001

Administer Flight Evaluation

CONDITIONS: In a CH-47D/F helicopter with an evaluator (SP/IP/IE/ME/SI/FI) and an evaluation scenario given by the evaluator.

STANDARDS: Appropriate common standards and the following additions/modifications:

1. Conduct an evaluation IAW chapter 3.
2. Evaluate tasks to ATM standards.
3. Conduct debrief, and determine status of the aviator as required.
4. Ensure appropriate entries are made on DA Form 7122-R (Crew Member Training Record) as required.

DESCRIPTION:

1. The evaluator administering the evaluation will receive a scenario in which a flight evaluation is to be performed. The evaluator will complete an evaluation using role reversal as one tool in order to demonstrate knowledge of the procedures in the ATM.
2. The evaluator will conduct an evaluation IAW this ATM and determine the pilot's level of knowledge in the appropriate subject areas and ATM tasks. During the evaluation the evaluator will apply the principles of flight instruction in chapter 3.
3. Once the training is completed, the evaluator, as a minimum, will debrief the pilot on those maneuver/procedures which were performed unsatisfactory. The evaluator will then determine recommendations for the commander on the aviator's status in the ATP and formulate a training plan as required. The evaluated trainer will determine appropriate entries for the DA Form 7122-R as required.

TRAINING AND EVALUATION REQUIREMENTS:

1. Training will be conducted in the aircraft, CH-47 FS/TFPS or academically.
2. Evaluation will be conducted in the aircraft or CH-47 FS/TFPS.

REFERENCES: Appropriate common references.

TASK 1002

Conduct a Passenger Briefing

CONDITIONS: Given the applicable operator's manual or unit-approved passenger briefing and information about the mission.

STANDARDS: Appropriate common standards and the following additions/modifications: Without omissions, conduct the briefing as directed by the PC using an approved CL.

DESCRIPTION: When directed by the PC, conduct applicable portions of the passenger briefing IAW the CL and the unit SOPs. Examples of briefing items are:

1. Proper direction to approach and depart the aircraft.
2. Location of EMERG entrances, exits and equipment.
3. Use of seat belts.
4. Location and general use of survival equipment.
5. Security of equipment.

Note. Chapter 8 of the appropriate operator's manual contains a detailed passenger briefing CL.

TRAINING AND EVALUATION REQUIREMENTS:

1. Training will be conducted in the aircraft or academically.
2. Evaluation will be conducted in the aircraft or academically.

REFERENCES: Appropriate common references.

TASK 1003

Conduct Flight Instruction

CONDITIONS: In a CH-47D/F helicopter with an IP/SI/ME/UT and training scenario given by the instructor.

STANDARDS: Appropriate common standards and the following additions/modifications:

1. Determine appropriate training plan.
2. Conduct academic training as necessary.
3. Conduct flight training utilizing fundamentals of instruction.
4. Conducts review and critique.
5. Determine appropriate entries are made on DA Form 7122-R, as required.

DESCRIPTION:

1. The trainer will brief the trainee on the training to be conducted. The trainer will conduct academic training as necessary.

2. Once the training is completed, the trainer will conduct a debriefing on the maneuvers/procedures trained. The trainer will determine the appropriate entries to be made in the trainees IATF.

TRAINING AND EVALUATION REQUIREMENTS:

1. Training will be conducted in the aircraft or academically.
2. Evaluation will be conducted in the aircraft.

REFERENCES: Appropriate common references.

TASK 1004

Plan a Visual Flight Rules Flight

CONDITIONS: Prior to VFR flight in a CH-47D/F helicopter, given access to Wx information; NOTAMs, flight planning aids, necessary charts, forms, publications and weight and balance information.

> ***Note.*** For all updated NOTAMs log on the primary web site: https://www.notams.jcs.mil/dinsQueryWeb/ or alternate web site: http://www.faa.gov/air_traffic/publications/notices/.

STANDARDS: Appropriate common standards and the following additions/modifications:

1. Determine if the aircrew and aircraft are capable of completing the assigned mission.
2. Determine if the flight can be performed under VFR IAW AR 95-1, applicable FARs/host-nation regulations, local regulations, and SOPs.
3. Determine the departure, en route and destination procedures IAW AR 95-1, applicable FARs/host-nation regulations, local regulations, and SOPs.
4. Select route(s) and altitudes that avoid hazardous Wx conditions. Do not exceed aircraft or equipment limitations and if appropriate, select altitude conforming to VFR cruising altitudes IAW DOD FLIP.
5. For cross-country flights, determine the distance ±1 nautical mile (NM), ground speed ±5 knots and estimated time en route (ETE) ±1 minute (MIN) for each leg of the flight. Compute magnetic headings ±5 degrees.
6. Determine the fuel required for the mission IAW AR 95-1, ±100 pounds.
7. Verify that the aircraft will remain within weight (WT) and center of gravity (CG) limitations for the duration of the flight IAW the appropriate operator's manual.
8. Verify aircraft performance data and ensure that PWR is AVAIL to complete the mission IAW the appropriate operator's manual.
9. Complete and file the FLPN IAW AR 95-1 and DOD FLIP.
10. Perform mission risk assessment IAW unit SOP.

DESCRIPTION:

1. Crew actions.
   a. The PC may direct other RCM to complete some elements of the VFR flight planning.
   b. The other RCM will complete the assigned elements and report the results to the PC.
   c. The PC will ensure all crewmembers are current, qualified and the aircraft is properly equipped to accomplish the assigned mission.
2. Procedures.
   a. Using appropriate military, FAA, or host-country weather facilities, obtain required flight Wx information. After ensuring that the flight can be completed under VFR IAW AR 95-1, check NOTAMs, chart(s) update manual and other appropriate sources for any restrictions or uncharted obstacles that apply to the flight. Obtain navigational charts that cover the entire flight area and allow for routing changes due to the Wx/terrain.
   b. Select the course(s) and altitude(s) that will best facilitate mission accomplishment.
   c. Determine the magnetic heading, ground speed and ETE for each leg to include the alternate airfield if required.
   d. Compute total distance, flight time and calculate the required fuel using a CPU-26A/P computer/Weems plotter (or equivalent) or approved mission planning software (MPS). Determine if the duplicate weight and balance forms in the aircraft logbook apply to the mission IAW AR 95-1.

Verify that the aircraft WT and CG will remain within allowable limits for the entire flight. Complete the appropriate FLPN and file with appropriate agency.

NIGHT OR NIGHT VISION GOGGLES CONSIDERATIONS: More detailed planning is necessary at night because of visibility restrictions. Checkpoints used during the day may not be suitable for night or NVG use.

TRAINING AND EVALUATION REQUIREMENTS:

1. Training will be conducted academically or CH-47 FS/TFPS.
2. Evaluation will be conducted academically or CH47 FS/TFPS.

REFERENCES: Appropriate common references and aircraft logbook.

TASK 1006

Plan an Instrument Flight Rules Flight

CONDITIONS: Prior to IFR flight in a CH-47D/F helicopter, given access to weather information; NOTAMs; flight planning aids; necessary charts, forms, and publications; and weight and balance information.

Note. The use of computer flight planning programs is authorized. The crew should verify the information with applicable charts before using.

Note. For all updated NOTAMs log on primary web site: https://www.notams.jcs.mil/dinsQueryWeb/ or the alternate web site: http://www.faa.gov/air_traffic/publications/notices/.

STANDARDS: Appropriate common standards and the following additions/modifications:

1. Determine if the aircrew and aircraft are capable of completing the assigned mission.
2. Determine if the flight can be performed under IFR IAW AR 95-1, applicable FARs/host-nation regulations, local regulations and SOPs.
3. Determine the proper departure, en route and destination procedures IAW AR 95-1, applicable FARs/host-nation regulations, local regulations and SOPs.
4. Select route(s) and altitude(s) that avoid hazardous Wx conditions. Do not exceed aircraft or equipment limitations and conform to IFR cruising altitudes IAW DOD FLIP. If off-airway, determine the course(s) ±5 degress and determine the off-airway altitude without error.
5. Select an approach that is compatible with the Wx, approach facilities and aircraft equipment; and determine if an alternate airfield is required IAW AR 95-1, applicable FARs/host-nation regulations, local regulations and SOPs.
6. Determine distance ±1 NM, true airspeed (TAS) ±5 knots, ground speed ±5 knots and ETE ±1 minute for each leg of the flight.
7. Determine the fuel required for the mission IAW AR 95-1 and FM 3-04.240, ±100 pounds.
8. Verify that the aircraft will remain within WT and CG limitations for the duration of the flight IAW the appropriate operator's manual.
9. Verify aircraft performance data and ensure that PWR is AVAIL to complete the mission IAW the appropriate operator's manual.
10. Complete and file the FLPN IAW AR 95-1 and the DOD FLIP.
11. Perform mission risk assessment IAW unit SOP.

DESCRIPTION:

1. Crew actions.
   a. The PC will ensure that all crewmembers are current and qualified to perform the mission. The PC will also determine if the aircraft is equipped to accomplish the assigned mission. The PC may direct the other RCM to complete some elements of the IFR flight planning.
   b. The other RCM will complete the assigned elements and report the results to the PC.
   c. The PC will ensure all crewmembers are current, qualified and the aircraft is properly equipped to accomplish the assigned mission.
2. Procedures.
   a. Obtain Wx information using appropriate military, FAA or host-country Wx facilities.
   b. Compare destination forecast and approach minimums and determine if an alternate airfield is required.
   c. Ensure the flight can be completed IAW AR 95-1.

d. Check NOTAMs and other appropriate sources for any restrictions applying to the flight.

e. Obtain navigation charts covering the entire flight area and allowing for routing or destination changes that may be required due to Wx conditions.

f. Select the route(s), course(s) and altitudes that will best facilitating mission accomplishment.

g. When possible, select preferred routing.

h. Determine the magnetic heading, ground speed and ETE for each leg, to include flight to the alternate airfield if required.

i. Compute the total distance, flight time and calculate the required fuel using a CPU-26A/P computer/Weems plotter (or equivalent) or approved MPS.

j. Determine if the weight and balance forms in the aircraft logbook apply to the mission IAW AR 95-1.

k. Verify aircraft WT and CG will remain within allowable limits for the entire flight.

l. Complete the appropriate FLPN and file with the appropriate agency.

Note. GPS IFR navigation must be certified by the FAA or host country regulations prior to use. With an IFR certified GPS, ensure the digital aeronautical flight information file (DAFIF) data is current and loaded prior to IFR use. If a certified GPS or current DAFIF data is not available then crews will not use the GPS for IFR navigation. However, they should consider and plan for its use as an EMERG backup system only.

TRAINING AND EVALUATION REQUIREMENTS:

1. Training will be conducted in the aircraft, CH-47 FS/TFPS, or academically.
2. Evaluation will be conducted in the aircraft, CH-47 FS/TFPS, or academically.

REFERENCES: Appropriate common references.

TASK 1010

Prepare a Performance Planning Card

CONDITIONS: Given the aircraft takeoff gross weight (GWT), environmental conditions at departure, cruise and arrival, a computer with the current, integrated performance and aircraft configuration (IPAC), PPC software or a blank DA Form 5701-47-R (CH-47 Performance Planning Card), the appropriate aircraft operator's manual, mission conditions, and aircraft basic weight.

Note. Performance planning will be completed prior to every mission. The IPAC is the most accurate and preferred method for calculating performance data.

Note. The AMCOM user's manual located under the "Help Menu" in the IPAC program provides instructions for using the IPAC. This software may be obtained at the following website: https://www.jtdi.mil.

Note. The IPAC, PPC software or the charts in the appropriate AMCOM approved aircraft operator's manual/CL must be used for performance planning.

STANDARDS: Appropriate common standards and the following additions/modifications:

1. Compute performance planning data using IPAC performance planning software or use TM 1-1520-240-10/TM 1-1520-271-10 and the descriptions below.
2. Input the appropriate information into the software.
3. Calculate the PPC values using accurate conditions for the time of takeoff within the following parameters:
   a. Free air temperature (FAT), ±5 degrees Celsius.
   b. Pressure altitude (PA), ±500 feet.
   c. GWT, ±500 pounds.
4. When manual calculations are required, calculate PPC values IAW the appropriate operator's manual and the instructions provided in Task 1010. Compute values within following parameters:
   a. Torque values, ±2 percent.
   b. Weight values, ±500 pounds.
   c. Fuel flow, ±100 pounds per hour.
   d. Airspeeds, ±5 knots.
5. Correlate planning information to determine aircraft and mission capabilities.

DESCRIPTION:

1. Crew actions.
   a. The PC will compute or direct other RCMs to compute or obtain the aircraft performance data required to complete the mission using one of the following procedures.
      (1) The IPAC.
      (2) Most current AMCOM approved electronic PPC software.
      (3) Performance data computed using the appropriate operator's manual.
   b. The PC will verify the accuracy of the computations and ensure that aircraft performance meets mission requirements and that aircraft limitations will not be exceeded and brief the other crewmembers on the performance planning data.
   c. All missions will be planned to remain within the 30 MIN PWR limit for departure/arrival and continuous (CONT.) PWR limit for cruise. If the pre-mission planning figures exceed these values, the mission profile will be reconfigured. This does not preclude flight within additional time-limited

operations as limited by the appropriate operator's manual for events such as un-forecasted environmental conditions or unplanned mission requirements. For the purpose of this task, cruise flight is defined as flight at a predetermined airspeed and altitude for the majority of the flight to a point where an approach is initiated to an intermediate or final destination.

2. Procedures.

a. Use of the PPC is mandatory to organize performance planning data required for the mission.

b. Determine and have available aircraft performance data required to complete the mission. DA Form 5701-47-R (figure 4-1, page 4-20) may be used to aid with organizing performance planning data required for the mission.

c. Arrival data is not required to be completed when manually computing the PPC if environmental data at destination or intermediate stops has not significantly changed.

d. When significant changes in the mission's environmental conditions occur, re-compute all affected values.

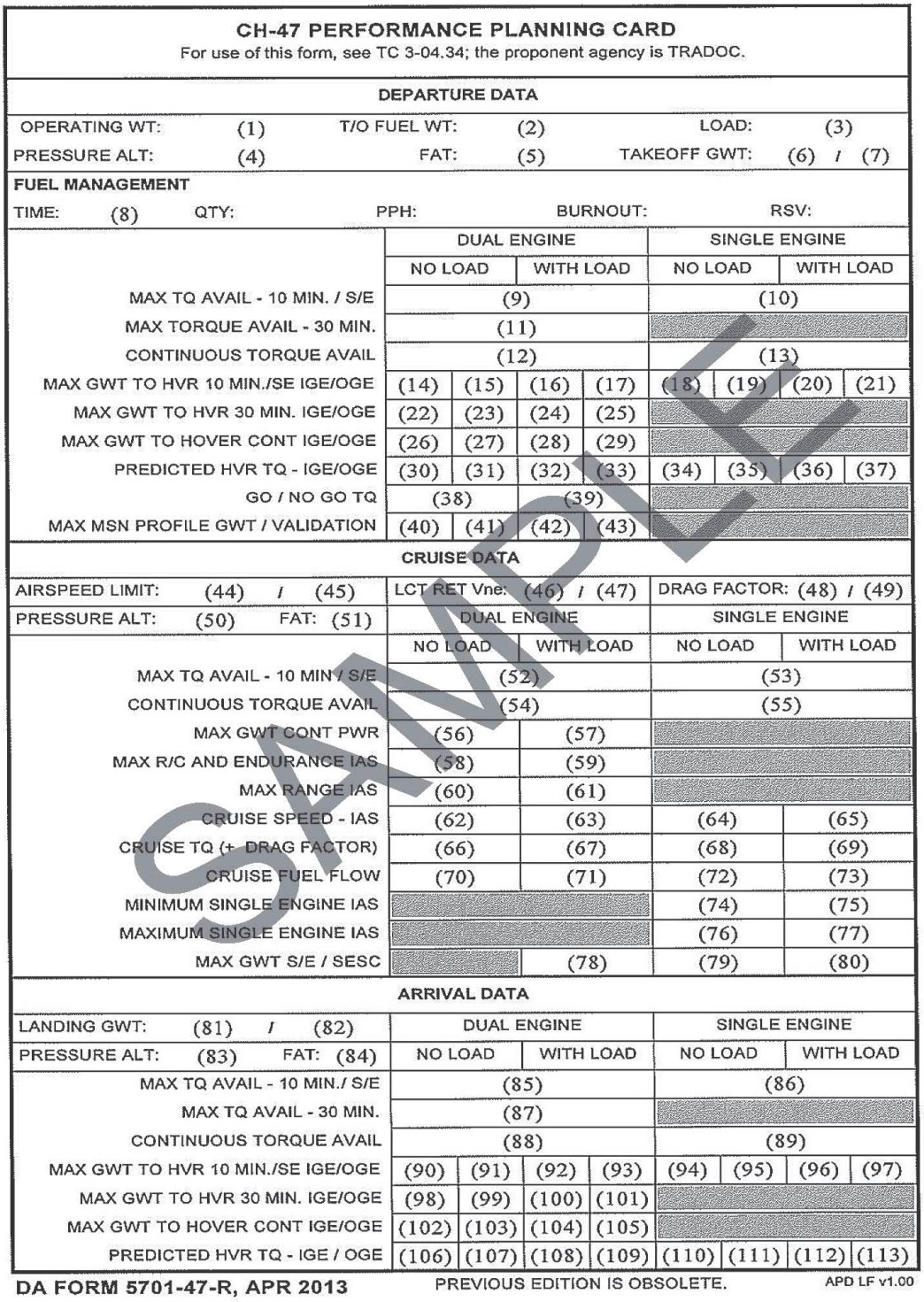
e. Anytime the environmental conditions change significantly, the crew will perform additional HVR PWR checks and re-compute all PPC values. A significant change is defined as ±1,000 feet PA and/or ±10 degrees Celsius or an increase of 1,000 pounds GWT from the departure data.

Note. Use mission forecast conditions to obtain the most accurate performance data.

Note. If engine air particle separators (EAPS) are installed, apply the appropriate offset to TQ and fuel flow values.

Note. The appropriate operator's manual (chapters 5, 7, and 9), contains examples for using the performance data chart(s). When an example is cited in this description, refer to the appropriate example in chapters 5, 7, or 9.

Note. If any computed value exceeds operating limitations, enter "***UA***" (unable). Additionally, enter "***N/A***" (not applicable) when it does not apply.



CH-47 PERFORMANCE PLANNING CARD
For use of this form, see TC 3-04.34; the proponent agency is TRADOC.

DEPARTURE DATA

OPERATING WT:	(1)	T/O FUEL WT:	(2)	LOAD:	(3)
PRESSURE ALT:	(4)	FAT:	(5)	TAKEOFF GWT:	(6) / (7)

FUEL MANAGEMENT

TIME: (8) QTY: PPH: BURNOUT: RSV:

	DUAL ENGINE				SINGLE ENGINE			
	NO LOAD		WITH LOAD		NO LOAD		WITH LOAD	
MAX TQ AVAIL - 10 MIN. / S/E	(9)				(10)			
MAX TORQUE AVAIL - 30 MIN.	(11)							
CONTINUOUS TORQUE AVAIL	(12)				(13)			
MAX GWT TO HVR 10 MIN./SE IGE/OGE	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)
MAX GWT TO HVR 30 MIN. IGE/OGE	(22)	(23)	(24)	(25)				
MAX GWT TO HOVER CONT IGE/OGE	(26)	(27)	(28)	(29)				
PREDICTED HVR TQ - IGE/OGE	(30)	(31)	(32)	(33)	(34)	(35)	(36)	(37)
GO / NO GO TQ	(38)		(39)					
MAX MSN PROFILE GWT / VALIDATION	(40)	(41)	(42)	(43)				

CRUISE DATA

AIRSPEED LIMIT: (44) / (45) LCT RET Vne: (46) / (47) DRAG FACTOR: (48) / (49)

PRESSURE ALT: (50) FAT: (51)

	DUAL ENGINE		SINGLE ENGINE	
	NO LOAD	WITH LOAD	NO LOAD	WITH LOAD
MAX TQ AVAIL - 10 MIN / S/E	(52)		(53)	
CONTINUOUS TORQUE AVAIL	(54)		(55)	
MAX GWT CONT PWR	(56)	(57)		
MAX R/C AND ENDURANCE IAS	(58)	(59)		
MAX RANGE IAS	(60)	(61)		
CRUISE SPEED - IAS	(62)	(63)	(64)	(65)
CRUISE TQ (+ DRAG FACTOR)	(66)	(67)	(68)	(69)
CRUISE FUEL FLOW	(70)	(71)	(72)	(73)
MINIMUM SINGLE ENGINE IAS			(74)	(75)
MAXIMUM SINGLE ENGINE IAS			(76)	(77)
MAX GWT S/E / SESC		(78)	(79)	(80)

ARRIVAL DATA

LANDING GWT: (81) / (82)

PRESSURE ALT: (83) FAT: (84)

	DUAL ENGINE				SINGLE ENGINE			
	NO LOAD		WITH LOAD		NO LOAD		WITH LOAD	
MAX TQ AVAIL - 10 MIN./ S/E	(85)				(86)			
MAX TQ AVAIL - 30 MIN.	(87)							
CONTINUOUS TORQUE AVAIL	(88)				(89)			
MAX GWT TO HVR 10 MIN./SE IGE/OGE	(90)	(91)	(92)	(93)	(94)	(95)	(96)	(97)
MAX GWT TO HVR 30 MIN. IGE/OGE	(98)	(99)	(100)	(101)				
MAX GWT TO HOVER CONT IGE/OGE	(102)	(103)	(104)	(105)				
PREDICTED HVR TQ - IGE / OGE	(106)	(107)	(108)	(109)	(110)	(111)	(112)	(113)

DA FORM 5701-47-R, APR 2013 PREVIOUS EDITION IS OBSOLETE. APD LF v1.00

Figure 4-1. DA Form 5701-47-R

3. Supplemental instructions.

   a. **Departure data.**

   Item 1-OPERATING WT. The operating WT consists of the basic aircraft WT, crew's baggage, EMERG equipment and extra equipment that the crew might have put on the aircraft. Record the operating WT of the aircraft. This is used for reference only.

Item 2-TAKEOFF (T/O Block) FUEL WT. Takeoff fuel WT consists of the total amount of fuel in the tanks of the aircraft. If ERFS II is used, that fuel will be added to the aircraft total. Record the takeoff fuel WT. If ERFS is used, add to aircraft total. This is used for reference only.

Item 3-LOAD. A load consists of internal cargo, external cargo or a combination of both, this may include passengers that will be dropped off during the mission. Record the MAX anticipated WT of the load(s) during the mission profile. This is used for reference only.

Item 4-PA. Record the PA forecast for the time of departure.

Item 5-FAT. Record the FAT forecast for the time of departure.

Item 6-TAKEOFF GWT no LOAD. The takeoff GWT (No Load[s]) is referenced from block 12 of the Department of Defense (DD) Form 365-4 (Weight and Balance Clearance Form F-Transport/Tactical) and is total aircraft WT. Record the takeoff GWT.

Item 7-TAKEOFF GWT with a LOAD. The takeoff GWT (With a load[s]) is referenced from block 16 of the DD Form 365-4 and is takeoff condition uncorrected. Record the takeoff GWT.

Item 8-FUEL MANAGEMENT. Use this space to record the inflight fuel consumption check, to include time, rate, quantity, fuel burnout and reserve.

Item 9-MAX TQ AVAIL–10 MIN. The MAX TQ AVAIL 10 MIN is used to represent the MAX 10 MIN TQ output (or the MAX 10 MIN limit for PWR turbine inlet TEMP [PTIT]) that both ENGs can produce under the forecasted conditions. A value less than 100 percent will indicate that a PTIT limit will be reached prior to exceeding the DUAL ENG TQ limit. A value greater than 100 percent will indicate that a PTIT limit should not be reached prior to reaching the MAX DUAL ENG TQ limit. If the calculated value is greater than 100 percent TQ, a value of 100 percent will be entered into the block IAW the DUAL ENG TQ limit stated in the appropriate operator's manual. This represents a combining XMSN limit; the ENGs may produce PWR in excess of the combining XMSN limit. It is possible that with a calculated value of 100 percent, the ENG could reach both limits (PTIT) and DUAL ENG TQ. Using the MAX TQ AVAIL 10 MIN chart and the forecast conditions at departure, record the MAX 10 MIN TQ limit AVAIL for DUAL ENG operation.

Item 10-MAX TQ AVAIL–(SE). The MAX TQ AVAIL (SE) is used to represent the MAX SE TQ or the MAX SE contingency PWR PTIT output that one ENG can produce under the forecasted conditions. A value less than 123 percent will indicate that a PTIT limit will be reached prior to exceeding the SE TQ limit. A value greater than 123 percent will indicate that a PTIT limit should not be reached prior to reaching the MAX SE TQ limit. If the calculated value is greater than 123 percent TQ, a value of 123 percent will be entered into the block IAW the SE TQ limit stated in the appropriate operator's manual. This represents an ENG XMSN limit; the ENGs may produce PWR in excess of the ENG XMSN limit. It is possible that with a calculated value of 123 percent, the ENG could reach both limits (PTIT and SE TQ). Using the SE contingency TQ AVAIL or contingency TQ AVAIL chart and the forecast conditions at departure, record the MAX TQ AVAIL for SE operation.

Item 11-INTERMEDIATE TQ AVAIL (30-MIN). The intermediate TQ AVAIL 30 MIN is used to determine the MAX 30 MIN TQ output or the MAX 30 MIN limit for PTIT that both ENGs can produce based on the forecasted conditions. A value less than 100 percent will indicate that a PTIT limit will be reached prior to exceeding the DUAL ENG TQ limit. A value greater than 100 percent will indicate that a PTIT limit should not be reached prior to reaching the MAX DUAL ENG TQ limit. If the calculated value is greater than 100 percent TQ, a value of 100 percent will be entered into the block IAW the DUAL ENG TQ limit stated in the appropriate operator's manual. This represents a combining XMSN limit; the ENGs may produce PWR in excess of the combining XMSN limit. It is possible that with a calculated value of 100 percent, the ENG could reach both limits (PTIT and DUAL ENG TQ). Using the intermediate TQ AVAIL 30 MIN chart and the forecast conditions at departure, record the MAX 30 MIN TQ AVAIL for DUAL ENG operation.

Item 12-CONT. TQ AVAIL (DUAL ENG). The CONT. TQ AVAIL is used to determine the MAX TQ output of both ENGs while still operating at the MAX normal operating range of the PTIT, or the MAX CONT. PTIT based on the forecasted conditions. A value less than 100 percent

will indicate that a PTIT limit will be reached prior to exceeding the DUAL ENG TQ limit. The ENGs may produce PWR in excess of the combining XMSN limits. A value greater than 100cpercent will indicate that a PTIT limit should not be reached prior to reaching the MAX DUAL ENG TQ limit. If the calculated value is greater than 100 percent TQ, a value of 100 percent will be entered into the block IAW the DUAL ENG TQ limit stated in the appropriate operator's manual. It is possible that with a calculated value of 100 percent, the ENG could reach both limits (PTIT and DUAL ENG TQ). Using the CONT. TQ AVAIL chart record CONT. TQ AVAIL for DUAL ENG operation.

Item 13-CONT. TQ AVAIL (SE). CONT. TQ AVAIL is used to determine the MAX TQ output of both ENGs while still operating at the MAX normal operating range of the PTIT or the MAX CONT. PTIT based on the forecasted conditions. A value less than 123 percent will indicate that a PTIT limit will be reached prior to exceeding the SE TQ limit. The ENG may produce PWR in excess of the ENG XMSN limits. A value greater than 123 percent will indicate that a PTIT limit should not be reached prior to reaching the MAX SE TQ limit. If the calculated value is greater than 123 percent TQ, a value of 123cpercent will be entered into the block IAW the SE TQ limit stated in the appropriate operator's manual. It is possible that with a calculated value of 123 percent, the ENG could reach both limits (PTIT and SE TQ). Using the CONT. TQ AVAIL chart and the forecast conditions at time of departure, record CONT. TQ AVAIL for SE operation. If the SE XMSN TQ limit line is reached before the planned PA, enter 123 percent. Refer to item 12.

Note. The procedure for calculating items 14 thru 29 apply to both "NO LOAD" and "WITH LOAD."

Item 14-15-MAX GWT to HVR 10 MIN-IGE/OGE no LOAD (DUAL ENG). This information is used to determine the MAX GWT the aircraft can lift based on the forecasted conditions at a desired IGE/OGE wheel height no LOAD using the MAX GWT to HVR (10 MIN) chart. Using the GWT to HVR (10 MIN) chart and forecasted conditions at departure enter the top chart (structural limit) at the FAT and read down to PA. Move horizontally to the left to the MAX structural GWT and note the WT. Then re-enter the top chart at the FAT and read down to PA on the bottom chart (ENG PWR AVAIL). Move horizontally to the right to read MAX IGE GWT for the desired wheel height. To calculate OGE value re-enter the top chart at the FAT and read down to PA on the bottom chart (ENG PWR AVAIL). Move horizontally to the left to read MAX OGE GWT for the desired wheel height. Record the most restrictive GWT value between MAX structural and ENG limited values.

Item 16-17- MAX GWT to HVR 10 MIN – IGE/OGE with a LOAD (DUAL ENG). This information is used to determine the MAX GWT the aircraft can lift based on the forecasted conditions at an IGE/OGE HVR with load(s) using the MAX GWT to HVR (10 MIN) chart. Using the MAX GWT to HVR (10 MIN) chart and forecasted conditions at departure enter the top chart (structural limit) at the FAT and read down to PA. Move horizontally to the left to the MAX structural GWT and note the WT. Record the most restrictive GWT value between MAX structural and ENG limited values. To calculate OGE value re-enter the top chart at the FAT and read down to PA on the bottom chart (ENG PWR AVAIL). Move horizontally to the left to read MAX OGE GWT for the desired wheel height. Record the most restrictive GWT value between MAX structural and ENG limited values.

Item 18-19-MAX GWT to HVR–IGE (SE). MAX GWT to HVR – IGE/OGE no LOAD (SE). This information is used to determine the MAX GWT the aircraft can lift based on the forecasted conditions at a desired IGE/OGE wheel height using the SE contingency TQ AVAIL charts. Using the HVR chart, the SE contingency TQ AVAIL (item 10) and the forecast conditions at the time of takeoff, record the MAX allowable GWT to HVR SE at the desired wheel height IGE. To calculate, enter the bottom left portion of the HVR chart using the MAX SE contingency TQ AVAIL TEMP and move right horizontally to the planned PA. Then move down vertically to the GWT section calculated in item 10. Move vertically until the appropriate IGE HVR height line is intersected. Then move right horizontally to the GWT chart (bottom right chart). Now enter the upper chart at the planned from the top. The intersection of the horizontal and vertical lines

represents the MAX GWT to HVR SE IGE. To calculate OGE value repeat steps above moving vertically to the OGE HVR height line.

Note. When calculating a MAX GWT to HVR–IGE or OGE SE (item 18, 19, 20 and 21) that requires using the COLD TEMP TQ ADJUSTMENT (DUAL ENG) scale, double the COLD TEMP TQ ADJUSTMENT and subtract this value from the TQ required prior to entering the bottom left portion of the HVR chart.

Item 20-21- MAX GWT to HVR – IGE/OGE with a LOAD (SE). This information is used to determine the MAX GWT the aircraft can lift based on the forecasted conditions at an IGE/OGE HVR with load(s) using the SE contingency TQ AVAIL chart. Using the HVR chart and MAX SE contingency TQ AVAIL (item 10), record the MAX allowable GWT to HVR for SE operation IGE/OGE for forecast conditions. To calculate IGE use the same procedure as item 18, except move vertically to the IGE HVR height line. To calculate OGE repeat steps above moving vertically to the OGE HVR height line.

Item 22-23- MAX GWT to HVR 30 MIN – IGE/OGE no LOAD (DUAL ENG). This information is used to determine the MAX GWT the aircraft can lift based on the forecasted conditions at a desired IGE/OGE wheel height using the MAX GWT to HVR (30 MIN) chart. Using the MAX GWT to HVR (30 MIN) chart and forecasted conditions at departure, record the MAX GWT to HVR IGE/OGE. Refer to item 14 and 15.

Item 24-25- **Item 24-25** - MAX GWT to HVR 30 MIN – IGE/OGE with a LOAD (DUAL ENG). This information is used to determine the MAX GWT the aircraft can lift based on the forecasted conditions at an IGE/OGE HVR or external (sling) load(s) height of 10 feet using the MAX GWT to HVR (30 MIN) chart. Using the MAX GWT to HVR (30 MIN) chart and forecasted conditions at departure, record the MAX GWT to HVR IGE/OGE. Refer to item 16 and 17.

Item 26-27- MAX GWT to HVR CONT. – IGE/OGE no LOAD (DUAL ENG). This information is used to determine the MAX GWT the aircraft can lift based on the forecasted conditions at a desired IGE/OGE wheel height using the MAX GWT to HVR–CONT. chart. Using the MAX GWT to HVR (CONT.) chart and forecasted conditions at departure, record the MAX GWT to HVR IGE/OGE. Refer to item 14 and 15.

Item 28-29- MAX GWT to HVR CONT.–IGE/OGE with a LOAD (DUAL ENG). This information is used to determine the MAX GWT the aircraft can lift based on the forecasted conditions at an IGE/OGE HVR or external (sling) load(s) height of 10 feet using the MAX GWT to HVR–CONT. chart. Using the MAX GWT to HVR (CONT.) chart and forecasted conditions at departure, record the MAX GWT to HVR IGE/OGE. Refer to item 16 and 17.

Item 30-PREDICTED HVR TQ IGE (DUAL ENG) no LOAD. Predicted HVR TQ may be used to confirm the pre-calculated aircraft GWT or to provide a basis for determining a possible TQ measuring system malfunction. This is the amount of PWR (TQ) required to HVR at the desired wheel height IGE usually conducted at a 10 foot wheel height HVR. Using the HVR chart and the forecast conditions at the time of takeoff, record the TQ required to HVR, at the desired wheel height IGE.

Note. For TEMPs below 0 degrees C, add the COLD TEMP TQ ADJUSTMENT value (DUAL ENG) to the predicted HVR TQ value. This value will be added to all predicted HVR (DUAL ENG) calculations.

Note. If the value for the predicted HVR TQ for items 30, 31, 32 and 33 is greater than the 30 MIN TQ AVAIL (item 11), the TAKEOFF GWT (item 6 and 7) must be adjusted to ensure the predicted HVR TQ is at or less than the 30 MIN TQ AVAIL.

Item 31-PREDICTED HVR TQ OGE (DUAL ENG) no LOAD. This is the amount of PWR (TQ) required to HVR at the desired wheel OGE usually conducted at an 80 foot wheel height HVR. Using the HVR chart and forecast conditions at the time of takeoff, record the TQ required to HVR OGE.

Item 32-PREDICTED HVR TQ IGE (DUAL ENG) with a LOAD. This is the amount of PWR (TQ) required to HVR with the load(s) approximately 10 feet above ground level (AGL) IGE. Conducted at a 10 foot wheel height HVR for internal load(s) and conducted approximately at a 40 foot wheel height HVR for external (sling) load(s). Using the HVR chart and the forecast conditions at the time of takeoff, record the predicted TQ required to HVR at an IGE height that will place the load(s) approximately 10 feet AGL for external (sling) load(s) or IGE for internal load(s).

Item 33-PREDICTED HVR TQ OGE (DUAL ENG) with a LOAD. This is the amount of PWR (TQ) required to HVR at the desired wheel height OGE conducted at an 80 foot wheel height HVR. Using the HVR chart and the forecast conditions at takeoff, record the predicted TQ required to HVR OGE.

Item 34-PREDICTED HVR TQ IGE (SE) no LOAD. This is the amount of PWR (TQ) required to HVR with a SE at the desired wheel height IGE usually conducted at a 10 foot wheel height HVR. Using the HVR chart and the forecast conditions at the time of takeoff, record the TQ required to HVR at the desired wheel height IGE. Compare to SE contingency TQ AVAIL/contingency TQ AVAIL (item 10) to determine if sufficient PWR is AVAIL to HVR SE at the appropriate wheel height.

Note. For TEMPs below 0 degrees C, double the COLD TEMP TQ ADJUSTMENT value (DUAL ENG) and add the derived value to the predicted HVR TQ value (SE). This value will be added to all predicted HVR (SE) calculations.

Item 35-PREDICTED HVR TQ OGE (SE) no LOAD. This is the amount of PWR (TQ) required to HVR with a SE at the desired wheel height OGE usually conducted at an 80 foot wheel height HVR. Using the HVR chart and the forecast conditions at takeoff, record the TQ required to HVR at the desired wheel height OGE. Compare to SE contingency TQ AVAIL/contingency TQ AVAIL (item 10) to determine if sufficient PWR is AVAIL to HVR SE OGE.

Item 36-PREDICTED HVR TQ IGE (SE) with a LOAD. This is the amount of PWR (TQ) required to HVR with a SE at the desired wheel height IGE normally conducted at a 40 foot wheel height HVR. Using the HVR chart and the forecast conditions at the time of takeoff, record the predicted TQ required to HVR at an IGE height that will place the load approximately 10 feet AGL for external (sling) load(s) or IGE for internal loads. Compare to SE contingency TQ AVAIL/contingency TQ AVAIL (item 10) to determine if sufficient PWR is AVAIL to HVR SE at the desired wheel height. If the PWR required exceeds the MAX SE TQ AVAIL, enter UA.

Item 37-PREDICTED HVR TQ OGE (SE) with a LOAD. This is the amount of PWR (TQ) required to HVR at the desired wheel height OGE. Conducted at an 80 foot wheel height HVR.

Item 38-GO/NO-GO TQ no LOAD. Using the HVR chart and the forecast conditions at the time of takeoff, enter the chart at the MAX TQ AVAIL (10-minute limit) obtained in item 9. Move vertically to the OGE line and horizontally to the desired HVR altitude. Then move vertically down to determine the GO/NO-GO value. The GO/NO-GO TQ value, calculated at the desired HVR altitude, is proportional to the MAX TQ AVAIL (10-minute limit) at OGE. That is, if the GO/NO-GO TQ is exceeded at the desired HVR altitude, then MAX TQ AVAIL (10-minute limit) will be exceeded if OGE maneuvers are attempted. OGE maneuvers should not be attempted if GO/NO-GO TQ is exceeded.

Item 39-GO/NO-GO TQ -with a LOAD. Refer to item 38 for definition.

Item 40- MAX ALLOWABLE GWT for MISSION PROFILE no LOAD. The MAX allowable GWT for the mission profile is based on either the MAX GWT of the aircraft (structural limit) or the highest altitude and associated TEMP (PWR limit) during the entire mission. Determine this value by comparing MAX GWT to HVR 30 MIN (items 22 and 98) and MAX GWT CONT. PWR (item 56) for cruise. Select the lowest GWT value that will be the limiting factor for the entire mission and add expendables that will be used prior to the reaching the highest altitude/TEMP if applicable. Expendables include items such as fuel consumed or cargo drop off. Record this value as the MAX ALLOWABLE GWT for MISSION PROFILE.

Example

If the maximum allowable GWT for the mission profile is limited to 40,000 pounds at the destination (item 81) and the aircraft will consume 2,000 pounds of fuel en route then the maximum allowable GWT for takeoff would be 42,000 pounds.

Note. If manually computing the performance planning data, items 40 thru 43 must be completed after all other data is computed.

Item 41-VALIDATION FACTOR no LOAD. Validation factor is a TQ value that is equal to your MAX allowable GWT for your mission profile based on departure conditions. If this value is exceeded prior to obtaining a desired wheel height HVR altitude then the aircraft GWT must be adjusted (unload cargo, passengers or fuel) to ensure the aircraft is kept within the operator's manual limitations. Using the HVR chart and the forecast conditions at the time of departure, record the predicted TQ required to HVR at the appropriate HVR altitude and at the MAX allowable GWT for the mission profile (item 40). To calculate the validation factor enter the HVR chart at the FAT and move right horizontally to the PA. Move down vertically to the GWT chart until the lowest MAX GWT calculated for the mission profile is intersected. Move left horizontally until the desired HVR altitude IGE (or OGE if appropriate) is intersected, then move down vertically to the predicted HVR TQ (DUAL ENG).

Item 42- MAX ALLOWABLE GWT for MISSION PROFILE with LOAD. Refer to item 40 for definition. Record the MAX allowable GWT for the entire mission profile at the appropriate HVR altitude. Determine this value by comparing MAX GWT to HVR 30 MIN (items 24 and 100) and MAX GWT CONT. PWR (item 57) for cruise. Refer to item 40.

Item 43-VALIDATION FACTOR with a LOAD. Refer to item 41 for definition. Using the HVR chart and forecast conditions at the time of departure, record the predicted TQ required to HVR at the appropriate HVR altitude and at the MAX allowable GWT for the mission profile (item 42). Calculate the same as in item 41.

b. **Cruise data.**

CAUTION

Strict compliance with the airspeed limitations provided in TM 1-1520-240-10/TM 1-1520-271-10, figures 5-3 and 5-8, is required regardless of cruise guide indicator (CGI) operational status. In addition, adherence to inflight cruise guide limitations shall also be maintained.

Item 44-AIRSPEED LIMIT no LOAD. This limitation will be either a structure limit or a blade compressibility limit as described in chapter 5 of the appropriate operator's manual. Using the airspeed operating limits chart, record the MAX airspeed for forecast cruise conditions. If the planned GWT is not intercepted, then refer to the MAX GWT for planned conditions chart and adjust the planned GWT accordingly. This chart is located in chapter 5 of the appropriate operator's manual.

Item 45-AIRSPEED LIMIT with a LOAD. Refer to item 44 for definition. Using the airspeed operating limits chart, record the MAX AIRSPEED for forecast cruise conditions. If the planned GWT is not intercepted, then refer to the MAX GWT for planned conditions chart and adjust the planned GWT accordingly.

Item 46-LONGITUDINAL CYCLIC TRIM (LCT) RETRACTED (RET) Velocity Never Exceed (VNE) no LOAD. Limitation based on the LCT actuator(s) failed in the RET position. With the LCTs failed in the RET position there is no cyclic feathering introduced which may cause excessive blade flapping along with an excessive nose low pitch attitude at higher airspeeds. This blade flapping along with the nose low pitch attitude may cause excessive stress on the aft vertical

shaft and rotor system and must be avoided. Using the airspeed operating limits chart (RET LCT), record the MAX AIRSPEED for forecast cruise conditions. This chart is located in Chapter 5 of the operator's manual. If the planned GWT is not intercepted, then refer to the MAX GWT for planned conditions chart and adjust the planned GWT accordingly.

Item 47-LCT RET V_{NE} with a LOAD. Refer to item 46 for definition. Using the airspeed operating limits chart (RET LCT), record the MAX AIRSPEED for forecast cruise conditions. If the planned GWT is not intercepted, then refer to the MAX GWT for planned conditions chart and adjust the planned GWT accordingly.

Item 48-49-DRAG FACTOR. The drag factor value is the amount of additional PWR required based on the wind resistance of the flat plate drag of the external (sling) load(s). The drag factor of the load(s) is calculated by the square (sq) area of the load(s), the type of load(s) and the way the load(s) is rigged. If the flat plate drag area is not available in the appropriate manuals then you must manually calculate.

(Tandem Configuration) Example

Concrete Block (Dimensions: Height: 3', Width: 5', Length: 8').
(Height x Width)= 15 sq feet + (Width x Length) = 40 sq feet.
Total Flat Plate Drag = 55 sq feet.

- In this configuration the load(s) will fly exposing the top and front of the load(s) to the wind thus resulting in the flat plate drag explained above.
- Using the drag chart, the drag area change of the external (sling) load(s), the forecast cruise conditions and the cruise airspeed in item 63 and item 65, record the additional TQ required for cruise with an external (sling) load(s).

Item 50-PA. Record the planned cruise or highest PA along the route.

Item 51-FAT. Record the forecast FAT at cruise or at the highest PA.

Item 52-MAX TQ AVAIL–10 MIN. Refer to item 9 for definition. Using the MAX TQ AVAIL 10 MIN chart and the forecast cruise conditions, record the MAX 10 MIN TQ limit AVAIL for DUAL ENG operation. Refer to item 9.

Item 53-MAX TQ AVAIL–(SE). Refer to item 10 for definition. Using the SE TQ AVAIL or contingency TQ AVAIL chart and the forecast cruise conditions, record the MAX TQ AVAIL for SE operation. Refer to item 10.

Item 54-CONT. TQ AVAIL (DUAL ENG). Refer to item 12 for definition. Using the CONT. TQ AVAIL chart and the forecast cruise conditions, record CONT. TQ AVAIL for DUAL ENG operation. Refer to item 12.

Item 55-CONT. TQ AVAIL (SE). Refer to item 13 for definition. Using the CONT. TQ AVAIL chart and the forecast cruise conditions, record CONT. TQ AVAIL for SE operation. Refer to item 13.

Note. By trading off airspeed for GWT and vice versa, PWR required for cruise flight will remain at or left of the CONT. PWR AVAIL line on the cruise charts.

Item 56-MAX GWT for CONT. PWR – CRUISE no LOAD. The MAX GWT for your CONT. PWR will give you information on the MAX WT you can carry or the MAX airspeed you can fly based on your CONT. PWR AVAIL at cruise. Using the applicable cruise chart for the highest cruise altitude and associated TEMP for the planned route of flight, determine which mission option to use.

Note. Higher GWT: If the mission requires the highest GWT, select the highest GWT at or left of the V_{NE} line and left of the CONT. PWR line. Note the airspeed for this GWT and annotate this speed in item 62.

Note. Higher airspeed: If the mission requires a higher airspeed and a lower GWT is acceptable, move vertically on the CONT. PWR line to the desired cruise AIRSPEED and move laterally to intersect a GWT that is at or left of the V_{NE} line.

Item 57-MAX GWT for CONT. PWR–CRUISE with a LOAD. Refer to item 56 for definition. Using the applicable cruise chart for the highest cruise altitude and associated TEMP for the planned route of flight, determine which mission option to use. Subtract drag factor from CONT. TQ line for external (sling) load(s). Refer to item 54.

Item 58-MAX R/C and END AIRSPEED (DUAL ENG) no LOAD. The MAX R/C and END airspeed computes at what airspeed the aircraft can achieve the highest R/C or the most time out of the usable fuel load (aloft time). This airspeed also represents the best SE airspeed in a SE configuration. Using the applicable cruise chart, record the MAX R/C and END AIRSPEED for the aircraft WT.

Item 59-MAX R/C and END AIRSPEED (DUAL ENG) with a LOAD. Refer to item 58 for definition. Using the applicable cruise chart, record the MAX R/C and END AIRSPEED for the aircraft weight.

Note. The effect of external drag is not accounted for in item 58.

Item 60-MAX RANGE AIRSPEED (DUAL ENG) no LOAD. The MAX range computes at what airspeed the aircraft can achieve the greatest distance out of the usable fuel load. This speed should be considered when a low fuel situation exists and a longer distance needs to be traveled. Using the applicable cruise chart, record the MAX range airspeed for the aircraft WT. If the Vne line is intercepted before the MAX range line, enter the Vne airspeed limit.

Item 61-MAX RANGE AIRSPEED (DUAL ENG) with a LOAD. Refer to item 59 for definition. Using the applicable cruise chart, record the MAX range AIRSPEED for the aircraft WT. If the V_{NE} line is intercepted before the MAX range line, enter the V_{NE} airspeed limit.

Note. The effect of external drag is not accounted for in item 61.

Item 62-CRUISE SPEED–AIRSPEED (DUAL ENG) no LOAD. Cruise speed should be selected based on operating within CONT. PWR with consideration of operating GWT and environmental conditions. Ensure cruise speed selected is not in excess of the airspeed limit (item 44) without a load(s) or the V_{NE} line IND on the cruise charts. Select and enter the desired cruise speed. Refer to item 54. Additionally, ensure speed selected is not in excess of AIRSPEED LIMIT speed, reference item 44, nor the V_{NE} line indicated on the cruise charts.

Item 63-CRUISE SPEED–AIRSPEED (DUAL ENG) with a LOAD. Refer to item 62 for definition. Select and enter the desired cruise speed. Refer to item 57. Additionally, ensure speed selected is not in excess of AIRSPEED LIMIT speed (item 45).

Item 64-CRUISE SPEED–AIRSPEED (SE) no LOAD. The airspeed calculated in item 58 without a load(s) represents the best SE airspeed and should be used unless the mission dictates otherwise when operating SE. Select and enter the desired cruise speed that is not greater than the MAX airspeed for SE cruise as computed in item 76, or slower than minimum airspeed for SE cruise as computed in item 74.

Item 65-CRUISE SPEED–AIRSPEED (SE) with a LOAD. The airspeeds calculated in item 59 with a load(s) represents the best SE airspeeds and should be used unless the mission dictates otherwise when operating SE. Select and enter the desired cruise speed that is not greater than the MAX airspeed for SE cruise as calculated in item 77 or slower than MIN airspeed for SE cruise as calculated in item 75.

Item 66-CRUISE TQ (DUAL ENG) no LOAD. Using the applicable cruise chart, record the TQ required to maintain the cruise airspeed listed in item 62.

Item 67-CRUISE TQ (DUAL ENG) with a LOAD. Using the applicable cruise chart, calculate the TQ required to maintain the cruise airspeed listed in item 63. Then, add the additional TQ required to cruise based on drag as calculated in item 48. If the selected cruise airspeed requires the aircraft to be flown in a time-limited ENG operation a lower, cruise airspeed must be selected in item 54 and the drag and cruise TQ recalculated.

Item 68-CRUISE TQ (SE) no LOAD. Using the applicable cruise chart, record the TQ required to attain the SE cruise airspeed listed in item 64. If the chart does not show SE TQ, double the TQ value shown for DUAL ENGs. If the SE TQ value exceeds the Chapter 5 limitation, enter UA.

Item 69-CRUISE TQ (SE) with a LOAD. Using the applicable cruise chart, record the TQ required to attain the SE cruise airspeed listed in item 65. If the chart does not show SE TQ, double the TQ value shown for DUAL ENGs. If the SE TQ value exceeds the chapter 5 limitation (in the appropriate operator's manual) , enter UA.

Note. For items 67 and 69, adjust the cruise TQ to compensate for drag caused by changes in the external configuration. Refer to item 48 for drag factor.

Item 70-CRUISE FUEL FLOW (DUAL ENG) no LOAD. Using the appropriate cruise chart and the TQ value listed in item 66, record the predicted fuel flow.

Item 71-CRUISE FUEL FLOW (DUAL ENG) with a LOAD. Using the appropriate cruise chart and the TQ value listed in item 67, record the predicted fuel flow.

Item 72-CRUISE FUEL FLOW (SE) no LOAD. Using the SE fuel flow chart and the TQ value listed in item 68, record the predicted fuel flow. The baseline is 0 degrees C, therefore increase or decrease this fuel flow by 1 percent for every 10 degrees C TEMP change from the baseline TEMP.

Item 73-CRUISE FUEL FLOW (SE) with a LOAD. Using the SE fuel flow chart and the TQ value listed in item 69, record the predicted fuel flow. Increase or decrease this fuel flow by 1 percent for every 10 degrees C TEMP change from the baseline TEMP.

Item 74-MIN SE AIRSPEED no LOAD. Minimum SE IAS is used to determine the minimum airspeed that will allow continued SE operations. Using the appropriate cruise chart, enter the chart at 50 percent of the computed contingency TQ AVAIL for cruise conditions. Move vertically to the first intersection of the actual GWT line. If the intersection is below the MAX R/C and END airspeed line, record the airspeed that will allow continued SE operation. If the TQ line is to the left of the actual GWT line and does not intersect the actual GWT line, enter UA for the minimum airspeed. When the TQ line is to the right of the actual GWT line and does not intersect the actual GWT line below the MAX R/C and END airspeed line, enter OGE for the minimum airspeed that will allow continued SE operation.

Item 75-MIN. SE AIRSPEED with a LOAD. Refer to item 74 for definition. Using the appropriate cruise chart, enter the chart at 50 percent of the computed contingencySE TQ AVAIL/contingency TQ AVAIL for cruise conditions. Move vertically to the first intersection of the actual GWT line. If the intersection is below the MAX R/C and END airspeed line, record the airspeed that will allow continued SE operation. If the TQ line is to the left of the actual GWT line and does not intersect the actual GWT line, enter N/A for the minimum airspeed. When the TQ line is to the right of the actual GWT line and does not intersect the actual GWT line below the MAX R/C and END airspeed line, enter OGE for the MIN airspeed that will allow continued SE operation.

Note. The effect of external drag is not accounted for in item 75.

Item 76-MAX SE AIRSPEED no LOAD. MAX SE IAS/CAS is used to determine the MAX airspeed that can be maintained while operating SE. Using the appropriate cruise chart, enter the chart at 50 percent of the computed contingency SE TQ AVAIL/contingency TQ AVAIL for cruise conditions. Move vertically to the intersection of the actual GWT line above the MAX R/C and END airspeed line. Record the MAX airspeed that will allow continued SE operation. If the

TQ line is to the left of the actual GWT line and does not intersect the actual GWT line, enter N/A for the MAX airspeed.

Item 77-MAX SE AIRSPEED with a LOAD. Refer to item 76 for definition. Using the appropriate cruise chart, enter the chart at 50 percent of the computed contingency SE TQ AVAIL/contingency TQ AVAIL for cruise conditions. Move vertically to the intersection of the actual GWT line above the MAX R/C and END airspeed line. Record the MAX airspeed that will allow continued SE operation. If the TQ line is to the left of the actual GWT line and does not intersect the actual GWT line, enter N/A for the MAX airspeed.

Note. The effect of drag on an external drag is not accounted for in item 68.

Item 78-MAX GWT SE. The MAX GWT SE value will give you the MAX allowable GWT that will sustain SE flight at the planned cruise PA to be flown for the mission. Using the SE service ceiling chart in the appropriate operator's manual, chapter 9, record the MAX allowable GWT that will allow sustained SE flight at the planned cruise PA to be flown for the mission. This value is based on MAX END, R/C airspeed at the MAX allowable GWT derived from the chart.

Item 79-SINGLE-ENG SERVICE CEILING (SESC) no LOAD. The SESC value will give you the MAX altitude that will be able to sustain SE flight at the planned cruise FAT and GWT. Using the SESC chart in Chapter 9 of the appropriate operator's manual, record the MAX altitude attainable, that will allow sustained SE flight using the actual aircraft GWT and forecast conditions.

Item 80-SESC with a LOAD. Refer to item 79 for definition. Using the SESC chart in Chapter 9 of the appropriate operator's manual, record the MAX altitude attainable, that will allow sustained SE flight using the actual aircraft GWT and forecast conditions.

Note. The values in items 79 and 80 are based on the MAX END, R/C airspeed at the MAX altitude attainable with the standard TEMP lapse rate applied.

---

c. **Arrival data.** Not required when manually computing the PPC if environmental data at destination or intermediate stops has not significantly changed (±1,000 feet PA and/or ±10 degrees C) or an increase of 1,000 pounds GWT from the departure data.

Item 81-LANDING GWT. Record the estimated landing GWT.

Item 82-LANDING GWT with a LOAD. Record the estimated landing GWT.

Item 83-PA. Record the forecast PA at destination at estimated time of arrival (ETA).

Item 84-FAT. Record the forecast FAT at destination at ETA.

Item 85-MAX TQ AVAIL–10 MIN. Refer to item 9 for definition. Using the MAX TQ AVAIL 10 MIN chart and the forecast arrival conditions, record the MAX TQ AVAIL for DUAL ENG operation. Refer to item 9.

Item 86-MAX TQ AVAIL–(SE). Refer to item 10 for definition. Using the contingency SE TQ AVAIL or contingency TQ AVAIL chart and the forecast arrival conditions, record the MAX TQ AVAIL for SE operation. Refer to item 10.

Item 87-MAX TQ AVAIL–30 MIN or INTERMEDIATE TQ AVAIL. Refer to item 11 for definition. Using the MAX TQ AVAIL 30 MIN chart and the forecast arrival conditions, record the MAX TQ AVAIL (30 MIN) for DUAL ENG operation. Refer to item 11.

Item 88-CONT. TQ AVAIL (DUAL ENG). Refer to item 12 for definition. Using the CONT. TQ AVAIL chart and the forecast conditions at time of arrival, record CONT. TQ AVAIL for DUAL ENG operation. Refer to item 12.

Item 89-CONT. TQ AVAIL (SE). Refer to item 13 for definition. Using the CONT. TQ AVAIL chart and the forecast conditions at time of arrival, record CONT. TQ AVAIL for SE operation. Refer to item 13.

Note. The procedure for calculating items 90 thru 105 apply to both "NO LOAD" and "WITH LOAD."

Item 90-91- MAX GWT to HVR 10 MIN – IGE/OGE (DUAL ENG). Refer to item 14 and 15 for definition. Using the MAX GWT to HVR (10 MIN) chart and forecasted conditions at arrival, record the MAX GWT to HVR IGE/OGE. Refer to item 14 and 15.

Item 92-93-MAX GWT to HVR 10 MIN–OGE (DUAL ENG). Refer to item 16 for definition. Using the MAX GWT to HVR (10 MIN) chart and forecasted conditions at arrival, record the MAX GWT to HVR OGE. Refer to item 16.

Item 94-95- MAX GWT to HVR–IGE/OGE (SE). Refer to item 18 and 19 for definition. Using the HVR chart, contingency SE TQ AVAIL obtained in item 86 and the forecast arrival conditions, record the MAX allowable GWT to HVR for SE operation at the desired wheel height IGE/OGE. Refer to item 18 and 19.

Note. When calculating a MAX GWT to HVR–IGE or OGE SE (item 94 and 96) that requires using the COLD TEMP TQ ADJUSTMENT (DUAL ENG) scale, double the COLD TEMP TQ ADJUSTMENT and subtract this value from the TQ required prior to entering the bottom left portion of the HVR chart.

Item 96-97- MAX GWT to HVR – IGE/OGE with a LOAD (SE). Refer to item 20 and 21 for definition. Using the HVR chart, SE contingency TQ AVAIL obtained in item 86 and the forecast arrival conditions, record the MAX allowable GWT to HVR for SE operation IGE/OGE. Refer to item 20 and 21.

Item 98-99- MAX G WT to HVR 30 MIN – IGE/OGE no LOAD (DUAL ENG). Refer to item 22 and 23 for definition. Using the MAX GWT to HVR (30 MIN) chart and forecasted conditions at arrival, record the MAX GWT to HVR IGE/OGE. Refer item 22 and 23.

Item 100-101- MAX G WT to HVR 30 MIN – IGE/OGE with a LOAD (DUAL ENG). Refer to item 24 and 25 for definition. Using the MAX GWT to HVR (30 MIN) chart and forecasted conditions at arrival, record the MAX GWT to HVR IGE/OGE. Refer to item 24 and 25.

Item 102-103- MAX G WT to HVR CONT. – IGE/OGE no LOAD (DUAL ENG). Refer to item 26 and 27 for definition. Using the MAX GWT to HVR (CONT.) chart and forecasted conditions at arrival, record the MAX GWT to HVR IGE/OGE. Refer to item 26 and 27.

Item 104-105- MAX GWT to HVR CONT. – IGE/OGE with a LOAD (DUAL ENG). Refer to item 28 and 29 for definition. Using the MAX GWT to HVR (CONT.) chart and forecasted conditions at arrival, record the MAX GWT to HVR IGE/OGE. Refer to item 28 and 29.

Note. If the value for the predicted HVR TQ for items 106, 107, 108, and 109 is greater than the 30 MIN TQ AVAIL (item 87), the TAKEOFF GWT (item 6 and 7) will be adjusted (for example, adjust fuel or cargo prior to takeoff) to ensure the predicted HVR TQ is at or less than the 30 MIN TQ AVAIL at arrival.

Item 106-PREDICTED HVR TQ–IGE (DUAL ENG) no LOAD. Refer to item 30 for definition. Using the HVR chart and the forecast arrival conditions, record the TQ required to HVR at the desired wheel height IGE for forecast arrival conditions. Refer to item 30.

Note. For TEMPs below 0 degrees C, add the COLD TEMP TQ ADJUSTMENT value (DUAL ENG) to the predicted HVR TQ value (DUAL ENG). This value will be added to all predicted HVR (DUAL ENG) calculations.

Item 107-PREDICTED HVR TQ–OGE (DUAL ENG) no LOAD. Refer to item 31 for definition. Using the HVR chart and the forecast arrival conditions, record the TQ required to HVR at the desired wheel height OGE. Refer to item 31.

Item 108-PREDICTED HVR TQ–IGE (DUAL ENG) with a LOAD. Refer to item 32 for definition. Using the HVR chart and the forecast arrival conditions, record the predicted TQ required to HVR at a height that will place the load(s) approximately 10 feet AGL and IGE. Refer to item 32.

Item 109-PREDICTED HVR TQ–OGE (DUAL ENG) with a LOAD. Refer to item 33 for definition. Using the HVR chart and the forecast arrival conditions, record the predicted TQ required to HVR OGE. Refer to item 33.

Item 110-PREDICTED HVR TQ–IGE (SE) no LOAD. Using the HVR chart and the forecast arrival conditions, record the TQ required to HVR at the desired wheel height IGE. Refer to item 34.

Item 111-PREDICTED HVR TQ–OGE (SE) no LOAD. Refer to item 35 for definition. Using the HVR chart and the forecast arrival conditions, record the predicted TQ required to HVR OGE. Refer to item 33.

Note. For TEMPs below 0 degrees C, double the COLD TEMP TQ ADJUSTMENT value (DUAL ENG) and add the derived value to the predicted HVR TQ value (SE). This value will be added to all predicted HVR (SE) calculations.

Item 112-REDICTED HVR TQ–IGE (SE) with a LOAD. Refer to item 36 for definition. Using the HVR chart and the forecast arrival conditions, record the predicted TQ required to HVR at a height that will place the load(s) approximately 10 feet AGL and IGE. If the required PWR exceeds the MAX SE TQ AVAIL, enter UA. Refer to item 36.

Item 113-PREDICTED HVR TQ–OGE (SE) with a LOAD. Refer to item 37 for definition. Using the HVR chart and the forecast arrival conditions, record the predicted TQ required to HVR SE OGE. Compare SE contingency PWR AVAIL (item 77) to determine if sufficient PWR is AVAIL to HVR SE OGE. If the required PWR to HVR SE OGE exceeds the MAX SE TQ AVAIL (item 86), enter UA. Refer to item 37.

TRAINING AND EVALUATION REQUIREMENTS:

1. Training will be conducted academically.
2. Evaluation will be conducted academically.

REFERENCE: Appropriate common references, TM 1-1520-240-10, and TM 1-1520-271-10.

TASK 1012

Compute Aircraft Weight and Balance

CONDITIONS: Given crew weights, aircraft configuration, mission cargo, passenger data, the applicable operator's manual, and a completed or blank DD Form 365-4.

STANDARDS: Appropriate common standards and the following additions/modifications:

1. Verify that GWT and CG remain within aircraft limits for the duration of the flight IAW the appropriate operator's manual.
2. Identify all mission or flight limitations imposed by WT or CG.
3. Ensure DD Form 365-4 has been completed within the preceding 90 days.

DESCRIPTION:

1. Crew actions.
   a. The PC will brief crewmembers on any limitations.
   b. Crewmembers will continually monitor aircraft loading during the mission (such as fuel transfers, external [sling] load[s] and cargo load[s]) to ensure CG remains within limits.
2. Procedures.
   a. Using the completed DD Forms 365-4 verifies that aircraft GWT and CG will remain within the allowable limits for the entire flight. Note all GWT and/or loading task/maneuver restrictions/aircraft limitations. If there is no completed DD Form 365-4 that meets the requirements of AR 95-1, prepare a DD Form 365-4 IAW the appropriate operator's manual and TM 55-1500-342-23, or complete a new DD Form 365-4.
   b. Verify the aircraft CG in relation to CG limits at predetermined times during the flight when an aircraft's configuration requires special attention; for example, when it is a critical requirement to keep a certain amount of fuel in a particular tank. Conduct CG checks for fuel transfer, external (sling) load(s) and cargo loading operations.

TRAINING AND EVALUATION REQUIREMENTS:

1. Training will be conducted academically.
2. Evaluation will be conducted orally or academically.

REFERENCES: Appropriate common references, TM 55-1500-342-23, and DD Form 365-4.

TASK 1013

Operate Mission Planning System

CONDITIONS: Given an approved computer with MPS, a mission briefing, signal operation instructions (SOI) information, weather information, navigational maps, DOD FLIP, intelligence data, and other materials as required.

STANDARDS: Appropriate common standards and the following additions/modifications:

1. Perform flight mission planning (Tasks 1004, 1006, and 1402).
2. Configure and operate the mission planning system/software (MPS).
3. Evaluate and enter performance planning data and Wx data, as appropriate.
4. Select appropriate map types and scales.
5. Select and enter appropriate primary and alternate routes, if required.
6. Select appropriate overlays and database.
7. Select and enter appropriate communication and improved data modem NET data.
8. Update MPS (for example DAFIF, electronic chart update manual).
9. Enter aircraft WT and CG data.
10. [F] Load mission data to PCMCIA cards.
11. Print out maps, time distance heading cards, waypoint lists, crew cards, communication cards, and other kneeboard products as required.

DESCRIPTION:

1. Crew actions.
   a. The PC will assign tasks.
   b. The crew receives the mission briefing.
   c. Mission data from higher headquarters may be received digitally, in the form of an overlay, a fragmentary order or operation order.
   d. One or more crew members may enter data into the portable flight planning software.
2. Procedures.
   a. Plan the flight by conducting a map reconnaissance and terrain analysis using the available map database. A detailed terrain analysis may be accomplished by using topographic elevation profiles and intervisibility plots.
   b. Enter threat data and ensure appropriate values are set for detection and lethality range.
   c. Enter waypoints, hazards, control measures, primary and alternate routes, engagement areas, lines and other information as needed.
   d. Enter or select SOI information from the appropriate database.
   e. Determine communications requirements and build radio presets NET information.
   f. Enter aircraft WT, CG and performance data for a specific aircraft tail number.
   g. Upon completion of mission planning and data entry, load the selected mission and aircraft specific data on to the data transfer card.

TRAINING AND EVALUATION REQUIREMENTS:

1. Training will be conducted academically or CH-47 FS/TFPS.
2. Evaluation will be conducted academically.

REFERENCES: Appropriate common references and the following: Task 1004, Task 1006, Task 1012, Task 1010, and Task 1402.

TASK 1014

Operate Aviation Life Support Equipment

> **WARNING**
>
> **When performing a combat mission or overwater mission, aviator worn gear can restrict head and torso movement. Users should conduct ground familiarity drills (blind switch/control ID) and crew coordination exercises before flight since the field of regard can be restricted by aviator worn mission equipment. The user must strictly adhere to proper crew coordination procedures during switch ID.**

CONDITIONS: Given the appropriate ALSE for the mission.

STANDARDS: Appropriate common standards and the following additions/modifications:

1. Inspect/perform operational checks on ALSE.
2. Use personal and mission ALSE IAW the appropriate operator's manual/instructions for each piece of equipment.
3. Brief/assist passengers in the use of ALSE.

DESCRIPTION:

1. Crew actions. The PC will verify that all required ALSE equipment is onboard the aircraft and meets all serviceability criteria prior to takeoff.
2. Procedures. Based on mission requirements, obtain the required ALSE. Inspect equipment for serviceability and perform required operational checks. The NCM will secure the required ALSE in the aircraft IAW AR 95-1, TM 1-1520-240-10, TM 1-1520-240-CL, TM 1-1520-271-10, TM 1-1520-271-CL, and the unit's SOP. The NCM will brief passengers in the use of ALSE.

TRAINING AND EVALUATION REQUIREMENTS:

1. Training will be conducted academically.
2. Evaluation will be conducted academically.

REFERENCES: Appropriate common references electronic manual (EM) 0250, TM 5-4220-202-14, TM 55-1680-317-23&P, and TM 1-1680-377-13&P.

TASK 1016

Perform Internal Load Operations

CONDITIONS: In a CH-47D/F helicopter loaded with passengers/cargo or academically.

STANDARDS: Appropriate common standards and the following additions/modifications:

1. RCM.
   a. Perform or ensure that a thorough passenger briefing has been conducted and that a passenger manifest is on file, if applicable IAW AR 95-1. Conduct a passenger briefing (Task 1002) IAW the appropriate operator's manual/CL and the unit's SOP.
   b. F Accurately enter the cargo WT into CAAS.
   c. Verify that the aircraft will remain within GWT and CG limitations.
   d. Ensure that the passengers/cargo is properly restrained.
   e. Ensure that floor-loading limits are not exceeded.
   f. Ensure that cargo meets restraint criteria.
2. NCM.
   a. Perform a thorough passenger briefing and ensure that a passenger manifest is on file, if applicable.
   b. Conduct the briefing IAW the appropriate operator's manual/CL and the unit SOP.
   c. Verify that the aircraft will remain within GWT and CG limitations.
   d. Load the aircraft IAW the load plan, if applicable.
   e. Ensure that floor-loading limits are not exceeded.
   f. Secure passengers/cargo IAW the appropriate aircraft operator's manual.
   g. Ensure that cargo meets restraint criteria.

DESCRIPTION:

1. Crew actions.
   a. The PC (with FE assistance), will formulate a load plan, ensure that a DD Form 365-4 is verified, if required, and ensure that the aircraft will be within GWT and CG limits. The PC will ensure that the crew loads the cargo, uses proper tie-down procedures, and complete a passengers briefing as required. The PC will determine whether the aircraft is capable of completing the assigned mission and will ensure that aircraft limitations will not be exceeded.
   b. The P* will perform a HVR PWR check before takeoff and ensure the MAX allowable GWT of the aircraft is not exceeded.
   c. The NCM will complete a passenger briefing as directed and ensure that passengers are seated and wearing seatbelts prior to takeoff IAW AR 95-1. The NCM will monitor passengers/cargo during the flight for security.
2. Procedures.
   a. Load cargo IAW the cargo plan or DD Form 365-4, as appropriate. Properly secure and restrain all cargo to meet restraint criteria IAW the appropriate manuals. (For additional information refer to Task 1012.)
   b. Brief passengers for the flight and seat them IAW the load plan or DD Form 365-4, as appropriate. Conduct the briefing IAW the appropriate operator's manual/CL, unit SOP, and information about the mission. Ensure that the passengers understand each element of the briefing.

Note. If the aircraft is not shutdown for loading, a passenger briefing may be impractical. Passengers may be pre-briefed or passenger-briefing cards may be used IAW local directives or the unit SOP.

Note. If the cargo/rescue winch is used, the NCM must ensure it is correctly operated IAW the appropriate operator's manual.

Note. Hazardous cargo will be handled, loaded and transported IAW AR 95-27 and the appropriate operator's manual/CL.

TRAINING AND EVALUATION REQUIREMENTS:

1. Training may be conducted in the aircraft or academically.
2. Evaluation may be conducted in the aircraft or academically.

REFERENCES: Appropriate common references, AR 95-27, DA Pam 738-751, FM 4-20.197, FM 55-450-2, TM 38-250, TM 1-1520-240-10, TM 1-1520-271-10, and TM 55-1500-342-23.

TASK 1019

Perform Preventive Maintenance Service Checks

CONDITIONS: Given a CH-47D/F helicopter and TM 1-1520-PMS3, TM 1-1520-240-PMS, or TM 1-1520-271-PMS.

Note. This task applies to NCMs only.

STANDARDS: Appropriate common standards and the following additions/modifications:

1. Correctly check all items IAW TM 1-1520-PMS3 or TM 1-1520-271-PMS.
2. Enter appropriate information on the appropriate forms IAW DA Pam 738-751.

DESCRIPTION:

1. Using TM 1-1520-PMS3, TM 1-1520-240 PMS, or TM 1-1520-271-PMS, conduct a PMS inspection. When conducting the inspection with another NCM, both NCMs will use the appropriate reference.
2. Take a fuel sample from each fuel tank and determine if the sample contains any water or foreign matter. Correctly enter appropriate information in the aircraft logbook.

NIGHT OR NIGHT VISION GOGGLES CONSIDERATIONS: If time permits, accomplish the maintenance inspection during daylight hours. During the hours of darkness, use a flashlight with an unfiltered lens to supplement available lighting. HYD leaks, oil leaks and other defects are difficult to see using a flashlight with a colored lens.

TRAINING AND EVALUATION REQUIREMENTS:

1. Training will be conducted in the aircraft.
2. Evaluation will be conducted in the aircraft.

REFERENCES: Appropriate common references, aircraft logbook, DA Pam 738-751, FM 3-04..7, FM 10-67-1, FM 3-04.203, TM 1-1520-240-10, TM 1-1520-240-23 series, TM 1-1520-240-CL, TM 1-1520-240-PMD, TM 1-1520-271-10, TM 1-1520-271-23 series, TM 1-1520-271-CL, TM 1-1520-271-PMD, and unit SOP.

TASK 1022

Perform Preflight Inspection

CONDITIONS: With a CH-47D/F helicopter and given the appropriate operator's manual/CL.

STANDARDS: Appropriate common standards and the following additions/modifications:

1. RCM.
   a. Perform the preflight inspection IAW the appropriate operator's manual/CL.
   b. Enter appropriate information on DA Form 2408-12, DA Form 2408-13 (Aircraft Status Information Record), and DA Form 2408-13-1 (Aircraft Inspection and Maintenance Record), IAW DA Pam 738-751.
2. NCM. Assist in all before preflight and preflight duties IAW the appropriate operator's manual/CL, the unit's SOP and for the designated duty position.

DESCRIPTION:

1. Crew actions.
   a. The PC is responsible for ensuring that a preflight inspection is conducted using the appropriate operator's manual/CL. The PC may direct other crewmembers to complete elements of the preflight inspection as applicable, and will verify that all checks have been completed IAW the appropriate aircraft operator's manual/CL. The PC will expediently report any aircraft discrepancies that may affect the mission and will ensure that the appropriate information is entered DA Form 2408-12, DA Form 2408-13, and DA Form 2408-13-1 IAW DA PAM 738-751.
   b. The crewmembers will complete the assigned elements and report the results to the PC.
2. Procedures.
   a. The NCM will ensure that the aircraft is prepared for preflight. The NCM will ensure the aircraft is properly serviced, special equipment is installed, entries in the aircraft logbook (DA Form 2408-12, DA Form 2408-13, and DA Form 2408-13-1 IAW DA Pam 738-751) are current and correct, and covers and tie-downs are removed. The PC will verify that all preflight checks have been completed and ensure that the crewmembers enter the appropriate information on the appropriate forms. The NCM will secure all pre-loaded cargo.
   b. As applicable, the PC will ensure that all pertinent data has been loaded into the aircraft (such as COMSEC fills, GPS keys waypoints, and FMs).
   c. If circumstances permit, accomplish preflight inspection during daylight hours.
   d. The NCM will ensure that all cowlings and equipment are secured on completion of preflight.

NIGHT OR NIGHT VISION GOGGLES CONSIDERATIONS: If performing the preflight inspection during the hours of darkness, a flashlight (with an unfiltered lens) should be used to supplement available lighting. HYD leaks, oil leaks and other defects are difficult to see using a flashlight with a colored lens. Ensure that internal and external lighting is operational. FM 3-04.203 contains details regarding night time preflight inspection.

TRAINING AND EVALUATION REQUIREMENTS:

1. Training will be conducted at the aircraft.
2. Evaluation will be conducted at the aircraft.

REFERENCES: Appropriate common references, FM 3-04.203, and DA Pam 738-751.

TASK 1024

Perform Before-Starting-Engine through Before-Leaving Helicopter Checks

Note. Anytime a NCM is outside the aircraft or inside the aircraft with the ENGs operating and the left-hand (LH) escape panel "REMOVED", the upper cabin door "OPEN," or the ramp cargo door "RET", the NCM's visor will be down unless using NVG.

CONDITIONS: In a CH-47D/F helicopter and given the applicable operator's manual/CL.

STANDARDS: Appropriate common standards and the following additions/modifications:

1. Perform procedures and checks IAW the appropriate operator's manual/CL.
2. F Both PI stations will have a full page ENG indication caution advisory system instrument on one MFD. The center MFD (No. 5) will have a full page warning, caution, advisory displayed until before-taxi checks, during startup and prior to conducting ENG shutdown checks.
3. Comply with call and response terminology as outlined in chapter 6 and by the unit SOP.
4. Enter appropriate information on DA Form 2408-12, DA Form 2408-13, and DA Form 2408-13-1.
5. Complete post flight inspection and properly secure the aircraft after the last flight of the day IAW the appropriate operator's manual.

DESCRIPTION:

1. Crew actions.
   a. Each crewmember will complete the required checks pertaining to their assigned crew duties IAW the appropriate operator's manual/CL. Crewmembers will coordinate with each other before entering data into aircraft systems.
   b. The P will read the CL and announce APU and ENG starts.
   c. All crewmembers will clear the area around the aircraft before APU start and each ENG start.
   d. NCMs will perform duties as required by duty position and as directed by the PC, IAW the unit's SOP, while maintaining situational awareness (SA).
   e. The PC will ensure the appropriate information on DA Form 2408-12, DA Form 2408-13, DA Form 2408-13-1, and the PAT log IAW the unit SOP and DA Pam 738-751.
   f. If two or more NCMs will perform flight duties, the FE will determine which crewmember will perform specific portions of each task.
   g. Secure the aircraft after completion of the flight IAW the appropriate operator's manual, TM 1-1520-240-23 series/TM 1-1520-271-23 series, TM 1-1500-250-23, and the unit SOP.
2. Procedures.
   a. Perform the before-starting engine through before-leaving helicopter checks IAW the appropriate operator's manual/CL. The call and response method will be used, as appropriate.
   b. The crewmember reading the CL will read the complete CL item.
   c. The crewmember performing the check will answer with the appropriate response. For example, for the call "SWIVEL SWITCH–AS REQUIRED", the response might be "SWIVEL SWITCH, STEER." "AS REQUIRED" is not an appropriate response. Responses that do not clearly communicate action or information should not be used. For example, when responding to the call, "SYSTEMS – CHECK" replying with "CHECK" doesn't clearly indicate that the system is within the normal operating range. A response of "ALL IN THE NORMAL OPERATING RANGE" communicates more accurate information.
   d. Perform the PAC check and when complete, record data on the PAC log.
   e. After flight, correctly enter all information required on the appropriate DA Forms.

f. During APU start, the NCM will be outside of the aircraft to ensure that the area is clear and to perform fireguard duties.

g. During ENG start, the NCM will assume a position 45 degrees from the front of the ENG at the rotor blade tip to ensure that the aircraft is clear and ready for the ENG start.

h. The NCM performing crew duties from the ramp station and the NCM performing crew duties from the cabin door station will have an aircraft portable fire extinguisher in hand during aircraft ENG start and shutdown procedures.

i. The NCM/PIs will complete the post flight IAW the appropriate operator's manual/CL.

j. On completion of required maintenance and inspection, the NCM will verify the aircraft is properly moored and protective covers and security devices are properly installed IAW the appropriate operators' manual/CL.

k. Perform additional security duties as directed by the PC.

NIGHT OR NIGHT VISION GOGGLES CONSIDERATIONS: Prior to starting the ENGs, ensure that all internal and external lights are operational and set. Internal lighting levels must be high enough to easily see the instruments and to start the ENGs without exceeding operating limitations.

SNOW/SAND/DUST CONSIDERATIONS: Ensure that all rotating components and inlets/exhausts are clear of ice/snow prior to starting APU/ENGs.

TRAINING AND EVALUATION REQUIREMENTS:

1. Training may be conducted in the aircraft or CH-47 FS/TFPS.
2. Evaluations will be conducted in the aircraft or CH-47 FS/TFPS.

REFERENCES: Appropriate common references, DA Pam 738-751, and PAC log.

TASK 1025

F Perform Flight Mission Management

CONDITIONS: In a CH-47F helicopter with a FPN loaded.

STANDARDS: Appropriate common standards and the following additions/modifications:

1. Load applicable mission data if available.
2. Load FPN, manually or data loader unit (DLU).
3. Confirm aircraft WT is entered accurately into the CAAS.
4. Confirm elevations (as required).
5. Confirm accurate coordinates.
6. Confirm inertial navigation unit values (as required).
7. Update navigation systems as required.
8. Accurately determine fuel and PWR requirements by systematically updating the FD.
9. Provide timely/accurate FD cues for the P*.
10. Configure MFDs/sensors/mission aids to maximize terrain/threat avoidance.

DESCRIPTION:

1. Crew actions.

   a. The PC will ensure all data is correctly entered into the FD. The PC will direct the use of sensors to maximize terrain/threat avoidance.

   b. The PC, when performing P* duties, will direct the PI to perform crew station mission manager functions as required.

   c. The P is considered the mission manager. The P will perform navigation system updates as required utilizing any available sensor.

   d. The P will update the FD as required to reflect accurate fuel/PWR/timing data.

   e. The P will make all data entries for FPN adjustment, FD cues, transponder and radio and navigational aids (NAVAIDs) frequency changes.

2. Procedures.

   a. Navigation and radio frequency information may be entered into the FD manually or through data transfer.

   b. The crew verifies accurate information by double-checking information displayed on the MFDs and CDUs with planning information.

   c. During flight, mission management tasks are completed as required.

   d. The aircraft state and status are continually monitored and adjusted by the mission manager.

   e. The mission manager navigates and verifies navigation system accuracy and ensures the aircraft remains on the established timeline as required.

   f. The FD solutions are evaluated and updated with accurate information.

   g. The P* is provided with timely information to adjust the aircraft state (speed, heading and altitude) to meet mission requirements.

   h. Aircraft sensors are utilized to update navigation systems, aid navigation and assist in terrain avoidance.

TRAINING AND EVALUATION REQUIREMENTS:

1. Training will be conducted in the aircraft or CH-47 TFPS.
2. Evaluation will be conducted in the aircraft.

REFERENCES: Appropriate common references.

TASK 1026

Maintain Airspace Surveillance

> **WARNING**
>
> **While moving about the cabin area during flight, the NCMs must be secured to a 5,000-pound or 10,000-pound tie-down fitting in the cabin area. NCMs will not secure their restraining harness to the ramp.**

CONDITIONS: In a CH-47D/F helicopter under VMC.

STANDARDS: Appropriate common standards and the following additions/modifications:

1. Brief airspace surveillance procedures prior to flight. This will include scan sectors.
2. Announce any unplanned drift or altitude changes, clear the aircraft and immediately inform other crewmembers of all air traffic or obstacles that pose a threat to the aircraft.
3. Announce when attention will be focused inside the aircraft using a time limit that is appropriate for the conditions and announce when attention is focused outside.
4. Maintain airspace surveillance in assigned scan sectors.
5. When landing, the crew will confirm the suitability of the area and that the aircraft is clear of obstacles.

DESCRIPTION:

1. Crew actions.

   a. The PC will brief airspace surveillance procedures prior to the flight. The briefing will include areas of responsibility and scan sectors.

   b. The P* will announce his or her intention to perform a specific maneuver and will remain focused outside the aircraft. The P* is responsible for clearing the aircraft and avoiding obstacles.

   c. The P and NCM, as duties permit, will assist in clearing the aircraft and will provide adequate warning of obstacles, unusual drift or altitude changes. The P and NCM will announce when their attention is focused inside the aircraft and again when attention is re-established outside.

   d. When landing, the crew will confirm the suitability of the area and that the aircraft is clear of barriers/obstacles. The NCMs will move about the aircraft as necessary to ensure total coverage.

2. Procedures.

   a. Maintain close surveillance of the surrounding airspace.

      (1) Keep the aircraft clear from other aircraft and obstacles by maintaining visual surveillance (close, middle, and far areas) of the surrounding airspace.

      (2) Inform the crew immediately of air traffic or obstacles that pose a threat to the aircraft. Call out the location of traffic or obstacles by the clock, altitude and distance method. (The 12 o'clock position is at the nose of the aircraft.)

      (3) Give distance in miles or fractions of miles for air traffic and in feet for ground obstacles as appropriate. When reporting, air traffic, specify the type of aircraft (fixed-wing or helicopter) and, if known, the model. The altitude of the air traffic should be reported as the same altitude, higher or lower than the altitude at which you are flying.

   b. Prior to changing altitude, visually and verbally clear the aircraft for hazards and obstacles, inclusive of what is ahead, above, to the left and to the right of the aircraft.

c. Prior to performing a descending flight maneuver, it may sometimes be desirable to perform a clearing "S" turn to the left or right. The clearing "S" turns will provide the aircrew with a greater visual scan area.

d. During a HVR or hovering flight, inform the P* of unannounced drift or altitude changes. When landing, the crew will confirm the suitability of the area.

NIGHT OR NIGHT VISION GOGGLES CONSIDERATIONS: The use of proper scanning techniques will assist in detecting traffic and obstacles and avoiding spatial disorientation. Hazards such as wires are difficult to detect.

TRAINING AND EVALUATION REQUIREMENTS:

1. Training may be conducted in the aircraft or CH-47 FS/TFPS.
2. Evaluation will be conducted in the aircraft or CH-47 FS/TFPS.

REFERENCES: Appropriate common references.

TASK 1027

Perform Power Assurance Check

> **CAUTION**
>
> Do not exceed the ENG TEMP, N_G and TQ limits. Use the appropriate charts in Section 5 of the Operator's Manual to ascertain limits for current conditions.

CONDITIONS: In a CH-47D/F helicopter and given access to appropriate charts.

STANDARDS: Appropriate common standards and complete the PAT check IAW the PAT log and TM 1-1520-240-10 or TM 1-1520-271-10.

DESCRIPTION:

1. Crew actions.
   a. The P will perform the checks in sequence. The P should coordinate with and direct assistance from the P* and NCM, as necessary.
   b. The P will ensure the P* is familiar with PAT check procedures.
   c. Ground procedures.
      (1) The P briefs and coordinates with the P* and NCM, as necessary.
      (2) Position the aircraft into the prevailing wind. Set the brakes and direct assistance, as necessary.
      (3) Confirm the flight controls are neutral and the thrust control is in the ground detent. Direct the P* to monitor the flight controls and maintain aircraft control when the thrust control is not in the ground detent.
      (4) Direct the NCM to assist with maintaining obstacle avoidance and advise the cockpit concerning the movement of other aircraft operating in the immediate area.
   d. Perform the PAT IAW the applicable reference.
   e. Once the check has been completed for both ENGs, return to the CL.
2. HVR procedures.
   a. The P briefs and coordinates with the P* and NCM, as necessary.
      (1) Direct the P* to maintain HVR position and heading while maintaining orientation outside the cockpit. Position hold (PHOLD) and translational rate command (TRC) may be used in order to maintain position.
      (2) Direct the NCM to assist with maintaining obstacle avoidance and advise the cockpit concerning other aircraft/hazards in the area.
   b. Perform the PAT IAW the applicable references. Manipulation of the ECLs may not be required if the TQs are in the appropriate ranges for the PAT.
   c. Once the check has been completed for both ENGs, continue with the CL.
3. Inflight procedures.
   a. The inflight PAT procedure will be conducted only if environmental conditions prevent the check on the ground or HVR.
      (1) The P briefs and coordinates with the P* and NCM, as necessary.
      (2) Direct the P* to maintain assigned altitude, heading and airspeed while maintaining orientation outside the cockpit.

(3) Direct the NCM to assist with maintaining obstacle avoidance and advise the cockpit concerning other aircraft/hazards in the area.

b. Establish the aircraft at the appropriate airspeed while maintaining 100 percent rotor revolutions per minute (RRPM).

c. Perform the PAT IAW the applicable reference. Once the check has been completed for both ENGs, confirm a system check and continue with the mission. Manipulation of the ECLs may not be required if the TQs are in the appropriate ranges for the PAT.

TRAINING AND EVALUATION REQUIREMENTS:

1. Training may be conducted in the aircraft, CH-47 FS/TFPS or academically.
2. Evaluation will be conducted in the aircraft or CH-47 FS/TFPS.

REFERENCES: Appropriate common references.

TASK 1028

Perform Hover Power Check

CONDITIONS: In a CH-47D/F helicopter with the before HVR check complete, at an appropriate HVR height and with performance planning information AVAIL and the aircraft cleared.

STANDARDS: Appropriate common standards and the following additions/modifications:

1. Position the aircraft in the vicinity of the takeoff point and in the direction of takeoff at the appropriate HVR height.
2. **F** Ensure the WT is entered accurately into the CAAS and that the HVR override data correctly represents performance planning data.
3. Determine if sufficient PWR is AVAIL. to complete the mission by comparing actual TQ to predicted TQ, GO/NO-GO TQ and the validation factor obtained during performance planning.
4. Determine if SE capability exists throughout all modes of flight.
5. Determine if aircraft performance is sufficient to complete the mission.
6. Determine if sufficient fuel exist to complete the mission.
7. Ensure aircraft limitations are not exceeded.

DESCRIPTION:

1. Crew actions.

   a. The PC will determine whether the aircraft is capable of completing the assigned mission and will ensure that aircraft limitations will not be exceeded.

   b. The P* will announce his or her intent to bring the aircraft to a stationary HVR for a HVR PWR check.

      (1) During the ascent, check for proper CG and control response.

      (2) Remain focused outside the aircraft and announce when the aircraft is stabilized at the desired HVR altitude.

      (3) Use a 10-foot stationary HVR near the takeoff point and in direction of takeoff when performing a HVR PWR check, unless mission or terrain constraints dictate otherwise.

      (4) If different HVR height is required, use that height during performance planning to compute GO/NO-GO TQ, validation factor TQ and predicted HVR TQ.

   c. During the ascent, the P will monitor the TQ.

      (1) If validation factor is approached before reaching desired HVR height, the P will announce this in enough time so the P* can take appropriate action.

      (2) The P will monitor the aircraft instruments, note ENG gas producer speed (N_1)/engine speed (N_G), PTITs, ENG oil TEMPs, ENG oil pressures (PRESS) and determine if sufficient fuel is available to complete the mission and verify the PWR check.

      (3) The P will compare the actual HVR performance data to the computed data on the PPC and announce the results to the P*. If "GO/NO-GO TQ" for the desired HVR height is indicated before reaching the planned HVR height used during performance planning, the P will inform the P* that OGE maneuvers cannot be conducted. The PC will confirm the "GO/NO-GO TQ" and adjust the mission, as required.

   d. The NCM will remain focused primarily outside the aircraft to assist in clearing and to provide adequate warning of obstacles.

Note. If an adjusted zero fuel WT is required, the data should be recorded when time permits and for accuracy conducted into the wind.

---

2. Procedures.

   a. Use the HVR height computed during performance planning when performing this task, unless the mission or terrain constraints dictate otherwise. If another HVR height is required, use that height to compute GO/NO-GO and validation factor TQ. Refer to Task 1038 in this ATM.

   b. At desired HVR height, monitor the aircraft instruments and verify the PWR check. The P will determine if SE capability exists and will compare actual TQ to predicted TQ, GO/NO-GO TQ, and the validation factor. The P will ensure that aircraft limitations are not exceeded.

   c. The PC will ensure that aircraft performance and fuel are sufficient to complete the mission.

Note. If the TQ required maintaining a stationary HVR does not exceed the GO/NO-GO TQ OGE, any maneuver requiring OGE/IGE PWR or less may be attempted.

Note. If the TQ required maintaining a stationary HVR exceeds the GO/NO-GO TQ OGE, but does not exceed the validation factor IGE, all IGE maneuvers may be attempted.

Note. If the TQ required maintaining a stationary HVR exceeds the computed validation factor, the MAX GWT may have been exceeded for the environmental conditions present. Anytime the GWT or environmental conditions change significantly, the crew will perform additional HVR PWR checks and re-compute all PPC values. Significantly changed is defined as ±1,000 feet PA and/or ±10 degrees Celcius or an increase of 1,000-pounds GWT from the departure data.

NIGHT OR NIGHT VISION GOGGLES CONSIDERATIONS: The crew will use proper scanning techniques to avoid excessive drift when hovering at night or using NVG.

TRAINING AND EVALUATION REQUIREMENTS:

1. Training will be conducted in the aircraft or CH-47 FS/TFPS.
2. Evaluation will be conducted in the aircraft or CH-47 FS/TFPS.

REFERENCES: Appropriate common references.

TASK 1032

Perform Radio Communication(s) Procedures

CONDITIONS: In a CH-47D/F helicopter given appropriate radio frequency(s) and applicable references.

STANDARDS: Appropriate common standards and the following additions/modifications:

1. RCMs.
   a. Program, check and operate aircraft avionics.
   b. Establish radio contact with the desired unit or ATC facility. When communicating with ATC facilities, using radio communication procedures and phraseology IAW the AIM, DOD FLIP and Department of Transportation [DOT]/FAA Order 7110.65.
   c. Operate intercommunication (INTERCOMM) system.
   d. Perform or describe two-way radio failure procedures IAW the DOD FLIP or host country regulations.
2. NCMs.
   a. Operate INTERCOMM system.
   b. Use the appropriate radio internal communication system (ICS) with the desired facility (as required for [NCMs]).

DESCRIPTION:

1. Crew actions.
   a. The PC will determine radio frequencies IAW mission requirements during the crew briefing and will indicate whether the P* or the P will establish and maintain primary communications.
   b. The P* will announce information not monitored by the P.
   c. The P will adjust avionics to required frequencies. The P will copy pertinent information and announce information not monitored by the P*.
   d. During normal operations, the NCM will monitor external communications to prevent interruption when external communications are transmitted or received. (Monitoring external communications may not be desirable during operations requiring extensive internal communication, for example, external (sling) load(s), hoist/winch operation or emergencies.)
   e. Crew actions for two-way radio failure are as follows:
      (1) P* or P will announce two-way radio failure to all crewmembers.
      (2) The PC will direct the efforts to identify and correct the avionics malfunction.
      (3) The P* will focus outside the aircraft during VMC or inside IMC on the instruments, as appropriate, but should not participate in troubleshooting the malfunction.
      (4) The P will remain focused primarily inside the aircraft to identify and correct the avionics malfunction. The other crewmembers must remain primarily focused outside the aircraft in order to maintain the P scan.
   f. Crew actions for aircraft INTERCOMM failure:
      (1) The PC will direct assistance from the crew to determine the malfunction and corrective action. Alternate actions may include switching to a different ICS box, changing microphone cords if available, hooking up to a different ICS station, hand and arm signals or passing notes.
      (2) If the problem cannot be corrected, the PC will determine the course of action, which may vary from landing as soon as practical to landing as soon as possible.
2. Procedures.
   a. Adjust avionics to the required frequencies. Continuously monitor the avionics as directed by the PC.

(1) When required, establish communications with the desired facility.

(2) Monitor the frequency before transmitting. Transmit the desired/required information. Use the correct radio call sign when acknowledging each communication.

(3) When advised to change frequencies, acknowledge instructions. Select the new frequency as soon as possible unless instructed to do so at a specific time, fix or altitude.

(4) Use radio communication procedures and phraseology as appropriate for the area of operations. Use standard terms and phraseology for all INTERCOMMs.

b. Procedures for two-way radio failure. Attempt to identify and correct the malfunctioning radio and announce the results. If two-way radio failure is confirmed, comply with procedure outlined in the flight information handbook (FIH) or host country regulations.

TRAINING AND EVALUATION REQUIREMENTS:

1. Training may be conducted in the aircraft or CH-47 FS/TFPS.
2. Evaluation may be conducted in the aircraft or CH-47 FS/TFPS.

REFERENCES: Appropriate common references, AIM, DOD FLIP, and DOT/FAA Order 7110.65 P/CG.

TASK 1033

F Perform Digital Communication Procedures

CONDITIONS: In a CH-47F helicopter or with desktop trainer and the requirement to establish joint variable message format/high frequency (HF) digital communications.

STANDARDS: Appropriate common standards and the following additions/modifications:

1. Construct a preset communications NET using all the NET parameters required for the mission.
2. Modify an existing preset communications NET with the required corrected data.
3. Transmit and/or receive digital communication messages, files and other data through the communication (COMM) page.

DESCRIPTION:

1. Crew actions.
   a. The ability to perform digital (improve data modem [IDM]) communications is contingent on the aircrew establishing digital NETs. Both voice and digital traffic can be sent and received over a digital enabled NET. However, digital traffic is not possible over a voice NET.
   b. Digital NET users must have subscriber and originator ID tags set in a minimum of two IDM aircraft, possess a common very high frequency (VHF), ultra high frequency, HF or frequency modulation frequency and subscribers must be enabled as team/primary members.
2. Procedures.
   a. The crew will initially construct and develop the desired digital NETs during pre-mission planning through the use of approved software. Certain critical elements of digital NETs will not be able to be configured in the aircraft.
   b. Unit of assignment, mission essential task list, aircraft configuration and resources will determine the ability to establish a digital NET for communication.

TRAINING AND EVALUATION REQUIREMENTS:

1. Training may be conducted in the aircraft, CH-47 TFPS or desktop trainer.
2. Evaluation will be conducted in the aircraft or CH-47 TFPS.

REFERENCES: Appropriate common references.

TASK 1034

Perform Ground Taxi

> **CAUTION**
>
> While turning during a two-wheel taxi, the P* must avoid the forward gear contacting the ground.

CONDITIONS: In a CH-47D/F helicopter on a suitable surface, with the before-ground taxi/after-landing check completed and the aircraft cleared.

STANDARDS: Appropriate common standards and the following additions/modifications:

1. RCM.
   a. Maintain a constant speed appropriate for conditions and stay within ground control limitations.
   b. Maintain the desired ground track.
2. NCM.
   a. Perform applicable checks IAW TM 1-1520-240-CL or TM 1-1520-271-CL and the unit's SOP when read by the P.
   b. Immediately inform the RCMs of any observed discrepancies or malfunctions.
   c. Clear the aircraft.
   d. Use hand and arm signals, if required, IAW FM 21-60.
   e. Visually ensure swivels are locked for two-wheel taxi.

DESCRIPTION:

1. Crew actions-Two-wheel taxi.
   a. The P* will ensure that the parking brake is released. The P* will announce their intent to begin the two-wheel taxi operations, the taxi plan, and the intended direction of any turns, and that the aircraft is clear of all traffic and obstacles. The P* will remain focused primarily outside the aircraft. The P and NCM will assist the P* in clearing the aircraft.
   b. The P* will call for the before-taxi check or the taxi check, as appropriate.
   c. The P will read the appropriate taxi check. The P will ensure the aft wheel swivel switch is locked and the AFCS/DAFCS select (SEL) switch is at "BOTH" or "OFF". The P will have the NCM in the ramp area visually confirm that swivel lock actuators are locked.
   d. The P* will advise the P to monitor ground control limitations and LCT operation. Initially, the P* will position the cyclic, as necessary, not to exceed two inches (2") aft. The P* will release the brakes, as required, and raise the thrust control until the forward landing gear are clear of the ground. The P* will maintain directional control with the pedals and speed with the thrust control.
      (1) During forward taxi, the P* will raise the thrust control to slow or stop the aircraft. The P* will lower it to increase forward speed. If desired, the P* will lower the forward gear to the ground while taxiing in a straight line or when all movement is stopped.
      (2) For back taxi, the P* will raise the thrust control until the aircraft begins to move rearward. The P* will maintain directional control with the pedals and speed with the thrust control. The P* will lower the thrust control to slow or stop the aircraft. The P* will raise the thrust control to increase rearward speed.
      (3) Prior to two-wheel taxi, the PC will have the FE/CE visually confirm that both aft gears are in the trail position and that both aft wheel swivel lock actuators are locked.

(4) The P* may use lateral cyclic inputs to assist with directional control. These inputs are normally required when taxiing in a crosswind.

2. Crew actions-Four-wheel taxi.

a. The P* will announce his or her intent to begin the four-wheel taxi and state the taxi plan. The P will call for the before-taxi check or the taxi check, as appropriate.

b. The P will read the appropriate taxi check. The P will ensure that the swivel switch is at "STEER" and that the AFCS/DAFCS SEL switch is "OFF".

c. The P will advise the P* that he or she has control of the brakes and the PWR steering. The P* will monitor LCT operation and take care to not exceed ground control limitations.

d. All crewmembers will clear the aircraft as necessary. The P* will raise the thrust control to start forward movement and then lower it to ground detent. All thrust control movements will be announced.

(1) The P will maintain the taxi speed with moderate brake applications, and call for thrust control application/reduction as appropriate.

(2) The P will slowly rotate the PWR steering control knob to turn the aircraft in the desired direction. During taxi at light GWT, the P may have to advise the P* to apply AFT cyclic to prevent a loss of steering control.

e. When the NCM is required outside the aircraft during taxiing, the NCM will take a position where the P*/P can clearly see his or her hand and arm signals or will remain attached to the aircraft communication system.

f. Prior to four-wheel taxi, visually confirm that both aft gears are in the trail position.

g. During four-wheel taxi, the P must not allow the PWR steering control knob to spring back to the neutral position.

h. If the LCT actuators cycle between RET and ground because of light loading on the aft landing gear, it may be necessary to apply up to 2 inches of aft cyclic. If this action does not prevent further LCT cycling, set the cyclic trim switch to "MANUAL". If the LCTs are not at "GROUND", manually set them to that position. When taxiing is complete and before performing a takeoff, to a HVR set the cyclic trim switch to automatic (AUTO).

NIGHT OR NIGHT VISION GOGGLES CONSIDERATIONS: The landing light should be used for unaided ground taxi and the searchlight with installed infrared (IR) band pass light filter when wearing NVG. The use of proper scanning techniques will assist in detecting obstacles that must be avoided.

SNOW/SAND/DUST CONSIDERATIONS: If ground reference is lost because of blowing snow/sand/dust, lower the thrust control, neutralize the flight controls and apply wheel brakes until visual reference is re-established.

Note. Use caution when taxiing near other maneuvering aircraft because of limited visual references and relative motion illusion.

Note. Use caution when taxiing on ice and snow covered surfaces where braking action is poor.

Note. Due to decreased visual references and a possibility of relative motion illusions, limit taxi speed to a rate appropriate for the conditions.

Note. At night, use of the landing, search or anti-collision lights may cause spatial disorientation in blowing snow/sand/dust.

TRAINING AND EVALUATION REQUIREMENTS:

1. Training may be conducted in the aircraft or CH-47 FS/TFPS.

2. Evaluation will be conducted in the aircraft.

REFERENCES: Appropriate common references and FM 21-60.

TASK 1038

Perform Hovering Flight

CONDITIONS: In a CH-47D/F helicopter with the, before hover check completed and the aircraft cleared.

STANDARDS: Appropriate common standards and the following additions/modifications:

1. Adjust the flight controls as required to perform a smooth, controlled ascent to HVR.
2. Perform a smooth, controlled descent with minimal drift at touchdown.
3. Maintain ground track, ±5 feet during HVR taxi.
4. Maintain a constant rate of turn, not to exceed 90 degrees within 4 seconds.

DESCRIPTION:

1. Crew actions.

   a. The P* will announce his or her intent to perform a specific hovering flight maneuver and will remain focused primarily outside the aircraft to monitor altitude and avoid obstacles. The P* will ensure and announce that the aircraft is cleared prior to turning or repositioning the aircraft. The P* will announce when terminating the maneuver.

   b. The P and NCM will assist in clearing the aircraft and provide adequate warning of obstacles and unannounced drift or altitude changes. The P/NCM will announce when their attention is focused inside the aircraft and again when their attention is re-established outside.

2. Procedures.

   a. Takeoff to a HVR.

      (1) Position the cyclic as necessary, not to exceed 2 inches aft while all four landing gear are on the ground, and maintain heading with the pedals.

      (2) Smoothly raise the thrust control and adjust the cyclic to ascend vertically to a 10-foot aft gear height, unless mission requirements dictate another altitude.

      (3) Release the brakes as necessary.

   b. Hovering flight.

      (1) Adjust the cyclic to maintain a stationary HVR or to HVR in the desired direction.

      (2) Control heading with the pedals and maintain altitude with the thrust control. Maintain a constant HVR speed appropriate for the conditions.

      (3) To return to a stationary HVR, apply cyclic in the opposite direction while maintaining heading with the pedals and altitude with the thrust control.

   c. Hovering turns.

      (1) Around the nose. With the aircraft stationary, pick a point, slightly forward of the nose. Control the direction and rate of turn with the cyclic, pedals and maintain altitude with the thrust control. (Cross-control of the cyclic and pedals is required to pivot around the nose.)

      (2) Around the center cargo hook. With the aircraft at a stationary HVR and the cargo hook over the pivot point, apply pedal in the desired direction of turn. Maintain a stationary position over the pivot point with the cyclic. Control the rate of turn with the pedals and maintain altitude with the thrust control.

      (3) Around the tail. With the aircraft at a stationary HVR and the pivot point under the tail, apply cyclic and pedal in the direction of the intended turn. Use cyclic and pedal(s) to control the rate of turn and movement. Maintain HVR altitude with the thrust control.

   d. Landing from a HVR.

      (1) Lower the thrust control to affect a smooth rate of descent until the aft gear contacts the ground.

(2) Coordinate thrust control reduction with aft cyclic, as necessary, to maintain pitch attitude and to stop forward movement.

(3) Smoothly lower the thrust control to allow the forward gear to contact the ground. Continue to lower the thrust control to ground detent, neutralize the controls and apply brakes to stop forward movement.

(4) If sloping conditions are suspected or anticipated, refer to Task 1062.

Note. The P and NCM should assist the P* in maintaining the position of the aircraft over the pivot point.

Note. When landing from a HVR to an unimproved area, the crew must check for obstacles under the aircraft.

NIGHT OR NIGHT VISION GOGGLES CONSIDERATIONS:

1. Movement over areas of limited contrast, such as tall grass, water, or desert tends to cause spatial disorientation. Seek HVR areas that provide adequate contrast and use proper scanning techniques. F Cross-monitor horizontal situation display–hover (HSDH) symbology. If disorientation occurs, apply sufficient PWR and execute an instrument takeoff (ITO)(Task 1170). If a takeoff is not feasible, try to maneuver the aircraft forward and down to the ground to limit the possibility of touchdown with sideward or rearward movement.

2. When performing operations during unaided night flight, ensure the searchlight or landing light (white light) is in the desired position. Use of the white light will impair night vision for several minutes. Therefore, exercise added caution if resuming flight before reaching full dark adaptation.

SNOW/SAND/DUST CONSIDERATIONS: During ascent to a HVR, if visual references do not deteriorate to an unacceptable level, continue ascent to the desired HVR altitude.

1. Ten-foot HVR taxi. During takeoff to a HVR, simultaneously accelerate the aircraft to a ground speed that keeps the snow/sand/dust cloud just aft of the cabin door.

2. Ten-foot HVR taxi. If visual references are expected to be significantly degraded, use the HVR symbology (Task 1039) and conduct with TRC, PHOLD, radar altimeter (RAD ALT) or inertial ALT hold selected. During takeoff to a HVR, simultaneously accelerate the aircraft to a ground speed that keeps the snow/sand/dust cloud just aft of the cabin door.

Note. Maintain optimum visibility by observing references close to the aircraft. Exercise caution when operating in close proximity to other aircraft or obstacles.

Note. When visual references deteriorate making a 10 foot HVR taxi unsafe, determine whether to abort the maneuver, ground taxi, air taxi or perform an ITO (Task 1170).

3. Twenty foot to 100 foot air taxi. Use this maneuver when it is necessary to move the aircraft over terrain that is unsuitable for HVR taxi. Initiate air taxi the same as a 10 foot HVR, but increase altitude normally not more than 100 feet and accelerate to a safe airspeed appropriate for conditions.

Note. Ensure an area is available to safely decelerate and land the aircraft. Under certain conditions, such as adverse winds, it may be necessary to perform a traffic pattern to optimize conditions at the desired termination point.

Note. Hovering OGE reduces available ground references and may increase the possibility of spatial disorientation. Be prepared to transition to instruments and execute an ITO (Task 1170) or unusual attitude recovery (Task 1182), if ground reference is lost.

Note. At night, use of landing, search, or anti-collision lights may cause spatial disorientation while in blowing snow/sand/dust.

CONFINED AREA CONSIDERATIONS: Select good references to avoid unanticipated drift. All crewmembers must be focused primarily outside for obstacle avoidance.

LANDING FROM A HOVER TO WATER: Prior to landing, the "PITOT HEAT" switch, must be "ON". The ramp, lower half of the cabin door, lower rescue door, and drain plugs must be closed. Landing/searchlights shall be "RET". From a stabilized HVR, decrease thrust control for a smooth rate of descent.

1. A vertical descent, rather than a descent with some forward movement, will tend to disperse the swirling water spray under a no-wind condition. As the aft wheels and then the fuselage near the water, continue to lower the thrust control to ground detent. As more of the fuselage enters the water, buoyancy will level the helicopter attitude.
2. As the attitude approaches level, the helicopter will start moving forward and stabilize at approximately 4 to 5 KTS. This speed will be attained with the controls in neutral and the thrust control at the ground detent. The water level will not vary significantly because of GWT or CG. As observed from the cockpit, the water level will appear to intersect the fuselage below the lower nose enclosure.

Note. Aft landing gear ground proximity switches are not actuated during a water landing. Therefore, longitudinal cyclic pitch actuators must be manually set to ground position.

CAUTION

If contact is made with floating debris, return to HVR and assess damage.

TRAINING AND EVALUATION REQUIREMENTS:

1. Training may be conducted in the aircraft or CH-47 FS/TFPS.
2. Evaluation will be conducted in the aircraft or CH-47 FS/TFPS.

REFERENCES: Appropriate common references.

TASK 1039

F Perform Hovering Flight Utilizing Symbology

CONDITIONS: In a CH-47F helicopter with the HSDH or vertical situation display – hover displayed at both PI stations, the before hover or before landing check completed and the aircraft cleared.

STANDARDS: Appropriate common standards and the following additions/modifications:

1. Correctly configure HVR symbology and modes for hovering operations.
2. Perform a smooth, controlled ascent to HVR.
3. Perform a smooth, controlled descent with minimal drift at touchdown.
4. Maintain ground track, ±5 feet during HVR taxi.
5. Maintain a constant rate of turn, not to exceed 90 degrees within 4 seconds.

DESCRIPTION:

1. Crew actions.

   a. The P* will select the HVR page on his or her MFD, and will remain focused inside on the HVR symbology. The HVR FD cue will be selected to view the velocity vector and acceleration cue. Select the appropriate HVR Mode.

   b. Prior to hovering flight, the P* will select HVR hold and the appropriate RAD hold (RAD ALT or inertial ALT hold).

   c. P may select HVR functions if directed by P*. The P and NCMs will maintain airspace surveillance and clear the aircraft as needed.

   d. P and NCMs will announce when their attention is focused inside the aircraft and again when their attention is re-established outside.

2. Procedures.

   a. The P* correctly configures their MFDs for HVR operations and announces their intent to use HVR symbology.

   b. If the P* loses visual reference with the ground he or she should announce it and instantly transition to a "HEAD-DOWN" condition using the HVR symbology page to maintain aircraft control with no drift.

   c. If P* becomes spatially disorientated while hovering utilizing symbology, the P will take the flight controls and fly utilizing symbology or outside references.

NIGHT OR NIGHT VISION GOGGLES CONSIDERATIONS:

1. Movement over areas of limited contrast, such as tall grass, water or desert tends to cause spatial disorientation. Seek HVR areas that provide adequate contrast and use proper scanning techniques.
2. The HSDH symbology will be selected to view the velocity vector and acceleration cue and select the appropriate HVR Mode to assist in maintaining SA.
3. If disorientation occurs, apply sufficient PWR and execute an ITO (Task 1170).
4. When performing operations during unaided night flight, ensure the searchlight or landing light (white light) is in the desired position. Use of the white light may impair night vision for several MINs. Therefore, exercise added caution if resuming flight before reaching full dark adaptation.

WARNING

At night, use of landing, search or anti-collision lights may cause spatial disorientation while in blowing snow/sand/dust.

SNOW/SAND/DUST CONSIDERATIONS: If visual references do deteriorate to an unacceptable level, the procedure below will assist in maintaining SA and aircraft control:

1. Hovering flight. Prior to hovering flight, the HSDH symbology will be selected to view the velocity vector and acceleration cue.
2. The P* or P as directed will select HVR hold and the appropriate altitude hold (RAD ALT or inertial ALT hold).
3. Select either AUTO, transition (30 knots reference scale), or precision (10 knots reference scale) as the HVR mode so small movements in position will be detected.
4. Stabilize at the appropriate HVR height until the HVR hold position and altitude are captured.
5. Adjust position with the "DAFCS" trim switch and altitude with the "UP/DOWN" switch on the thrust control and heading with pedals as necessary.
6. Upon approaching the desired termination point, begin decelerating so as to arrive in a stabilized HVR using primarily acceleration cue and velocity vector.
7. When performing hovering flight without symbology and little to no visual references, accelerate the aircraft to a ground speed that will keep the snow/sand/dust cloud just aft of the cabin door.

Note. Maintain optimum visibility by observing references close to the aircraft. Exercise caution when operating in close proximity to other aircraft or obstacles.

Note. When visual references deteriorate and/or crew is unaware of potential obstacles that make a 10 foot HVR taxi unsafe, determine whether to abort the maneuver and ground taxi, air taxi or perform an ITO (Task 1170).

Note. Hovering OGE reduces available ground references and may increase the possibility of spatial disorientation. Be prepared to transition to instruments and execute an ITO (Task 1170) or unusual attitude recovery (Task 1182), if ground reference is lost.

CONFINED AREA CONSIDERATIONS: All crewmembers must be focused primarily outside for obstacle avoidance.

TRAINING AND EVALUATION REQUIREMENTS:

1. Training may be conducted in the aircraft or CH-47 TFPS.
2. Evaluation will be conducted in the aircraft or CH-47 TFPS.

REFERENCES: Appropriate common references.

TASK 1040

Perform Visual Meteorological Conditions Takeoff

CONDITIONS: In a CH-47D/F helicopter with the hover power, before-takeoff checks completed and the aircraft cleared.

STANDARDS: Appropriate common standards and the following additions/modifications:

1. Properly clear the aircraft.
2. F Ensure FD cues are displayed accurately as required.
3. Maintain takeoff heading ±10 degrees below 50 feet AGL.
4. Maintain ground track aligned with takeoff direction.
5. Maintain aircraft in trim above 50 feet AGL or as appropriate for transition to terrain flight.
6. Maintain takeoff PWR until reaching minimum SE airspeed, desired climb airspeed or transition to mission profile.

DESCRIPTION:

1. Crew actions.

   a. The PC will determine the direction of takeoff by analyzing the tactical situation, wind, long axis of the takeoff area, and the lowest obstacles. The PC will confirm that required PWR is available by comparing the information from the PPC to the HVR PWR check. The PC will ensure that the required fuel for the mission is available by comparing the required fuel onboard the aircraft to the PPC. If the fuel onboard is inadequate, add sufficient fuel, abort or revise the mission.

   b. The P* will remain focused primarily outside the aircraft throughout the maneuver to provide obstacle clearance. The P* will announce whether the takeoff is from the ground or from a HVR and his or her intent to abort or alter the takeoff. The P* will select reference points to assist in maintaining the takeoff flight path.

   c. The P and NCM will announce when ready for takeoff and will remain focused primarily outside the aircraft to assist in clearing and to provide adequate warning of obstacles.

   d. The P will monitor PWR requirements and advise the P* if PWR limits are being approached. The P and NCM will announce when their attention is focused inside the aircraft and again when attention is re-established outside.

   e. The NCM will assist in clearing the aircraft, advise the P* when the forward and aft landing gear are off the ground and obstacle avoidance.

2. Procedures.

   a. From the ground.

      (1) The P* will announce his or her intent to takeoff from the ground. The P* will focus his or her attention primarily outside the aircraft but will occasionally cross-check the flight instruments.

      (2) All crewmembers will clear the aircraft.

      (3) The P* will select reference points to maintain ground track. With the cyclic and pedals in the neutral position, the P* will release the brakes as required and raise the thrust control until the aircraft is airborne and accelerating.

      (4) All landing gear should leave the ground at the same time. As the aircraft leaves the ground, the P* will apply forward cyclic control as required to smoothly accelerate through effective translational lift (ETL) at an altitude appropriate for the terrain and obstacles.

      (5) The P* will adjust the cyclic as necessary to continue the acceleration (approximately 5 degrees nose down), obtain the desired climb airspeed, and maintain ground track. The P* will position the thrust control as necessary to clear obstacles in the flight path and obtain the desired

R/C. The P* will use the pedals to maintain heading when below 50 feet AGL and in trim when above 50 feet AGL.

(6) When the P* obtains the desired climb airspeed, the P* will adjust the cyclic as necessary to stop the acceleration. The P* will adjust the thrust control to continue or to stop the R/C. DThe P will confirm LCT operation.

b. From a HVR.

(1) The P* will announce his or her intent to takeoff from a HVR. The P* will focus attention primarily outside the aircraft.

(2) All crewmembers will clear the aircraft.

(3) The P* will select reference points to maintain ground track. The P* will apply forward cyclic to smoothly accelerate the aircraft through ETL while adjusting the thrust control, as required, to maintain the appropriate HVR height. The P* will perform the rest of the maneuver as for a takeoff from the ground.

Note. Performing this maneuver in certain environments may require HVR OGE PWR. Evaluate each situation for PWR required versus PWR AVAIL, such as terrain flight takeoff.

Note. The P* must avoid excessive and unnecessary nose-low accelerative attitudes.

Note. The NCMs should remain seated during this maneuver unless METT-TC requires deviation.

NIGHT OR NIGHT VISION GOGGLES CONSIDERATIONS:

1. If sufficient illumination exists to view obstacles, accomplish the takeoff in the same way as a VMC takeoff during the day. Visual obstacles, such as shadows, should be treated the same as physical obstacles.

2. If sufficient illumination does not exist, perform an altitude-over-airspeed takeoff by applying takeoff PWR first, followed by a slow acceleration to ensure obstacle clearance. The P* may perform the takeoff from a HVR or from the ground.

a. Maintain the takeoff PWR setting until reaching climb airspeed. Adjust PWR as required to establish the desired R/C and cyclic to maintain the desired airspeed. The P should alternate attention between cross-check instruments while assisting in obstacle avoidance. The P* and NCM should maintain orientation outside the aircraft and concentrate on obstacle avoidance. The P should make all internal checks.

b. Maintain desired ground track. Reduced visual references during the takeoff and throughout the ascent at night may make it difficult to maintain the desired ground track. Knowledge of the surface wind direction and velocity will assist in maintaining the desired ground track.

c. Use proper scanning techniques to avoid spatial disorientation.

d. When performing operations during unaided night flight, ensure that the searchlight or landing light (white light) is in the desired position. Use of the white light may impair night vision for several MINs. Therefore, exercise added caution if resuming flight before reaching fully dark adaptation.

SNOW/SAND/DUST CONSIDERATIONS: Apply thrust and cyclic control as required to ascend vertically. As the aircraft leaves the ground, maintain heading with the pedals and a level attitude with the cyclic. As the aircraft clears the snow/sand/dust cloud and clears the barriers, accelerate to climb airspeed and trim the aircraft.

Note. Brakes set or released may be determined by the type of surface, hard or soft, during the reconnaissance.

Note. In some cases, applying pitch with the thrust control to blow away loose snow/sand/dust from around the aircraft is beneficial before performing this maneuver.

Note. The P* should be prepared to transition to instruments or FD cues and execute an ITO if ground reference is lost.

WARNING

At night, use of the landing, search, or anti-collision lights may cause spatial disorientation while in blowing snow/sand/dust.

CONFINED AREA CONSIDERATIONS: Prior to departure, confirm the takeoff plan. Perform a HVR PWR check, if required. Reposition the aircraft, if desired, to afford a shallower departure angle and minimize PWR requirements. During departure, adjust the cyclic and the thrust control as required to establish a constant departure angle to clear obstacles. All crewmembers must be focused primarily outside for obstacle avoidance.

MOUNTAIN/PINNACLE/RIDGELINE CONSIDERATIONS: Analyze winds, obstacles and density altitude. Perform a HVR PWR check, if required. Determine the best takeoff direction and path for conditions. After clearing obstacles, accelerate the aircraft to the desired airspeed.

Note. Where drop-offs are located along the takeoff path, the aircraft may be maneuvered downslope to gain airspeed.

MUD/MUSKEG/TUNDRA CONSIDERATIONS: Perform one of the following takeoff techniques:

1. Dry muskeg/tundra areas. A vertical takeoff may be best in drier areas where the aircraft has not sunk into the muskeg/tundra or where obstacles prohibit motion. Smoothly increase the thrust control until the crew confirms that the wheels/skis are free. Adjust flight controls as necessary to perform a VMC takeoff.
2. Wet areas. In wet areas where the aircraft is likely to have sunk or is stuck in the mud/muskeg/tundra, the following technique may be best: With the cyclic in the neutral position, smoothly increase the thrust control. As HVR PWR is approached, adjust the cyclic as necessary to ascend vertically to break the suction of the wheels/skis. When free, adjust the flight controls as necessary to perform a VMC takeoff.

Note. Before performing operations in a mud/muskeg/tundra environment, it is important to understand dynamic rollover and differential airspeed hold (DASH) actuator characteristics.

TRAINING AND EVALUATION REQUIREMENTS:

1. Training may be conducted in the aircraft or CH-47 FS/TFPS.
2. Evaluation will be conducted in the aircraft or CH-47 FS/TFPS.

REFERENCES: Appropriate common references.

TASK 1042

Perform Cruise Check Procedures

> **CAUTION**
>
> Flight crewmembers will use a safety restraining harness at all times while moving about the cabin area. If crewmembers are not performing any tasks or maneuvers, they should remain seated with seat belts secured.

CONDITIONS: In a CH-47D/F helicopter and given access to the appropriate operator's manual/CL.

STANDARDS: Appropriate common standards and the following additions/modifications:

1. RCM.
   a. Call for the cruise check, 15 to 30 minutes after takeoff or after initial entry into mission profile.
   b. Read the cruise check from the appropriate operator's manual/CL and confirm the appropriate responses.
   c. Perform an inflight fuel consumption check.
   d. In addition to the fuel check, correctly monitor the fuel quantity and consumption rate at least every 30 minutes during the flight.
   e. Check individual fuel tank levels for proper system operation during the fuel consumption check and at least every 30 minutes during the flight.
   f. F The P will update the FLPN values for wind, outside air temperature (OAT) and speed as appropriate. The P will confirm fuel and PWR requirements/fuel remaining in CAAS with planning requirements.
   g. Initiate an appropriate course of action if actual fuel consumption varies from the planned value and the mission cannot be completed with the required reserve.
   h. Initiate an appropriate course of action if the NCM detects a maintenance-related fault.
2. NCM.
   a. Perform the initial ramp and cabin check when called for by either RCM.
   b. Perform ramp and cabin check at least every 30 minutes during the flight as mission permits.
   c. The NCM will remain secured to the aircraft by a safety harness connected to a 5,000-pound or 10,000-pound tie-down ring or static line if installed, in the cabin area during the ramp and cabin check.
   d. Immediately notify the PC of any malfunctions or discrepancies noted during the check.
   e. During these checks, the helmet clear visor must be down.
   f. The NCM will check the following items:

Note. The maintenance panel has indicators that the PI cannot see. Although a cruise check is conducted every 30 minutes, the FE should constantly be aware of the status of indications on the maintenance panel by placing themselves in a position to monitor it.

---

   (1) Forward XMSN area. Check for leaks, unusual vibrations, and soundproofing security.
   (2) Flight control closet. Check for leaks, extended jam indicators, loose hardware and soundproofing security.
   (3) Heater compartment. Check for component condition, leaks, and if used, proper heater operation.

(4) Avionics compartment. Check for proper cooling fan operation and component and soundproofing security.

(5) Transformer (XFMR)-RECTs. Check air intakes for obstruction, the crewmember will visually check behind the seat and soundproofing for obstructions.

(6) Passengers and individual equipment.

(a) Passengers. Ensure passengers are seated with seatbelts secured. Monitor passengers for symptoms of airsickness.

(b) Individual equipment. All individual equipment not secured to a person (or held in the hands) will be secured. Equipment will not be stored, secured under or behind seats that are occupied.

(7) Area outside aircraft. Check both sides; check fuel cells, ENG area and aft pylon area for leaks, damage or loose cowlings.

(8) Internal cargo.

(a) Check for proper security and condition during flight. Ensure equipment boxes, tool boxes and so forth are secured during flight.

(b) Cargo containing fuel (for example vehicles or internal tanks [ERFS]). Check for fumes or leaks during flight. Inform the PI immediately if fuel is leaking inside the cabin area or if fuel fumes exist.

(9) Main formers in cabin roof. Check for unusual vibration.

(10) No.1 and No.2 ENGs. Visually check for leaks.

(11) Combining XMSN area. Check for leaks and unusual vibration.

(12) ENG mount and drive shaft areas. Check for unusual vibrations.

(13) Maintenance panel. Check for system malfunction.

(a) HYD PRESS. Check the "FLT CONT and UTIL HYD PRESS" gauges for normal PRESS. Ensure there is no more than ±50 pounds per square inch (psi) fluctuation in any HYD gauge.

- FLT PRESS. Normal PRESS between 2,500 to 3,200 psi.
- UTIL. PRESS. Normal PRESS between 2,500 to 3,500 psi.

(b) HYD TEMPs. Check the FLT CONT and UTIL HYD TEMP gauges for normal TEMP.

- FLT CONT and UTIL HYD TEMPs are in the caution range between 95 to 120 degrees Celsius.
- MAX TEMP for all systems is 120 degrees Celsius.

(c) **D** Latch indicators. Check for tripped (black and white) indications.

(d) **F** Digital indicators. Check/verify fault indicators are not illuminated.

Note. The only latch indicators that a "RESET" can be attempted on are the debris screen latches.

- **D** Warning lights. Ensure warning lights are not illuminated. Press to test during cruise check to ensure the bulbs have not burned out.
- Fluid levels. Ensure the fluid levels in all three systems remain constant.

Note. The aircraft hydraulic systems may be serviced inflight.

---

(14) AFT synchronizing shaft bearing and mount. Check for vibrations and signs of overheating.

(15) Ramp area. Check for leaks, chafed lines, extended filter buttons, accumulator (ACCUM) PRESS, shorted or grounded wires and security of aft XMSN access doors.

DESCRIPTION:

1. Crew actions.

   a. Either RCM will call for the cruise check after takeoff or when the aircraft enters the mission profile.

   b. The NCM(s) will check the ramp and cabin area during the initial cruise check, when requested by either RCM and every 30 minutes thereafter as the mission allows.

2. Procedures.

   a. D After either RCM has called for the cruise check, the P will read the operator's manual/CL for the appropriate checks. The RCM will record the time and fuel quantity. The P will obtain the rate of consumption from the fuel flow indicators and will compute and record the burnout and reserve entry time. The P will determine if sufficient fuel is available to complete the mission with the required reserve and will check individual fuel tanks for the current fuel level.

   b. At least every 30 MINs, the P will monitor the fuel quantity, consumption rate, and verify system operation. If the fuel quantity or flow indicates a deviation from the initial check, the P will repeat the initial check to determine if the fuel quantity is adequate for the mission. The P will also check individual fuel tanks to ensure that the system is operating normally and determine if the fuel quantity in the auxiliary (AUX) fuel tanks is decreasing normally.

   Note. F CAAS updates fuel consumption continuously.

   Note. Verify ability to transfer fuel from internal (ERFS) to external tanks before using internal tank fuel quantities in fuel reserve/burnout computations.

   ---

   c. The NCMs will check the ramp and cabin area and notify the PIs of any discrepancies when found. If no discrepancies are found, announce "RAMP and CABIN CHECK COMPLETE, all SYSTEMS NORMAL."

   Note. The clear visor provides eye protection while not degrading the crewmember's ability to see inside the aircraft. Anytime a NCM is inside the aircraft with the ENGs operating and the LH escape panel is "REMOVED" or the upper cabin door is "OPEN" or the ramp cargo door is "IN", the NCMs visor will be down unless using NVGs.

   Note. When two or more NCMs are assigned to the flight, the FE will outline their specific duties during the mission briefing. The ramp and cabin checks may be divided between the NCMs.

NIGHT OR NIGHT VISION GOGGLES CONSIDERATIONS:

1. If performing ramp and cabin checks during the hours of darkness, a flashlight with an unfiltered lens should be used to supplement available lighting. HYD leaks, oil leaks and other defects are difficult to see using a flashlight with a colored lens.

2. NCMs must use caution while performing ramp checks with the white lights when the NVG curtain is not in use. When wearing NVG, flip the goggles up and slide the clear visor down. When finished, slide the clear visor up, flip the goggles down and inform PIs the status of the ramp and cabin check.

TRAINING AND EVALUATION REQUIREMENTS:

1. Training will be conducted in the aircraft or CH-47 FS/TFPS.
2. Evaluation will be conducted in the aircraft or CH-47 FS/TFPS.

REFERENCES: Appropriate common references.

TASK 1044

Navigate by Pilotage and Dead Reckoning

CONDITIONS: In a CH-47D/F helicopter and given the appropriate navigational maps, plotter and flight computer.

STANDARDS: Appropriate common standards and the following additions/modifications:

1. Maintain orientation within 500 meters or .25 NMs.
2. Arrive at check points/destination at ETA, ±1 minute.

DESCRIPTION:

1. Crew actions.

   a. The P* will focus primarily outside the aircraft and respond to navigation instructions given by the P. The P* will acknowledge commands issued by the P for the heading, altitude and airspeed changes necessary to navigate the desired course. The P* will announce significant surface features to assist in navigation.

   b. The P will direct the P* to change aircraft heading, altitude, and airspeed as appropriate to navigate the desired course. The P will use rally terms, specific headings, relative bearings, or key terrain features to accomplish this task. The P will announce all plotted wires before approaching the location, when the aircraft's altitude makes the wires a hazard. The P will monitor aircraft instruments and both the P and NCM will assist in clearing the aircraft while providing adequate warning to avoid traffic and obstacles. The P and NCM will announce when their attention is focused inside the aircraft and again when attention is re-established outside.

   c. The FE and/or CE will continually watch for traffic and obstacles along the flight path.

2. Procedures.

   a. Both pilotage and dead reckoning will be used to maintain the position of the aircraft along the planned route. Planned headings will be adjusted as necessary to compensate for the effects of the wind.

   b. Perform a ground speed check as soon as possible by computing the actual time required to fly a known distance. Adjust estimated times for subsequent legs of the flight route using actual ground speed. Compare planned ground speed with actual ground speed and adjust airspeed as required to arrive at each control point at its original ETA.

NIGHT OR NIGHT VISION GOGGLES CONSIDERATIONS: More detailed flight planning is required when the flight is conducted at terrain flight altitudes, when visibility is reduced or in a night or NVG environment. Interior cockpit lighting should be considered when selecting colors for preparing NAVAIDs, such as maps and kneeboard notes. FM 3-04.203 contains details on night navigation and mission planning.

TRAINING AND EVALUATION REQUIREMENTS:

1. Training may be conducted in the aircraft or CH-47 FS/TFPS.
2. Evaluations will be conducted in the aircraft or CH-47 FS/TFPS.

REFERENCES: Appropriate common references.

TASK 1046

Perform Electronically Aided Navigation

CONDITIONS: In a CH-47D/F helicopter with an electronically aided navigational system installed and operational.

STANDARDS: Appropriate common standards and the following additions/modifications:

1. Operate the installed electronically aided navigational system IAW the appropriate TM or manufacturer's operating manual.
2. Determine the position of the aircraft along the route of flight within 200 meters.
3. Arrive at check points/destination at ETA, ±1 minute.
4. **F** Select the course deviation indicator for the active course guidance source.
5. **F** If using the FD selects the correct course guidance source prior to coupling the system.

DESCRIPTION:

1. Crew actions.

   a. The P* will focus primarily outside the aircraft and respond to navigational instructions or cues given by the P. The P* will acknowledge commands issued by the P for the heading, altitude, and airspeed changes necessary to navigate the desired course. The P* will announce significant terrain features to assist in navigation.

   b. The P will be the primary operator of the electronic-aided navigation system. The P will direct the P* to change aircraft heading, altitude, and airspeed as appropriate to navigate the desired course. The P will use rally terms, specific headings, relative bearings or key terrain features to accomplish this task.

   c. The P will announce all plotted wires before approaching the location, when the aircraft's altitude makes the wires a hazard. The P will monitor aircraft instruments and both the P and NCM will assist in clearing the aircraft while providing adequate warning to avoid traffic and obstacles.

   Note. Only the P will perform inflight time/labor intensive navigation programming duties (for example building routes).

2. Procedures. Perform the turn-on, test and programming procedures IAW the appropriate TM. The proper updating and shutdown procedures will be performed IAW TM 1-1520-240-10, TM 1-1520-271-10, or manufacturer's equipment operator's manual.

TRAINING AND EVALUATION REQUIREMENTS:

1. Training may be conducted in the aircraft or CH-47 FS/TFPS.
2. Evaluations will be conducted in the aircraft or CH-47 FS/TFPS.

REFERENCES: Appropriate common references and the manufacturer's operating manual, if required.

TASK 1052

Perform Visual Meteorological Conditions Flight Maneuvers

CONDITIONS: In a CH-47D/F helicopter with the aircraft cleared when applicable.

STANDARDS: Appropriate common standards and the following additions/modifications:

1. Turns.
   a. Clear the aircraft.
   b. Maintain selected bank angle, ±10 degrees.
   c. Roll out on desired heading, ±10 degress.
2. Climbs and descents. Clear the aircraft.
3. Traffic pattern flight. Enter, operate in and depart a traffic pattern.

DESCRIPTION:

1. Crew actions.

   a. The P* will remain focused primarily outside the aircraft. The P* will announce and clear each turn, climb and descent.

   b. The P and NCM will assist in clearing the aircraft and will provide adequate warning of traffic and obstacles. The P/NCM will announce when their attention is focused inside the aircraft and again when attention is re-established outside.

2. Procedures. The P* will adjust cyclic as required to maintain the desired airspeed, course, ground track or heading as appropriate. The P* will adjust the thrust control as required to maintain the desired climb/descent rate or altitude and maintain aircraft in trim with the pedals. Perform traffic pattern operations IAW ATC directives, AIM, local SOP and FM 3-04.203.

   a. VMC Climb. The P* will raise the thrust control to initiate climb. The P* will adjust pedals to maintain aircraft in trim. The P* will lower the thrust control to stop climb at desired altitude.

   b. VMC Climbing turns. The P* will raise the thrust control to initiate climb. The P* will adjust pedals to maintain aircraft in trim and apply cyclic in the desired direction of turn. The P* will adjust the cyclic as required to stop turn on heading and lower the thrust control to stop climb at desired altitude.

   c. VMC Straight-and-level flight. The P* will adjust the thrust control to maintain altitude. The P* will adjust pedals to maintain aircraft in trim. The P* will maintain airspeed and heading.

   d. VMC Level turns. The P* will apply cyclic in the desired direction of turn. The P* will adjust the thrust control to maintain altitude and adjust pedals to maintain aircraft in trim. The P* will apply cyclic opposite the direction of turn to stop the turn on the desired heading.

   e. VMC Descents. The P* will lower the thrust control to initiate the descent. The P* will adjust pedals to maintain aircraft in trim. The P* will raise the thrust control to stop rate of descent at the desired altitude.

   f. VMC Descending turns. The P* will lower the thrust control to initiate descent. The P* will adjust pedals to maintain aircraft in trim and apply cyclic in the desired direction of turn. The P* will adjust cyclic as required to stop turn at the desired heading. The P* will raise the thrust control to stop the descent at desired altitude.

   g. Traffic pattern flight.

      (1) The P* will maneuver the aircraft into position to enter the downwind leg midfield at a 45-degree angle (or IAW local procedures), at traffic pattern altitude, and at the desired airspeed. (Alternate entries may be used if approved by ATC.) On downwind, the P will complete the before-landing check. Before turning base, the P* will lower the thrust control and adjust airspeed as required and initiate a descent.

(2) If performing a straight-in or a base-leg entry, the P* will reduce airspeed at a point to facilitate the approach. The P* will turn base and final leg, as appropriate, to maintain the desired ground track. The P* will perform the desired approach. The P* will announce each turn in the pattern and the type of approach planned. The P and NCM will assist in clearing the aircraft throughout each turn in the traffic pattern.

(3) For a closed traffic pattern after takeoff, the P* will climb straight ahead at climb airspeed to the appropriate altitude, turn to crosswind, and continue the climb. The P* will initiate the turn to downwind as required to maintain the desired ground track. The P* will adjust the thrust control and cyclic as required to maintain traffic pattern altitude and airspeed.

h. Before-landing check. The P will perform the before-landing check before turning base and announce when it is completed.

NIGHT OR NIGHT VISION GOGGLES CONSIDERATIONS:

1. The P* will focus primarily outside the aircraft and should concentrate on obstacle avoidance and aircraft control. The P will make all internal cockpit checks.

2. For NVG training in the traffic pattern, the recommended MAX airspeed is 100 KIAS/KCAS and the recommended MAX bank angle is 30 degrees.

TRAINING CONSIDERATIONS: For traffic pattern training, the recommended airspeed is 70 KIAS/KCAS and a 500 FPM R/C or descent on crosswind and base legs and 100 KIAS/KCAS on the downwind leg.

TRAINING AND EVALUATION REQUIREMENTS:

1. Training may be conducted in the aircraft or CH-47 FS/TFPS.
2. Evaluation will be conducted in the aircraft or CH-47 FS/TFPS.

REFERENCES: Appropriate common references.

TASK 1058

Perform Visual Meteorological Conditions Approach

> **CAUTION**
>
> Landings to the ground will be accomplished with the ramp in the full up position unless internal cargo loading prohibits or if tactical situation dictates. If landing with the ramp in other than the full-up position, caution must be exercised by the crew to avoid ramp contact with the ground.

> **CAUTION**
>
> To prevent droop-stop pounding, do not exceed ground control limitations after all landing gear contact the ground.

CONDITIONS: In a CH-47D/F helicopter given VMC with the landing area reconnaissance and before landing check completed.

STANDARDS: Appropriate common standards and the following additions/modifications:

1. Maintain a constant approach angle clear of obstacles to desired point of termination (HVR) or touchdown (surface).
2. Maintain rate of closure appropriate for the conditions.
3. Maintain ground track alignment with the landing direction, as appropriate.
4. Align aircraft with landing direction below 50 feet AGL or as appropriate for transition from terrain flight.
5. Perform a smooth and controlled termination to a HVR or touchdown to the surface.
6. Determine wind direction and velocity throughout the landing sequence using wind indicators and the CAAS.

DESCRIPTION:

1. Crew actions.

   a. The P* will select a suitable landing area (analyze suitability, barriers, winds, approach path, touchdown point and takeoff direction). The P* will focus primarily outside the aircraft to provide obstacle clearance throughout the maneuver. The P* will announce when he or she begins the approach and whether the approach will terminate to a hover or to the surface. The P* will also announce the intended point of landing and any deviation from the briefed approach, to include a go-around, if required.

   b. The P and NCM will confirm the suitability of the area, assist in clearing the aircraft, and provide adequate warning of traffic and obstacles. The P will acknowledge any deviations during the approach. **D** The P will confirm that the LCTs "RET" during the approach. The P and NCM will announce when their attention is focused inside the aircraft and again when attention is re-established outside.

2. Procedures. Evaluate winds. Select an approach angle that allows obstacle clearance while descending to the desired point of termination. Once the termination point is sighted and the approach angle is intercepted, adjust thrust control as necessary to establish and maintain a constant angle. Maintain entry airspeed until the rate of closure appears to be increasing. Above 50 feet AGL, maintain ground track alignment and the aircraft in trim. Below 50 feet AGL, align the aircraft with the landing direction.

Progressively decrease the rate of descent and rate of closure until reaching the termination point (HVR, touchdown) or until a decision is made to perform a go-around.

a. To a hover. The approach to a HVR may terminate with a full stop over the planned termination point or continue movement to transition to hovering flight. Progressively decrease the rate of descent and rate of closure until an appropriate HVR is established over the intended termination point.

b. To the surface. The decision to terminate to the surface with zero speed or with forward movement will depend on the aircraft's loading/environmental conditions. Touchdown with minimum lateral movement. After surface contact, ensure that the aircraft remains stable until all movement stops. Smoothly lower the thrust control to the full down position and neutralize the pedals and cyclic. Apply brakes if required.

c. Go-around. The P* should perform a go-around if a successful landing is doubtful or if visual reference with the intended termination point is lost. Once climb is established, re-assess the situation and develop a new course of action.

Note. Performing this maneuver in certain environments may require HVR OGE PWR. Evaluate each situation for PWR required versus PWR AVAIL.

Note. If wind conditions may be a factor, a wind evaluation should be performed. Techniques for evaluating wind conditions are found in FM 3-04.203.

Note. Steep approaches can place the aircraft in potential settling-with-PWR conditions.

NIGHT OR NIGHT VISION GOGGLES CONSIDERATIONS:

1. Altitude, apparent ground speed and rate of closure are difficult to estimate at night.

   a. The rate of descent during the final 100 feet should be slightly less than during the day to avoid abrupt attitude changes at low altitudes.

   b. After establishing the descent during unaided flights, slightly reduce airspeed until apparent ground speed and rate of closure appear to be increasing. Progressively decrease the rate of decent and forward speed until termination of the maneuver.

2. Surrounding terrain or vegetation may decrease contrast and cause degraded depth perception during the approach. Before descending below obstacles, determine the need for artificial lighting.

3. Use proper scanning techniques to avoid spatial disorientation.

4. When performing operations during unaided night flight, ensure that the searchlight or landing light (white light) is in the desired position. Using the white light may impair night vision for several MINs. Therefore, exercise added caution if resuming flight before reaching full dark adaptation.

SNOW/SAND/DUST CONSIDERATIONS:

1. Termination to a point OGE.

   a. This termination requires OGE PWR and may be used for some snow/sand/dust landings.

   b. Make the approach to an OGE HVR over the intended landing point.

   c. Slowly lower the thrust control and allow the aircraft to descend. The rate of descent will be determined by the rate in which the snow/sand/dust is blown from the intended landing point.

   d. Remain above the snow/sand/dust cloud until it dissipates and visual references can be seen for touchdown. After ground contact, lower the thrust control to the ground detent position and neutralize the flight controls.

2. Termination to the surface with forward speed.

   a. This termination may be made to an improved landing surface or suitable area with minimal ground references.

   b. Once the appropriate approach angle is intercepted, adjust the thrust control as necessary to establish and maintain the angle.

c. As the apparent rate of closure appears to increase, progressively decrease the rate of descent and rate of closure to arrive at the touchdown area slightly above ETL. At this point, maintain the minimum rate of closure that ensures that the snow/sand/dust cloud remains behind the PI's station.

d. When the wheels or skis contact the snow/ground, if conditions allow, maintain landing attitude to dissipate forward speed then smoothly lower the thrust control to allow the forward landing gear to settle. Effort should be made not to bury wheels or skis.

3. Termination to the surface with no forward speed.

a. This termination should be made to landing areas where slopes, obstacles, or unfamiliar terrain, preclude a landing with forward speed.

b. It is not recommended when new or powder snow or fine dust is present because whiteout/brownout conditions will occur.

c. The termination is made directly to a reference point on the ground with no forward speed. After ground contact, smoothly lower the thrust control to the ground detent position and neutralize the flight controls.

Note. Brakes set or released may be determined by the type of surface, hard or soft, during the reconnaissance.

---

d. Packed surface area. Thin layer of snow or dust on top of a hard sub-surface with some visible terrain elements such as rocks. Set the brakes to minimize forward roll after landing.

e. Soft surface area. This is considered as a thick layer of snow or dust with no visible sub-surface. Release the brakes to minimize abrupt stop after landing and unnecessary stress on the aft landing gear.

Note. When landing in deep sand or snow, the aircraft wheels/skis may settle at different rates.

Note. During sand/dust landings, all doors and windows should be closed and vent blowers turned off.

Note. OGE hovering reduces available ground references and may increase the possibility of spatial disorientation. Be prepared to transition to instruments and execute an ITO if ground reference is lost.

Note. HVR OGE reduces available ground references and may increase the possibility of spatial disorientation. If ground references are limited, the P* may elect to perform coupled HVR flight (Task 1039) and transition inside to the HVR symbology. Be prepared to transition to instruments and execute an ITO if ground reference is lost.

Note. At night, use of the landing, search or anti-collision light may cause spatial disorientation while in blowing snow/sand/dust.

CONFINED AREA CONSIDERATIONS:

1. Before commencing the approach, the crew will determine and brief an escape route in case a go-around is necessary.

2. An approach one-third of the useable landing area will reduce the approach angle and minimize PWR requirements.

3. During the approach, continue to determine the suitability of the area. If possible, make the decision for a go-around before descending below the barriers or going below ETL.

4. The parking brake should be set before landing on unimproved areas where the surface slopes (Task 1062).

5. After touchdown, check aircraft stability as the thrust control is lowered.

MOUTAIN/PINNACLE/RIDGELINE CONSIDERATIONS:

1. Before commencing the approach, the crew will determine and brief an escape route in case a go-around is necessary. During the approach, continue to determine the suitability of the intended landing point.
2. Select a shallow to steep approach angle, depending on the wind, line of demarcation, density altitude, GWT and obstacles. During the approach, continue to determine the suitability of the intended landing point.
3. The rate of closure may be difficult to determine until the aircraft is close to the landing point.
4. Reduce airspeed to slightly above ETL until the rate of closure can be determined and decide whether to continue the approach or make a go-around. If a go-around is required, it should be performed before decelerating below ETL. If the approach is continued, terminate to a HVR or to the surface.
5. After touching down, check aircraft stability as the thrust control is lowered (Task 2125).

Note. To successfully operate in small areas, it may be necessary to place the nose of the aircraft over the edge of the landing area. This may cause a loss of important visual references when on final approach. All crewmembers must assist in providing information on aircraft position in the landing area.

MUD/MUSKEG/TUNDRA CONSIDERATIONS: Select a suitable area and terminate the approach to a 10-foot HVR over the intended touchdown point. Begin a vertical descent until the aircraft touches down. Check aircraft stability while lowering the thrust control. If the area is suitable, lower the thrust control to the ground detent position and neutralize the cyclic and pedals.

TRAINING AND EVALUATION REQUIREMENTS:

1. Training may be conducted in the aircraft or CH-47 FS/TFPS.
2. The evaluation will be conducted in the aircraft or CH-47 FS/TFPS.

REFERENCES: Appropriate common references.

TASK 1062

Perform Slope Operations

CAUTION

Landings to the ground will be accomplished with the ramp in the full up position unless internal cargo loading prohibits or if tactical situation dictates. If landing with the ramp in other than the full-up position, caution must be exercised by the crew to avoid ramp contact with the ground.

CAUTION

To prevent droop-stop pounding, do not exceed ground control limitations after all landing gear contact the ground.

CONDITIONS: In a CH-47D/F helicopter with aircraft cleared and given a slope area.

STANDARDS: Appropriate common standards and the following additions/modifications:

1. RCM.
   a. Select a suitable landing area.
   b. Set the parking brakes before landing.
   c. Maintain heading, ±5 degrees.
   d. Maintain minimum drift before touchdown and then no drift allowed after wheel contact.
2. NCM.
   a. Confirm suitable landing area.
   b. Clear the aircraft.
   c. Announce drift and altitude.

DESCRIPTION:

1. Crew actions.

   a. The P* will announce their intent to perform a slope operation and will establish the helicopter over the slope. The P* will ensure the brakes are set and will announce their intended landing area and any deviations from the intended maneuver. The P* should be aware of the common tendency to become tense and, as a result, to over control the aircraft while performing the slope operation. The P* will note the aircraft attitude at a HVR, prior starting descent to land on the slope.

   b. All crewmembers will clear the aircraft and provide warning of obstacles, excessive drift, or excessive attitude changes.

   c. The P and NCM will assume a position where he or she can observe the slope operation. The NCM will clear the sector while checking that the rotor blades are clear of obstacles and the ground. The NCM will call out wheel height from 10 feet to the ground, in 1-foot increments. The NCM will advise the P* when all landing gear are on the ground and the aircraft is stable.

2. Procedures.
   a. Upslope landings.

      (1) With the aircraft heading upslope, the P* will lower the thrust control until the forward landing gear contacts the ground. The P* will maintain heading with the pedals and adjust cyclic

as necessary to maintain the position of the aircraft. The P* will continue to lower the thrust control until the aft landing gear contacts the ground.

(2) When all landing gear is on the ground, the P* will smoothly lower the thrust control to ground detent. The P* will then neutralize the controls while checking the stability of the aircraft.

(3) The P* will perform the takeoff from the upslope in the reverse sequence.

b. Downslope landings.

(1) With the aircraft heading downslope, the P* will lower the thrust control until the aft landing gear contacts the ground. The P* will adjust pitch attitude to maintain a stabilized position on the slope by coordinating thrust control reduction with aft cyclic movement. This may result in a slightly higher pitch attitude when the LCTs program to ground detent. The P* will maintain heading with the pedals.

(2) The P* will smoothly and continuously lower the thrust control until the forward landing gear contacts the ground. If the aircraft slides down the slope, the P* will return to a HVR and reposition.

(3) When all landing gear are on the ground, the P* will smoothly lower the thrust control to ground detent. The P* will then neutralize the controls while checking the stability of the aircraft.

(4) The P* will perform the takeoff from the downslope in the reverse sequence.

c. Cross-slope landings.

(1) With the aircraft heading cross slope, the P* will lower the thrust control until the upslope aft landing gear contacts the ground. The P* will maintain heading with the cyclic and pedals as required.

(2) The P* will maintain pitch attitude by coordinating thrust control reduction with aft cyclic movement. This will normally place the downslope aft landing gear in contact with the ground. The P* will coordinate the cyclic and pedals as necessary. The P* will continue to lower the thrust control until the forward landing gear is on the ground.

(3) The P* will smoothly lower the thrust control to ground detent. The P* will then neutralize the controls while checking the stability of the aircraft.

(4) The P* will perform the takeoff from the cross slope in the reverse sequence.

Note. The LCT actuators will program to the "GROUND" position as soon as the aft landing gear contacts the ground and the landing gear proximity switches engage. This may cause the aircraft to accelerate forward. To prevent this acceleration, the crew has two options. The P may place the AFCS/DAFCS cyclic trim switch to "MANUAL" and land with the LCT actuators in the "RET" position or extend the actuators to "GROUND" before conducting slope operations. After landing with the LCTs in the "RET" position, ensure the LCTs are placed to the "GROUND" position. After departing the slope, the P will return the AFCS/DAFCS cyclic trim switch to "AUTO".

Note. Before conducting slope operations, RCMs must understand droop-stop characteristics.

Note. If, at any time, successful completion of the landing is doubtful, the P* must abort the maneuver.

Note. If the slope landing cannot be conducted without droop-stop pounding, reposition the aircraft.

NIGHT OR NIGHT VISION GOGGLES CONSIDERATIONS:

1. When conducting slope operations, select reference points to determine slope angles.

2. When performing operations during unaided night flight, ensure that the searchlight is in the desired position. Use of the white light may impair night vision; therefore, exercise added caution if resuming flight before reaching full dark adaptation.

TRAINING AND EVALUATION REQUIREMENTS:

1. Training will be conducted in the aircraft.
2. Evaluation will be conducted in the aircraft.

REFERENCES: Appropriate common references.

TASK 1063

Perform External (Sling) Load(s) Operations

WARNING

Crewmembers must remain clear of the MID cargo hook. If jettisoning becomes necessary, the hook may spring back when the load is released, resulting in injury.

WARNING

At no time will the push-to-talk button on the hoist/winch control grip be used during external (sling) load(s) operations. Inadvertent hook release could occur if NCM does not visually locate release button before releasing load(s).

CAUTION

A static electricity discharge wand will be utilized IAW FM 4-20.197.

CONDITIONS: In a CH-47D/F helicopter with operational cargo hook(s), external (sling) load(s), completed DA Form 7382 (Sling Load Inspection Record), and training load(s) IAW FM 4-20.197.

Note. A qualified sling load inspector, before external (sling) load(s) operations, will inspect all external (sling) load(s). Certification must be recorded on a DA Form 7382 and copies distributed IAW FM 4-20.197.

STANDARDS: Appropriate common standards and the following additions/modifications:

1. RCM.

   a. Before hook-up. Verify DA Form 7382 is complete and on file and that the aircraft will remain within GWT and CG limitations. Do not exceed prescribed airspeed restrictions (if applicable) for external (sling) load(s).

   b. Hook-up and HVR.

      (1) Ensure that the aircraft remains clear of the load(s) and obstacles.

      (2) Perform a vertical descent/ascent with the load(s) to a load(s) height of 10 feet, ±3 feet, or appropriate for the conditions.

      (3) Determine PWR sufficient to continue the maneuver.

   c. Takeoff.

      (1) Maintain aircraft in trim (above 100 feet AGL).

      (2) The P will reference the RAD ALT and back-up the NCM calling the load(s).

   d. Approach and load(s) release.

      (1) Maintain a constant approach angle to ensure the load(s) safely clears obstacles and terminates over the intended point of landing.

(2) Perform a vertical descent from 10 feet with the load(s) to the desired touchdown point, ±5 feet.

(3) The P will reference the RAD ALT and back-up the NCM calling the load(s).

2. NCM.

a. The NCM will ensure that the aircraft is prepared for external (sling) load(s) operations.

b. The NCM will also ensure that all sling(s) equipment is inspected IAW FM 4-20.197 and all sling(s) equipment is secured in the aircraft before takeoff.

(1) Provide aircraft guidance for hook up and release using no more than two directions at a time.

(2) Clear the aircraft and external (sling) load(s) during the operation.

(3) Confirm load(s) is hooked and secured.

(4) Ensure that load(s) and sling(s) are free of entanglements.

(5) Continue to monitor load(s) for oscillation.

c. The NCM will call the load(s) height from ground to 10 feet in 1-foot increments and from 10 feet to the ground also in 1-foot increments. The NCM will call the load(s) height AHO on takeoff/approach at 100 feet, 75 feet, 50 feet, 25 feet, 20 feet, 15 feet, and 10 feet.

d. Monitor and call the load(s) height during terrain flight at altitudes of 200 feet AHO and below.

DESCRIPTION:

1. Crew actions.

a. The PC will conduct a thorough crew briefing and ensure that all crewmembers are familiar with external (sling) load(s) operations, EMERG and communication procedures. The PC will ensure that DD Form 7382 has been completed. The PC will determine the direction of takeoff by analyzing the tactical situation, the wind, the long axis of the takeoff area, and the lowest obstacles and will confirm that required PWR is AVAIL by comparing the information from the PPC/F HVR override, to the HVR PWR check.

b. The P* will remain focused outside the aircraft throughout the maneuver. The P* will monitor altitude and avoid obstacles.

c. The P will monitor the cockpit instruments and assist the P* in clearing the aircraft. The P will set cargo hook switches, as required, and should make all radio calls. When directed by the P*, the P will "ARM" the cargo hook.

d. The P and NCM not calling the load(s) will assist in clearing the aircraft and will provide adequate warning of obstacles.

e. The NCM calling the load(s) will remain primarily focused on the load(s). The NCM may place the radio switches on the ICS "OFF". The cargo hook switch on the hoist operator's panel will be "ARMED" and the hoist operator's grip must be secured and within easy reach to be able to jettison the load(s) in the event of an EMERG or if it will endanger the crew or aircraft. The NCM will guide the P* during the load(s) pickup, advise of the load(s) condition inflight and direct the P* when setting down the load(s).

f. The NCM will attach his or her restraining harness to a 5,000-pound or 10,000-pound tie-down ring and assume a position at the right aft corner of the rescue hatch.

g. Table 4-3, page 4-79, for an example of an external (sling) load(s) briefing CL.

Table 4-3. Example of crew briefing checklist for external (sling) load(s) procedures

1. Prior to hook-up–Determine takeoff GWT, SE capability and verify GO/NO-GO and validation factor.
2. P–Duties.
   a. ARM the cargo hook master switch.
   b. Turn OFF radio pin switches for P* (if required).
   c. Common Missile Warning System (CMWS)/ASE Variant – STANDBY.
   d. ARC 220–STANDBY or OFF.
   e. Inform P* before reaching limits.
   f. Perform HVR PWR check and before takeoff check.
   g. Cargo hook master switch:
      - OFF above 200 feet AHO and SE airspeed.
      - ARMED below 200 feet and SE airspeed.
   h. The P will back-up the NCM calling the load(s) using the RAD ALT.
3. NCM–Duties.
   a. NCM calling load(s) will have radios "OFF" and winch/hoist control grip secured and positioned within reach.
   b. Advise load(s) in sight.
   c. Direct P* over load(s) (no more than two directions at a time).
   d. Advise when load(s) is hooked.
   e. Advise when hook-up personnel(s) are clear and direction.
   f. Advise when load(s) is clear to come up.
   g. Advise when sling(s) are tight.
   h. Advise load(s) height during takeoff from the ground to 10 feet in 1-foot increments.
   i. Monitor load(s) inflight.
   j. The NCM will call the load(s) height from 10 feet to the ground and from the ground to 10 feet in 1-foot increments. The NCM will call the load(s) height AHO on takeoff/approach at 100 feet, 75 feet, 50 feet, 25 feet, 20 feet, 15 feet, and 10 feet.
4. Hook authority.
   a. Normal release–Rests with PC, but normally is released by the NCM.
   b. EMERG Release–Rests with PC. PC will determine when the load(s) will be jettisoned based on aircraft performance. The NCM at the load(s) must jettison the load(s) if it will endanger the crew or aircraft. Load(s) jettisons will be announced to the aircrew.
5. ICS Failure between RCM and NCM (two challenge rule).
   a. Before load(s) is hooked/slack in sling(s)–NCM opens hook with normal release.
   b. After slings tight/load(s) is airborne–NCM with communication will notify crew and call the load(s) down.
   c. Between PIs–PI with communication takes flight controls.
   d. Two challenge rule. If any RCM or NCM identifies a potential hazard that crew member will call out the hazard and a corrective action. If the P* does not respond after a second call out then it is the responsibility of the P to announce, "I have the FLIGHT CONTROLS" and make the appropriate corrective action.
6. Aircrew comments and acknowledges briefing.

2. Procedures. Refer to table 4-4, page 4-79, for words and phrases that may be used for external (sling) load(s) operations.

Table 4-4. Words and phrases for external (sling) load(s) operations

Cargo hook master switch is “ARMED”	Aft hook is loaded, forward hook is loaded
Load(s) under the nose	MID-hook is loading
Load(s) in sight	Hook-up crew clear right
Forward	Hook-up crew clear left
Back	Sling(s) coming tight
Left	Sling(s) tight
Right	Load(s) is off the ground
Down	Cleared for flight
Up	Load(s) on ground
Hold (fwd, aft, up and down)	Slack in the sling(s)
Pole in hand	Release the load(s)
Clevis on pole	Load(s) is/are released
Hook in hand	Clear to reposition
Load(s) is/are hooked	Cargo hook master switch is “OFF”

a. Hook-up and HVR.

(1) The P will set cargo hook control switch in the “ALL” position and place the cargo hook switch in the “ARM” position. The P may place the radio switches on the P* ICS “OFF” as directed by P*.

(2) The P* will announce when the load(s) is under the nose of the aircraft or when he or she loses sight of the load(s). The NCM will use “HOTMIC” (hot microphone), and will inform the P* that he or she will be going on “HOTMIC”. The P* will follow hand signals from the signalman and commands from the NCM to HVR over the load(s). The P* will remain vertically clear of and centered over the load(s).

(3) When the load(s) is hooked, the NCM will inform the P* that the load(s) is hooked, remove slack from the sling(s), and ascend vertically to a stabilized load(s) height of 10 feet.

(4) If the NCM is using “HOTMIC”, the NMC will inform the P* that he or she is going off “HOTMIC”.

(5) If a ground crew is used for the hook-up, the NCM will advise the P* when and in what direction the crew cleared the load(s) and the aircraft. The NCM will monitor the load(s) rigging and advise the P* when the sling(s) are tight. During the load(s) hook-up and after the sling(s) are tight, the P should refer to the RAD ALT for actual aircraft height AGL. The P should then round up the height to the nearest 5 feet and add 10 feet for the appropriate HVR height.

(6) The NCM will call out load(s) height in 1-foot increments until the load(s) is 10 feet off the ground. When the load(s) is stable and the rigging appears safe, the NCM will announce that the load(s) is cleared for flight. Ensure that aircraft limitations are not exceeded.

b. Takeoff.

(1) The P* will maintain a 10 foot load(s) height until the P completes a HVR PWR check and a before-takeoff check.

(2) Before takeoff, the P* will ensure that the load(s) is cleared for flight by the NCM calling the load(s). The P* will make smooth control inputs to initiate the takeoff and establish a constant angle of climb that will permit safe obstacle clearance.

(3) During takeoff, NCM will call the aircraft load(s) height AHO at 15 feet, 20 feet, 25 feet, 50 feet, 75 feet, and 100 feet. The P will back-up the NCM by calling out the load(s) height by referencing the RAD ALT.

(4) When above 100 feet AHO or when clear of obstacles, adjust attitude and PWR, as required, to establish the desired R/C and airspeed. During the acceleration, the P* will avoid unnecessary nose-low attitudes and over controlling to reduce load(s) oscillation.

(5) The NCM will announce the load(s) condition (such as load(s) clear of all barriers, load(s) is stable, and so forth). When aircraft load(s) height above 100 feet AGL or when clear of obstacles, the P* will increase airspeed slowly to determine the flight characteristics of the load(s). Smoothly adjust flight controls to prevent load(s) oscillation.

(6) After passing through 200 foot AHO load(s) height and best SE airspeed, the cargo hook master switch may be placed in the "OFF" position. The crew will verbally acknowledge placement of the cargo hook master switch to "OFF".

Note. Performing this maneuver in certain environments may require HVR OGE PWR. Evaluate each situation for PWR required versus PWR AVAIL.

Note. Ensure that the cargo switch is in the "ARM" position when operating at altitudes below 200 feet AHO/best SE airspeed.

Note. If a load(s) oscillation develops, the primary method for arresting the oscillation is to decrease airspeed. Additional measures may include shallow turns or banks, small climbs or descents or a combination of any or all methods.

---

c. En route.

(1) During cruise flight, the P will place the cargo hook master switch in the "OFF" position, as directed in paragraph 2b(6) and announce that the cargo hook master switch is "OFF". The NCM will verbally confirm the cargo hook master switch is "OFF".

(2) The P will turn on the P*'s radio switches as required.

(3) The P will advise the P* to make smooth control applications to prevent load(s) oscillation. The NCM will monitor the load(s) for oscillation/load(s) height and advise the P* of the status of the load(s).

d. Approach and load(s) release.

(1) The P may turn "OFF" the P*'s radio switches, as directed.

(2) The P* will establish and maintain an approach angle that will keep the load(s) clear of obstacles to the desired point of termination.

(3) The P* will establish a rate of closure appropriate for the conditions and the load(s). (A go-around should be made before descending below obstacles or decelerating below ETL.)

(4) Before passing below 200-foot AHO load(s) height and below best SE airspeed, place the cargo hook master switch in the "ARM" position and the cargo hook control switch is in the appropriate position. The crew will verbally confirm placement of the cargo hook master switch to the "ARM" position.

(5) The NCM will call the aircraft load(s) height altitude (AHO) on approach at 100 feet, 75 feet, 50 feet, 25 feet, 20 feet, 15 feet and the altitude that places the load(s) at 10 feet. The P will back up the NCM calling the load(s) by referencing the RAD ALT.

(6) The P* will terminate the approach at a stationary HVR with the load(s) 10 feet above the intended release point. The NCM will confirm that the release point is clear and direct the aircraft to the release point. The NCM will then clear the load(s) down vertically; he or she will call out load(s) height in 1-foot increments until the load(s) is completely on the ground.

(7) Continue descent to obtain slack in the sling(s), and then HVR laterally to ensure that the clevis is clear of the load(s) before releasing the load(s); the NCM will advise the P* when the clevis is clear.

(8) The NCM will release the load(s) upon confirmation from the P* or IAW the unit's SOP. The NCM will confirm that the load(s) is released before clearing the P* to reposition from the release point.

Note. Before conducting an external (sling) load(s) operation, all crewmembers must ensure that they are able to communicate with each other.

Note. The NCM will place the INTERCOMM switch to "HOTMIC" when using the cargo loading pole. If two or more NCMs will be conducting crew duties, the NCM calling the load(s) may brief one of the additional crewmembers to place him or her on "HOTMIC".

Note. The P* will not allow the external (sling) load(s) to descend below the HVR height until the NCM calling the load(s) has cleared the load(s) to the ground.

Note. Load(s) will meet external air transportability (EAT) requirements IAW FM 4-20.197. Procedures for air transportation of hazardous material will be IAW AR 95-27.

Note. If possible, avoid flight over populated areas.

Note. Before the mission, the PC will ensure that all crewmembers and the hook-up crew are familiar with the hand and arm signals shown in FM 4-20.197, appendix A.

Note. AFCS/DAFCS-OFF external (sling) load(s) hook-ups are not authorized except in an actual EMERG.

NIGHT OR NIGHT VISION GOGGLES CONSIDERATIONS:

1. For unaided night flight, one landing/searchlight will be unfiltered white light.
2. When NVG are used, hovering with minimum drift is difficult and requires proper scanning techniques and crew coordination. If possible, use an area with adequate ground contrast and reference points. Visual obstacles, such as shadows, should be treated the same as physical obstacles.
3. The rate of descent and rate of closure should be slightly slower to avoid abrupt attitude changes at low altitudes.
4. The NCM calling the load(s) should wear NVG during external (sling) load(s) operations. The NCM will notify the PC any time he or she must flip up the NVG. White lighting, such as flashlight or searchlight, may be used as necessary to view the hooks or load(s).

TRAINING AND EVALUATION REQUIREMENTS:

1. Training will be conducted in the aircraft or CH-47 FS/TFPS.
2. Evaluations will be conducted in the aircraft or CH-47 FS/TFPS.

REFERENCES: Appropriate common references, AR 95-27, FM 4-20.197, FM 4-20.198, FM 4-20.198, FM 21-60, and TM 10-1670-295-23&P.

TASK 1064

Perform a Roll-On Landing

CONDITIONS: In a CH-47D/F helicopter and given a suitable landing area, with the before-landing check complete.

STANDARDS: Appropriate common standards and the following additions/modifications:

1. Select a suitable landing area.
2. Maintain a constant approach angle, clear of obstacles to desired point of touchdown.
3. Maintain ground track alignment with the landing direction, as appropriate.
4. Initiate a deceleration no less than 100 feet AHO.
5. Perform a smooth, controlled touchdown, at/above ETL, but below 60 KTS ground speed.
6. Touchdown with a MAX of 20-degree nose high pitch attitude aligned with the landing direction, ±5 degrees.

DESCRIPTION:

1. Crew actions.

   a. The P* will focus primarily outside the aircraft to clear the aircraft throughout the approach and landing. The P* will announce his or her intent to perform a roll-on landing, when beginning the approach, the intended point of landing, and any deviations from the approach.

   b. The P will verify that the brakes are released and that the swivels are locked before starting the approach. The P and NCM will confirm the suitability of the landing area and will provide adequate warning of hazards or obstacles. The P/NCM will announce when their attention is focused inside the aircraft and again when attention is re-established outside.

   c. Airspeed should be adjusted to maintain the optimum airspeed for existing conditions. If a SE EMERG condition exists, adjust airspeed for best SE flight (MAX END).

2. Procedures.

   a. Before starting the approach. The P will verify that the brakes are released and that the swivels are locked. When the desired approach angle is intercepted, the P* will lower the thrust control as required to establish the descent.

   b. During the approach.

      (1) The P* will maintain the desired airspeed until reaching a point from which the obstacles can be cleared, but no lower than 100 feet AHO. The P* will then assume a progressive decelerating attitude to achieve a touchdown on the AFT landing gear. The touchdown speed will be commensurate with aircraft performance and landing area conditions.

      (2) The NCM will inform the P* when the aircraft is clear of all obstacles in the flight path.

      (3) The P* will slip the aircraft during the deceleration to achieve runway alignment before touchdown. **D** The P will check that the LCTs "RET" during the deceleration. The P* will maintain the desired angle of descent with the thrust control.

      (4) If at any time during the approach, touchdown, or during the rollout, the maneuver may be aborted, or a go-around initiated if any crewmember determines the landing area is unsuitable. If a SE EMERG condition exists and sufficient SE PWR is AVAIL, execute go-around or abort the landing.

   c. Before touchdown. The P* will adjust the thrust control to achieve a smooth touchdown on the AFT landing gear before going below ETL.

   d. After landing.

      (1) The P* will maintain the landing attitude with the cyclic and thrust control (not to exceed 20 degres nose high) until forward speed is sufficiently slowed or stopped.

(2) The P* will smoothly lower the thrust control until the forward landing gear contacts the ground. The P* will then neutralize the flight controls and apply brakes as necessary to stop forward movement.

Note. During the landing roll out sequence, the primary aerodynamic braking force is provided by the aft rotor system. Applying aft cyclic will lessen the effectiveness of this rotor due to differential collective pitch and possibly increase the roll-out distance. Therefore, it is recommended not to apply more aft cyclic than is necessary to maintain ground contact with the aft landing gear.

Note. To abort this maneuver, prior to decelerating below ETL or below the final obstacles apply forward cyclic to allow the aircraft to become airborne and accelerate. Consideration of PWR AVAIL must be made when conducting SE operations. If it becomes necessary to abort below ETL or going below final obstacles and SE power is not AVAIL the PI will have to use their best judgment to bring the aircraft to a HVR and decelerate if sufficient obstacle clearance exists.

NIGHT OR NIGHT VISION GOGGLES CONSIDERATIONS: Altitude, apparent ground speed, and rate of closure are difficult to estimate when making an approach to an area of limited contrast (at night.) The P* will determine the need for artificial lighting and rate of descent at night during the final 100 feet should be slightly slower than during the day to avoid abrupt attitude changes at low altitudes.

ROUGH/UNPREPARED SURFACE CONSIDERATIONS: Closely monitor touchdown speed when landing to a rough or unprepared surface. Consistent with the situation and aircraft capabilities, a more pronounced deceleration before touchdown coupled with stronger aerodynamic braking after touchdown may be appropriate. Note that the wheel brakes may be less effective. If the surface is soft, exercise care when lowering the thrust control until the aircraft comes to a complete stop.

Note. The wheel brakes may be less effective. To prevent an abrupt stop, smoothly lower the thrust control until the aircraft comes to a complete stop.

ROLL-ON LANDING TO WATER CONSIDERATIONS: Roll-on landings to water can be performed within the limitations shown in chapter 5 of the appropriate operators manual, but should be performed only during training missions or actual SE conditions when a hovering approach is not possible. Roll-on landings for training should only be performed to calm water (Sea State 1 or less).

1. Approach. Prior to performing a roll-on landing to the water, the “PITOT HEAT” switch must be “ON”. The ramp, lower half of the cabin door, lower rescue door, and drain plugs must be “CLOSED”. Landing/searchlights shall be “RET”. A shallow approach should be flown at an airspeed that provides safe aircraft control. Prior to water entry, it may be necessary to use the windshield wipers.
2. Landing. Entry of the aft wheels into the water is easily recognized because the helicopter may decelerate rapidly depending on the rate of descent. Touchdown attitude should be held constant until the apparent water speed has decreased below 10 knots. The thrust control should be lowered slowly.
3. After landing. At or below 10 knots, the nose can be lowered to the water by lowering the thrust control rod and neutralizing the cyclic stick. A 4 to 5 knots forward speed will result when the helicopter is level and the flight controls are neutralized with the thrust control at the ground detent.

Note. Aft landing gear ground switches are not actuated during water landing, therefore, LCT actuators must be manually set to “GROUND” position.

Note. When the helicopter is in the water, two-way communication is not possible on systems whose antennas are submerged. The HF radio can be operated.

TRAINING AND EVALUATION REQUIREMENTS:

1. Training may be conducted in the aircraft or CH-47 FS/TFPS.
2. Evaluation will be conducted in the aircraft or CH-47 FS/TFPS.

REFERENCES: Appropriate common references.

TASK 1068

Perform Go-Around

CONDITION: In a CH-47D/F helicopter after performing a precision or non-precision approach.

STANDARDS: Appropriate common standards plus the following additions/modifications:

1. Determine when a go-around is required.
2. Immediately apply appropriate PWR to initiate go-around.
3. Immediately adjust to appropriate climb airspeed for conditions.
4. F If utilized, immediately depress the "GO AROUND" button on the thrust control and couple the FD if required.

DESCRIPTION:

1. Crew actions.
   a. The P* will announce his or her intent to perform a go-around and will remain primarily focused outside to avoid obstacles.
   b. The P and NCM will assist in clearing the aircraft and provide adequate warning of obstacles. The P will also monitor system instruments to ensure aircraft limits are not exceeded.
2. Procedures.
   a. When it becomes doubtful that a safe landing can be done, announce "GO-AROUND." Immediately apply PWR (if AVAIL) and simultaneously adjust pitch attitude to stop the descent and clear any obstacles. Maintain aircraft in trim and adjust to the appropriate climb speed for conditions. Maintain the appropriate ground track.
   b. F The P* may engage the "GO AROUND" mode by pressing the "GO AROUND" button on the thrust control or engage the "GO AROUND" mode by pressing the "GO AROUND" button on the respective FD/display control panel.

Note. The decision to go-around may be made at any time but in limited PWR situations should be determined before descending below the barriers or decelerating below ETL.

CAUTION

F Selecting the coupled "GO AROUND" mode during limited PWR conditions or operating at high GWT may exceed aircraft limitations.

SNOW/SAND/DUST CONSIDERATIONS: If during the go-around, visual references are lost, initiate an ITO immediately.

MOUNTAINOUS AREA CONSIDERATIONS: Perform one of the following:

1. Where escape routes exist, turn the aircraft away from the terrain, apply forward cyclic and lower the thrust control, if possible. Accelerate the aircraft to an appropriate airspeed for conditions and complete the go-around.
2. Where escape routes do not exist, adjust aircraft for MAX R/C to ensure obstacle clearance. Upon clearing obstacles, accelerate aircraft to an appropriate airspeed for conditions and complete the go-around.

TRAINING AND EVALUATION REQUIREMENTS:

1. Training may be conducted in the aircraft or CH-47 FS/TFPS.

2. Evaluation will be conducted in the aircraft or CH-47 FS/TFPS.

REFERENCES: Appropriate common references.

TASK 1070

Respond to Emergencies

CONDITIONS: In a CH-47D/F helicopter with a trainer; or academically and given a specific EMERG condition or the indications of a specific malfunction and given a suitable landing area.

STANDARDS: Appropriate common standards and the following additions/modifications:

1. RCM.
   a. Recognize, announce and analyze indications of an EMERG. Perform or describe all immediate action EMERG checks IAW TM 1-1520-240-10, TM 1-1520-271-10, TM 1-1520-240-CL, and TM 1-1520-271-CL.
   b. Perform appropriate EP.
   c. Select/confirm the suitability of the landing area if required.
2. NCM.
   a. Recognize, announce, and analyze indications of an EMERG. Perform or describe all immediate action EMERG checks IAW TM 1-1520-240-10, TM 1-1520-271-10, TM 1-1520-240-CL, and TM 1-1520-271-CL.
   b. Perform appropriate EP.
   c. Prepare the aircraft and passengers for an EMERG landing.
   d. Assist in confirming the suitability of the landing area if required.
   e. Assist in evacuating passengers to designated assembly area.

DESCRIPTION:

1. Crew actions. Any crewmember detecting an EMERG will immediately announce the EMERG to the other crewmembers. If time permits, the RCMs will lock shoulder harnesses, make a mayday call and tune the transponder to EMERG, as appropriate.
   a. The crew will perform the underlined and non-underlined steps as applicable IAW the appropriate operator's manual/CL and initiate the appropriate type of landing if required.
      (1) During VMC, the P* will focus primarily outside the aircraft to maintain aircraft control and obstacle clearance.
      (2) During IMC, the P* will remain focused inside the aircraft on the flight instruments to maintain aircraft control.
      (3) If time permits, RCMs will also lock shoulder harnesses, make a mayday call and tune transponder to "EMERG" as required.
   b. If time permits, the P will verify all EMERG checks with the appropriate operator's manual/CL. The P will request appropriate EMERG assistance.
   c. The NCM will prepare the passengers for an EMERG landing, ensuring passengers' seatbelts are fastened and cargo is secured.
      (1) During the descent, the NCM will assist in clearing the aircraft.
      (2) After landing, the NCM will assist in evacuating the passengers to the designated assembly area. If normal exits cannot be used, the NCM will use the nearest EMERG exit to expedite the evacuation.
      (3) After accounting for all crewmembers and passengers, the NCM will assist the other crewmembers in any follow-on action (fire fighting, first aid, EMERG signaling or survival equipment).
2. Procedures. Analyze the EMERG situation (for example, aircraft response and caution/advisory light indications as required). Determine the malfunction and select the appropriate EMERG procedures IAW

the appropriate aircraft operator's manual/CL. Perform the EMERG procedure IAW the appropriate aircraft operator's manual/CL.

Note. Only qualified and current IPs/SPs may simulate EPs when at one set of flight controls. Paragraph 4-1c(2)(h) lists the EPs that are prohibited from practice in the aircraft. Appendix D contains information on executing EPs.

a. The following EPs must be conducted during this training in the aircraft while occupying a station with access to the flight controls.

b. The following EPs can be performed concurrently:

- SE failure at altitude.
- ENG or fuselage fire-inflight.
- D ENG XMSN hot.
- F ENG 1 or ENG 2 XMSN warning.

NIGHT OR NIGHT VISION GOGGLES CONSIDERATIONS: Take special precautions to identify the correct switches/levers when performing EPs at night or while wearing NVG.

TRAINING AND EVALUATION REQUIREMENTS:

1. Training may be conducted in the aircraft, CH-47 FS/TFPS, or academically.
2. Evaluation may be conducted in the aircraft, CH-47 FS/TFPS, or academically.

REFERENCES: Appropriate common references.

TASK 1077

Perform Procedures for Two-Way Radio Failure

CONDITIONS: In a CH-47D/F helicopter with an inoperative radio or in a classroom environment.

STANDARDS: Appropriate common standards and the following additions/modifications:

1. Implement procedures for two-way radio failure.
2. Correctly perform crew coordination actions.

DESCRIPTION:

1. VFR.

   a. If two-way radio failure occurs while operating under VFR or if VMC are encountered after the failure, continue the flight VMC.

   b. Land as soon as practicable.

2. IFR.

   a. If two-way radio failure occurs while operating under IFR in the national airspace system, adjust the transponder and continue the flight IAW instructions in the FIH.

   b. If two-way radio failure occurs while operating under IFR outside continental of the U.S (CONUS), comply with international civil aviation organization rules or applicable host country regulations.

TRAINING AND EVALUATION REQUIREMENTS:

1. Training may be conducted in the aircraft, CH-47 FS/TFPS, or academically.
2. Evaluation may be conducted in the aircraft, CH-47 FS/TFPS, or academically.

REFERENCES: Appropriate common references, DOD FLIP, FIH, and unit SOP.

TASK 1094

D Perform Flight with Advanced Flight Control System/F Digital Advance Flight Control System-Off

CONDITIONS: In a CH-47D/F helicopter in VMC.

STANDARDS: Appropriate common standards and the following additions/modifications:

1. Maintain trim flight ±1 ball width.
2. Maintain the standards for the task/maneuver being performed.

DESCRIPTION:

1. Crew actions.

   a. The P* or P will announce to the other crewmembers when he or she detects an AFCS/DAFCS malfunction.

   b. The P* will react positively and smoothly to divergent movements, enter all maneuvers slowly, and avoid over controlling the aircraft.

   c. During VMC, the P* will focus primarily outside the aircraft to maintain aircraft control and obstacle clearance.

2. Procedures.

   a. The P* will smoothly coordinate control movements to maintain the aircraft in trim. The P* will monitor the turn-and-slip indicator for indications of divergent movements.

   b. The P* will smoothly and positively react to any divergent movements of the aircraft. The NCM will check that all passengers are wearing their seatbelts and that all cargo and mission equipment is secured.

Note. Any maneuver in this ATM may be conducted with the AFCS/DAFCS-OFF except for those items listed in paragraph 4-1c(2)(h). The standards for the maneuvers are the same as with the AFCS/DAFCS-ON. When conducting training flights with AFCS/DAFCS-OFF, the flight should be restricted to essential personnel only. RCM proficiency must be considered when tasks are selected for performance with the AFCS/DAFCS-OFF.

NIGHT OR NIGHT VISION GOGGLES CONSIDERATIONS: To aid in preventing spatial disorientation, do not make large or abrupt attitude changes.

TRAINING AND EVALUATION REQUIREMENTS:

1. Training may be conducted in the aircraft or CH-47 FS/TFPS.
2. Evaluation will be conducted in the aircraft.

REFERENCES: Appropriate common references.

TASK 1162

Perform Emergency Egress

> **WARNING**
>
> **Removing an injured crewmember or passenger may increase the severity of the injuries. Analyze the risk of additional injury versus the risk of leaving the crewmember or passenger in the aircraft until assistance arrives.**

CONDITIONS: In a CH-47D/F helicopter.

STANDARDS: Appropriate common standards plus the following additions/modifications:

1. Perform or describe using EMERG exits on the aircraft IAW the appropriate aircraft operator's manual.
2. Perform or describe the EMERG egress of a PI, NCM, or passenger from his or her seat.
3. Perform or describe the EMERG ENG shutdown of the aircraft IAW the appropriate aircraft operator's manual.
4 Assist in marshalling passengers to designated assembly area.
5. Perform or describe duties as briefed in the crew mission briefing.

DESCRIPTION:

1. Crew actions.
   a. The PC will direct an EMERG egress. The PC will determine if the egress will be done before the rotor blades have stopped. (If the PC is incapacitated, the next ranking RCM/NCM will perform this function.) The PC will also determine and announce if an EMERG ENG shutdown will be performed.
   b. The P* and P will egress their respective positions and assist with passenger egress.
   c. The NCM will direct passenger egress.
   d. All crewmembers will perform duties as briefed during the crew briefing and assist with the egress of incapacitated crewmembers and passengers, if required.
2. Procedures.
   a. If an EMERG egress occurs, use the cabin/cockpit doors. If the cabin/cockpit doors are jammed, use the EMERG release. If the EMERG release does not work, break out the Plexiglas windows with the crash axe, boot or other suitable object. Once out, guide yourself and passengers to clear the aircraft in a safe direction and meet at the assembly point. Account for all personnel.
   b. Perform the EMERG egress of a PI from his or her seat IAW the appropriate aircraft operator's manual.
   c. Perform EMERG ENG shutdown procedures IAW the appropriate aircraft operator's manual.

OVERWATER CONSIDERATIONS: If egress must be made from an aircraft that has gone into the water, do not exit, until rotor blades have stopped. Secure a handhold within the cockpit to maintain orientation, employ underwater breathing device (if equipped), and wait for cockpit and cabin area to fill with water. Once aircraft is full of water, use the cargo/cockpit doors. If they are jammed, use the "EMERG" release. If the EMERG release does not work, break out the windows with the crash axe, boot, or other suitable object, and swim clear of the aircraft. Do not activate life preserver until clear of aircraft and on surface.

TRAINING AND EVALUATION REQUIREMENTS:

1. Training will be conducted in the aircraft or academically.
2. Evaluation will be conducted in the aircraft or academically.

REFERENCES: Appropriate common references.

TASK 1166

Perform Instrument Maneuvers

CONDITIONS: In a CH-47D/F helicopter under IMC or simulated IMC, with navigation checks complete, reference to instruments only and given appropriate navigational publications.

STANDARDS: Appropriate common standards and the following additions/modifications:

1. Tune and identify appropriate NAVAIDs, as required.
2. Determine, intercept, and maintain the desired course, ±5 degrees.
3. Identify station passage, as required.
4. Maintain the desired DME arc ±1 NM.
5. For direct routing, ensure flight route meets minimum en route altitude requirements.

DESCRIPTION:

1. Crew actions.

   a. The P* will remain focused inside the aircraft and will monitor radios and ATC information.

   b. The P* will announce any deviation not directed by ATC or the P and will acknowledge all directives given by ATC or the P.

   c. The P will select and announce radio frequencies. The P also will monitor radios and ATC information not monitored by the P*.

   d. During VMC or simulated IMC, the P and NCM will focus primarily outside the aircraft to provide adequate warning of traffic or obstacles.

   e. The P/NCM will announce when their attention is focused inside the aircraft and again when attention is re-established outside.

2. Procedures.

   a. Prior to flight, when the use of the ADF is expected, ensure that the ADF will receive on the desired band, that the ADF bearing pointer is selected and points in the direction of the selected station, and that FD F is providing the proper indications IAW the original equipment manufacturer (OEM).

   b. Before flight, when the use of the VOR/ILS receiver is expected, ensure that the VOR is operational and the NAVAID bearing pointer is selected, and HSI/CDI and FD F are providing the proper indications IAW the OEM.

   c. Before flight, when the use of the tactical air navigation (TACAN) receiver is expected, ensure that the TACAN is operational and the NAVAID bearing pointer is selected, and HSI/CDI and FD F are providing the proper indications IAW the OEM.

   d. Before using a selected VOR/TACAN for navigation, tune and identify the VOR/TACAN. After identifying the desired station and the position of the aircraft in relation to the desired course, turn to an appropriate intercept heading.

   e. Maintain the intercept heading until approaching an on-course indication. Depending on the rate of closure, start a turn to intercept the desired course. On course indication is within one dot CDI deflection for VOR, TACAN and LOC and ±5 degrees for non-directional beacon (NDB).

   f. F Before using the inertial navigation systems for direct routing, ensure that the systems are properly aligned IAW the OEM. Verify the FLPN is loaded and reflects the intended route of flight to be flown.

   g. F Properly engage the FD, as desired, and backup the inertial navigations systems by using land-based NAVAID facilities.

   h. During flight, maintain heading to track the desired course. If the navigational instruments show an off-course condition, turn as necessary toward the course to re-intercept. If navigational instruments

do not indicate movement toward the course within a reasonable time, increase the intercept angle. When re-intercepting the course turn toward the course and apply the appropriate drift correction (normally one-half [½] of the intercept angle). Continue to bracket the course by decreasing corrections until obtaining a heading that will maintain the aircraft on course.

i. Determine arrival at intersections IAW procedures in FM 3-04.240. Identify station passage by observing the first complete reversal of the bearing pointer and/or the TO/FROM indicator on the HSI or HSD [F].

NIGHT OR NIGHT VISION GOGGLES CONSIDERATIONS: To aid in preventing spatial disorientation, do not make large or abrupt attitude changes.

TRAINING AND EVALUATION REQUIREMENTS:

1. Training may be conducted in the aircraft or CH-47 FS/TFPS.
2. Evaluation may be conducted in the aircraft or CH-47 FS/TFPS.

REFERENCES: Appropriate common references.

TASK 1167

F Perform Instrument Maneuvers using Standby Flight Display

CONDITIONS: In a CH-47F helicopter with an operational standby flight display (SFD).

STANDARDS: Appropriate common standards and maintain the aircraft in trim above 40 KIAS/KCAS.

DESCRIPTION:

1. Crew actions.
   a. The P* will initiate "DUAL MFD" failure by selecting "NVG" on both of his or her MFDs and dimming to unreadable level.
   b. The P will configure his or her MFDs so that primary flight instruments are displayed. The P will be prepared to take control of the aircraft at any time.
   c. The P* will recover from the "MFD" failure by selecting "NORM" or increasing the brightness on the MFDs.
2. Procedures.
   a. The P* will fly the aircraft utilizing the SFD and will not exceed any of the operator's manual limitations.
   b. The P and NCM will clear the aircraft while the P* is flying the aircraft using the SFD.

Note. The P should monitor the flight instruments and be prepared to accept a transfer of controls.

Note. During an actual MFD failure under IMC, change the flight controls during short intervals to minimize fatigue on a single PI.

TRAINING AND EVALUATION REQUIREMENTS:

1. Training may be conducted in the aircraft or CH-47 TFPS.
2. Evaluation may be conducted in the aircraft or CH-47 TFPS.

REFERENCES: Appropriate common references.

TASK 1170

Perform Instrument Takeoff

CONDITIONS: In a CH-47D/F helicopter under IMC or simulated IMC, with reference to instruments only, with HVR PWR check and before takeoff checks completed and aircraft cleared.

STANDARDS: Appropriate common standards and the following additions/modifications:

1. Correctly determine instrument takeoff PWR (HVR PWR plus 10 percent TQ).
2. Maintain PWR as required (±2 percent TQ).
3. Maintain accelerative climb attitude ±1 bar width (not to exceed 10 degrees nose low) until climb airspeed is attained.
4. Maintain takeoff heading, ±10 degrees.
5. Maintain the aircraft in trim after 40 KIAS/KCAS.
6. Maintain an appropriate R/C, ±200 FPM.
7. Maintain desired climb airspeed, ±10 KIAS/KCAS.

DESCRIPTION:

1. Crew actions.

   a. The P* will focus primarily outside the aircraft during the VMC portion of the maneuver. The P* will announce when he or she initiates the maneuver and any intentions to alter or abort the takeoff. Before the aircraft enters actual IMC, the P* will make the transition to the flight instruments.

   b. The P will announce when ready for takeoff and will focus primarily outside the aircraft to assist in clearing during the VMC portion of the maneuver and to provide adequate warning of obstacles. The P will announce when his or her attention is focused inside the aircraft. As the aircraft enters actual IMC, the P will announce when IMC and will monitor the flight instruments to assist in establishing coordinated flight within aircraft operating limits.

   c. The NCM will maintain airspace surveillance during the VMC portion of the maneuver. During IMC or simulated IMC the P and NCM will focus primarily outside the aircraft to provide adequate warning of traffic or obstacles. The P/NCM will announce when their attention is focused inside the aircraft and again when attention is re-established outside.

2. Procedures.

   a. From the ground.

      (1) Align the aircraft with the desired takeoff heading. Ensure the attitude indicator is set for takeoff.

      (2) Initiate the takeoff by increasing the thrust control smoothly and steadily, while maintaining a level attitude, until instrument takeoff PWR is reached. When instrument take-off PWR is established and the altimeter and VSI show a positive climb, adjust pitch attitude below the horizon as required for the initial acceleration (not to exceed 10° nose low).

      (3) Visually maintain runway clearance and alignment on takeoff and transition to the flight instruments before entering IMC. At approximately 40 KIAS/KCAS, the P* will check the turn-and-slip indicator to ensure that the aircraft is in trim.

      (4) Maintain the heading/course required by the departure procedure or ATC instructions. When the desired climb airspeed is reached, adjust cyclic to maintain airspeed and adjust the thrust control to maintain the desired climb rate.

   b. From a HVR.

      (1) The P* will align the aircraft with the desired takeoff heading at the appropriate HVR height. The P* will check the attitude indicator for the appropriate attitude.

(2) The P* will initiate the takeoff by increasing the thrust control smoothly and steadily, while maintaining a level attitude, until instrument takeoff PWR is reached.

(3) When the altimeter and VSI show a positive R/C, the P* will continue as in a takeoff from the ground.

Note. Performing this maneuver in certain environments may require HVR OGE PWR. Evaluate each situation for PWR required versus PWR AVAIL.

Note. As the aircraft enters IMC, the P should monitor the flight instruments and be prepared to accept a transfer of controls.

Note. When the crew is operating under IMC, the NCM will take a position on the P* side of the aircraft for obstacle clearance and airspace surveillance.

TRAINING AND EVALUATION REQUIREMENTS:

1. Training may be conducted in the aircraft or CH-47 FS/TFPS.
2. Evaluation may be conducted in the aircraft or CH-47 FS/TFPS.

REFERENCES: Appropriate common references.

TASK 1174

Perform Holding Procedures

CONDITIONS: In a CH-47D/F helicopter under VMC, IMC, or simulated IMC, with reference to instruments only and given holding instructions and appropriate DOD FLIP.

STANDARDS: Appropriate common standards and the following additions/modifications:

1. Tune and identify the appropriate NAVAIDs.
2. Enter the holding pattern IAW FM 3-04.240, AIM, and FAR Part 91.
3. Time and track holding pattern legs IAW FM 3-04.240 or host-nation requirements.
4. Send the appropriate report to ATC IAW DOD FLIPs.

DESCRIPTION:

1. Crew actions.

   a. Before arrival at the holding fix, the P will analyze the holding instructions and brief the other crewmembers on the proposed entry, outbound heading, and inbound course. Upon arrival at the holding fix, the P* will perform the correct entry into holding. The P will select radio frequencies, monitor radio(s), and announce ATC information not monitored by the P*. Also, the P will compute outbound times (if required) and headings to adjust for winds and direct the P* to adjust the pattern as necessary.

   b. The P* will fly headings and altitudes and will adjust inbound and outbound times as directed by ATC or the P. The P* will announce deviations as well as ATC information not monitored by the P.

   c. During simulated IMC, the P and NCM will focus primarily outside the aircraft to provide adequate warning of traffic or obstacles. The NCM will take a position on the P* side of the aircraft.

2. Procedures.

   a. Upon arrival at the holding fix, turn (if required) to the predetermined outbound heading. Maintain the outbound heading IAW DOD FLIP or as directed by ATC. After the appropriate time or distance outbound, turn to the inbound heading and apply normal tracking procedures to maintain the inbound course. Note the time or distance as appropriate, required to fly the inbound leg. When holding at a NAVAID, begin timing the outbound leg when abeam the station.

   b. When holding at an intersection, begin timing the outbound leg upon establishing the outbound heading.

Note. GPS IFR navigation must be certified by the FAA or host country regulations prior to GPS IFR use. With an IFR certified GPS, ensure the DAFIF data is current and loaded prior to IFR use. If a certified GPS or current DAFIF data is not available then crews will not use the GPS for IFR navigation. However, they should consider and plan for its use as an EMERG backup system only.

TRAINING AND EVALUATION REQUIREMENTS:

1. Training may be conducted in the aircraft or CH-47 FS/TFPS.
2. Evaluation may be conducted in the aircraft or CH-47 FS/TFPS.

REFERENCES: Appropriate common references.

TASK 1176

Perform Non-Precision Approach

CONDITIONS: In a CH-47 helicopter or simulator, under IMC or simulated IMC, with reference to instruments only, given approach information and appropriate clearance, with the before-landing checks complete.

STANDARDS: Appropriate common standards and the following additions/modifications:

1. Execute the approach IAW AR 95-1, applicable AWRs, FM 3-04.240, and DOD FLIP.
2. For RNAV/GPS approaches, properly configure RNAV/GPS equipment; select an appropriate approach from a current and approved navigation database; and maintain the course centerlilne within the appropriate RNAV limits for each segment of the approach (2-dot course deviation indicator [CDI] deflection).
3. For nondirectional beacon (NDB), very high frequency omnidirectional range (VOR), or tactical air navigation (TACAN) approaches, maintain course centerline, ±5 degrees (1-dot CDI deflection).
4. For localizer approaches, maintain course centerline, ±2.5 degrees (2-dot deflection).
5. During airport surveillance radar (ASR) approaches, make immediate heading and altitude changes issued by ATC and maintain heading, ±5 degrees.
6. Comply with descent minimums prescribed for the approach.
7. F For flight director operations, select the correct lateral navigator and appropriate vertical and longitudinal cues.
8. Perform the appropriate missed approach procedure per DOD FLIP or ATC instruction upon reaching the missed approach point (MAP), unless landing can be accomplished per AR 95-1.

DESCRIPTION:

1. Crew actions.
   a. Each RCM will review the approach to be flown before initiating the procedure. The crew will confirm that the correct NAVAID/communication frequencies and systems are configured correctly.
   b. The P* will focus primarily inside the aircraft on the instruments and perform the approach. The P* will follow the heading/course, altitude, and missed approach directives issued by the P/ATC. The P* will announce any deviation not directed by ATC or the P and acknowledge all navigation directives given by the P.
   c. The P will call out the approach procedure to the P* and advise the P* of any unannounced deviations.
   d. The P will call out the approach procedure to the P* and advise the P* of any unannounces deviations.
   e. The P will—
      - Monitor outside for the landing environment.
      - Announce when he or she makes visual contact suitable to complete the landing IAW AR 95-1.
      - If directed by the P*, take the controls to complete the landing.
      - Announce if he or she does not make visual contact by the MAP and call out the missed approach procedures.

   f. During simulated IMC, the P and NCM will focus primarily outside the aircraft to provide adequate warning of traffic or obstacles. The NCM will take a position on the P* side of the aircraft.
2. Procedures. Perform the desired approach procedures IAW AR 95-1, the DOD FLIP, FM 3-04.240, TM 1-1520-240-10, and TM 1-1520-271-10.

TRAINING AND EVALUATION REQUIREMENTS:

1. Training may be conducted in the aircraft or simulator.
2. Evaluation may be conducted in the aircraft or simulator.

REFERENCES: Appropriate common references.

TASK 1178

Perform Precision Approach

CONDITIONS: In a CH-47D/F helicopter under VMC, IMC or simulated IMC, with reference to instruments only, and given approach information and appropriate DOD FLIP approach clearance, and the before-landing checks complete.

STANDARDS: Appropriate common standards and the following additions/modifications:

1. Execute the approach IAW AR 95-1, FM 3-04.240, AIM and the DOD FLIP.
2. For an ILS approach, maintain the LOC centerline, ±2.5 degrees (two dot [CDI] deflection), and the glide slope indicator within full scale deflection.
3. For a precision approach radar (PAR) approach, make immediate heading and altitude changes issued by ATC and maintain heading, ±5 degrees for final approach, maintain glide slope as directed by ATC.
4. Comply with the decision altitude (DA) prescribed for the approach.
5. F If using FD, select the correct sensor prior to coupling the system.
6. Perform the correct MAP IAW DOD FLIP or ATC instruction upon reaching the DH if landing cannot be accomplished IAW AR 95-1.

DESCRIPTION:

1. Crew actions.
   a. Each RCM will review and confirm the specific approach to be flown before initiating the procedure. The crew will confirm that the correct NAVAID/communication frequencies, HSI, HSD F, and HSI mode select panel are set as required.
   b. The P* will focus primarily inside the aircraft on the instruments and perform the approach. The P* will follow the heading/course, altitude, and missed approach directives issued by the P/ATC. The P* will announce deviations not directed by ATC or the P and will acknowledge all navigation directives given by the P.
   c. The P will call out the approach procedure to the P* and will advise the P* of unannounced deviations. FThe P will enter FD data as directed by the P*. The P will monitor outside for the landing environment, announce when he or she makes visual contact suitable to complete the landing IAW AR 95-1, and if directed by the P*, take the flight controls to complete the landing. The P will announce if he or she does not make visual contact by the MAP and call out the missed approach procedures.
   d. During simulated IMC, the P and NCM will focus primarily outside the aircraft to provide adequate warning of traffic or obstacles. The NCM will take a position on the P*'s side of the aircraft.
2. Procedures. Perform the desired approach procedures IAW AR 95-1, the DOD FLIP, FM 3-04.240, TM 1-1520-240-10, and TM 1-1520-271-10.

> ***Note.*** GPS IFR navigation must be certified by the FAA or host country regulations prior to GPS IFR use. With an IFR certified GPS, ensure the DAFIF data is current and loaded prior to IFR use. If a certified GPS or current DAFIF data is not available then crews will not use the GPS for IFR navigation. However, they should consider and plan for its use as an EMERG backup system only.

TRAINING AND EVALUATION REQUIREMENTS:

1. Training may be conducted in the aircraft or CH-47 FS/TFPS.
2. Evaluation may be conducted in the aircraft or CH-47 FS/TFPS.

REFERENCES: Appropriate common references.

TASK 1180

Perform an Emergency Global Positioning System Recovery Procedure

CONDITIONS: In a CH-47D/F helicopter in VMC or simulated IMC, given an approved EMERG GPS recovery procedure, with procedure clearance received and the before-landing check completed.

STANDARDS: Appropriate common standards and the following additions/modifications:

1. Enter/confirm the appropriate waypoint (initial approach fix [IAF], intermediate approach fix [IF], final approach fix [FAF], MAP, or missed approach holding fix [MAHF]) into the navigation system.
2. Execute the procedure IAW an approved recovery procedure.
3. Maintain a briefed airspeed not to exceed 90 KIAS/KCAS on final and missed approach segments.
4. Maintain the prescribed course, ±5 degrees.
5. Comply with the descent minimums prescribed for the procedure.
6. Arrive at the minimum descent altitude (MDA) before reaching the MAP.
7. F If using the FD selects the correct course guidance source.
8. Execute a missed approach on reaching the MAP if a safe landing cannot be accomplished.
9. During the missed approach, immediately establish a climb using an appropriate R/C airspeed until established at the minimum safe altitude (MSA).

DESCRIPTION:

1. Before flight, the crew should review the recovery procedure with the map to familiarize themselves with the procedure, local terrain, and obstructions in the vicinity of the procedure. The PC performs a thorough map reconnaissance to determine the highest obstruction in the area of operations.
2. Before initiating the procedure, the P* must climb to the prescribed MSA, proceed toward the IAF, and make the appropriate radio calls. During the procedure, the P* will focus primarily inside the aircraft on the instruments. Adjust the aircraft ground track to cross the IAF, IF and then the FAF on the prescribed course. When over the FAF, begin the final descent as appropriate.
3. The P remains primarily focused outside the aircraft to provide adequate warning to avoid obstacles/hazards. The P will announce when his or her attention is focused inside the cockpit. FThe P will enter FD data as directed by the P*. The P will monitor the aircraft instruments during the procedure and the P should tune the communication and navigation radios and transponder as required. The P will be prepared to call out the procedure to the P*, if asked and be in a position to assume control of the aircraft and land the aircraft if VMC is encountered.
4. The NCM will take a position on the P* side of the aircraft for obstruction clearance and airspace surveillance. The NCM will alert the crew immediately, if VMC is encountered.

NIGHT OR NIGHT VISION GOGGLES CONSIDERATIONS. The P should be in a position to assume control of the aircraft at any time when a landing environment can be determined visually (aided/unaided). During night unaided flight, consider using the searchlight to identify the landing area.

TRAINING CONSIDERATIONS: This task will **ONLY** be performed under VMC in a training environment.

Note. The IAF, IF, FAF, MAP, and MAHF, must be programmed in the navigation system as an additional route for the mission.

Note. It is not necessary to hold after a missed approach. The PC may elect to return to the IAF at the MSA and attempt to complete the approach after coordinating with ATC or other aircraft using the approach procedure.

Note. GPS IFR navigation must be certified by the FAA or host country regulations prior to GPS IFR use. With an IFR certified GPS, ensure the DAFIF data is current and loaded prior to IFR use. If a certified GPS or current DAFIF data is not available then crews will not use the GPS for IFR navigation. However, they should consider and plan for its use as an EMERG backup system only.

Note. Thoroughly brief inadvertent IMC multi-aircraft operations in the mission brief. As a minimum, cover the following topics: multi-aircraft breakup procedure, individual aircraft holding altitudes/separation, when individual aircraft are allowed to depart their assigned altitude, missed approach procedures with aircraft in the holding pattern, frequencies and command/control procedures.

TRAINING AND EVALUATION REQUIREMENTS:

1. Training may be conducted in the aircraft or CH-47 FS/TFPS.
2. Evaluation will be conducted in the aircraft or CH-47 FS/TFPS.

REFERENCES: Appropriate common references.

TASK 1182

Perform Unusual Attitude Recovery

CONDITIONS: In a CH-47D/F helicopter in VMC with reference to instruments only.

STANDARDS: Appropriate common standards and the following additions/modifications:

1. Analyze aircraft attitude. Without delay, use correct recovery procedures with minimum loss of altitude.
2. Without delay, perform recovery procedures in the following sequence:
   a. Attitude-Level the wings and pitch attitude while maintaining the aircraft in trim.
   b. Heading-Establish and maintain appropriate heading.
   c. TQ-Adjust to cruise or climb PWR.
   d. Airspeed-Maintain the desired airspeed.
   e. Altitude-Return to the appropriate/desired altitude after establishing aircraft control.
3. Clear the aircraft.
4. Recover without exceeding aircraft operating limitations.

DESCRIPTION:

1. Crew actions.

   a. The trainer or evaluator will place the aircraft in unusual attitude and transfer the controls to the P. The P will acknowledge the transfer of controls, the unusual attitude, and recover the aircraft as P*. The P* may elect to use the "GO AROUND" button on the thrust control and couple the system as required.

   b. During recovery, the P* will remain focused inside the aircraft.

   c. The P will assist in monitoring the aircraft instruments, and call out attitude, TQ and trim as necessary.

   d. During IMC, the P and NCM will focus primarily outside the aircraft to provide adequate warning of traffic and obstacles. The NCM will take a position on the P* side of the aircraft.

2. Procedures.

   a. To recover from an unusual attitude, correct the pitch and bank attitude, trim the aircraft as required, and adjust PWR to return to level flight and the appropriate altitude. All components are changed simultaneously with little lead of one over the other.

   b. The displacement of controls used in recoveries may be greater than those for normal flight. Care must be taken in making adjustments as straight-and-level flight is approached. The instruments must be observed closely to avoid over controlling.

Note. NCM tasks may include checking for fire, preparing passengers for an EMERG landing, and/or executing any portion of an EP pertaining to the NCM.

NIGHT OR NIGHT VISION GOGGLE CONSIDERATIONS: IMC is not a prerequisite for an unusual attitude. Low level ambient light may induce visual illusions and spatial disorientation. During NVG operations, video noise may contribute to loss of visual cues.

SNOW/SAND/DUST CONSIDERATIONS: Obscurants other than Wx can induce loss of visual contact. At low altitudes where these conditions would be encountered, it is extremely important that these procedures be initiated immediately to prevent ground contact.

TRAINING AND EVALUATION REQUIREMENTS:

1. Training may be conducted in the aircraft or CH-47 FS/TFPS.
2. Evaluation will be conducted in the aircraft or CH-47 FS/TFPS.

REFERENCES: Appropriate common references.

TASK 1184

Respond to Inadvertent Instrument Meteorological Conditions

CONDITIONS: In a CH-47D/F helicopter under VMC or academically.

STANDARDS: Appropriate common standards and the following additions/modifications:

1. Announce "IMC", maintain proper aircraft control and make the transition to instrument flight immediately.
2. Immediately initiate a climb.
3. Continue IIMC recovery procedures as follows:
   a. Attitude-Level the wings and adjust pitch for desired airspeed while maintaining the aircraft in trim.
   b. Heading-Maintain heading; turn only to avoid known obstacles.
   c. TQ-Maintain climb PWR until reaching appropriate cruise altitude.
   d. Airspeed-Adjust to appropriate climb airspeed.
   e. Altitude-Climb to a minimum safe altitude as prescribed by DOD FLIP, local regulation or SOP after establishing aircraft control.
4. Contact ATC, as required. Comply with ATC instructions and complete the IIMC recovery IAW local regulations and SOP.

DESCRIPTION:

1. Crew actions.
   a. The P* will announce "INADVERTENT IMC" immediately initiate a climb, and establish aircraft control while transitioning to the instruments. The P* will immediately announce if he or she becomes disoriented. F The P* may elect to use the "GO AROUND" button on the thrust control.
   b. The P will announce "INADVERTENT IMC" and monitor the cockpit instruments to assist in recovery. The P will announce when the aircraft is in a positive climb, the current altitude and altitude climbing to and the heading. F If using the FD, the P will enter FD data as directed by the P*.
   c. The P will adjust the transponder to "EMERG", adjust the navigational radio(s) as appropriate, and make the appropriate radio calls. The P will perform any other tasks as directed by the P* and will always remain prepared to take the flight controls should the P* become disoriented.
   d. The NCM will focus primarily outside the aircraft to provide adequate warning for avoiding terrain or obstacles and will announce if VMC are encountered. The NCM will perform any other tasks as directed by the P*/P.
2. Procedures.
   a. The crew should consider establishing a TQ and airspeed appropriate for the mission environment to use in the event of encountering IMC. If briefed during the crew briefing, this can help eliminate confusion during the actual EMERG.
   b. The most important action when encountering IMC is to immediately begin climbing while establishing aircraft control via the instruments. Once this is accomplished, the transponder should be set to "EMERG" to alert ATC.
      (1) Tuning navigational radios or making radio calls will be determined by local procedures. The crew should contact ATC on guard and allow ATC to assign an appropriate altitude and heading/course and, if necessary, a frequency.
      (2) If radio contact cannot be established first, the crew must ensure navigational radios are tuned as quickly as possible to determine the aircraft's position and appropriate course for recovery.

NIGHT OR NIGHT VISION GOGGLES CONSIDERATIONS: When using NVGs, it may be possible to

see through a thin obscuration, such as fog and drizzle, with little or no degradation. The NVGs may be removed (or flipped up) once flight is stabilized.

> ***Note.*** If IMC conditions are entered with the IR searchlight or landing light on, spatial disorientation may occur. Low-level ambient light may induce visual illusions and spatial disorientation. During NVG operations, video noise may contribute to loss of visual cues.

SNOW/SAND/DUST CONSIDERATIONS: Obscurants other than Wx can induce loss of visual contact. At low altitudes where these conditions would be encountered, it is extremely important that these procedures be initiated immediately to prevent ground contact.

TACTICAL CONSIDERATIONS: In tactical environments without navigational aids, the crew should consider flying a GPS route. The GPS route can be the planned mission route with sufficient terrain/obstacle clearance established in the event of IIMC.

TRAINING AND EVALUATION REQUIREMENTS:

1. Training may be conducted in the aircraft, CH-47 FS/TFPS, or academically.
2. Evaluations will be conducted in the aircraft or CH-47 FS/TFPS.

REFERENCES: Appropriate common references.

TASK 1188

Operate Aircraft Survivability Equipment

CONDITIONS: In a CH-47D/F helicopter equipped with ASE or academically.

> **WARNING**
>
> **ASE systems, when energized, may cause thermal burns or other injuries to personnel that are too close to an active system. Observe all operator's manual warnings and cautions. Ensure CMWS or ASE variant safety pin is installed when ever aircraft is in a non-hostile environment or in a position where inadvertent flare/chaff launch may cause injury to personnel and or may cause destruction of equipment or property.**

STANDARDS: Appropriate common standards and the following additions/modifications:

1. RCM.
   a. Describe the purpose of each installed item of ASE.
   b. Perform/describe preflight inspection, turn-on, test, operation, EPs, and shutdown of installed ASE.
   c. Determine partial failure alternatives.
   d. Employ/describe use of installed ASE.
2. NCM.
   a. Prepare equipment for operation.
   b. Employ/describe using installed ASE.

DESCRIPTION:

1. Crew actions.
   a. The PC will ensure crewmembers understand the employment of installed ASE during the conduct of the mission. The PC will also ensure all ASE payload(s) and settings are IAW the mission briefing.
   b. When the crew encounters a radar directed threat, the P* will remain primarily focused outside to avoid obstacles, perform the required evasive maneuver, reposition the aircraft as necessary to break lock, deploy to cover, and then avoid the threat. The P will dispense chaff prior to performing break lock evasive maneuvers for break lock. The P and NCM will assist in clearing the aircraft and provide adequate warning of obstacles.
   c. The P* or P will begin dispensing chaff by pressing the chaff dispense button, or ensuring that the mode switch is in "PROGRAM" as required. The P and NCM will assist in clearing the aircraft and provide adequate warning of obstacles.
   d. When the crew encounters an IR directed threat, the P* will remain primarily focused outside to avoid obstacles, employ evasive maneuvers after defeating the threat with CMWS, deploy to cover, and then avoid the threat. Allow CMWS and variant ASE systems to automatically launch flares. If reliability of equipment is questionable or system has not reacted to observed threat, then P*, P and NCM will launch flares manually.
   e. The NCM will remove and install safety pin(s) IAW the appropriate operator's manual/CL.
2. Procedures.
   a. Perform or describe preflight inspection, turn-on, test, operation, EPs and shutdown of installed ASE equipment. Evaluate and interpret the ASE visual and aural indications.

b. Execute mission employment IAW doctrine, and determine failure alternatives.

TRAINING AND EVALUATION REQUIREMENTS:

1. Training may be conducted in the aircraft, CH-47 FS/TFPS, or academically.
2. Evaluation will be conducted in the aircraft, CH-47 FS/TFPS, or academically.

REFERENCES: Appropriate common references, computer-base aircraft survivability equipment trainer (CBAT) aircraft survivability equipment trainer (ASET) programs, CMWS or variant ASE operator's manual(s), and unit battalion/brigade level intelligence staff officer (S-2)/officer/tactical operations (TACOPS) officer.

TASK 1190

Perform/Identify Hand and Arm Signals

CONDITIONS: Given a list of hand and arm signals from FM 21-60 to identify or perform.

STANDARDS: Appropriate common standards and the following additions/modifications:

1. RCM. Identify or perform at a minimum, the hand and arm signals required for moving an aircraft left, right, forward or backward and those for takeoff, landing, external (sling) load(s) hooked and release sling load(s), as appropriate, IAW FM 21-60.
2. NCM. Identify or perform, at a minimum, the hand and arm signals required for moving an aircraft left, right, forward or backward and those for takeoff, landing, external (sling) load(s) hooked and release sling load(s), as appropriate, IAW FM 21-60.

DESCRIPTION: Identify or perform the hand and arm signals required to move an aircraft from one point to another.

TRAINING AND EVALUATION REQUIREMENTS:

1. Training will be conducted academically.
2. Evaluation will be conducted academically.

REFERENCES: Appropriate common references and FM 21-60.

TASK 1194

Perform Refueling Operations

CONDITIONS: With a CH-47D/F helicopter with refueling equipment or academically.

STANDARDS: Appropriate common standards and the following additions/modifications:

1. Ensure that safety procedures are complied with and all individuals are wearing the appropriate protective clothing IAW FM 10-67-1, the appropriate operator's manual/CL and FM 3-04.113.
2. Ensure that the aircraft is refueled IAW FM 10-67-1, the appropriate operator's manual/CL, FM 3-04.113, and the unit's SOP.
3. Enter the appropriate information on DA Form 2408-12.

DESCRIPTION:

1. Crew actions.
   a. Cold refueling.
      (1) A crewmember will guide the refueling vehicle to the aircraft. Ensure that the driver parks the vehicle the proper distance from the aircraft IAW FM 10-67-1. Verify that all personnel not involved with the refueling operation are a safe distance away.
      (2) Ground and refuel the aircraft IAW FM 10-67-1, the appropriate operator's manual/CL and the unit SOP. Ensure that the tanks are filled to the required level. When the refueling is completed, ensure that all caps are secured and remove the ground connection if the aircraft will not remain parked. Make the appropriate entries on DA Form 2408-12.
   b. Hot refueling.
      (1) The P and NCM will assist the P* in positioning the aircraft. Ensure that the proper separation is maintained between the fuel source, the aircraft and the refueling equipment. Before refueling the aircraft, the PC will verify that personnel not involved with the refueling operation are a safe distance away.
      (2) The crewmember outside will ensure that the aircraft is grounded, refuel the aircraft IAW FM 10-67-1, appropriate operator's manual/CL and the unit SOP and assist with the refueling operation. Ensure that the tanks are filled to the required level. When the refueling is completed, ensure that all caps are secured and remove the ground connection.
      (3) The crewmember outside will inform the PC when the refueling is completed. Assist passengers in boarding the aircraft and in securing their seat belts. Assist the P* and P in clearing the aircraft during the departure from the refueling area. Make the appropriate entries on DA Form 2408-12.
2. Procedures. All refueling operations (cold/hot) will be IAW FM 3-04.113 and unit SOP.

NIGHT OR NIGHT VISION GOGGLES CONSIDERATIONS: Supplement aircraft lighting at the refueling station by using an explosion-proof flashlight with an unfiltered lens to check for leaks and fuel venting, and for signaling, as necessary.

TRAINING AND EVALUATION REQUIREMENTS:

1. Training will be conducted in the aircraft or academically.
2. Evaluation will be conducted in the aircraft or academically.

REFERENCES: Appropriate common references, DA Pam 738-751, FM 3-04.113, FM 10-67-1, and FM 21-60.

TASK 1200

Perform NonRated Crewmember Duties during a Maintenance Test Flight

WARNING

When standing on the engine work platform with the engine operating, the NCM must keep all clothing, tools and body parts away from the engine inlet and bleed band areas.

CONDITIONS: In a CH-47D/F helicopter or academically in a classroom environment and given the applicable (CH-47D/F) MTF manual.

STANDARDS: Appropriate common standards and the following additions/modifications:

1. Perform or describe appropriate maintenance procedures and checks IAW CH-47D/F MTF manual.
2. Perform or describe maintenance procedures and checks directed by the MP.
3. Immediately inform the MP of any malfunction or discrepancy detected during the maintenance procedures or checks.

DESCRIPTION:

1. Crew actions.

   a. If two or more NCMs are performing crew duties during the test flight (TF), the FE will ensure they are briefed on their duties and responsibilities.

   b. NCMs will perform duties and responsibilities IAW CH-47D/F MTF manual and TM 1-1520-240-23 or TM 1-1520-271-23 series. If any procedure is conducted or the result is not IAW the applicable maintenance or troubleshooting manual, the MP will be notified.

2. Procedures.

   a. Prior to and during the TF, the NCM must constantly monitor all aircraft systems and components. The NCM will inform the MP of any unusual vibrations, noises, smells, leakage or component malfunctions. The CE will also perform any maintenance procedures and checks required by the MP.

   b. Prior to flight, the NCM will remove any additional panels, covers and cowlings required by the MP. If the DASH actuator is required for a mechanical rig check, the NCM will set it to 36 inches and disconnect the electrical connectors.

   c. The NCM will make the following checks:

      (1) Maintenance panel check. The NCM will check the maintenance panel IAW the CH-47D/F MTF manual. The NCM will check and announce each individual "HYD SYS PRESS" (MAX fluctuation ±50 psi) and press to test all panel lights. The NCM will ensure that the "XMSN MAIN and AUX PRESS" lights and ground contact lights remain "ON". The NCM will announce when he or she tests the latch indicators and fault indicator, check all indicators for proper operation.

      (2) Cargo hooks and winch. The NCM will ensure that the cargo hook area and winch are clear of obstructions and non-flight personnel are at a safe distance. The NCM will also ensure that the cargo hook and winch operational check is conducted IAW the appropriate CH-47D/F MTF manual.

      (3) Cargo ramp and door. The NCM will ensure that the ramp area is clear of obstruction. Check the "APU start ACCUM" for minimum PRESS IAW the appropriate operator's manual. Ensure that the ramp control handle is at "STOP" and the ramp is level with the cabin floor. Ensure that the ramp operational check is IAW appropriate CH-47D/F MTF manual.

(4) Lights. The NCM will assist the P* in checking and setting their searchlights and will notify the MP that the anti-collision, position, and formation lights are operational.

(5) Swivel locks check. The NCM will check the swivel lock actuators and inform the MP of their position (locked or unlocked).

(6) Ramp isolation check. The NCM will lower the ramp until it rests on the ground and will place the ramp control handle in the "STOP" position. When the MP announces "RAMP ISOLATION SWITCH OFF", the NCM will attempt to raise the ramp and will give the MP the appropriate response.

(7) Fire-pull handle and cross-feed fuel valve checks. The NCM will be positioned to observe the fuel and XFEED valves. When the MP pulls the fire pull handle or places the XFEED valve switch to the "OPEN" position, the NCM will check the fuel valves and appropriate lights for proper operation. When the MP pushes in the fire pull handle or places the XFEED valve switch to the "CLOSED" position, the NCM will check the valves and lights for proper operation.

(8) Flight control travel and HYD check. The NCM will check the HYD gauges on the maintenance panel and notify the MP when a "PRESS" has dropped or returned to normal. During the control interlock check, the NCM will tell the MP the PRESS at which the flight control HYD systems change over.

(9) Pitot anti-ice system check. The NCM will check all pitot tubes, pilot and co-pilot yaw-port heat for proper operation.

(10) Bleed band closure check. The NCM will take a position on the ENG work platform to observe the ENG bleed band. The NCM must continue to communicate with the MP and should turn his or her head away from the ENG when keying the INTERCOMM. The NCM will observe the opening and closing of the bleed band and will give the MP the appropriate response.

(11) Mechanical rig check. When called for by the MP, the NCM will reconnect the electrical connectors on the DASH actuator. The NCM will announce when he or she is reconnecting the electrical connectors and when they are connected and flight control closet soundproofing is reinstalled.

TRAINING AND EVALUATION REQUIREMENTS:

1. Training may be conducted in the aircraft or academically.
2. Evaluations will be conducted in the aircraft or academically.

REFERENCES: Appropriate common references, CH-47D/F MTF, TM 1-1520-240-23 series, and TM 1-1520-271-23 series.

TASK 1202

Perform Auxiliary Power Unit Operations

CONDITIONS: In a CH-47D/F helicopter with an operational APU, and a qualified and current APU operator.

Note. This task only applies to NCMs.

STANDARDS: Appropriate common standards and the following additions/modifications:

1. Preflight all systems to be operated during APU operations.
2. Operate APU, systems and equipment IAW the appropriate operator's manual/CL.
3. Shutdown systems, equipment and APU IAW the appropriate operator's manual/CL.
4. Perform or describe appropriate EPs for APU fire IAW appropriate operator's manual.
5. Enter appropriate information, if required, on DA Form 2408-12, DA Form 2408-13, and DA Form 2408-13-1.

DESCRIPTION:

1. Crew actions.
   a. The NCM will coordinate with and brief any additional ground support personnel before APU start. Perform preflight inspection of the APU. The NCM will ensure that the rotor blade tie-downs are removed if PTU operation is required. The NCM will brief all necessary personnel on procedures to be followed in an EMERG. The NCM will direct assistance from any additional ground support personnel to aid in maintaining the clearance of APU exhaust areas during the APU start sequence and any subsequent ground checks.
   b. Additional ground support personnel should assist the NCM as directed.
2. Procedures.
   a. Before starting APU.
      (1) Brief the additional ground support personnel as necessary. Review aircraft logbook for any faults that would prevent operation of the APU, APU GEN or PTUs.
      (2) Perform preflight inspection of the APU and check APU exhaust cover, rotor blade tie-downs and fluid levels. Check APU start ACCUM and signal ACCUM for proper PRESS prior to starting APU IAW the appropriate operator's manual.
      (3) Ensure that the EMERG UTIL PRESS valve and UTIL reservoir depressurization valve handles are in the "NORMAL" position. Ensure that EMERG fuel shut-off valve is "OPEN".
      (4) Connect aircraft battery (BATT) and BATT charger and ensure that all cockpit switches are "OFF".
   b. Starting procedures.
      (1) With fireguard posted, place BATT switch in the "ON" position and check master caution panel for "UTIL HYD PRESS caution light "ON" and "APU ON" caution or advisory light extinguished.
      (2) Set APU switch to "RUN" position for 3 to 5 seconds, then to the "START" position for 2 seconds and release the switch. Check master caution panel for "APU ON" caution or advisory light to be illuminated and the "UTIL HYD PRESS" caution light to be extinguished.
      (3) Set the APU GEN switch to "ON" and check master caution panel to ensure that No.1 and No.2 XFR RECT lights go "OUT". If PWR transfer units are required, set PTU No.1 and No.2 switches to the "ON" position while checking the master caution panel to ensure that the HYD FLT control No.1 and HYD FLT control No.2 caution lights are "OUT".

Note. If the UTIL HYD PRESS caution light does not extinguish within 30 seconds after APU caution or advisory light comes "ON", place the APU switch to "OFF".

Note. If a HYD FLT control caution light does not go out in 30 seconds, set the affected PTU system to the "OFF" position.

c. Shutdown procedures.

(1) Before shutdown of the APU, all electrical equipment that was switched "ON" should be turned "OFF".

Note. F A shutdown will be initiated using the CDU power page regardless if equipment was turned on.

(2) Neutralize the flight controls, then place PTU switches to the "OFF" position. Set the APU GEN switch to the "OFF" position. Set APU switch to the "OFF" position. Place the BATT switch to the "OFF" position and disconnect the BATT and BATT charger cables.

d. Emergency procedures.

(1) In the event of an APU fire, the APU fuel manual shut-off valve should be set to the "OFF" position, APU switch to "OFF", BATT switch to the "OFF" position and the crew should make every effort to fight the fire.

(2) If the APU should ever be shut down prematurely, set APU switch to the "OFF" position and check electronic sequence unit for BIT equipment indications.

NIGHT OR NIGHT VISION GOGGLES CONSIDERATIONS: During night operations, ensure that adequate lighting (anti-collision, position lights) is on and the fire guard has a flashlight with un-filtered lens. This task is prohibited while wearing NVG.

TRAINING AND EVALUATION REQUIREMENTS:

1. Training will be conducted in the aircraft.
2. Evaluation will be conducted in the aircraft.

REFERENCES: Appropriate common references, DA Pam 738-751, TM 1-1520-240-PMD, TM 1-1520-271-PMD, TM 1-1520-240-23 series, and TM 1-1520-271-23 series.

TASK 1253

F Operate Common Avionics Architecture System/Control Display Unit/Multi-Function Display

CONDITION: In a CH-47F helicopter with an operational CAAS/CDU/MFD.

STANDARDS: Appropriate common standards plus the following additions/modifications:

1. Configure the CAAS/CDU/MFD for the mission IAW operator's manual (TM 1-1520-271-10).
2. Initialize the CAAS/CDU/MFD for operation.

DESCRIPTION:

1. Crew actions.
   a. The P* will focus primarily outside the aircraft and respond to information given by the P.
   b. The P monitors all mission equipment and uses the CAAS/CDU/MFD for communication, navigation, and mission information.
2. Procedures.
   a. The P will place the CAAS into operation during run-up and will operate inflight through shutdown by using any or all of the following functions:
      (1) Perform the turn on, and then select the desired display for each aircraft MFD. Understand factors and emergencies adversely affecting the MFDs, which could result in degraded mission performance or the mission being aborted. Perform the proper shutdown procedures IAW the operator's manual.
      (2) Initialize the CAAS/CDU using the initialization page and embedded GPS/inertial navigation system (EGI) page IAW the CL.
      (3) Enter and store data on the data page as necessary to effectively complete assigned mission. Transfer data from the data transfer unit (DTU) to the CAAS/CDU, and save data from the CAAS to the DTU as necessary.
      (4) Enter and engage "FLPN" (to include search patterns) of FLPN page of the CAAS/CDU. The P should also be able to modify existing FLPNs inflight to accomplish mission changes en route.
      (5) Use the equipment status (EQP STAT) page of the CAAS/CDU to determine system status and determine mission accomplishment relative to operational condition of displayed equipment.
      (6) Select and set up the avionics using the CNI pages of the CDU.
      (7) Use the navigation radio(s) (NAV RADIO[S]) control page of the CDU to select and tune the proper navigation aid.
      (8) Fix positions and record positions as waypoints using the "MARK" button on the CDU.
   b. Address EP associated with MFD, CAAS and CDU failures.

NIGHT OR NIGHT VISION GOGGLES CONSIDERATIONS: Ensure MFD power switch is set to appropriate mode for current conditions NVG or NORM and brightness/contrast are at an acceptable level for day, night or NVG operations.

TRAINING AND EVALUATION REQUIREMENTS:

1. Training may be conducted in the aircraft or CH-47 TFPS.
2. Evaluation may be conducted in the aircraft or CH-47 TFPS.

REFERENCES: Appropriate common references.

TASK 1260

F Operate Digital Map

CONDITIONS: In a CH-47F helicopter with an operational MFD and the appropriate navigational maps loaded.

STANDARDS: Appropriate common standards plus the following additions/modifications:

1. Operate bezel keys on the MFD to select desired map configuration, overlays and orientation.
2. Operate the multi-function control unit to gain desired information and to manipulate desired mission data on the digital map display.

DESCRIPTION:

1. Crew actions.
   a. The P* will primarily remain focused outside the aircraft.
   b. The P will primarily perform digital map operations.
2. Procedures.
   a. Select appropriate type of map for display.
   b. Select desired viewing range and scale.
   c. Select appropriate type of overlay for the tactical situation.

NIGHT OR NIGHT VISION GOGGLES CONSIDERATIONS: Ensure MFD lighting adjustment is set at an acceptable level for day, night, or NVG operations.

TRAINING AND EVALUATION REQUIREMENTS:

1. Training may be conducted in the aircraft or CH-47 TFPS.
2. Evaluation may be conducted in the aircraft or CH-47 TFPS.

REFERENCES: Appropriate common references.

TASK 1262

Participate in a Crew-Level After Action Review

CONDITIONS: After flight in a CH-47D/F helicopter and given a unit-approved, crew-level AAR CL.

STANDARDS: Appropriate common standards and the following additions/modifications:

1. PC/air mission commander (AMC) will conduct a detailed crew-level AAR using the example shown below or a unit-approved, crew-level AAR CL after each flight.
2. All crewmembers will actively participate in the review.

DESCRIPTION:

1. Crew actions.
   a. The PC will conduct a crew-level AAR. The PC will use a unit-approved CL, similar to the one shown in table 4-4. The PC will actively seek input from all crewmembers. The PC will ensure that the results of the review are passed to operations and flight standards.
   b. All crewmembers will actively participate in the review. The intent is to constructively review the mission and apply lessons learned into subsequent missions.
2. Procedures.
   a. Using an AAR CL, participate in a crew-level AAR of the mission. Table 4-5 provides a suggested crew-level AAR CL (for the minimum mandatory items required.)
   b. The review should be an open and frank discussion of all aspects of the mission. It should include all mission factors and incorporate all crewmembers. The results of the review should be passed to operations and flight standards.

Table 4-5. Suggested format for a crew-level after action review checklist

1. Restate mission objectives with mission, enemy, terrain and weather, troop and support available, time available and civil considerations (METT-TC).
2. Conduct review for each mission segment:
a. Restate planned actions/interactions for the segment.
b. What actually happened?
(1) Each crewmember states in own words.
(2) Discuss impacts of crew coordination requirements, aircraft/equipment operation, tactics, commander's intent, and so forth.
c. What was right or wrong about what happened?
(1) Each crewmember states in own words.
(2) Explore causative factors for both favorable and unfavorable events.
(3) Discuss crew coordination strengths and weaknesses in dealing with each event.
d. What must be done differently the next time?
(1) Each crewmember states in own words.
(2) Identify improvements required in the areas of team relationships, mission planning, workload distribution and prioritization, information exchange, and cross-monitoring of performance.
e. What are the lessons learned?
(1) Each crewmember states in own words.
(2) Are changes necessary to:
(a) Crew coordination techniques?
(b) Flying techniques?

Table 4-5. Suggested format for a crew-level after action review checklist

(c) Standing operating procedures?
(d) Doctrine, ATM, or TMs?
3. Effect of segment actions and interactions on the overall mission.
a. Each crewmember states in own words.
b. Lessons learned.
(1) Individual level.
(2) Crew level.
(3) Unit level.
4. Advise unit operations of significant lessons learned.

TRAINING AND EVALUATION REQUIREMENTS:

1. Training will be conducted academically.
2. Evaluation will be conducted academically.

REFERENCES: Appropriate common references.

TASK 1402

Perform Tactical Flight Mission Planning

CONDITIONS: Prior to flight in a CH-47D/F helicopter and given a mission briefing, navigational maps, a navigational computer, Army-approved mission planning station and software, if available and other flight planning materials as required.

STANDARDS: Appropriate common standards and the following additions/modifications:

1. Analyze the mission using the factors of METT-TC.
2. Operate the Army-approved mission planning station and software, if available.
3. Perform a map/photo reconnaissance using the available map media, photos, and Army-approved mission planning station and software. Ensure that all known hazards to terrain flight are plotted.
4. Select the appropriate flight altitudes.
5. Develop load plan and verify aircraft weight and balance (Task 1012).
6. Select appropriate primary and alternate routes and enter all of them on a map, route sketch, or into the Army-approved mission planning station and software, if available.
7. Determine the distance, ±1 kilometer; ground speed, ±5 knots; and ETE, ±1 minute for each leg of the flight.
8. Determine the fuel required and reserve IAW AR 95-1, ±100 pounds.
9. Obtain and analyze Wx briefing to determine that Wx and environmental conditions are adequate to complete the mission.
10. Load mission data to the mission data card, as required.
11. Produce mission products IAW unit SOP, as required.
12. Conduct a thorough crew mission briefing.

DESCRIPTION:

1. Crew actions.

   a. The PC/AMC will delegate mission tasks to crewmembers, will have the overall responsibility for mission planning, and will conduct a thorough crew mission briefing. The PC/AMC will analyze the mission in terms of METT-TC.

   b. The P and NCM will perform the planning tasks directed by the PC/AMC. The P and NCM will report their planning results to the PC/AMC.

2. Procedures.

   a. Analyze the mission using the factors of METT-TC.

   b. Conduct a map or an aerial photoreconnaissance.

   c. Obtain a thorough weather briefing that covers the entire mission; include sunset and sunrise times, density altitudes, winds, and visibility restrictions. If it is to be a night mission, the briefing would include moonset and moonrise times and ambient light levels, if available.

   d. Determine primary and alternate routes, terrain flight modes, and movement techniques. Determine time, distance, and fuel requirements using the navigational computer or Army-approved mission planning station and software, if available.

   e. Annotate the map or Army-approved mission planning station and software, if available, with sufficient information to complete the mission IAW the unit's SOP. This includes waypoint coordinates that define the entry routes into the GPS/Army-approved mission planning station and software, if available. Consider such overlay items as hazards, checkpoints, observation posts and friendly and enemy positions. Review contingency procedures.

Note. Evaluate Wx impact on the mission. Considerations should include aircraft performance and limitations.

NIGHT OR NIGHT VISION GOGGLES CONSIDERATIONS: More detailed flight planning is required when the flight is conducted in reduced visibility, at night or in the NVG environment. FM 3-04.203 contains details about night navigation. NVG navigation with standard maps can be difficult because of map colors, symbology and colored markers used during map preparation.

TRAINING AND EVALUATION REQUIREMENTS:

1. Training will be conducted academically.
2. Evaluations will be conducted academically.

REFERENCES: Appropriate common references.

TASK 1404

Perform Electronic Countermeasures/Electronic Counter-Countermeasures Procedures

CONDITIONS: In a CH-47D/F helicopter and given an appropriate data fill transfer device.

STANDARDS: Appropriate common standards and the following additions/modifications:

1. Test and operate aircraft avionics and voice security equipment IAW the appropriate operator's manual.
2. Maintain radio discipline.
3. Use the SOI section of the automated NET control device.
4. Recognize and respond to enemy electronic countermeasures.
5. Operate AN/APX-100 or AN/APX-118 (transponder system) identification, friend or foe (IFF) system.

DESCRIPTION:

1. Crew actions.

   a. The PC will ensure that assigned radio frequencies are briefed during the crew briefing. The PC will indicate whether the P* or P will establish and maintain primary communications.

   b. The P* will announce mission information not monitored by the P and deviations from directives.

   c. The P will manage and announce radio(s) frequencies and copy and decode pertinent information. The P will announce information not monitored by the P*.

2. Procedures.

   a. Electronic communications should not be used in a tactical environment except when necessary. If electronic communication is required, the best method is to operate in the secure voice mode. To eliminate confusion and reduce transmission time, the crew must use approved communication words, phrases, and codes. Plan what to say before keying the transmitter.

   b. Transmit information clearly, concisely, and slowly enough to be understood by the receiving station. Ideally, keep transmissions under 10 seconds. Do not identify a unit or an individual by name during non-secure radio transmissions. Follow the procedures listed below.

      (1) Authentication. Use proper SOI procedures to authenticate all inflight mission changes and artillery advisories when entering or departing a radio NET, when challenged or when requesting authentication.

      (2) Meaconing, interference, jamming, and intrusion (MIJI) procedures. Keep accurate and detailed records of MIJI incidents. Report an incident as soon as possible when a secure communications capability exists.

      (3) Visual methods. Use other visual communication methods IAW FM 21-60, such as flags, lights, panels, pyrotechnics, hand and arm signals, and aircraft maneuvers.

      (4) AN/APX-100/118 IFF. Turn on, test and operate the IFF IAW the appropriate operator's manual. Operate the IFF IAW the tactical situation. During shutdown, hold or zeroize the code, as required.

TRAINING AND EVALUATION REQUIREMENTS:

1. Training may be conducted in the aircraft, CH-47 FS/TFPS or academically.
2. Evaluations will be conducted in the aircraft, CH-47 FS/TFPS or academically.

REFERENCES: Appropriate common references, DOD AIM 86-100, FM 4-04.120, TM 11-5810-262-10, and TM 11-5895-1199-12.

TASK 1406

Perform Terrain Flight Navigation

CONDITIONS: In a CH-47D/F helicopter and given a mission briefing and required navigational maps and materials.

STANDARDS: Appropriate common standards and the following additions/modifications:

1. RCM.

   a. During nap of the earth (NOE) flight, (surface to 25 feet [AHO]), know the en route location within 200 meters.

   b. During contour flight (25 to 80 feet AHO) or low-level flight (80 to 200), know the en route location within 500 meters.

   c. Locate each objective within 100 meters.

   d. Arrive at each objective at the planned time, ±1 minute (if an objective arrival time was given in the mission briefing).

2. NCM. Announce significant terrain features to aid in navigation.

DESCRIPTION:

1. Crew actions.

   a. The P* will remain focused outside the aircraft and respond to navigation instructions and cues given by the P. The P* will acknowledge commands issued by the P for heading and airspeed changes necessary to navigate the desired course. The P* will announce significant terrain features to assist the P in navigation.

   b. The P will furnish the P* with the information required to remain on course. The P will announce all plotted wires/hazards before approaching their location. The P will use rally terms and terrain features to convey instructions to the P*. Examples of these terms are "TURN LEFT to your 10 O'CLOCK," "STOP TURN," and "TURN DOWN the VALLEY to the LEFT". If using the HSI (I) during low-level flight, 80 feet AHO, the P may include headings. The P should use electronically aided navigation to help arrive at a specific checkpoint, turning point or objective.

   c. The P*, P, and NCM should use standardized terms to prevent misinterpretation of information and unnecessary cockpit conversation. The crew must look far enough ahead of the aircraft at all times to assist in avoiding traffic and obstacles.

2. Procedures.

   a. During NOE and contour flight, identify prominent terrain features located some distance ahead of the aircraft and lying along or near the course.

      (1) Using these terrain features to key on, the P* maneuvers the aircraft to take advantage of the terrain and vegetation for concealment.

      (2) If this navigational technique does not apply, identify the desired route by designating a series of successive checkpoints.

      (3) To remain continuously oriented, compare actual terrain features with those on the map.

      (4) An effective technique is to combine the use of terrain features and rally terms when giving directions. This will allow the P* to focus his or her attention outside the aircraft.

   b. For low-level navigation, the time and distance can be computed effectively. This means the P* can fly specific headings and airspeeds. Each of the methods for stating heading information is appropriate under specific conditions.

      (1) When a number of terrain features are visible and prominent enough for the P* to recognize them, the most appropriate method is navigation instruction toward a terrain feature in view.

(2) When forward visibility is restricted and frequent changes are necessary, controlled turning instructions are more appropriate.

(3) Clock headings are recommended when associated with a terrain feature and with controlled turning instructions.

Note. For additional information, refer to Tasks 1044, 1046, and 1166.

Note. The aircrew should incorporate the use of Army-approved mission planning station and software, if available, with this task.

NIGHT OR NIGHT VISION GOGGLES CONSIDERATIONS:

1. Conducting the flight in reduced visibility (or at night) requires more detailed and extensive flight planning and map preparation. FM 3-04.203 contains details on night navigation. NVG navigation with standard maps can be difficult because of map colors, symbology and colored markers used during map preparation.
2. Use proper scanning techniques to ensure obstacle avoidance.

TRAINING AND EVALUATION REQUIREMENTS:

1. Training may be conducted in the aircraft or CH-47 FS/TFPS.
2. Evaluations will be conducted in the aircraft.

REFERENCES: Appropriate common references and FM 3-25.26.

TASK 1408

Perform Terrain Flight

CONDITIONS: In a CH-47D/F helicopter with tactical flight mission planning completed.

STANDARDS: Appropriate common standards and the following additions/modifications:

1. RCM.
   a. Maintain altitude and airspeed appropriate for the selected mode of flight, visibility and METT-TC.
   b. Maintain aircraft in trim during contour and low-level flight and when appropriate for NOE flight.
2. NCM. Maintain constant scan of assigned sector.

DESCRIPTION:

1. Crew actions.
   a. The P* will focus primarily outside the aircraft and acknowledge all navigational and obstacle-clearance instructions given by the P. The P* will announce the intended direction of flight or any deviation from instructions given by the P. During terrain flight, the P* is primarily concerned with threat and obstacle avoidance.
   b. The P will provide adequate warning to avoid obstacles detected in the flight path or identified on the map. The P and NCM will assist in clearing the aircraft and provide adequate warning of obstacles, unusual attitudes, altitude changes or threat. The P and NCM will announce when their attention is focused inside the aircraft and when attention is re-established outside.
   c. During contour flight, the P will advise the P* whenever an unannounced descent is detected. If the descent continues without acknowledgement or corrective action, the P will again advise the P* and be prepared to make a thrust control input. The P will raise the thrust control when it is apparent that the aircraft will descend below 25 feet AHO.
   d. During NOE flight, the P will advise the P* whenever an unannounced descent is detected. The P will immediately raise the thrust control when it is apparent that the P* is not taking corrective action and the aircraft will descend below 10 feet AHO.
2. Procedures.
   a. Terrain flight is close to the earth's surface. The modes of terrain flight are NOE, contour and low-level.
   b. Crewmembers will seldom perform pure NOE or contour flight. Instead, crewmembers will alternate techniques while maneuvering over the desired route. The crew must look far enough ahead of the aircraft at all times to assist in avoiding traffic and obstacles.
      (1) NOE Flight. Perform NOE flight at varying airspeeds and altitudes as close to the earth's surface as vegetation, obstacles and ambient light permit.
      (2) Contour flight. Perform contour flight by varying altitude and while maintaining a relatively constant airspeed, depending on the vegetation, obstacles and ambient light. Generally, follow the contours of the earth.
      (3) Low-level flight. Perform low-level flight at a constant airspeed and altitude. To prevent or reduce the chance of detection by enemy forces, fly at the minimum safe altitude that will allow a constant altitude.

Note. Performing this maneuver in certain environments may require HVR OGE PWR. Evaluate each situation for PWR required versus PWR AVAIL.

Note. Terrain flight is considered sustained flight below 200 feet AGL, (except during takeoff and landing).

NIGHT OR NIGHT VISION GOGGLES CONSIDERATIONS:

1. When wearing NVGs, the P* will not exceed 40 KIAS/KCAS when flying at or below 25 feet AHO. Between 25 feet and 80 feet AHO, the P* will not exceed 70 KIAS/KCAS. Above 80 feet AHO, the P* may use any airspeed up to V_{NE}.
2. Wires are difficult to detect with the NVG.
3. Use proper scanning techniques to ensure obstacle avoidance.
4. During NVG terrain flight, observe the NVG speed and altitude restrictions in TC 3-04.11.

OVERWATER CONSIDERATIONS:

1. All crewmembers will wear floatation devices IAW AR 95-1.
2. Overwater flight, at any altitude, is characterized by a lack of visual cues, and, therefore, has the potential of causing visual illusions. To minimize spatial disorientation, the crew should use RAD ALT hold during overwater flight.
3. Be alert to any unannounced changes in the flight profile and be prepared to take immediate corrective actions. The RAD ALT low bug should be set to assist in altitude control.
4. Operations become increasingly more hazardous as references are reduced (open water versus a small lake), water state increases (calm to chop to breaking condition with increasing wave height), and visibility decreases (horizon becomes same color as water, water spray [or rain] on windshield, sunny mid-day versus twilight).
5. Hazards to flight such as harbor lights, buoys, wires, and birds must be considered during overwater flight. These considerations may also apply to flight over desert or broad expanses of snow, especially under low ambient lighting.

TRAINING AND EVALUATION REQUIREMENTS:

1. Training may be conducted in the aircraft or CH-47 FS/TFPS.
2. Evaluations will be conducted in the aircraft.

REFERENCES: Appropriate common references and FM 3-25.26.

TASK 1411

Perform Terrain Flight Deceleration

CONDITIONS: In a CH-47D/F helicopter with tactical flight mission planning completed and aircraft cleared.

STANDARDS: Appropriate common standards and the following additions/modifications:

1. RCM.
   a. Maintain heading alignment with the selected flight path.
   b. Maintain the aft rotor clear of all obstacles.
   c. Decelerate to the desired airspeed or to a full stop.
2. NCM. Maintain the tail clear of all obstacles.

DESCRIPTION:

1. Crew actions.

   a. The P* will focus primarily outside the aircraft to clear the aircraft throughout the maneuver. The P* will announce his or her intention to decelerate or come to a full stop, any deviation from the maneuver, and completion of the maneuver.

   b. The P and NCM will provide adequate warning to avoid obstacles detected in the flight path and will announce when their attention is focused inside the cockpit and again when attention is re-established outside.

2. Procedures.

   a. The P* will initially raise the thrust control to maintain the altitude of the aft landing gear. (Thrust control application, may not be necessary when initiation of the maneuver is at higher airspeeds.)

   b. The P* must consider variations in the terrain and obstacles when determining aft rotor clearance. The P* will apply aft cyclic to slow to the desired airspeed (or come to a full stop) while adjusting the thrust control to maintain the altitude of the aft landing gear.

   c. The P* will maintain heading with the pedals and will make all control movements smoothly. If the altitude of the aft landing gear increases during the deceleration, the P* may need to lower the thrust control to return to the desired altitude.

   d. If the aircraft attitude is changed excessively or abruptly, it may be difficult to return the aircraft to a level attitude and over controlling may result.

Note. Performing this maneuver in certain environments may require HVR OGE PWR. Evaluate each situation for PWR required versus PWR AVAIL.

NIGHT OR NIGHT VISION GOGGLES CONSIDERATIONS: Due to the limited field of view of the NVG, the P* must avoid abrupt changes in aircraft attitude. An extreme nose-high attitude limits the forward field of view and may cause disorientation. The P* should maintain proper scanning techniques to ensure obstacle avoidance and clearance.

TRAINING AND EVALUATION REQUIREMENTS:

1. Training may be conducted in the aircraft or CH-47 FS/TFPS.
2. Evaluations will be conducted in the aircraft.

REFERENCES: Appropriate common references.

TASK 1412

Perform Evasive Maneuvers

CONDITIONS: In a CH-47D/F helicopter in a tactical environment, familiar with classified evasive tactics techniques and procedures (TTP) and all organic ASE, having received enemy fire.

STANDARDS: Appropriate common standards and the following additions/modifications:

1. Perform appropriate evasive maneuver (EVM) communications.
2. Perform appropriate EVM for the type of threat.
3. Evaluate any damage to aircraft.
4. Recommend or execute a course of action.

DESCRIPTION:

1. EVMs consist of a combination of classified and unclassified TTP used to defeat enemy surface-to-air fire (SAFIRE) and aircraft threats. A complete discussion of EVM requires aircrews to consult critical additional classified information. When specific strengths and weaknesses of U.S aircraft and survivability equipment are tied to a specific threat weapon system, the information is classified SECRET NOFORN.

2. Consult with local TACOPS officer for latest area of operations threat systems. If the enemy cannot be avoided through tactical flight procedures, then EVMs are used to avoid or minimize exposure in the enemy's weapon engagement zone (WEZ). The WEZ is defined by the four dimensions of the weapon's range (R MAX), minimum range, MAX altitude, minimum altitude and the weapons time of flight (TOF). Traditionally Army helicopters employ tactical flight mission planning, tactical flight procedures, and standoff to avoid the enemy WEZ by staying outside R MAX. Where the enemy locations are unpredictable, other aspects of the WEZ must be exploited to improve aircraft survivability. Once engaged the crew's primary goal should be to limit enemy weapon effectiveness, and exit the WEZ as quickly as possible by applying the appropriate EVM, and suppress the system if able. Aircrews should anticipate the possibility of multiple weapons systems arrayed with interlocking fields of fire when conducting EVM. Aircrews must also be aware of the difference between cover and concealment during tactical flight.

3. Considerations: When tactics are insufficient, the crew will select and apply the appropriate EVM. Any EVM must be used in concert with ASE, onboard weapon systems, and other TTP to minimize the SAFIRE threats to the aircraft. EVM are broadly categorized by whether the enemy weapon is guided or unguided. Generally, the aircrew must defeat the weapon system for guided weapons and defeat the gunner for unguided weapons. Both guided and unguided weapons require time to get to the target based on weapon to target range and projectile velocity. At some ranges, the TOF can be exploited to allow the PI to maneuver the aircraft out of danger. However, the time required varies greatly depending on the type of weapon and TOF. Tank main gun rounds and automatic antiaircraft cannons have extremely high velocities and very short TOF where as rocket propelled grenade (RPG) and certain antitank guided missiles (ATGMs) have comparatively slow TOF.

4. Communication. Intra-cockpit and inter-flight communication during a SAFIRE or air attack event are critical in performing EVM in a timely manner. Alerting the rest of the flight maximizes mission survivability by providing early warning and reaction time, and perhaps maneuver space, with the goal of minimizing other aircrews exposure to the WEZ if not enabling them to avoid the WEZ altogether. The "threat call" must be both directive (telling the flight what you want them to do) and descriptive (telling the flight why) to build the flight's SA. Always preface threat calls with the flight call sign to avoid potential confusion in situations where multiple flights are using the same frequency.

   a. Aircrew coordination throughout the EVM sequence is of paramount importance. Crews should brief and practice actions during EVM to ensure efficiency and communication effectiveness. In any case, the person observing the enemy fire must communicate to the P* in order for the P* to be able to effectively execute EVM. The aircrew must communicate the threat information to other aircraft in the flight, and after the immediate danger is past, to the appropriate outside agencies for battlefield SA.

b. The first crewmember to realize enemy fire will announce the nature and direction of the threat by the most immediate means available.

c. The P* will announce the direction of threat to other aircraft and his intent. The P* will remain focused outside the aircraft during the event and should be aware that crewmembers involved in returning suppressive fire may be unavailable for assisting in obstacle avoidance or noting other threat sources. The P* is responsible for safe performance of EVM and aircraft control.

d. The P will be alert for obstacles and new threat sources encountered during the event. The P will remain oriented on threat location and assist clearing the aircraft and will announce warning to avoid obstacles and when attention is focused inside the aircraft. The P should note location of the threat quickly and as accurately as the situation allows. It is imperative that all applicable crewmembers are able to quickly and accurately locate and transmit threat data in order to maintain individual and collective SA during quickly changing situations. Not storing/reporting an enemy location may be more detrimental than the risk of taking time to note the location when contact occurs. The crew will transmit a report, (as required) to other aircraft within the flight, higher HQ, and the owning ground unit/tactical commander.

e. Other crewmembers will remain oriented on the threat location and employ appropriate countermeasures or suppressive fire as appropriate. They will announce when their attention is focused inside the cockpit; for example, when firing the weapons.

Note. Crewmembers will not use friendly affiliated graphic control measures/icons/symbols to mark enemy locations and vice-versa to avoid fratricide and other unnecessary confusion.

5. Maneuvers.

a. Unguided weapons. Unguided weapons (such as small arms, unguided rockets, and tanks) require the enemy gunner to predict an intercept point by estimating where the target aircraft will be at the TOF of the projectiles. Once fired, the rounds cannot be corrected. The two basic strategies of defeating unguided weapons are to present the most difficult targeting (ballistic) solution possible and then to change the enemy's ballistic solution as often as possible. The PI presents the enemy with the most difficult target by maneuvering in three dimensions. Unguided weapons are generally employed in three basic methods: aimed fire, curtain fire and barrage fire-each requires a different countermeasure. Curtain and barrage fire may not be specifically aimed at an individual aircraft but rather fired into a predicted or suspected air avenue of approach that the enemy believes will be over flown by the aircraft.

(1) Countering aimed fire: When encountering accurate aimed fire, the crew should immediately alert the flight, jink until the aircraft exits the enemy WEZ, while suppressing with organic weapons if feasible. Jinking is defined as deliberate, controlled changes of multiple axes in order to elude effective enemy fire. Turns can be lateral or vertical, and are most effective when combined; such as, changing direction and altitude simultaneously. Jinking is used to disrupt/deny the enemy a weapon's firing solution by moving the aircraft away from the predicted point of impact/intercept. Properly executed, jinking maximizes errors in the enemy weapon system's firing solution by forcing the gunner to correct for azimuth, range, altitude, and changing velocity constantly and simultaneously. This maneuver incorporates a change in direction with a (optional) climb or descent every several seconds. Jinks should be random in direction so as not to become predictive. The jinking maneuver is accomplished with positive flight control inputs, but should not be a violent maneuver. Jinking will be ineffective if the helicopter does not displace over the ground and cause the enemy to shift his aiming point. Therefore, excessively tight turns should normally be avoided as they result in the helicopter failing to displace out of the enemy's weapon's field of view.

Note. Prolonged jinking may dissipate the aircraft's kinetic energy and may make the aircraft an easier target.

(2) Countering barrage fire: If engaged by accurate barrage fire, depart the area of fire as quickly as possible via the most direct path. Since barrage fire is being aimed into a 'box,' turn only to avoid areas of concentrated fire. Do not "jink" as this will delay departure from the barrage.

(3) Countering curtain fire: Turn to avoid flying into curtain fire when possible. When engaged by accurate curtain fire, depart the area of fire as quickly as possible via the most direct path.

(4) Tanks: Generally the unguided weapons countermeasures listed above are appropriate defenses against tank fire. Additionally, tank fire control systems and turret slew rates in azimuth and elevation combined with the limited field of view on the tank gunner's weapon sight make it very difficult to track aircraft with high relative velocity. Tank gunners are particularly vulnerable to aircraft displacing in the vertical plane. If engaged with a semi-automatic command to line of sight (SACLOS) missile fired from a tank, refer to the procedure listed in paragraph 5c.

(5) Artillery countermeasures procedure. Artillery can pose a threat to slow-speed helicopters particularly operating at a readily identifiable firing position. Artillery takes time to shift fires; this time interval can be used by helicopters to stay ahead of the enemy's ability to target/shift fires onto them. If two or more unexplained explosions occur within 500 meters of the aircraft, suspect enemy artillery and proceed as follows:

(a) Depart the impact area by 500 meters.

(b) Reposition every 20 seconds to avoid enemy adjusting (shifting) fire onto your new location.

(c) Report receiving enemy artillery/mortar fire to facilitate timely counter battery fire from friendly field artillery.

b. Automatic antiaircraft guns. The crew should use the unguided weapons countermeasures above to defeat the guns/projectiles themselves. For radar aided/directed AAA systems, use the radar countermeasures listed below.

c. SACLOS missiles. SACLOS weapon systems includes ATGM and certain antiaircraft missiles. These systems can vary from slow speed ATGMs (~100 meters per second) to very high-speed antiaircraft missiles (700 meters per second) and may use wires, radio or light amplification by stimulated emission of radiation (LASER) for the command link. These systems are countered by departing the missile engagement zone or WEZ prior to weapons impact. Regardless of the type of SACLOS missile, the weakest part of the guidance system is the enemy gunner. Older ATGMs glide during most of their flight resulting in low energy and poor missile maneuverability. This combined with relatively high latency within the guidance systems means the missile can be readily out flown by the targeted aircraft. With high-speed/high-G SACLOS antiaircraft systems, the missiles themselves are more difficult to be out flown by a helicopter due to its maneuverability/speed and decreased reaction time by the aircrew.

d. Radar guided weapons. Refer to classified Army aviation TTP.

e. Heat seeking (IR) missiles. Refer to classified Army aviation TTP.

f. Fixed wing. Fighter aircraft are characterized by their high performance with high attack speeds. Their ability to move vertically in excess of 40,000 + FPM means that fighter aircraft can easily come and go from the area without detection by the attack helicopter crew. Fighters can work independently or in a minimum of two aircraft section. If one is detected, expect another enemy aircraft nearby. When operating in an area of possible enemy fighter activity, perform the following actions:

(1) Be predictable to friendly fighters by being on the air tasking order and squawk the appropriate transponder codes/modes to avoid fratricide.

(2) Be unpredictable to enemy fighters by using night and/or adverse Wx to avoid detection when possible.

(3) In daylight, avoid flying over areas of high contrast such as bodies of water or open fields if possible.

Note. If fighters are observed circling, rapidly climbing, or turning towards the aircraft, the crew should consider a fighter attack imminent.

---

(4) If hostile fighter activity is observed:

(a) Take defensive (passive) protection measures (for example, verify IFF is operational).

(b) Take offensive (active) protective measures if fighters are identified as enemy (refer to classified special instructions).

(c) Refer to classified Army aviation TTP for further crew procedures.

(5) Air-to-ground gun/rocket evasive maneuvers. Fighters normally carry limited cannon ammunition with its high performance working against rocket or gun attack accuracy against helicopter targets. The enemy fighter will have as little as 0.5 to 3.0 seconds to execute a gun or rocket engagement due to their high speed and the limited effective range of their gun or rockets.

(6) Air-to-ground bomb passive countermeasures. Once dropped, the fighter's bomb will fall on a ballistic flight path that can be avoided or mitigated if detected in time. The time of fall of the bombs can be exploited by the attack helicopter crew to avoid the heart of the enemy's weapons effect zones. To avoid being hit by their own fragments, bombs are equipped with time-delayed fuzes of 4 to 6 seconds minimum. At 100 KTS ground speed, a helicopter can displace over 300 meters in 6 seconds. Once bombs depart the fighter, the helicopter should fly perpendicular to the bomb's line of fall and proceed at MAX speed and minimum altitude. This will place the helicopter at the edge of the fragment envelope where fragment density will be at a minimum. IR/RAD missile evasive maneuvers: Refer to classified Army aviation TTP.

g. Helicopters. Due to their limited performance differential and inability to accelerate out of enemy weapons range, once engaged it is impractical for helicopters to break contact from one another. Consequently, the success of helicopter evasive maneuvers will likely depend on seeing the enemy aircraft first and avoiding its WEZ. The most effective means of avoiding a helicopter WEZ is to achieve "rotor blade masking" by operating above the enemy helicopter.

(1) Maintain MAX maneuver energy and **do not** decelerate below "bucket speed" (approximately MAX END/MAX R/C airspeed).

(2) Maintain the enemy helicopter in sight until it is destroyed if able and appropriate.

(3) Vector other friendly helicopters onto the enemy.

(4) Deny or limit enemy shooting opportunities by exiting the enemy weapon system WEZ and then climb above the enemy helicopter and force rotor blade masking.

(5) All organic weapons system should be considered based on their individual characteristics and effectiveness against mobile thin-skinned targets.

Note. Friendly locations must be considered prior to firing.

NIGHT OR NIGHT VISION GOGGLES CONSIDERATIONS: Threat elements will be harder to detect. Crewmembers must maintain SA.

TRAINING AND EVALUATION REQUIREMENTS:

1. Training may be conducted in the aircraft or CH-47 FS/TFPS.
2. Evaluation will be conducted in the aircraft.

REFERENCES: Appropriate common references, FM 3-90, FM 3-54.10, FM 3-04.140, and http://www.usaace.army.smil.mil/ttps/approvedttp.html.

TASK 1413

Perform Actions on Contact

CONDITIONS: In a CH-47D/F helicopter in a tactical environment and given a tactical mission briefing and map with graphics and enemy contact.

STANDARDS: Appropriate common standards plus use the correct actions on contact consistent with the tactical situation.

1. If appropriate, immediately deploy to a covered and concealed position using suppressive fire.
2. Use the correct actions on contact consistent with the observation as appropriate for the mission.
3. Transmit tactical report IAW SOI, the unit's SOP or mission briefing.

DESCRIPTION:

1. Crew actions. When engaged by or upon detecting the enemy, the crewmember identifying the threat will announce the nature (visual observation, RAD detection or hostile fire) and the direction of the threat.

   a. Proper pre-mission planning and intelligence data may aid in developing flight profiles and route selection to avoid hostile fire.

   b. Fly the helicopter to a concealed area using the evasive techniques below and suppressive fire, as required. Choose a course of action that supports the mission and the intent of the unit commander's directives. For additional information, refer to Task 1412.

   c. If engaged by the enemy, the crew will announce the nature of the threat (hostile fire or radar detection) and the direction of the threat. The crewmember that first identified the threat is responsible for announcing the threat bearing, relative to the aircraft and launch countermeasures/suppressive fire as necessary.

   d. The P* will announce the direction of flight to deploy to cover and remain focused outside the aircraft during the evasive maneuver and clearing.

   e. Avoid over-controlling/excessive maneuvering that may result in loss of aircraft control (or insufficient PWR) to recover from the maneuver.

   f. The P and NCM will remain focused primarily outside the aircraft and announce adequate warning to avoid obstacles detected during the evasive maneuver.

   g. The P will remain oriented on threat location. The P will announce warnings to avoid obstacles when his or her attention is focused inside the aircraft, again when his or her attention is re-established outside and will transmit a tactical report.

   h. The NCM will remain focused primarily outside the aircraft and announce adequate warning to avoid obstacles. The NCM will also provide suppressive fire as required.

   Note. The NCMs must be able to transmit a tactical report IAW the SOI, unit SOP or mission briefing.

   ---

2. Procedures.

   a. The specific maneuver required will depend on the type of hostile fire encountered. The guidance below may assist with developing actions-on-contact for the given threat system. A thorough intelligence briefing will help to identify actions-on-contact the crew can expect to take for the most probable threat system employment.

      (1) Tanks, RPG and small arms.

         (a) If concealment is available, deploy toward the area of concealment

         (b) If concealment is not readily available, immediately turn to an oblique angle while applying forward cyclic. Turn to an oblique angle from the hostile fire to minimize the aircraft's profile and to make it a more difficult target. Apply forward cyclic to accelerate

while descending in an attempt to mask the aircraft. Make turns of unequal magnitude, at unequal intervals, and small altitude changes to provide the best protection until beyond the effective range of hostile weapons.

(c) If the situation permits, employ immediate suppressive fire.

(2) Large caliber, anti-aircraft fire (radar-controlled).

(a) Refer to classified procedures.

(b) To reduce the danger, descend immediately to NOE altitude.

(3) Fighters.

(a) On sighting a fighter, try to mask the helicopter.

(b) If the fighter is alone and executes a dive, turn the helicopter toward the attacker and descend. This maneuver will cause the fighter PI to increase the attack angle.

(c) Depending on the fighter's dive angle, it may be advantageous to turn sharply and maneuver away once attacker is committed. The fighter PI will then have to break off the attack to recover from the maneuver.

(d) Once the fighter breaks off the attack, maneuver the helicopter to take advantage of terrain, vegetation and shadow for concealment.

(4) Heat-seeking missiles.

(a) M-130. As appropriate, employ the ASE to counter heat-seeking devices while maneuvering to avoid the threat. If a missile is detected, apply forward cyclic and turn the heat source away from the threat. Attempt to mask the aircraft while orienting crew served weapons for suppressive fire.

(b) CMWS/ALE-47/AAR-57. If a missile is detected, initially maintain course/altitude and allow the countermeasure system to defeat the threat. Perform the appropriate combat maneuvering flight (Task 2127) maneuver and turn to an oblique angle from the threat to minimizing the profile of the aircraft while evading. Delay a descent momentarily after last flare launch to allow for IR missile decoy. Attempt to mask the aircraft while orienting/employing crew served weapons for suppressive fire.

(5) Radar-guided missiles. Perform the appropriate combat maneuvering flight (Task 2127) maneuver to break the line of sight to the radar source while simultaneously activating chaff if available. Maneuver away from the threat source and attempt to keep the threat system to the right rear or left rear of aircraft and simultaneously dispense chaff. Attempt to keep the chaff cloud between the aircraft and the threat source. Once chaff is dispensed, turn the aircraft to maneuver away from the chaff cloud and continue to chaff and turn until the aircraft is masked.

(6) Anti-tank-guided missiles. Some missiles fly relatively slowly and are avoidable by rapidly repositioning the helicopter. If terrain or vegetation is unavailable for masking, remain oriented on the missile as it approaches. As the missile is about to impact, rapidly change flight path or altitude to evade it.

(7) Artillery. Depart the impact area, and determine CBRNE requirements.

Note. Dispensing chaff while maneuvering may cause tracking radars to break lock.

---

b. After successfully deploying to cover, the crew will:

(1) Report the situation.

(2) Develop the situation.

(3) Choose a course of action, if not directed by the unit commander. (The P*/P will announce the unit commander's directive if not monitored by the other crewmember.)

(4) If hit by hostile fire, rapidly assess the situation and determine an appropriate course of action.

(a) Assess aircraft controllability.

(b) Check all instruments, and warning and caution lights. If a malfunction is IND, initiate the appropriate EP.

(c) If continued flight is possible, take evasive action.

(d) Radio call(s) your situation, location, action, and request for assistance if desired.

(e) Continue to be alert for unusual control responses, noises and vibrations.

(f) Monitor all instruments for an indication of a malfunction.

(g) Fly the aircraft to the nearest secure location and land.

(h) After landing, inspect the aircraft to determine the extent of damage and if flight can be continued.

Note. Proper employment of terrain flight techniques will reduce exposure to enemy threat weapon systems.

Note. Threat elements will be harder to detect. Rapid evasive maneuvers will be more hazardous due to division of attention and limited visibility. Maintain SA with regard to threat and hazard location.

Note. Performing this maneuver in certain environments may require HVR OGE PWR. Evaluate each situation for PWR required versus PWR AVAIL.

NIGHT OR NIGHT VISION GOGGLES CONSIDERATIONS:

1. At low ambient light levels, obstacle detection is difficult. The P* may experience spatial disorientation if he or she executes abrupt maneuvers. Proper scanning techniques and good cockpit communication are necessary to avoid these hazards.
2. The crew should consider using artificial lighting if the ambient light level is insufficient for obstacle detection.

TRAINING AND EVALUATION REQUIREMENTS:

1. Training may be conducted in the aircraft, CH-47 FS/TFPS, or academically.
2. Evaluations will be conducted in the aircraft, CH-47 FS/TFPS, or academically.

REFERENCES: Appropriate common references, ASET, and FM 34-25-7.

TASK 2010

Perform Multi-Aircraft Operations

CONDITIONS: In a CH-47D/F helicopter with the mission briefing completed.

STANDARDS: Appropriate common standards and the following additions/modifications:

1. RCM.
   a. Participate in a formation flight briefing IAW unit SOP.
   b. Correctly perform takeoff, join-up and/or landing in formation.
   c. Correctly perform formation changes, when required.
   d. Maintain proper separation for the type of formation flight being conducted.
   e. If visual contact is lost, properly execute briefed loss of visual contact/inflight link up procedures.
   f. Perform techniques of movement, if required.
2. NCM.
   a. Assume a position in the helicopter, as briefed, to observe other aircraft in the formation.
   b. Announce if visual contact is lost with other aircraft.

DESCRIPTION:

1. Crew actions.

> ***Note.*** The most important consideration when an aircraft has lost visual contact with the formation is to announce loss of visual contact to the other members of the crew and the rest of the flight and reorient. Except for enemy contact, all mission requirements are subordinate to this action.

   a. The P* will focus primarily outside the aircraft for clearing and tracking other aircraft. The P* will announce any maneuver or movement before execution and inform the P and NCM if visual contact is lost with other aircraft. If visual contact is lost with other aircraft, complete the following.

      (1) The crew will immediately make a radio call to the flight and begin reorientation procedures (example: "Chalk 3 has loss of visual contact with the formation").

      (2) Lead will announce and maintain heading, altitude and airspeed until all aircraft have rejoined the flight. The P* will also announce his or her position relative to the next waypoint.

      (3) The aircraft that has lost visual contact with the flight will immediately assume leads heading, airspeed and maintain vertical separation as briefed.

      (4) If IMC are encountered execute IIMC breakup as briefed. The P* will ensure that the appropriate radio calls are made during IMC breakup.

   b. The P and NCM will provide adequate warning of traffic or obstacles detected in the flight path and identified on the map. The P and NCM will inform the P* if visual contact is lost with other aircraft or if an enemy is sighted. Also, when their attention is focused inside the aircraft and again when attention is re-established outside along with the seat position. The PC will call out direction and altitude in case of IMC breakup. The NCMs will position themselves in the aircraft to observe other aircraft in the formation and assist in maintaining aircraft separation and obstacle clearance.

2. Procedures.
   a. Perform formation flight IAW the unit's SOP and the common references in this ATM.
   b. If the tactical situation requires, perform techniques of movement IAW FM 3-04.203. Maneuver into the briefed flight formation. Maintain horizontal and vertical separation for the type of formation being flown.

c. The following procedures will be performed if visual contact is lost unless otherwise established in unit SOPs:

(1) Takeoff: Immediately make a radio call to the formation. All helicopters should leave the ground simultaneously. The trailing aircraft must remain at a level altitude or stack up 1-10 feet vertically to remain out of the disturbed air of the aircraft in front of them. In the event an aircraft in the flight loses visual contact with the formation, the crew will immediately make a radio call to the formation and the P* will adjust to an altitude that will afford visual acquisition, above or below the briefed cruise altitude and attempt reorientation of the formation.

(2) Cruise: Free cruise formation should be employed when operating at terrain flight altitudes or in a combat environment. This will allow the individual aircraft more flexibility to move within the formation avoiding terrain, obstacles and enemy threat. Consideration should be given to DGs fields-of-fire to aid in protecting the entire formation. During periods of degraded visibility, crews are more susceptible to losing other aircraft in the formation. Crews should consider flying a close formation to maintain orientation on the flight. In the event an aircraft in the flight loses visual contact with the formation, the crew will immediately make a radio call to the formation and lead will announce and maintain heading, altitude and airspeed. If sufficient altitude exists, a descent may allow the crew to re-establish visual contact with the formation. If sufficient altitude does not exist, the P* should initiate a climb to provide vertical separation from the flight.

(3) Approach: Immediately make a radio call to the formation and execute a go-around unless an alternate course of action has been briefed. The lead aircraft must maintain a constant approach angle so other aircraft in the formation will not have to execute excessively steep, shallow, or slow approaches. Aircraft should not descend below the aircraft ahead of them in the formation and entering their rotor-wash. This could result in an over-TQ, loss of aircraft control or entering a settling with PWR condition. In the event an aircraft in the flight loses visual contact with the formation, the crew will immediately make a radio call to the formation and execute a go-around in the briefed direction.

c. Reorientation procedures.

(1) After announcing the aircraft has a loss of visual contact with the formation, lead will announce and maintain heading, altitude and airspeed, turning only to avoid known obstacles or enemy threat. Lead will also announce his or her position relative to the next waypoint or rally point. The remainder of the formation will continue to follow lead. The crewmember who has lost visual contact will announce his or her position relative to the same waypoint or rally point (RP) to assist in reorientation to the flight. This procedure will continue until the formation is reoriented and joined.

(2) Considerations should include but are not limited to rallying to a known point, use of covert/overt lighting, and ground rally. METT-TC, PWR AVAIL and ambient light will influence how contact is re-established.

(3) Situations may occur when an aircraft rejoins the flight in another position than briefed. Only after the entire flight is formed can the mission commander proceed with the mission.

d. Aircrew briefing. All multi-aircraft operations will be briefed using a unit approved multi-aircraft/mission briefing CL. Table 4-6 provides a CL of mandatory briefing items that must be included in all multi-aircraft operations briefings.

Table 4-6. Multi-aircraft operations briefing checklist

1. Formation type(s): takeoff, cruise and approach.
2. Altitude.
3. Airspeed: outbound to RP, cruise, inbound from SP.
4. Aircraft lighting.
5. Loss communication(s) procedures.
6. Lead change procedures.
7. Loss of visual contact/inflight link-up/rally points.
8. Actions on contact.
9. IIMC procedures.
10. Downed aircraft procedures/personnel recovery/CSAR.

NIGHT OR NIGHT VISION GOGGLES CONSIDERATIONS: Closure rates are more difficult to determine. Consideration should be given to keeping formation changes to a minimum. All crewmembers must avoid fixation by using proper scanning techniques. Consider the use of aircraft external lighting to aid in the visual acquisition of other aircraft during loss of visual contact.

1. During unaided night flight, the crew should use formation and position lights to aid in maintaining the aircraft's formation position. Lighting will be IAW AR 95-1 and unit SOP.

2. When conducting NVG formation flight, the crew should use the IR formation lights and IR anti-collision lights to maintain the aircraft's position in the formation. The NCM not engaged in observing other aircraft in the formation will perform flight duties as directed by the PC.

Note. Additional crewmember requirements are in TC 3-04.11, chapter 4.

SNOW/SAND/DUST CONSIDERATIONS:

1. Takeoff. A simultaneous formation takeoff may not be possible due to loss of visual contact with other aircraft in the formation. Crews should consider taking off single ship then conducting an inflight link up once clear of the snow/sand/dust cloud. During single-ship takeoff, it is important to notify the formation when clear of the dust cloud to notify the next aircraft ready for takeoff.

2. Approach. A landing should be made to the ground with forward ground speed and heading for all aircraft off-set by 10 degrees from lead's landing direction. This will ensure lateral separation during periods of degraded visibility. For example, lead lands heading 360 degrees, chalk 2 lands 350 degrees, chalk 3 lands 010 degrees, chalk 4 lands 350 degrees and chalk 5 lands 010 degrees.

TRAINING AND EVALUATION REQUIREMENTS:

1. Training will be conducted in the aircraft.
2. Evaluation will be conducted in the aircraft.

REFERENCES: Appropriate common references and ATTP 3-18.12.

TASK 2050

Develop an Emergency Global Positioning System Recovery Procedure

WARNING

This procedure is designed strictly for recovery under VMC for training and for IIMC use only and will not be used for a planned IFR flight unless approved by the U.S Army aeronautical services agency. This emergency recovery procedure is only authorized to be flown when the situation prevents the use of an approved navigational aid.

CONDITIONS: In a CH-47D/F helicopter and given a tactical or aeronautical map with current obstruction information. A MPS with digital maps and recent chart updating manual may be used to aid in developing this procedure.

STANDARDS: Appropriate common standards and the following additions/modifications:

1. Select a suitable recovery/landing area and coordinate, if required, airspace de-confliction.
2. Select an approach course (degrees magnetic), a missed approach course, FAF, MAP, IF, IAF, and MAHF.
3. Determine obstacle clearance for the final, MAHF, missed, intermediate, initial segments and the MSA.
4. Determine altitudes based on obstacle clearance for FAF, MAHF, MAP, IF, IAP, and MSA (figure 4- to figure 4-, page 4-.
5. Determine the appropriate obstacles in the missed approach segment and determine 20:1 slope penetration.
6. Establish a 3 NM holding pattern at the MAHF.
7. Prepare an EMERG recovery procedure diagram IAW the example.
8. Complete a suitability/flyability check, to include loading waypoints, under VMC to validate the procedure.

Note. All altitudes are in feet mean sea level (MSL), all waypoints are latitude/longitude (LAT/LONG), all distances are NM and visibility is SM. All obstacles are MSL unless otherwise noted. The FIH has the necessary conversion tables.

WARNING

Ensure coordinates for maps and GPS are the same datum (for example, WGS-84) or points on the ground may be off significantly and obstacle clearance will be questionable.

Note. PPS refers to the GPS precise positioning service. It is DOD policy that military aircraft operate with the GPS in the PPS mode.

Note. Complete the enclosed figures for determining approach criteria. The width cannot be adjusted.

DESCRIPTION:

1. Select the most suitable recover/landing area. Select an area based on METT-TC and obstacles. Ensure proper coordination for airspace de-confliction has been accomplished.
2. Final approach segment (figure 4-2):
   a. The final approach segment begins at the FAF and ends at the MAP.
   b. Determine the MAP (normally associated with the landing area or threshold).
   c. Determine the FAF. The minimum distance is 3 NM from the MAP. The MAX length is 10 NM. The optimum length is 5 NM. The width is 2.4 NM (1.2 NM on either side of centerline).

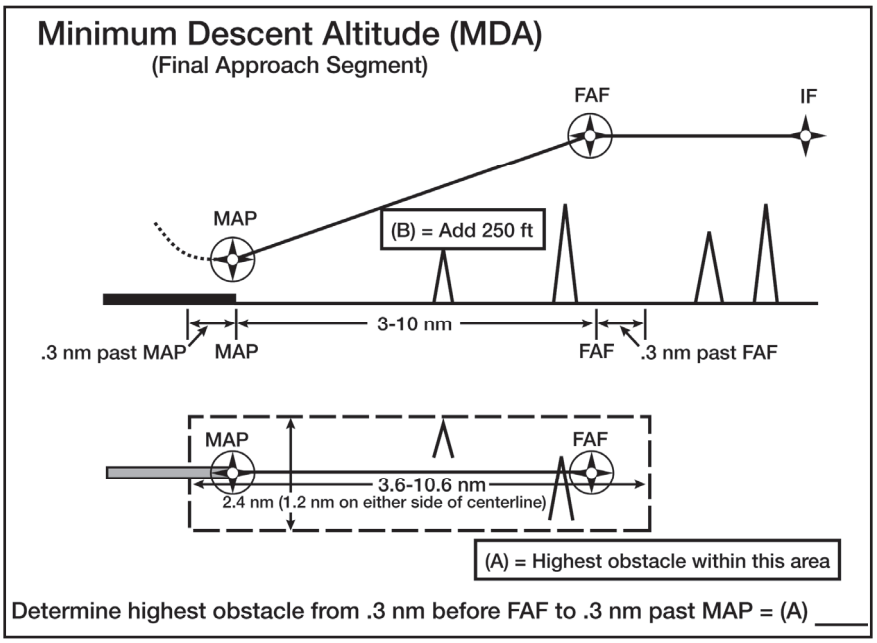


Figure 4-2. Final approach segment

3. Determine the MAHF (figure 4-3).
   a. Determine the MAHF for the landing area.
   b. The minimum distance is 3 NM and the MAX distance is 7.5 NM from the MAP. The optimum distance is 5 NM. The holding pattern leg will not exceed 3 NM. The width is 4 NM (2 NM on either side).

MAHF altitude calculation

Solution: (A) (Rounded up nearest 100 feet) + (B) 1,000' = (°C) (MAHF Altitude)
U = Highest obstacle within 10 NM centered on the MAHF

Figure 4-3. MAHF altitude calculation formula

4. Missed approach segment (figure 4-4, page 4-141).
   a. The missed approach segment will start at the MAP and ends at a holding point designated by a MAHF.
   b. Optimum routing is straight ahead (within 15 degrees of the final approach course) to a direct entry. A turning missed approach may be designated if needed for an operational advantage, but is not discussed in this task due to the complexity of determining obstacle clearance.

c. The area of consideration for missed approach surface and the 20:1 obstacle clearance evaluation for all rotary wing.

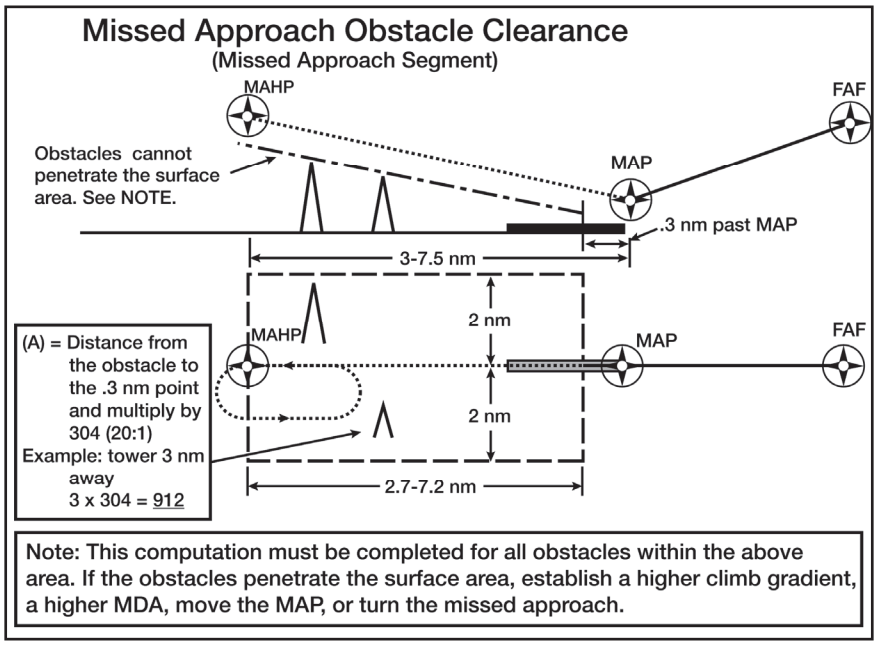


Figure 4-4. Missed approach segment

5. Intermediate approach segment (figure 4-5).

a. The intermediate segment begins at the IF and ends at the FAF.

b. Determine the IF. The minimum distance is 3 NM and the MAX distance is 5 NM from the IF to the FAF. The width is 4 NM (2 NM on either side).

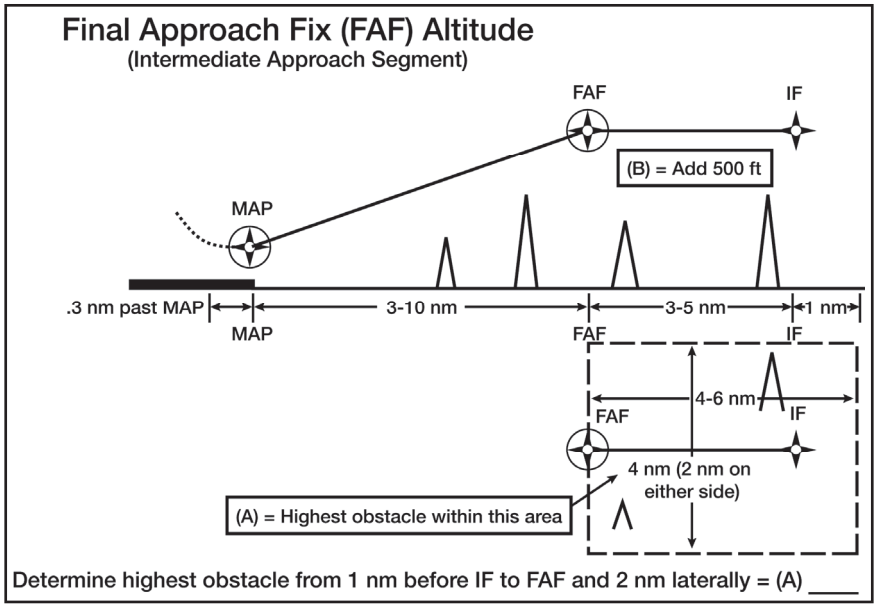


Figure 4-5. Intermediate approach segment

6. Initial approach segment (figure 4-6, page 4-142).

a. The initial approach segment begins at the IAF and ends at the IF.

b. Determine the IAF. Up to three IAFs are allowed. The minimum distance is 3 NM from the IF and the MAX distance is 10 NM. The width is 4 NM (2 NM on either side).

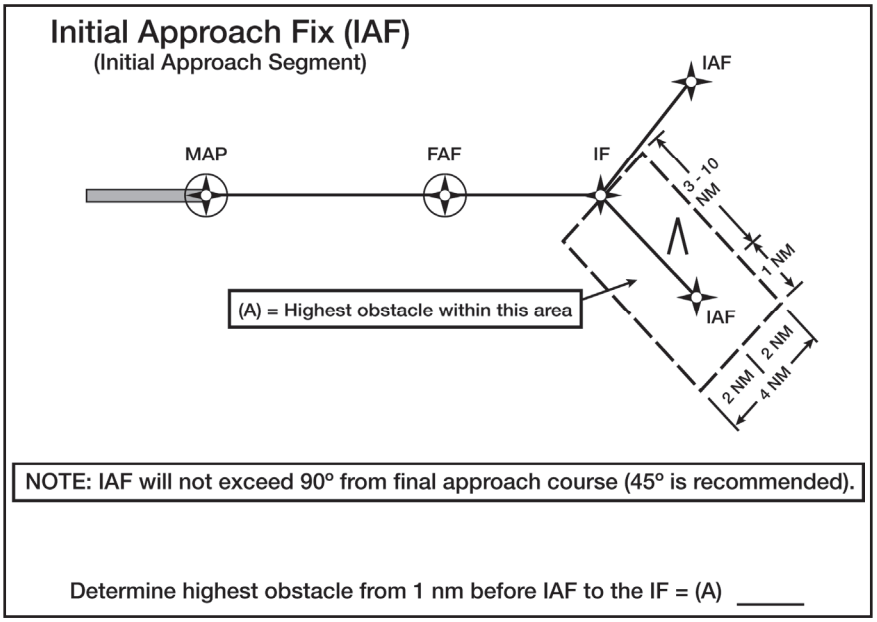


Figure 4-6. Initial approach segment

7. Determine the MSA for the landing area (figure 4-7). Use the off-route obstruction clearance altitude (CONUS) or the off-route terrain clearance altitude (outside the continental U.S) elevation from the en route low altitude (ELA) chart for the area of operations, if available.

a. Select the highest altitude within 30 NM of the MAP.

(1) If an ELA is not available, the minimum sector altitude will be determined by adding 1,000 feet to the MAX elevation figures (MEF).

(2) When a MEF is not available, apply the 1,000 feet rule to the highest elevation within 30 NM of the MAP.

b. Minimum sector altitudes can be established with sectors not less than 90 degrees and with sector obstacle clearance having a 4 NM overlap. Use the figure below for determining MSA.

MSA calculation

Solution: (A)(Rounded up nearest 100 feet) + (B) 1,000' = (°C)(MSA)
U = Highest obstacle within 30 NM centered on the MAP

Figure 4-7. MSA calculation formula

8. The procedures diagram (figure 4-8, page 4-143). The procedure diagram may be computer generated or hand sketched. The diagram need not be as detailed as a DOD approved chart, but must provide all data as outlined in the example to execute the procedure.

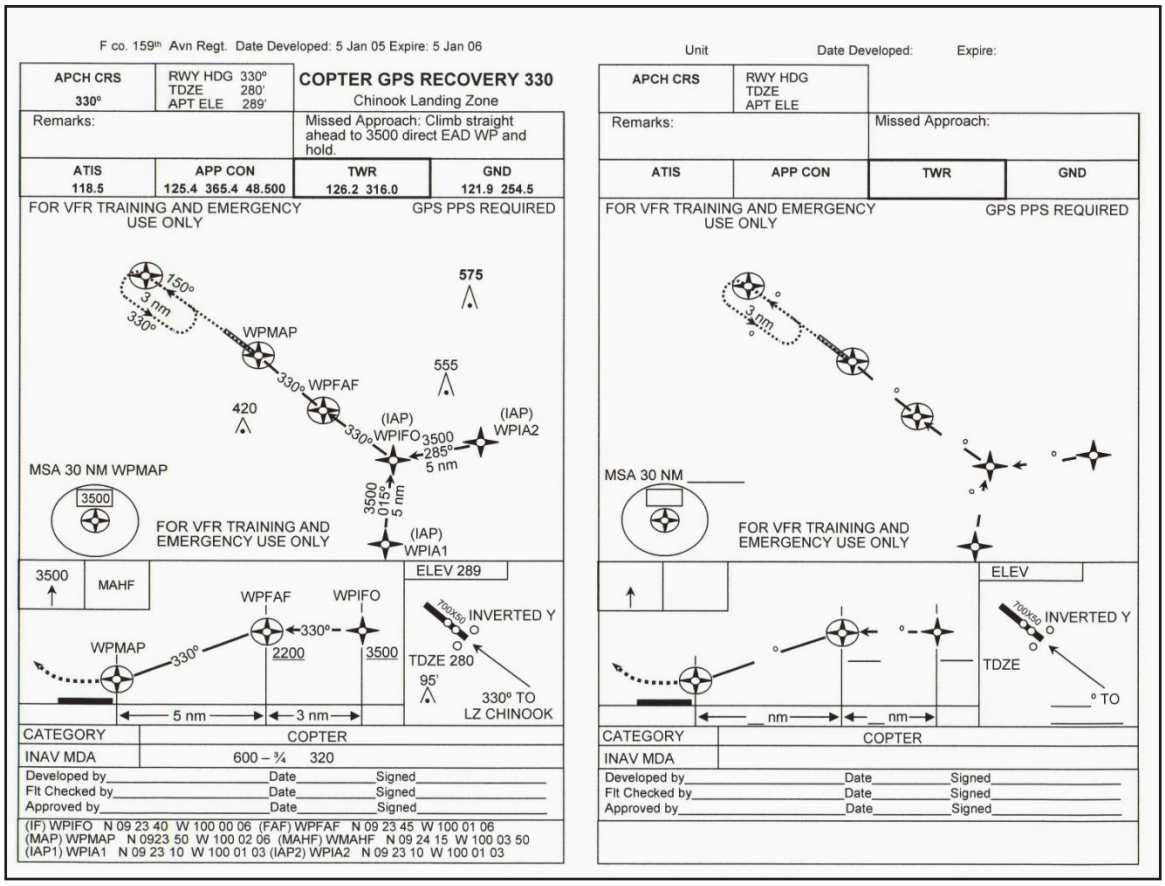


Figure 4-8. Sample of emergency GPS diagram

a. The plan view. The plan view will include the following:

(1) The highest obstacle altitude (MSL) in bold.

(2) The approach course (degrees magnetic), IAF, IF, FAF, MAP, MAHF holding pattern, obstacles, and MSA. It also includes the terms—

(a) "FOR VFR TRAINING and EMERG USE ONLY" twice.

(b) "PRECISE POSITIONING SERVICE (PPS) REQUIRED."

b. Minimums section. The minimums section will include the following. The MDA visibility and height above landing (HAL). Use table 4-7 to compute the landing visibility minimum based on HAL.

c. Landing area sketch. The landing area sketch includes a drawing/diagram of the landing area and the elevation of the highest obstacle within the landing area (if applicable).

d. Prior to publication, the diagram will include, as a minimum, all items included in the example diagram.

Table 4-7. Landing visibility minimums based on height above landing

HAL	***250 – 475 ft***	***476 – 712 ft***	***713 – 950 ft***
Landing Visibility Minimum (SM)	½	¾	1.0

9. Flight check. Complete a flight check under VMC in an aircraft to finalize the procedure and validate the diagram. Once a successful flyability/suitability check has been completed, the diagram will be validated by the developer in the lower marginal data area. Once validated by the developer the procedure must be approved by the appropriate authority in the lower marginal data area prior to publication. The flight should validate the following:

a. Locations-IAF, IF, FAF, MAP, and MAHF.
b. Obstacles.
c. Approach course.
d. Obstacle clearance.
e. Altitudes-MDA, FAF, IF, IAF, and MSA/holding pattern altitude.

Note. All waypoints (IAF, IF, FAF, MAP, and MAHF) will be verified by two separate GPS NAV systems; for example, Doppler GPS navigation system, embedded GPS inertial navigation system, or precision lightweight GPS receiver. At least one will have PPS. If unable to complete a suitability/flyability check due to the operational environment, the commander should consider an elevated risk when using this recovery procedure.

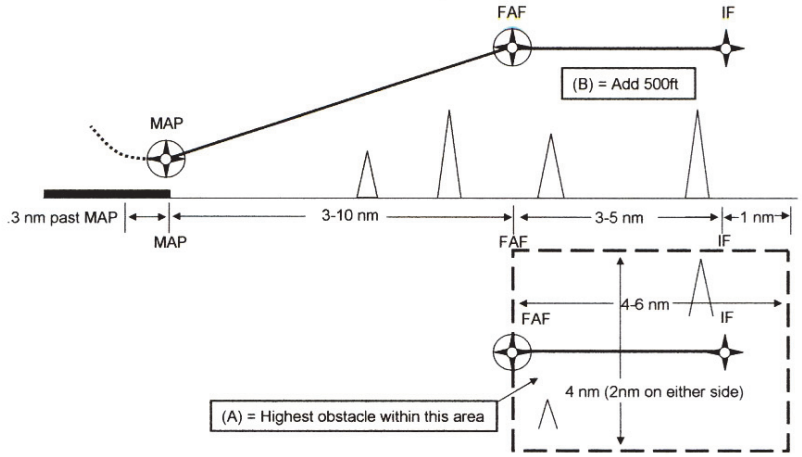
TRAINING AND EVALUATION REQUIREMENTS:

1. Training will be conducted in the aircraft or academically.
2. Evaluation will be conducted in the aircraft.

REFERENCES: Appropriate common references, FAA handbook 8260.3, FAA Order 8460.42A, and FAA Order 7130.3.

Final Approach Fix (FAF) Altitude

(Intermediate Approach Segment)

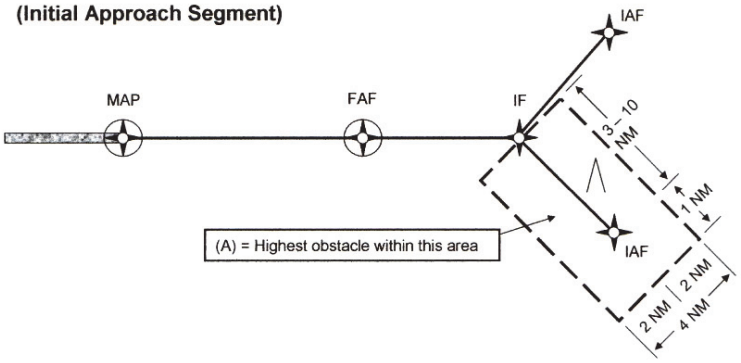


Determine highest obstacle from 1nm before IF to FAF and 2nm laterally= (A) ____

Solution: (A)_____ (rounded up nearest 100 ft)+ (B) 500ft = (C)_____ (FAF)

Initial Approach Fix (IAF)

(Initial Approach Segment)



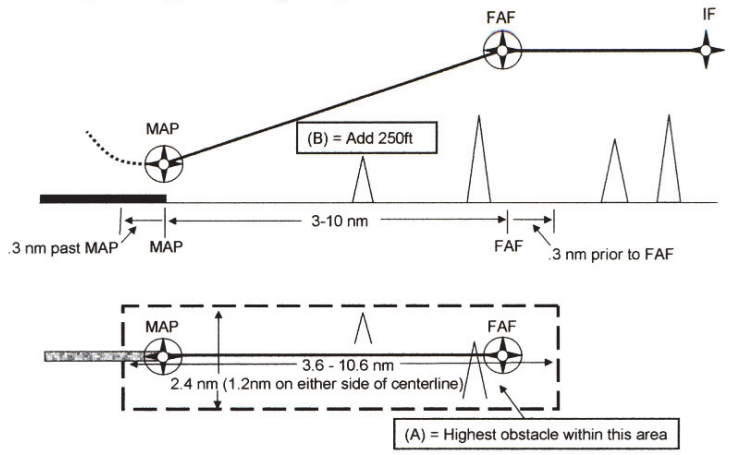
NOTE: IAF will not exceed 90º from final approach course (45º is recommended).

Determine highest obstacle from 1 nm before IAF to the IF= (A) _____

Solution: (A)_____ (rounded up nearest 100 ft)+ (B) 1000ft = (C)_____ (IAF)

Minimum Descent Altitude (MDA)

(Final Approach Segment)

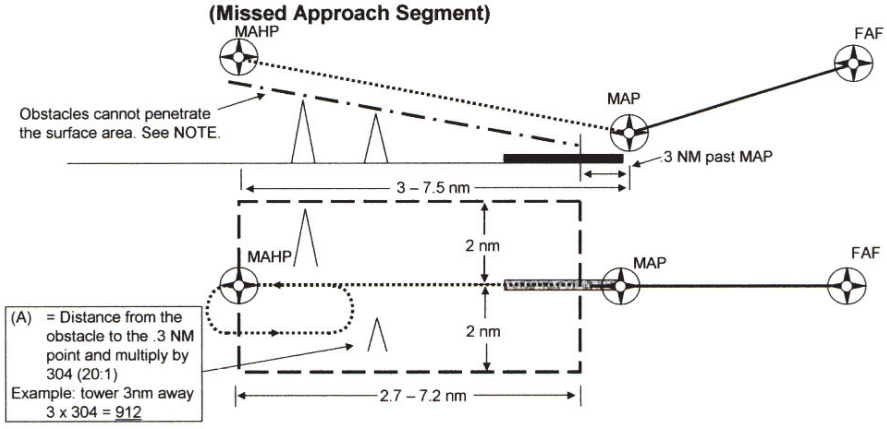


Determine highest obstacle from .3 nm before FAF to .3 nm past MAP = (A) _____

Solution: (A)_____ (rounded up nearest 20 ft)+ (B) 250ft = (C)_____ (MDA)

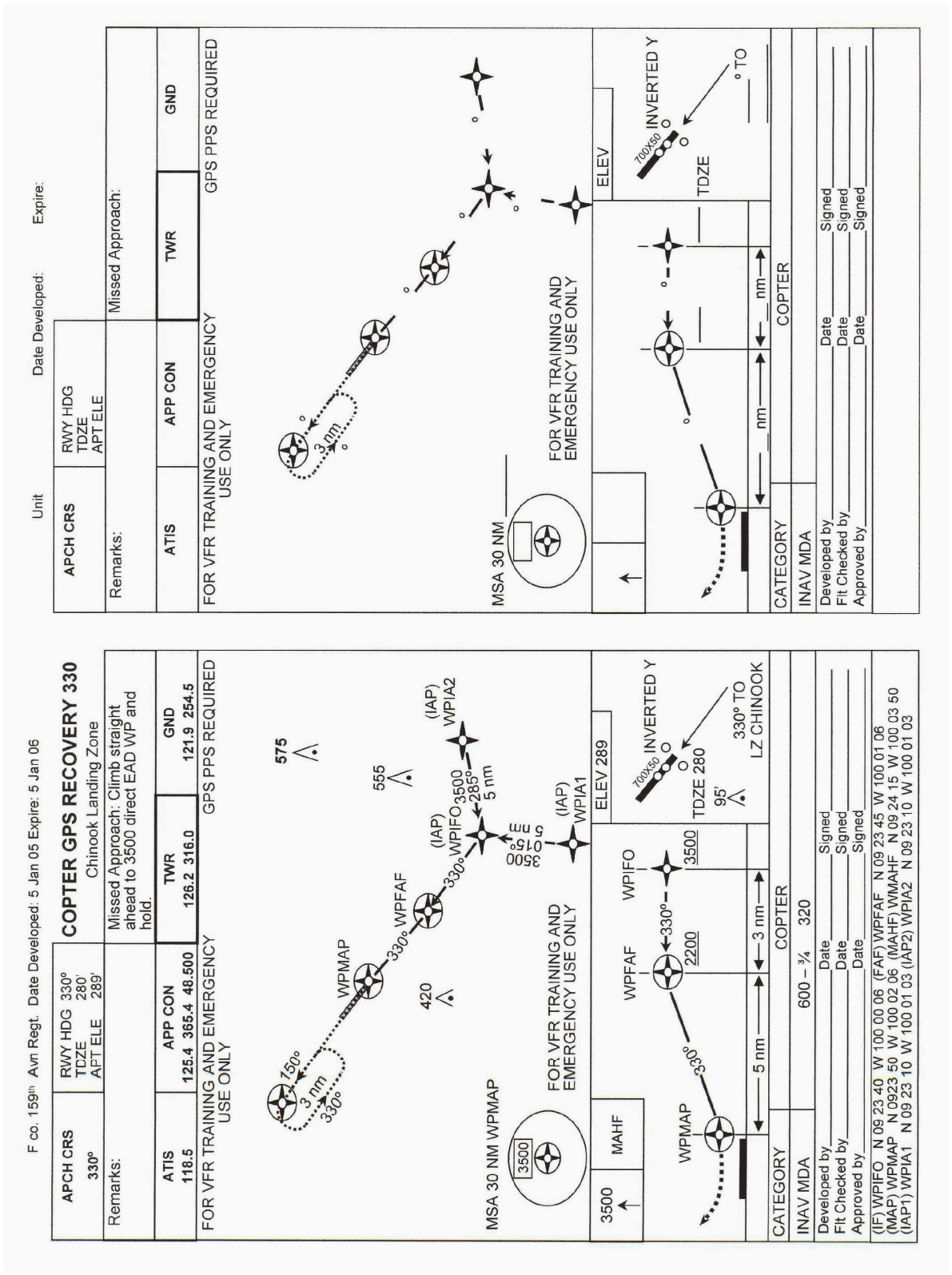
Missed Approach Obstacle Clearance

(Missed Approach Segment)



Note: This computation must be completed for all obstacles within the above area. If the obstacles penetrate the surface area, establish a higher climb gradient, a higher MDA, move the MAP, or turn the missed approach.

Solution: (A)_____ + (B) MDA – 250' = (C)_____ (max allowable obstacle height)


F co. 159th Avn Regt. Date Developed: 5 Jan 05 Expire: 5 Jan 06
APCH CRS 330°
RWY HDG 330°
TDZE 280'
APT ELE 289'
COPTER GPS RECOVERY 330
Chinook Landing Zone
Remarks:
Missed Approach: Climb straight ahead to 3500 direct EAD WP and hold.
ATIS 118.5
APP CON 125.4 365.4 48.500
TWR 126.2 316.0
GND 121.9 254.5
FOR VFR TRAINING AND EMERGENCY USE ONLY
GPS PPS REQUIRED
575
555
420
WPMAP
WPFAF
WPIFO
(IAP) WPIA2
(IAP) WPIA1
3500
285°
5 nm
150°
330°
3 nm
MSA 30 NM WPMAP
FOR VFR TRAINING AND EMERGENCY USE ONLY
ELEV 289
700X50 INVERTED Y
TDZE 280
95'
330° TO LZ CHINOOK
MAHF
5 nm
3 nm
COPTER
CATEGORY
INAV MDA
600 – ¾ 320
Developed by Date Signed
Flt Checked by Date Signed
Approved by Date Signed
(IF) WPIFO N 09 23 40 W 100 00 06 (FAF) WPFAF N 09 23 45 W 100 01 06
(MAP) WPMAP N 0923 50 W 100 02 06 (MAHF) WMAHF N 09 24 15 W 100 03 50
(IAP1) WPIA1 N 09 23 10 W 100 01 03 (IAP2) WPIA2 N 09 23 10 W 100 01 03
Unit
Date Developed:
Expire:
APCH CRS
RWY HDG
TDZE
APT ELE
Remarks:
Missed Approach:
ATIS
APP CON
TWR
GND
FOR VFR TRAINING AND EMERGENCY USE ONLY
GPS PPS REQUIRED
MSA 30 NM
FOR VFR TRAINING AND EMERGENCY USE ONLY
ELEV
700X50 INVERTED Y
TDZE
° TO
nm
nm
COPTER
CATEGORY
INAV MDA
Developed by Date Signed
Flt Checked by Date Signed
Approved by Date Signed

TASK 2052

Perform Water Bucket Operations

WARNING

Never dump water onto ground personnel, as the water impact could result in injury. Minimize hovering or flying slowly over fires. The rotor-wash fans the flames, which may cause more hazards to ground crews. When performing this task with cabin doors open, ensure that any personnel in the cabin area are wearing a safety harness secured to a 5,000 lb or 10,000 lb tie-down ring, static line or sitting in a seat with seat belt fastened.

Note. The water bucket, when loaded, is a high-density load with favorable flight characteristics. Reduced velocity V_{NE} and bank angle limits must be kept in mind. Much of the mission profile is flown at high GWT and low airspeed. In addition, density altitude is greatly increased in the vicinity of a major fire. Performance planning must receive special emphasis.

CONDITIONS: In a CH-47D/F helicopter with an operational center cargo hook, water bucket, required briefings, checks completed and an AWR.

STANDARDS: Appropriate common standards and the following additions/modifications:

1. RCM.
   a. Conduct pre-mission planning to determine fuel and bucket cinching requirements. Verify the aircraft will remain within GWT and CG limitations for the duration of the flight.
   b. In conjunction with the NCMs, complete the required checks to ensure proper system operation before mission departure.
   c. Operate the water bucket system IAW manufacturer specifications.
   d. Recognize and respond to a water bucket system malfunction.
   e. Use proper dipping procedures for the water bucket type.
   f. Demonstrate knowledge of fire behavior and terminology.
   g. Hook-up and HVR.
      (1) Maintain vertical ascent heading, ±10 degrees.
      (2) Maintain altitude of load, ±10 feet AGL, +3 feet.
      (3) Complete HVR PWR checks.
   i. En route, maintain load obstacle clearance (minimum 50 feet [AHO]).
   j. Approach and water release.
      (1) Evaluate fire/simulated fire for flight path and altitude requirements.
      (2) Maintain a constant approach angle to ensure that load safely clears obstacles.
      (3) Maintain ground track alignment with selected approach path.
      (4) Execute a smooth and controlled pass or termination over the intended point/area of water drop.
      (5) Deploy water as directed in proper location, orientation and/or length.
2. NCM.

a. In conjunction with RCMs, complete required water bucket checks to ensure proper system operation before mission departure and attach water bucket to the aircraft.

b. Ensure that water bucket is configured for the condition and mode of flight.

c. Recognize and respond to a water bucket system malfunction.

d. Demonstrate knowledge of fire behavior and terminology.

DESCRIPTION:

1. Crew actions.

a. The PC will conduct a thorough crew, external (sling) load(s), and water bucket briefing. The PC will ensure that all crewmembers are familiar with water bucket operations and EMERG and communication procedures. The PC will ensure that DA Form 7382 has been completed. The PC will confirm that required PWR is available by comparing the information from the PPC to the HVR PWR check.

b. The P* will remain focused primarily outside the aircraft throughout the maneuver. The P* will monitor altitude and avoid obstacles.

c. The P will monitor the cockpit instruments and assist the P* in clearing the aircraft. The P will set cargo hook switches, as required, and should make all radio calls. When directed by the P* during the approach, the P will place the cargo hook master switch to the "ARMED" position. The NCM will release the water IAW the crew briefing.

d. The P and NCM will assist in clearing the aircraft and will provide adequate warning of obstacles. The P and NCM will announce when their attention is focused inside and again when attention is re-established outside.

e. The NCM will remain focused primarily on the bucket. The NCM will guide the P* during the bucket pickup, advise of the bucket condition inflight, provide directions and assistance when the water is dumped and direct the P* when setting down the bucket.

f. The NCM will advise the P* of any water bucket faults or failures.

g. External (sling) load(s) procedures IAW Task 1063 will be used for normal external (sling) load techniques and load call outs. The NCM will advise the P* when the water bucket is in the water, filling, full, water deploying and empty. The NCM will instruct the P* as necessary to keep the electrical attachment assembly from entering the water.

2. Procedures.

a. Preflight.

(1) The PC will analyze the mission using METT-TC, and determine the amount of water required to conduct the mission and the initial profile to be used during the water emplacement.

(2) The NCMs will ensure that the water bucket is installed and all installation checks are completed IAW the unit's SOP.

(3) The crew will conduct the ground checks IAW the manufacturer's procedures to confirm the proper operation of the water bucket before takeoff.

b. Hook-up and HVR.

(1) Once the water bucket is placed on the ground beside the aircraft and all associated wiring is installed, place the cargo hook master switch in the "ARM" position.

(2) Follow verbal signals from the NCM to HVR over the water bucket. Apply control movements as necessary to remain vertically clear and centered over the water bucket.

(3) Once in this position, smoothly apply thrust control input until all slack is removed from the suspension cable. Maintain heading with pedals.

(4) Apply additional thrust to raise the bucket to 10 feet AGL. Monitor aircraft instruments to ensure that aircraft limitations are not exceeded.

c. Water pickup. Evaluation of the water pickup should include depth, obstacles, water current and availability of HVR references.

(1) Bambi bucket water pick-up.

(a) Arrive over water source with no forward ground speed and a bucket height of 10 feet above water level.

(b) Slowly reduce the thrust control and apply a slight amount of forward cyclic control until the Bambi bucket contacts the water. Follow the NCM's verbal guidance to remain centered over the bucket as it fills, applying cyclic, thrust and pedals (control) as necessary.

(c) The PI can vary the bucket's capacity by varying the speed at which it is pulled from the water. A slow lift gives minimum fill. A fast lift gives MAX fill.

(d) When the NCM indicates the bucket is ready (or full), increase the thrust control until all slack is removed from the suspension cable and the lip of the bucket is clear of the water, maintain heading with pedals.

(e) Apply additional thrust control to raise the filled bucket clear of the water's surface to a height of 10 feet. Ensure that the bucket is holding the water and monitor aircraft instruments to ensure that aircraft limitations are not exceeded.

(2) Sims and simplex water pickup.

(a) Arrive over water source with no forward ground speed and a bucket height of 10 feet above water level.

(b) Ensure that bucket doors are open.

(c) Slowly reduce the thrust control until the bucket makes contact with the water. Once the bucket has submerged in the water, follow the NCM's verbal guidance to remain centered over the bucket as it fills, applying cyclic, thrust and pedals (control) as necessary.

(d) When the NCM indicates the bucket is full, the NCM will close the bucket doors and ensure that the bucket is ready.

(e) Then the P* can increase thrust control until all slack is removed from the suspension cable and the lip of the bucket is clear of the water. Maintain heading with pedals.

(f) Apply additional thrust control to raise the filled bucket clear to the water's surface to a height of 10 feet. Ensure that the bucket is holding the water and monitor aircraft instruments to ensure that aircraft limitations are not exceeded.

Note. Use the manufacturer's recommended en route airspeeds for each type of water bucket. This prevents the buckets from twisting and pinching the cables.

---

d. Takeoff. Establish a constant angle of climb that will permit safe obstacle clearance. When above 100 feet AGL or when clear of obstacles, adjust attitude and PWR as required to establish the desired R/C and airspeed. Smoothly adjust flight controls to prevent bucket oscillation.

Note. Ensure that the cargo hook master switch is in the "ARMED" position when operating at altitudes below 300 feet AHO and in the "OFF" position above 300 feet AHO.

---

e. En route. Maintain the desired altitude, flight path, and airspeed. Make smooth, control applications to prevent bucket oscillation. If a lateral bucket oscillation occurs, reduce airspeed. If fore-and-aft oscillation occurs, perform the same procedures as in Task 1063 in this ATM.

Note. When flying with the bucket empty, open the bucket to allow streamlining. This prevents the bucket from twisting and pinching the cables.

---

f. Approach and water release.

(1) Altitude and airspeed affect the dump pattern. It is most concentrated at lower altitudes (AGL) and at a HVR. The pattern will spread with altitude and speed. The PC will determine the most appropriate height and speed for the pattern desired or IAW the mission briefing.

(2) Evaluation of the fire should include wind direction, velocity, terrain and type of fire. Fires usually require a drop height of 100 to 200 feet AGL and a ground speed of 30 to 60 KTS.

(3) The aircraft's ground track should be upwind and adjusted so the spray will provide MAX cooling to hot spots, as well as dampen unburned vegetation. Altitude and airspeed may be adjusted for fires of varying intensity and types. However, it must be noted that low, slow passes may tend to increase the fire's intensity due to rotor down wash.

(4) When the approach angle is intercepted, decrease the thrust control to establish the descent. When passing below 300 feet AGL, place cargo hook master switch in the "ARM" position. When reaching the desired airspeed and altitude, the recommended crew coordination terms for bucket operations are as follows:

(a) Approaching the target–"PREPARE TO OPEN THE DOORS" (approximately 10 seconds out).

(b) Over the target–"OPEN DOORS."

(c) When the drop is complete–"CLOSE DOORS."

Note. The NCM will advise the P* of the condition of the bucket and call out the water level while releasing water. The bucket manufacturer does not recommend dumping at airspeeds above 50 KIAS/KCAS.

Note. There is a delay of appropriately 0.5 to 1.0 second between the activation of the dump switch and discharge of the water.

Note. Avoid flight over populated areas.

Note. A go-around should also be initiated if visual contact with the water release area is lost or if a crewmember announces "CLIMB, CLIMB, CLIMB." This phrase will only be used when there is not enough time to give detailed instructions to avoid obstacle.

Note. Refer to table 4-8, page 4-164, for a sample of a water bucket procedure guide for water bucket operations, to include sample calls for dropping water.

Table 4-8. Water bucket procedure guide

Water bucket preflight check
1. Bottom of chain for tears in fabric.
2. Shackle and lockwire or tie-wrap condition.
3. Sidewall battens.
4. Diagonal M-straps connecting the suspension cables for wear.
5. Purse lines on the fabric dump valve.
6. Cinch strap belt–The end opposite the D-ring shall have a knot.
7. Suspension lines for frays, kinks and conditions.
8. Ballast pouch in the bucket for rips or holes.
9. Control head for secure fittings.
10. Tripline for kinks, frays or loose swages.
11. Perform operational check of control head.
Dumping water
1. PI calls–Altitude, airspeed and monitors RAD ALT during pass.
2. NCM–Calls "Prepare to open bucket/doors" approximately 10 seconds from target.
3. NCM–Calls over target "Open bucket/doors."

4. NCMs Respond–"Bucket/doors open, bucket is ¾, ½, ¼, bucket empty."
Note. Water bucket doors are opened or closed depending on bucket type and clear for flight, as required.
Landing
1. Normal load approach.
2. Clear bucket to ground.
3. Clear to slide (direction) away from load.
4. Release the slings and disconnect electrical lines.
5. Recover bucket and secure in aircraft.
Emergency procedures
1. Open the bucket, if necessary.
2. Call bucket open, bucket empty
3. Jettison the load, if necessary.
4. Call load jettisoned.
5. Hook operations–Normal and EMERG.
6. Lost communication procedures.

g. Post mission. Ensure that water bucket is serviceable, de-rig aircraft and water bucket, and ensure that all documentation is complete on water bucket usage and inspection.

SAND/DUST/SMOKE CONSIDERATIONS: If during the approach, visual reference with the water release area (or obstacles) is lost, immediately initiate a go-around or ITO as required. Be prepared to transition to instruments. Once VMC is regained, continue with the go-around. (If required, releasing the water reduces the GWT of the aircraft and minimizes PWR demand).

MOUNTAINOUS AREA CONSIDERATIONS: If at any time during an approach, if sufficient PWR is unavailable or turbulent conditions or wind shift create an unsafe condition, immediately perform a go-around. (If required, releasing the water reduces the GWT of the aircraft and minimizes PWR demand.)

OVERWATER CONSIDERATIONS:

1. All crewmembers will wear floatation devices IAW AR 95-1.
2. Overwater flight, at any altitude, is characterized by a lack of visual cues, and therefore, has the potential of causing visual illusions. To minimize spatial disorientation, the crew should use RAD ALT hold during overwater flight.
3. Be alert to any unannounced changes in the flight profile and be prepared to take immediate corrective actions. The "RAD ALT" low bug should be set to assist in altitude control.
4. Operations become increasingly more hazardous as references are reduced (open water versus a small lake), water state increases (calm to chop to breaking condition with increasing wave height), and visibility decreases (horizon becomes same color as water, water spray [or rain] on windshield, sunny mid-day versus twilight).
5. Hazards to flight such as harbor lights, buoys, wires and birds must be considered during overwater flight.

NIGHT OR NIGHT VISION GOGGLES CONSIDERATIONS: Not recommended.

1. During water bucket operations, the P*'s attention will be divided between the aircraft instruments (altitude and ground speed) and the outside. It is critical during NVG operations that the crewmembers' focus be primarily outside to provide warning to the P* of obstacles (or hazards) during the entire operation.

2. Spatial disorientation can be overwhelming during overwater operations at night. Proper scanning techniques are necessary to avoid spatial disorientation. If there are visible lights on the horizon or if the shoreline can be seen, the PI may opt to approach and HVR the aircraft so it is pointed toward these references, if the wind permits. If no other references exist, deploy chemlights to assist in maintaining a stable HVR during the water pickup.

TRAINING AND EVALUATION REQUIREMENTS:

1. Training will be conducted in the aircraft.
2. Evaluation will be conducted in the aircraft.

REFERENCES: Appropriate common references, AR 70-62, FM 4-20.197, and water bucket AWR.

TASK 2054

Perform Fast-Rope Insertion and Extraction Operations

Note. Headquarters, Department of the Army (HQDA) policy specifies the fast-rope insertion and extraction system (FRIES) is not approved for Army-wide use and names the Commanding General, U.S Army Special Operations Command (USASOC), as the executive agent for FRIES doctrine. The use of FRIES is restricted to special operations forces, pathfinders, long-range surveillance units, and HQDA-approved schools with a USASOC-approved FRIES program of instruction. Approval for FRIES operation is only required for ground forces and should be verified by the aviation supporting unit. The aviation unit will review U.S Special Operations Command (USSOCOM) regulation 350-6 prior to conducting FRIES operations.

WARNING

Ensure that crewmembers in the cabin area are wearing a safety harness secured to a 5,000-pound or 10,000-pound tie-down ring or static line anytime the door or ramp is open. Also, ensure that all ropers are on the ground before any ropes are released.

CONDITIONS: In a CH-47D/F helicopter with FRIES equipment installed.

STANDARDS: Appropriate common standards and the following additions/modifications:

1. RCM.
   a. Conduct a thorough crew and passenger briefing.
   b. Maintain entry altitude as directed, ±10 feet.
   c. Maintain entry airspeed of 80 KIAS/KCAS, ±5 KIAS/KCAS.
   d. Maintain track aligned with landing direction.
   e. Perform a smooth, controlled termination to a HVR over the insertion point. Deceleration attitude is not to exceed 20 degrees.
   f. Maintain appropriate HVR height, ±5 feet.
2. NCM. Ensure that the aircraft is configured for FRIES operations IAW TC 21-24.

DESCRIPTION:

1. Crew actions.
   a. The PC will conduct a crew and passenger briefing and ensure that personnel are familiar with normal and EPs. The PC will ensure that the aircraft is rigged.
   b. The P* will remain focused primarily outside the aircraft throughout the maneuver and will announce when he or she begins the maneuver. The P* will also announce the intended point of insertion.
   c. The P and NCM will assist in clearing the aircraft and will provide adequate warning of obstacles. The P and NCM will also assist the P* in maintaining a stable HVR. The NCM will inspect the rigging to ensure that the aircraft is configured for fast rope operations.
2. Procedures.
   a. To perform a FRIES assault, execute a VMC approach to the insertion point. On final approach, adjust airspeed and altitude during the approach to stop over the insertion point at a predetermined

HVR height (not to exceed rope length). At a stabilized HVR, the FRIES operation begins. Remain over the area at a stabilized HVR until all ropers and ropes are clear.

b. After ropers are clear, crewmembers will pull the ropes back inside the aircraft or release them by pulling the locking device and detaching the rope. Keep the aircraft stationary until the "ROPES CLEAR" signal is given.

Note. Tasks 1038 and 1411 contain procedures that may be used in performing this task.

Note. A high HVR, especially if a 90-foot rope is used, may cause the loss of all visual HVR cues.

Note. Refer to table 4-9 for a sample FRIES CL.

NIGHT OR NIGHT VISION GOGGLES CONSIDERATIONS: Due to loss of forward references during decelerations, recommend MAX pitch attitude of 15 degrees. Use IR bypass band filter searchlight, as necessary, to maintain position and HVR altitude for NVG operations. Proper scanning techniques are necessary to detect aircraft drift and to avoid spatial disorientation.

TRAINING AND EVALUATION REQUIREMENTS:

1. Training will be conducted in the aircraft.
2. Evaluations will be conducted in the aircraft.

REFERENCES: Appropriate common references, FRIES AWR, TC 21-24, and USSOCOM regulation 350-6.

Table 4-9. Example of a fast-rope operations checklist

Fast-rope operations checklist
1. Pre-roping actions.
2. Receive a briefing from the officer in charge or the AMC.
3. Coordinate and brief all participants.
4. Rig aircraft and conduct a joint inspection.
5. Brief roper, safety(s), assistant fast-rope masters (AFRMs) and fast-rope master (FRM).
6. Rig and inspect ropers.
7. Conduct a static rehearsal.
Aircraft loading
1. Position equipment and personnel.
2. Ensure that all personnel have straps or seat belts.
Actions inflight
1. Monitor the command NET.
2. Monitor the aircrew NET.
3. Monitor the flight route.
Actions at 10-minute warning (applies to long infiltrations)
1. Issue the 10-minute time warning and "GET READY".
2. Check equipment and belay system hook-up.
3. Check fast-rope hook-up.
4. Secure fast-rope bar in position.
5. Ensure the fast-rope is back coiled and markers are attached.
Actions at 6-minute warning
1. Issue the 6-minute warning.
2. Remove personnel restraints or seat belts.
3. Position personnel and equipment.

4. Break chemlights, for night operations.
5. Open aircraft doors, if required.
Actions at 1-minute warning
1. Issue the 1-minute time warning and STAND BY.
2. Position ropers in stick formation.
Actions at flare
1. Identify the target area.
2. Deploy bundles/equipment (safeties) and clear ropes.
3. Deploy FRIES ropes (FRM and AFRM).
4. Check ropes to ensure that 15 feet of rope is on the surface (FRM).
Actions for descent
1. FRM, AFRM, or safety positions the number 1 man at the rope. (The FRM may exit first or last.)
2. FRM issues the command “GO,” AFRM echoes “GO” command, and the ropers exit the aircraft.
3. Safety informs the PC, “ROPERS OUT.”
4. AFRM or safety controls the ropers’ rate of exit.
5. AFRM exits last.
6. Aircrew or safeties observe the last roper. Safety tells the PC, “ALL ROPERS AWAY,” after the last roper is on the surface and signals.
7. PC issues command “JETTISON” or “RECOVER ROPES.”
8. Aircrew or safeties jettison or recover ropes and issue “ROPES CLEAR” report to the PC.

TASK 2056

Perform Rappelling Operations

WARNING

Ensure that the rappel master is secured to a 5,000-pound or 10,000-pound tie-down ring or static line. Also ensure that all ropers are on the ground before any ropes are released. If the roper's equipment becomes fouled on the ramp or probe, ensure that the roper is "locked in" on the rope before freeing the equipment. Maintain visual contact with the roper until equipment is freed.

CAUTION

Weight bags must remain attached to any rope that is retrieved into the aircraft.

CONDITIONS: In a CH-47D/F properly configured and HVR OGE PWR is AVAIL.

STANDARDS: Appropriate common standards and the following additions/modifications:

1. RCM.
   a. Conduct a thorough crew and passenger briefing.
   b. Maintain appropriate HVR altitude, ±5 feet.
   c. Maintain ropes in continuous contact with the ground.
   d. Do not allow drift to exceed 5 feet from the intended HVR point.
   e. HVR symbology selected at P* station.
2. NCM general duties.
   a. Properly clear aircraft and make rope calls informing PIs of status of ropes and passengers.
   b. Check that all equipment is installed properly.
   c. Ensure that load(s)/passengers weight does not exceed aircraft limitations.
   d. Ensure that equipment is rigged properly when performing equipment drops.
   e. Ensure that ropes are on the ground before releasing ropers.
   f. Use proper terminology.

DESCRIPTION:

Note. The PC will ensure that the intended P* for the maneuver is assigned the seat position that will afford the greatest visibility for conducting the maneuver.

1. Crew actions.

   a. PC conducts (or directs) a crewmember to conduct a crew and passenger briefing and ensure that personnel are familiar with normal and EPs. NCM will verify rope lengths with supportive unit and inform the PC. NCM will inspect rigging to ensure that the aircraft is configured properly for rappelling operations. PC confirms the ropes are rigged properly.

b. P* remains focused primarily outside the aircraft throughout the maneuver and will announce when he or she begins the maneuver. P* will also announce the intended point of insertion and pass the rappelling execution command to the NCMs.

c. P and NCM assist in clearing the aircraft and provide adequate warning of obstacles. The P/NCM will also assist P* in maintaining a stable HVR.

d. NCMs will determine who will make specific calls and inform the PIs (normally, right ramp makes primary calls). NCMs will be responsible for passing the 10-, 6-, 3- and 1-minute calls. The right ramp usually will be responsible for making the primary rope calls.

e. NCMs will use pre-established procedures and communications, including hand and arm signals, with the FRM. NCMs will deploy, release, or retrieve the ropes.

f. NCMs will inform PC once all ropes are clear of the aircraft, have been retrieved back into the aircraft, or are secure during elevator training.

2. Procedures.

a. Ten minutes before ETA, the P will announce, "TEN MINUTES OUT." Each NCM or rope master will inform the passengers at his or her station of the timed call and announce when the station is ready, "AFT READY," "FORWARD READY." The same procedures will be conducted at the 6-, 3- and 1-minute timed calls. At night, the NCMs at each station will break the chemlights attached to the ropes by the 6-minute call.

b. When the objective is sighted and the P* judges that he or she can initiate the maneuver to stop at a stabilized HVR over the target point, the P* will apply aft cyclic and adjust thrust control, as necessary, to stabilize at a HVR over the intended target. If the closure rate to the intended HVR point is too fast, the P* may adjust the aircraft attitude, but will not exceed 20 degrees nose high. Maintain appropriate roping height, ±5 feet. The P should call out aircraft parameters, attitude, and RAD height during the maneuver. NCMs will get into roping position by 1-minute out.

c. When stabilized at a HVR, the right ramp should announce "OVER THE TARGET," the P* will call "ROPES-ROPES-ROPES." The NCM at each station will deploy, direct or help ropes when the ropes have been deployed. The right ramp should announce "AFT ROPES OUT" (if applicable) and the right gun will announce "FORWARD ROPES OUT" (if applicable) when personnel/equipment exits the aircraft. The right ramp should announce, "AFT ROPING IN PROGRESS," the forward CE will announce "FORWARD ROPING IN PROGRESS" (if applicable). Although all NCMs are responsible for maintaining the aircraft at a stabilized HVR with minimum drift and clear of obstructions, the right ramp should make the primary calls.

d. When personnel/equipment is clear, each NCM at a station will visually confirm personnel/equipment is clear and release (or retrieve) ropes as briefed. The right ramp should announce, "AFT ROPES RELEASED, AFT READY"; the right gun will announce, "FORWARD ROPES RELEASED (if applicable), FORWARD READY, CLEARED FOR FLIGHT."

e. The P* will announce his or her intent to depart the target area. The P* will maintain outside visual reference and depart the area maintaining obstacle clearance along the intended ground track.

f. Standard terminology will be used during rappelling insertion (table 4-10).

Table 4-10. Standard rappelling insertion terminology

Speaker	*Reason*	*Statement*
From P* to the crew.	Indicates ready for rope deployment.	* "Ropes, ropes, ropes"
From FE/CE to PIs.	Indicates the ropes are deployed over target.	* "Ropes out"
From FE/CE to PIs.	Indicates the first roper is exiting aircraft.	* "Roping in progress"
From FE/CE to PIs.	Indicates the ropes have been cut away.	* "Ropes released"
From FE/CE to PIs.	Indicates the ropes have been pulled back into the aircraft and are secured.	* "Ropes retrieved"
From FE/CE to PIs.	Hold position.	"Hold"
From FE/CE to PIs.	Indicates direction in which to reposition the	"Move" (left, right, forward,

	aircraft.	back)
From FE/CE to PIs.	Indicates all ropers are clear from the aircraft.	“Aft ready, forward ready”
Forward CE	Will be the only one to say this.	“Clear for flight”
From FE/CE to PIs.	Indicates a problem at a station; all roping ceases until problem is rectified.	“Stop stick”
From FE/CE to PIs.	Indicates aircraft is over the target.	“Over the target”
* Aft, forward from CE to PIs, will preclude calls to indicate appropriate station.		

ADVERSE WEATHER/TERRAIN CONDITIONS: Rappel operations will not be conducted under the following conditions:

1. Lightning strikes within 1 NM of rappelling operations.
2. Water or ice on the rope inhibiting the ability of the rappellers to control their descent.
3. The rope is exposed to the elements for a sufficient length of time to freeze-thereby reducing its tensile strength.
4. Blowing particles produced by rotor wash, causing the aircrew or the rappel master to lose visual contact with the ground.

NIGHT OR NIGHT VISION GOGGLES CONSIDERATIONS: Proper scanning techniques are necessary to avoid spatial disorientation. One chemlight will be attached to the end of the rope and one to the attachment point of the rope. NVG lighting will be IAW the unit SOP or the tactical environment.

TRAINING AND EVALUATION REQUIREMENTS:

1. Training will be conducted in the aircraft.
   a. PI training does not require ropers.
   b. NCM training requires personnel/gear to go down the ropes.
2. Evaluations will be conducted in the aircraft.
   a. PI evaluations do not require ropers.
   b. NCM evaluations require personnel/gear to go down the ropes.

REFERENCES: Appropriate common references, ATTP 3-18.12, and TC 21-24.

TASK 2058

Perform Special Patrol Infiltration/Exfiltration Operations

WARNING

Ensure that the special patrol infiltration/exfiltration (SPIES) master and crew chief wear a safety harness secured to a 5,000-pound or 10,000-pound tie-down ring or static line anytime the door or ramp is opened.

CAUTION

Ensure that SPIES rope remains secured to the cargo floor until the aircraft has landed. If recovery of SPIES rope is impossible, execute a roll-on landing to avoid entanglement in the rotor system.

CONDITIONS: In a CH-47D/F helicopter with SPIES equipment installed and SPIES crew assigned.

STANDARDS: Appropriate common standards and the following additions/modifications:

1. RCM.
   a. Conduct a thorough crew and passenger safety briefing.
   b. Maintain obstacle clearance between team members, obstacles and the ground.
   c. Maintain airspeed, ±5 KTS. (MAX airspeed with team members attached is 70 [KIAS/KCAS] in moderate climates and 50 KIAS/KCAS in cold climates.)
   d. Bank angle not to exceed 30 degrees.
2. NCM. Ensure that the aircraft is prepared for SPIES operations IAW TC 21-24 and the unit's SOP.

DESCRIPTION:

1. Crew actions.
   a. The PC will conduct a thorough crew briefing and ensure that all crewmembers are familiar with SPIES operations, EMERG and communication procedures. The PC will ensure that the aircraft is rigged.
   b. The P* will remain focused primarily outside the aircraft throughout the maneuver to ensure aircraft control and obstacle avoidance. The P* will announce the intended point of extraction and remain centered over the target, incorporating corrections from the SPIES master as required.
   c. The P and NCM will assist in clearing the aircraft and will provide adequate warning of obstacles. The P and NCM will assist the P* during the pickup phase of the operation. The NCM will advise the P* when the slack is out of the ropes, and when the SPIES members are off the ground and AHO. During forward flight, the NCM must constantly monitor the SPIES members and keep the P* informed of their stability and clearance.
2. Procedures.
   a. Establish communications with personnel at extraction site. The approach should be terminated into the wind at a 90-foot HVR. Normal length of SPIES ropes is 120 feet. Once stabilized over the extraction site, the NCM (when authorized by the PC) will throw out the deployment bags. The NCM will inform the P* when all ropers are ready and hook-up is complete. The NCM verifies that extraction harnesses are secure and safe as the ropers are lifted off the ground.

b. Ascend at a rate that will ensure the safety of the SPIES members. To avoid jerking the SPIES members off the ground, the slack in the ropes must be removed cautiously. Do not start forward flight until all obstacles are cleared.

c. MAX en route airspeed will not be faster than 70 KIAS/KCAS in moderate climates and 50 KIAS/KCAS in cold climates while team members are attached to the SPIES rope. MAX aircraft bank angle will be no greater than 30 degrees. During forward flight, the NCM must constantly monitor the SPIES members and keep the P* informed of their stability. It may be necessary to reduce airspeed if SPIES personnel begin to spin or if the cone angle exceeds 30 degrees.

d. Upon arrival at the dismount area, transition to hovering flight at an altitude of 250 feet AGL. Start vertical descent with the rate not to exceed 100 FPM (at touchdown). Maintain a stable HVR until SPIES team members clear the rope.

OVERWATER CONSIDERATIONS:

1. The SPIES is suitable for extracting teams from the water. For this procedure, three inflatable life vests (or any type of floatation device) are tied to the SPIES rope to provide buoyancy for the rope while in the water.

2. Takeoff, en route, and landing are the same for water as over land. The dismounting procedures differ when landing on a ship. Once onboard, the team members take their orders from personnel in charge of the deck.

3. All crewmembers will wear floatation devices IAW AR 95-1.

4. Overwater flight, at any altitude, is characterized by a lack of visual cues, and, therefore, has the potential of causing visual illusions. To minimize spatial disorientation, the crew should use RAD ALT hold during overwater flight.

5. Be alert to any unannounced changes in the flight profile and be prepared to take immediate corrective actions. The “RAD ALT” low bug should be set to assist in altitude control.

6. Operations become increasingly more hazardous as references are reduced (open water versus a small lake), water state increases (calm to chop to breaking condition with increasing wave height), and visibility decreases (horizon becomes same color as water, water spray [or rain] on windshield, sunny mid-day versus twilight).

7. Hazards to flight such as harbor lights, buoys, wires and birds must be considered during overwater flight.

NIGHT OR NIGHT VISION GOGGLES CONSIDERATIONS:

1. For unaided night flight, the landing light and searchlight should be operational. If a NVG filter is installed, it should be removed.

2. Due to the high HVR altitude of SPIES operations, it is very difficult to determine altitudes and relative position over the ground. The barometric altimeter is not reliable for this maneuver, but can be used as an aid to help maintain a constant altitude. References (such as tops of trees, lights, and man-made objects) can be used to help prevent drift by lining up the objects and maintaining their relative position once the aircraft is at a stable altitude.

3. If possible, select an area with good contrast and several reference points at the same or greater height as the SPIES HVR altitude. Proper scanning techniques are necessary to avoid spatial disorientation.

4. Spatial disorientation can be overwhelming during nighttime overwater operations. If there are visible lights on the horizon or if the shoreline can be seen, the PI may opt to approach the survivor(s) so the aircraft is pointed toward these references, if the wind permits. If no other references exist, deploy chemlights to assist in maintaining a stable HVR.

TRAINING AND EVALUATION REQUIREMENTS:

1. Training will be conducted in the aircraft.

2. Evaluation will be conducted in the aircraft.

REFERENCES: Appropriate common references and SPIES AWR.

TASK 2059

Perform Rescue-Hoist/Winch Operations

WARNING

Ensure that crewmembers in the cabin area are wearing a safety harness secured to a 5,000-pound or 10,000-pound tie-down ring or static line anytime the upper cabin door and rescue hatch door are open. The crewmember riding the hoist will be secured either to the aircraft or to the jungle penetrator. Ensure that cable touches the ground or the water before ground personnel touch the cable. Cable will be charged with in excess of 300,000 volts of static electricity.

CAUTION

Care must be taken not to snag terrain features or foliage with the rescue-hoist cable. This may result in exceeding the 600 pounds structural limitation of the overhead pulley support.

CONDITIONS: In a CH-47D/F helicopter equipped with an operational rescue-hoist/winch system.

STANDARDS: Appropriate common standards and the following additions/modifications:

1. RCM.
   a. Conduct a thorough crew and passenger safety briefing.
   b. Perform rescue-hoist procedures IAW TM 1-1520-240-10/TM 1-1520-240-CL or TM 1-1520-271-10/TM 1-1520-271-CL.
   c. Perform rescue-hoist/winch procedures IAW TM 1-1520-240-10/CL, TM 1-1520-271-10/CL, FM 8-10-6, and the unit's SOP.
   d. Maintain appropriate HVR altitude, ±5 feet.
   e. Do not allow drift to exceed ±5 feet from the intended HVR point.
   f. Perform post flight procedures per the appropriate aircraft operator's manual/CL.
2. NCM.
   a. Perform a preflight inspection of the rescue-hoist/winch IAW TM 1-1520-240-10/TM 1-1520-240-CL, TM 1-1520-271-10/TM 1-1520-271-CL, and the unit SOP.
   b. Ensure that the crew, passengers, cargo and mission equipment are secured.
   c. Operate the rescue-hoist/winch IAW the appropriate TM.
   d. Perform post flight procedures IAW the appropriate aircraft operator's manual/CL.

DESCRIPTION:

1. Crew actions.
   a. Rescue hoist operations.
      (1) The PC will conduct a thorough crew briefing and ensure that all crewmembers are familiar with rescue-hoist operations, EPs, communication procedures, lowering the flight medic, and

lifting the patient off the ground using the hoist or aircraft. The PC will also ensure that all crewmembers understand "CUT CABLE" procedures.

(2) The P* will remain focused primarily outside the aircraft throughout the maneuver to ensure aircraft control and obstacle avoidance. The P* will announce the intended point of HVR and remain centered over the target, incorporating corrections from the NCM.

(3) The P and NCM will assist in clearing the aircraft and will provide adequate warning of obstacles. The P and NCM will also assist the P* in maintaining a stable HVR by providing the P* with information regarding the drift of the aircraft. The P will also monitor cockpit indications. The P will be able to operate the control panel for the rescue-hoist if necessary.

(4) The NCM will ensure that the hoist is configured and will ensure that all lifting devices (such as jungle penetrator, SKED/stokes litter, and survivor's slings) are secured in the aircraft before takeoff.

(5) The NCM will ensure that the winch is configured for rescue-hoist operations and the appropriate write-up is entered on DA Form 2408-13-1 for the MID-hook being removed IAW TM 1-1520-240-10/TM 1-1520-271-10.

(6) The NCM will conduct the hoist operation IAW, TM 1-1520-240-10/CL, TM 1-1520-271-10/CL, and the unit SOP.

b. Cargo winch operations.

(1) The NCM will ensure that the winch is configured for rescue-hoist operations and the appropriate write-up is entered on DA Form 2408-13-1 for the MID-hook being removed IAW TM 1-1520-240-10/TM 1-1520-271-10.

(2) The NCM will conduct the rescue-hoist operation IAW, TM 1-1520-240-10/CL, TM 1-1520-271-10/CL, and the unit SOP.

2. Procedures.

a. General recovery procedures over land.

(1) Crewmembers alerted approximately 5 minutes before arrival at pickup site.

(2) Crewmembers complete all required checks (such as rescue-hoist control panel switches set, hoist circuit breakers (CBs) set, [ICS] selector switches set and crewmembers reposition for hoist operations).

(3) Make the approach into the wind if possible and plan to terminate the approach at an altitude that will clear the highest obstacle.

(4) Select an appropriate reference point to maintain heading and position over the ground. Once stabilized over pickup site, perform hoist operations IAW FM 8-10-6, TM 1-1520-240-10/CL, TM 1-1520-271-10/CL and the unit SOP.

b. Inert patient recovery.

(1) General format is the same as over land except the NCM/medical officer (MO) is lowered on the hoist and secures the patient to the recovery device.

(2) Prior to deploying, all crewmembers will be briefed on method of recovery (simultaneous or singular recovery of the patient and MO) and a radio communications check should be made between the PI, NCM and MO.

c. General recovery procedures overwater.

(1) General format is the same as over land except a smoke device may be used to determine wind direction and velocity. Terminate the approach at a 100-foot HVR, 20 feet before reaching the patient. Deploy the recovery device and allow it to contact the water before reaching the patient.

(2) All crewmembers will wear floatation devices. Operations become increasingly more hazardous as references are reduced (open water versus a small lake or ship versus small boat), sea state increases (calm to chop to breaking condition with increasing wave height), and visibility decreases (horizon becomes same color as water, water spray or rain on windshield, sunny mid-day versus twilight).

Note. The NCM will advise the P* when the person/equipment is in position on the jungle penetrator. The NCM will perform hoist operations IAW the standard words and phrases IAW unit SOP. The NCM will secure jungle penetrator or stokes litter upon completion of the hoisting operation. Should difficulty in maintaining a stable HVR occur, the NCM will extend additional cable as slack to preclude inadvertent, jerking.

OVERWATER CONSIDERATIONS:

1. All crewmembers will wear floatation devices IAW AR 95-1.
2. Overwater flight, at any altitude, is characterized by a lack of visual cues, and, therefore, has the potential of causing visual illusions. To minimize spatial disorientation, the crew should use RAD ALT hold during overwater flight.
3. Be alert to any unannounced changes in the flight profile and be prepared to take immediate corrective actions. The "RAD ALT" low bug should be set to assist in altitude control.
4. Operations become increasingly more hazardous as references are reduced (open water versus a small lake), water state increases (calm to chop to breaking condition with increasing wave height), and visibility decreases (horizon becomes same color as water, water spray [or rain] on windshield, sunny mid-day versus twilight).
5. Hazards to flight such as harbor lights, buoys, wires and birds must be considered during overwater flight.

NIGHT OR NIGHT VISION GOGGLES CONSIDERATIONS: Use proper scanning techniques to avoid spatial disorientation.

1. For unaided night flight, the landing light and searchlight should be operational. If a NVG filter is installed, it should be removed.
2. When NVGs are used, hovering with minimum drift is difficult and requires proper scanning techniques and crewmember coordination. If possible, use an area with adequate ground contrast and reference points.
3. Visual obstacles such as shadows should be treated the same as physical obstacles.
4. Spatial disorientation can be overwhelming during nighttime overwater operations. If there are visible lights on the horizon or if the shoreline can be seen, the PI may opt to approach the survivor(s) so the aircraft is pointed toward these references, if the wind permits. If no other references exist, deploy chemlights to assist in maintaining a stable HVR.

TRAINING AND EVALUATION REQUIREMENTS:

1. Training will be conducted in the aircraft.
2. Evaluation will be conducted in the aircraft.

REFERENCES: Appropriate common references, FM 8-10-6, and TM 55-4240-284-12&P.

TASK 2064

Perform Paradrop Operations

> **WARNING**
>
> **Ensure that any personnel in the cabin area not wearing a parachute are wearing a safety harness secured to a 5,000-pound or 10,000-pound tie-down ring or are sitting in a seat with a seat belt fastened.**
>
> **If parachutes use automatic ripcord releases, ensure that the automatic release is disconnected before descent is initiated. For an inflight emergency, if altitude cannot be maintained, notify the jumpmaster immediately so automatic ripcord releases can be disconnected.**
>
> **Ensure that static lines remain secured to the anchor point until they are recovered or the aircraft has landed. If recovery of static lines is impossible, execute a roll-on landing to avoid entangling deployment bags in the rotor system.**

CONDITIONS: In a CH-47D/F helicopter rigged for paradrop operations and a jumpmaster onboard.

STANDARDS: Appropriate common standards and the following additions/modifications:

1. RCM.
   a. Conduct a thorough crew and passenger safety briefing.
   b. Maintain airspeed of a minimum 80 KIAS/KCAS and a MAX 110 KIAS/KCAS (with 90 KIAS/KCAS being the optimum speed).
   c. Maintain appropriate ground track over the drop zone.
2. NCM. Ensure that the aircraft is prepared for paradrop operations IAW TM 1-1520-240-10, TM 1-1520-271-10, FM 3-05.211, FM 3-21.220, and the unit SOP.

DESCRIPTION:

1. Crew actions.
   a. The PC will conduct a thorough crew briefing and ensure that all crewmembers are familiar with paradrop operations, EMERG and communication procedures. The PC will ensure that the aircraft is rigged.
   b. The P* will remain focused primarily outside the aircraft throughout the maneuver.
   c. The P and NCM will assist in clearing the aircraft and will provide adequate warning of obstacles and traffic.
   d. The P will ensure that the jumpmaster or FE retrieves the static lines as soon as the last parachutist has cleared the aircraft.
   e. The NCM will ensure that the aircraft is prepared for paradrop operations. The NCM or the jumpmaster will acknowledge all communications from the P* and P. The NCM will inform the P* or P when all parachutists have exited the aircraft and when the deployment bags have been recovered.
2. Procedures.
   a. Maintain altitude, airspeed and ground track as determined during pre-mission planning and jumpmaster's instructions.

b. Perform inflight procedures IAW FM 3-05.211, FM 3-21.220, and unit SOP.

c. The FE/CE will:

(1) Remove the ramp extensions and ensure that the ramp and cabin floor are clean and dry.

(2) Install the static line anchor cable and retriever, if needed, IAW, TM 1-1520-240-10, and TM 1-1520-271-10.

(3) Ensures that the static line anchor cable does not sag more than 6 inches and will check the turnbuckle for safety.

(4) Pad and tape all clamps on the cable with cellulose wadding and masking tape.

(5) Rig the troop seats for the mission; adjust the seat backs, if required and ensure that airsick bags are available.

(6) Lower the ramp to a 3-degrees below level position before the crew begins the drop.

d. The crew will conduct the paradrop IAW the procedures covered in the briefing and the references listed below.

e. The PC will check that the jumpmaster (or FE) retrieves the static lines as soon as the last parachutist has cleared the aircraft.

Note. If the jumpmaster cannot communicate directly with the P*/P, the jumpmaster will communicate with the NCM via hand-and-arm-signal IAW FM 21-60. The NCM will relay necessary information to the P*/P via the INTERCOMM system.

TRAINING AND EVALUATION REQUIREMENTS:

1. Training will be conducted in the aircraft.
2. Evaluation will be conducted in the aircraft.

REFERENCES: Appropriate common references, FAR Part 105, FM 3-21.220, and FM 3-05.211.

TASK 2066

Perform Extended Range Fuel System Operations

WARNING

Failure to remove water and contaminants from the ERFS II tank sump could result in contaminants being transferred to the helicopter fuel tank(s) or other aircraft or equipment during FARE operations. If water and contaminants are not removed, a loss of ENG power may result.

CAUTION

Failure to close the Unisex valves at the ERFS II tank(s) end of the single point pressure refueling hose assembly could allow suctioning of fuel from the helicopter main fuel tanks during FARE operations.

CONDITIONS: In a CH-47D/F helicopter with ERFS installed or academically.

STANDARDS: Appropriate common standards and the following additions/modifications:

1. RCM.
   a. Ensure ERFS data is entered and recognized in the CAAS.
   b. Balance/manage fuel tank levels (if appropriate) to maintain aircraft within CG limits.
   c. Operate the auxiliary fuel management panel IAW the appropriate operator's manual/CL.
   d. Recognize and respond to ERFS malfunctions.
   e. Perform or describe appropriate EPs IAW the appropriate aircraft operator's manual/CL.
2. NCM.
   a. Configure aircraft IAW TM 1-1560-312-10.
   b. Complete all before flight, inflight and preflight duties IAW TM 1-1520-240-10/ TM 1-1520-271-10, and TM 1-1560-312-10.
   c. Perform all fuel servicing IAW TM 1-1520-240-10, TM 1-1520-271-10, TM 1-1560-312-10, FM 3-04.111, and FM 10-67-1.
   d. Recognize and alert P to ERFS malfunctions.
   e. After ERFS operation, remove and store ERFS IAW TM 55-1560-307-13&P or TM 1-1560-312-10.

DESCRIPTION:

1. Crew actions.
   a. The PC will conduct a thorough mission briefing and ensure that all personnel are familiar with normal and EPs.
   b. The PC will ensure that a preflight of the ERFS is conducted before flight.
   c. The P will ensure that all main tanks are on and all AUX pumps are "OFF" when ERFS transfer to the main tanks is desired.
   d. The P will monitor the main fuel indicators and ensure that fuel management procedures are conducted.

e. The NCM will ensure that the system is operational before flight, monitor the fuel management panel inflight and ensure that ERFS tank(s) and associated equipment are inspected for proper operation and that no leaks are evident.

f. The NCM will manage the tank fuel transfer sequence as directed by the PC, inform the crew when the low-level warning lights illuminate, close the dump valve when empty, and inform the crew of any unusual or EMERG situations.

2. Procedures.

a. Each crewmember will complete all required inspections pertaining to his or her section of TM 1-1520-240-10, TM 1-1520-271-10, TM 1-1560-312-10, and the unit SOP.

b. NCMs will ensure that no fuel leaks are evident during servicing, preflight and inflight operation of the ERFS. If leaks are evident, stop servicing immediately and refer to the appropriate maintenance manuals.

c. After the ERFS tank system is serviced, a fuel sample will be taken from the sample area of each tank. If contamination is found, conduct contamination inspection procedures IAW TM 1-1560-312-10, FM 3-04.111, and FM 10-67-1. Ensure that a fuel sample has been taken IAW the appropriate manuals.

d. Each crewmember will ensure that all safety and operational procedures are conducted IAW TM 1-1560-312-10.

NIGHT OR NIGHT VISION GOGGLES CONSIDERATIONS: If time permits, accomplish servicing and preflight inspections during daylight hours. During the hours of darkness, use a flashlight with an unfiltered lens to supplement available lighting. HYD leaks, oil leaks and other defects are difficult to see using a flashlight with a colored lens.

TRAINING AND EVALUATION REQUIREMENTS:

1. Training will be conducted in the aircraft.
2. Evaluations will be conducted in the aircraft.

REFERENCES: Appropriate common references, FM 3-04.111, FM 10-67-1, IETM EM-0199, TM 1-1520-240-PMD, TM 1-1520-271-PMD, and TM 1-1560-312-10.

TASK 2068

Perform Shipboard Operations

WARNING

Do not move the cyclic with the pitch and roll of the ship. Do not allow the rotor to dip down to a low position, as it could be fatal to deck crews and those exiting the aircraft.

CONDITIONS: In a CH-47D/F helicopter and the appropriate joint publication (JP) reference.

STANDARDS: Appropriate common standards and the following additions/modifications:

1. RCM.
   a. Comply with arrival and departure and landing signal enlisted (LSE)/controller instructions.
   b. Set parking brakes before landing.
   c. Ensure a green deck before landing.
2. NCM.
   a. Ensure landing gear (wheels) is cleared on deck.
   b. Ensure that all landing gear is cleared onto or off the deck.
   c. Ensure that aircraft is chained or moored before exiting.

DESCRIPTION:

1. Crew actions.

   a. The P* will focus primarily outside the aircraft to provide obstacle clearance throughout the maneuver. The P* will announce when he or she begins the approach and whether the approach will terminate to a HVR or to the surface. The P* also will announce the intended point of landing and any deviation to the approach, to include go-around. The P* will announce his or her intentions to takeoff.

   b. The P will call out "crossing the wake" and will complete the before-landing check. The P will ensure that the parking brakes are set. The P (or NCM) will verbally relay the signalman's signals if the P* loses visual contact with the LSE.

   c. The P and NCM will assist in clearing the aircraft and will provide adequate warning of obstacles, unannounced drift, and changes in altitude. The P/NCM will announce when their attention is focused inside and will acknowledge all P* directions. The P/NCM will assist the P* in ensuring that the main wheels are within the landing deck circle before touchdown.

2. Procedures. The deck landing area may have a perimeter safety net, perimeter markings, and red lights outlining the landing area. Two white lineup lines form an "X" through the landing area. These lines contain white lights, which are only visible when the aircraft is aligned on the approach path. Around the center of the "X" is a white circle with a centered amber light. The landing gear will normally be in the forward portion of this circle but landing will be as directed by the LSE/controller. Most ships have floodlights to illuminate the landing area for unaided operations but the lights can be turned down or off for NVG operations.

   a. Before approach.

      (1) When cleared to land, adjust airspeed as necessary, descend to 200 feet AGL and enter the landing pattern. (During landing, the LSE will expect the PI in the seat nearest the bow of the ship, to be at the flight controls for the first landing.)

      (2) Make a standard rate turn (or less) in the appropriate direction and cross perpendicular to the ship's wake and then begin the turn to final.

(3) When the ship is underway, it will be necessary to make lateral corrections to maintain alignment with the landing deck, lineup lines. An alternate technique is to lead the ship by initiating the approach to a point forward of the flight deck.

b. During the approach.

(1) Cross the deck edge no faster than a brisk walk, at an altitude of 5 to 10 feet above the landing surface. (Higher altitudes make it difficult to maintain good visual references.) Keep the LSE in sight.

(2) Stop all aircraft movement over the center of the deck and ensure that the wheels are within the landing circle.

Note. The LSE will assist during the last part of the approach with hand and arm signals.

c. Hovering.

(1) Maintain a HVR until the LSE gives the signal to set the aircraft down. Follow the LSE's signal to move left, right, aft or forward.

(2) Control drifts using the ship's superstructure and the horizon, if visible, for attitude reference while hovering.

Note. The P will verbally relay the signalman's signals if the P* loses visual contact with the LSE.

d. Landing.

(1) In rough seas, attempt to land when the ship is at the apex of a pitch up.

(2) Watch the LSE and listen to guidance from the ship's tower. Lower the thrust control and perform a controlled touchdown with the main wheels inside the landing deck circle.

(3) When the landing gear is on the deck, smoothly lower the thrust control to the full down position. The P shall immediately turn "OFF" the AFCS/DAFCS to prevent un-commanded inputs.

(4) Maintain the cyclic centered and ignore aircraft motion. Wait until the wheels are chocked and chained before exiting the aircraft.

e. Takeoff.

(1) The P will show his or her hands during the day or will flash a light at night to indicate to the LSE which aviator is at the controls.

(2) The P shall turn "ON" the AFCS/DAFCS just before takeoff.

(3) When cleared for takeoff, increase PWR and smoothly ascend to a HVR height of 10 feet, keeping the LSE in sight. Slide left or right as directed to clear obstructions and depart the ship at a 45-degree angle from the bow.

(4) The ship can be used for an attitude reference during acceleration.

(5) During conditions of reduced visibility, it may be necessary to transition to instruments for most of the takeoff.

Note. HVR OGE PWR may be required for this task.

NIGHT OR NIGHT VISION GOGGLES CONSIDERATIONS: At night and during periods of reduced visibility, fly instruments or cross-check the flight instruments while in the holding pattern. The P will advise when he or she has the lineup line in sight. The P* will transition outside and make flight control adjustments as necessary to line up on final and to remain aligned with the lineup line. The P will continue to assist by monitoring the flight instruments, calling out airspeed and altitude as necessary.

OVERWATER CONSIDERATIONS:

1. All crewmembers will wear floatation devices IAW AR 95-1.
2. Overwater flight, at any altitude, is characterized by a lack of visual cues, and, therefore, has the potential of causing visual illusions. To minimize spatial disorientation, the crew should use "RAD ALT" hold during overwater flight.
3. Be alert to any unannounced changes in the flight profile and be prepared to take immediate corrective actions. The "RAD ALT" low bug should be set to assist in altitude control.
4. Operations become increasingly more hazardous as references are reduced (open water versus a small lake), water state increases (calm to chop to breaking condition with increasing wave height), and visibility decreases (horizon becomes same color as water, water spray [or rain] on windshield, sunny mid-day versus twilight).
5. Hazards to flight such as harbor lights, buoys, wires and birds must be considered during overwater flight.

TRAINING AND EVALUATION REQUIREMENTS:

1. Training will be conducted in the aircraft.
2. Evaluations will be conducted in the aircraft.

REFERENCES: Appropriate common references.,

TASK 2074

Perform Forward Arming and Refueling Point Operations

CONDITIONS: In a CH-47D/F helicopter with ERFS installed, fuel handlers, security team (as required based on METT-TC), a forward area refueling equipment (FARE) system or academically.

STANDARDS: Appropriate common standards and the following additions/modifications:

1. RCM.
   a. Conduct pre-mission planning to include required load(s) configuration as briefed. Verify the aircraft will remain within GWT and CG limitations for the duration of the flight.
   b. Conduct a thorough crew and support personnel safety briefing.
   c. Ensure that the aircraft is configured and fueled for the mission.
   d. Ensure that the passengers and cargo are properly restrained.
   e. Ensure that the FARP is certified IAW appropriate publications.
   f. Be familiar with EPs for FARP operation and tactical shutdown procedures IAW appropriate publications.
2. NCM.
   a. Load the aircraft IAW the load plan, if applicable, and complete all before-flight, inflight and preflight duties IAW appropriate publications.
   b. Ensure that floor-loading limits are not exceeded.
   c. Secure passengers and cargo.
   d. NCMs will be familiar with EPs for FARP operation and tactical shutdown procedures IAW appropriate publications.

DESCRIPTION:

1. Crew actions.
   a. The PC will conduct a thorough crew briefing and ensure that all crewmembers and support personnel are familiar with FARP operations, EMERG and communication procedures. The PC will confirm that required PWR is AVAIL by comparing the information from the PPC to the HVR PWR check.
   b. The PC will ensure that a preflight of the FARP system is conducted before flight and all equipment is available.
   c. The P will assist in marshaling and fireguard duties and any other duty that the PC assigns.
   d. The FE is responsible for safely loading the aircraft before mission and unloading it after the aircraft is shut down. The FE also controls the fuel flow from inside the aircraft. In addition, the FE is responsible for cutting the fuel supply from inside the aircraft in case of a mishap or an EMERG.
   e. The CE will assist in setting up the refueling points and with marshalling and fireguard duties.
   f. The petroleum, oil, lubricants (POL) handlers are responsible for setting up the FARP and the actual refueling operation. POL handlers will be the only individuals allowed to start the pumps.
   g. Aircraft internal fuel tank installation, preflight, inflight, set up, tear down and storage of the FARP system will be conducted IAW FM 3-04.111 and TM 1-1560-312-10. EPs will be conducted IAW the references mentioned above.
2. Procedures.
   a. Standard FARP operation crew.
      (1) The crew consists of two RCMs, two qualified NCMs and two POL handlers. The number of crewmembers may be increased as the mission (or the commander) dictates.

(2) Commanders will ensure that crewmembers and POL handlers are trained on crew duties before they conduct refueling operations. Each crewmember will complete all required inspections pertaining to his or her section of FM 3-04.111, TM 1-1560-312-10, and the unit's SOP.

(3) NCMs will ensure that no fuel leaks are evident during servicing, preflight and during inflight operation of the ERFS. If leaks are evident, stop servicing immediately and fix the problem.

(4) After the ERFS tank system is serviced, a fuel sample will be taken from the appropriate sample area. If contamination is found, conduct contamination inspection procedures IAW TM 1-1560-312-10, FM 3-04.111, and FM 10-67-1. Ensure that a fuel sample has been taken after 30 MINs of servicing the ERFS tanks to allow sediment, water and other contaminants to settle.

(5) Each crewmember will ensure that all safety and operational procedures are conducted IAW FM 3-04.111 or TM 1-1560-312-10.

(6) The FE will ensure that all mission/FARP equipment is loaded and secured in the aircraft FM 3-04.111 or TM 1-1560-312-10.

(7) Fuel will be transferred from the internal tanks in the same order as if the tanks were being self-deployed. To maintain the aircraft's CG, the fuel-transfer sequence will be 3-1-2.

b. Preflight inspection.

(1) Requirements are found in FM 3-04.111, appendix J and table J-8.

(2) The FARP CL is found in FM 3-04.111, appendix J and table J-12.

(3) These are the minimum inspections and procedures that will be accomplished during FARP operations and further instructions will be found in unit SOPs.

c. Preflight.

(1) After receiving a mission briefing, ensure that required fuel and ammunition is on hand. Ensure that it is installed, secured, inventoried and operational before flight IAW the units SOP.

(2) Conduct a thorough crew and support team briefing, covering, as a minimum: landing direction, frequencies and call signs, EPs, execution (security, set up, refuel, rearm and recovery), dispersal plan, alternate setup location, site layout and load(s).

d. Arrival.

(1) The designated primary rearming/refueling aircraft will set up first.

(2) The secondary rearming/refueling aircraft will carry a duplicate 2-point FARE for back up. The secondary aircraft will loiter outside the weapons surface danger area and no closer than 150 feet from the rearm/refuel site.

(3) The security team will immediately establish perimeter defense as briefed. The site layout and FARE system setup will be IAW FM 3-04.111, FM 3-04.113, and unit SOP.

e. Communications. The primary aircraft's flight crew will monitor all calls into the FARP and brief incoming aircraft on pertinent information for the FARP on request (such as landing direction, active refuel point and so forth).

Note. Task 1016 may be used in performing this task.

NIGHT OR NIGHT VISION GOGGLES CONSIDERATIONS:

1. Aircraft lighting. During night or NVG operations, the CH-47 will maintain lighting as METT-TC and unit SOP dictates.

2. Area lighting. During refueling operations, artificial lights may be needed because of the low natural light level. Color-coded, low-intensity light sources may be used to indicate direction, takeoff and landing areas, and pad sites. Only red lights should be used to mark obstacles. If NVGs are used, ensure that artificial lighting does not cause any undue reflections toward the cockpit.

TRAINING AND EVALUATION REQUIREMENTS:

1. Training will be conducted in the aircraft.

2. Evaluation will be conducted in the aircraft or academically.

REFERENCES: Appropriate common references, FM 3-04.111, FM 10-67-1, and TM 1-1560-312-10.

TASK 2076

Perform Caving Ladder Operations

CONDITIONS: In a CH-47D/F helicopter with caving ladder equipment installed.

STANDARDS: Appropriate common standards and the following additions/modifications:

1. RCM.
   a. Conduct a thorough crew briefing.
   b. Ensure that the aircraft is configured for ladder operations.
   c. Ensure that the ladder is inspected, serviceable and secured to the aircraft cabin floor.
   d. MAX airspeed with ladder deployed is 60 KIAS/KCAS with personnel attached to the ladder and 40 KIAS/KCAS with no personnel attached.
   e. Maintain appropriate HVR altitude, ±5 feet.
   f. Do not allow drift to exceed, ±5 feet from the intended HVR point.
2. NCM.
   a. Configured for ladder operations, inspect and install a serviceable ladder to the cabin floor.
   b. Advise the P* when the survivors are in sight.
   c. Inform the PIs when the ladder is being deployed/recovered.
   d. Direct the P* to a stabilized HVR over the survivors.
   e. Deploy light markers as required.
   f. Deploy ladder, extract survivor(s) and secure ladder equipment.

DESCRIPTION:

1. Crew actions.
   a. The PC will conduct a thorough crew briefing and ensure that all crewmembers are familiar with ladder operations, EMERG and communication procedures. The PC will ensure that the aircraft is rigged.
   b. The P* will remain focused primarily outside the aircraft throughout the maneuver to ensure aircraft control and obstacle avoidance. The P* will announce the intended point of extraction and remain centered over the target with corrections from the P and NCM as required.
   c. The P and NCM will assist in clearing the aircraft and will provide adequate warning of obstacles. They will assist the P* during the pickup phase of the operation and will advise when the ladder is on the ground or in the water. If forward flight is required, the NCM must constantly monitor the survivor(s) and keep the P* informed of their stability.

2. Procedures. Ladder operations is a method used by search and rescue aircraft to retrieve downed crewmembers from the water when no watercraft are in the area or time constraints will not allow the aircrew to wait for such craft to arrive for the rescue operations. Additionally, ladder operations may be used for infiltration/exfiltration of personnel in confined areas such as a dense jungle environment.
   a. The PC will ensure that the ladder is inspected, serviceable and secured to the aircraft cabin floor.
   b. The NCM will remove the ramp extensions and ensure that the ramp and cabin floors are clean. The NCM will inspect and secure a serviceable ladder to the aircraft cabin floor. Chemlights will be attached to the bottom of the ladder and 10 feet from the bottom. Proper flotation will be attached to the ladder as necessary.
   c. The PC will inform the NCM when to deploy the ladder and establish what MAX RAD ALT reading may be achieved with the ladder safely on the ground or in the water.
   d. Once personnel in the water or on the ground are located, plan the approach into the wind as much as possible. The approach should terminate to a HVR approximately 20 feet above the personnel.

e. The crewmember in the cabin area will lower the ladder when directed to by the PC. The crewmember will advise when the ladder has been deployed and that it is in the water or on the ground.

f. The ladder must touch the water or the ground before any personnel in the water or on the ground touch it, to avoid electrical static discharge shock.

g. Due to lack of visual references, it will be difficult to detect drift over the water. Crewmembers must assist the P* with maintaining a constant position over the personnel on the ground or in the water.

h. Personnel to be extracted will grasp the ladder after it has entered the water or touched the ground and comes within reach. Personnel will then climb the ladder into the aircraft.

i. Crewmembers will assist with entry in the aircraft as much as possible.

j. In the event personnel are injured and cannot climb into the aircraft, they will attach themselves to the ladder with a snap link attached to the front of the survival vest. These personnel will be flown to the nearest landing area, lowered to the ground and then moved into the aircraft.

NIGHT OR NIGHT VISION GOGGLES CONSIDERATIONS: For night operations, attach one chemlight to the bottom of the ladder. This will help the crewmembers to identify when the ladder enters the water. Attach one more chemlight about 10 feet up from the bottom of the ladder so the person can still see the ladder when the bottom is in the water or on the ground.

OVERWATER CONSIDERATIONS:

1. All crewmembers will wear floatation devices IAW AR 95-1.

2. Overwater flight, at any altitude, is characterized by a lack of visual cues, and, therefore, has the potential of causing visual illusions. To minimize spatial disorientation, the crew should use “RAD ALT” hold during overwater flight.

3. Be alert to any unannounced changes in the flight profile and be prepared to take immediate corrective actions. The “RAD ALT” low bug should be set to assist in altitude control.

4. Operations become increasingly more hazardous as references are reduced (open water versus a small lake), water state increases (calm to chop to breaking condition with increasing wave height), and visibility decreases (horizon becomes same color as water, water spray [or rain] on windshield, sunny mid-day versus twilight).

5. Hazards to flight such as harbor lights, buoys, wires and birds must be considered during overwater flight.

TRAINING AND EVALUATION REQUIREMENTS:

1. Training will be conducted in the aircraft.
2. Evaluation will be conducted in the aircraft.

REFERENCES: Appropriate common references, ladder AWR, and TC 3-05.212.

TASK 2078

Perform Helocast/Soft Duck Operations

> **WARNING**
>
> **Ensure that crewmembers and the cast master in the cabin area are wearing a safety harness secured to a 5,000-pound or 10,000-pound tie-down ring anytime the door or ramp is open.**

CONDITIONS: In a CH-47D/F helicopter with helocast equipment installed, a helocast team cast master, combat swimmers, combat divers and combat rubber raiding crafts (CRRC)-soft duck, hard duck or rolled duck.

STANDARDS: Appropriate common standards and the following additions/modifications:

1. RCM.
   a. Conduct a thorough crew and passenger briefing.
   b. Maintain altitude, ±3 feet.
   c. Maintain ground speed, ±3 KTS.
2. NCM.
   a. Ensure that aircraft is configured for helocast or soft duck operations.
   b. Perform crew coordination actions.

DESCRIPTION:

1. Crew actions.

   a. The PC will conduct a crew and passenger briefing and ensure that personnel are familiar with EPs. The PC will also ensure that all participants in the helocast/soft duck operations are briefed IAW the unit's SOP.

   b. The P* should make the approach into the wind if possible. The P* will slow to the desired airspeed and altitude, not to exceed 20 KTS and 20 feet (recommend 10 KTS at 10 feet).

   c. The P will provide the P* with information regarding airspeed and altitude. The P will also monitor the cockpit indicators.

   d. The P and NCM will announce when their attention is focused inside the aircraft and again when attention is re-established outside.

   e. The NCM will assist the cast member as necessary.

> **CAUTION**
>
> The PI cannot rely on the airspeed indicator below 40 KIAS/KCAS the ground speed should not exceed that of a brisk walk. Ground speeds in excess of 20 KTS and 20 feet may cause injury.

   f. The P will provide the P* with information regarding ground speed and altitude. The P will also monitor the cockpit indications.

   g. The P and NCM will announce when their attention is focused inside the aircraft and again when attention is re-established outside.

   h. The NCM will assist the cast master as necessary.

2. Procedures.

a. Helocast operations.

(1) HVR checks will be made before beginning helocast operations to verify PWR AVAIL, aircraft controllability and accuracy of the RAD ALTs.

(2) The PC will give the cast master "TEN MINUTE OUT," "FIVE MINUTE OUT", and "ONE MINUTE OUT", alert calls. The PC at "one minute out" will announce "AT THE READY LINE." The cast master will relay these alert calls to the swimmers. On receiving the command "AT THE READY LINE," the cast master will announce "AT THE READY LINE", at which time all participants will remove the restraint devices and be prepared to reposition to the door or ramp area for the jump.

(3) The approach should be made into the wind. Approach speed is 80 KIAS/KCAS MAX from the release point to the area of cast operations. The approach is situation-dependent and may be either a VMC or a terrain flight approach. After arrival at the cast location, slow to the briefed airspeed and altitude.

(4) When the aircraft has established the proper position, airspeed and altitude, and has arrived at the jump location, the PC will give the cast master the command "AT THE START LINE".

(5) The cast master will confirm the position, airspeed, and altitude are safe and give the command "GET SET" to the swimmers. At the command "GET SET", the swimmers will position to the door (or ramp area). The cast master will then tap each swimmer on the shoulder and give the command "GO". On the command "GO", each swimmer will exit the aircraft IAW the instruction received during the safety briefing. The cast master may also jump, but must always exit last.

(6) After entering the water, all swimmers will indicate that they are unhurt by raising one arm overhead. The aircraft will not leave the area until all swimmers report no injuries. The P* will maintain heading, altitude and airspeed until the last team member has exited the aircraft.

(7) After deployment, the drop profile is terminated by increasing altitude and airspeed to the desired mode of flight.

b. Soft duck operations.

(1) The cast master and NCM will ensure that the aircraft is rigged IAW the unit's SOP.

(2) The approach should be made into the wind. Approach speed is 80 KIAS/KCAS MAX from the release point to the area of the drop site. The approach is situation-dependent and may be either a VMC or a terrain flight approach.

(3) Upon arrival at the drop site, a progressive deceleration and descent will be initiated. The cast master (or NCM) will give corrections as to the aircraft alignment with the drop area.

(4) The P will call out the aircraft altitude and airspeed starting at 100 feet in 10 feet and 10 KIAS intervals. The PC will give the cast master "TEN MINUTE OUT," "FIVE MINUTE OUT," and "ONE MINUTE OUT," alert calls. The PC at "one minute out" will announce "AT THE READY LINE." The cast master will relay these alert calls to the raid team members. On receiving the command "AT THE READY LINE," the cast master will announce "AT THE READY LINE." At this time, all participants will remove the restraint devices and be ready to reposition to the door or ramp area for the jump.

(5) After arrival at the drop site, slow to the desired airspeed (5 KTS/5 feet, 10 KTS/10 feet, or 20 KTS/20 feet). When launching the soft duck, 5 KTS and 5 feet will be used. The P*'s visibility may become limited due to the spray from the water. The P will turn on the wipers if required.

(6) When the aircraft has established the proper position, airspeed, and altitude, and has arrived at the drop site, the PC will give the cast master the command "AT THE START LINE".

(7) The cast master will confirm the position, airspeed, and altitude are safe. The cast master will give the command "DROP", at which time the NCM will release the equipment (CRRC-soft duck, hard duck or rolled duck). The NCM will announce "RAFT AWAY". The cast master will announce "RAFT AWAY," at which time the team members will position themselves at the door (or ramp area). The cast master will then tap each team member on the shoulder and give the

command “GO”. On the command “GO”, each team member will exit the aircraft IAW the instruction received during the safety briefing. The cast master may also jump, but must always exit last.

(8) After entering the water, all team members will indicate that they are unhurt by raising one arm overhead. The aircraft will not leave the area until all team members report no injuries. The P* will maintain heading, altitude and airspeed until the last team member has exited the aircraft.

(9) After deployment, the drop profile is terminated by increasing altitude and airspeed to the desired mode of flight.

c. Preparation of the aircraft.

(1) The ramp extensions must be removed.

(2) Helicopter internal cargo handling system will be installed as required.

(3) Pilot and co-pilot RAD ALTs must be installed and operational.

(4) The aircraft will be prepared for water landings such as drain plugs installed and center cargo hook stowed.

(5) Aircraft windshield wipers must be operational.

(6) Pitot and yaw port heat must be operational.

(7) A headset for the cast master will be onboard.

OVERWATER CONSIDERATIONS:

1. All crewmembers will wear floatation devices IAW AR 95-1.

2. Overwater flight, at any altitude, is characterized by a lack of visual cues, and, therefore, has the potential of causing visual illusions. To minimize spatial disorientation, the crew should use “RAD ALT” hold during overwater flight.

3. Be alert to any unannounced changes in the flight profile and be prepared to take immediate corrective actions. The “RAD ALT” low bug should be set to assist in altitude control.

4. Operations become increasingly more hazardous as references are reduced (open water versus a small lake), water state increases (calm to chop to breaking condition with increasing wave height), and visibility decreases (horizon becomes same color as water, water spray [or rain] on windshield, sunny mid-day versus twilight).

5. Hazards to flight such as harbor lights, buoys, wires and birds must be considered during overwater flight.

NIGHT OR NIGHT VISION GOGGLES CONSIDERATIONS: Spatial disorientation can be overwhelming during nighttime overwater operations. If there are visible lights on the horizon or if the shoreline can be seen, the PI may opt to approach the cast area so the aircraft is pointed toward these references, if the wind permits. Proper scanning techniques are necessary.

TRAINING AND EVALUATION REQUIREMENTS:

1. Training will be conducted in the aircraft.
2. Evaluation will be conducted in the aircraft.

REFERENCES: Appropriate common references, FM 3-21.38, FM 3-21.220, FM 10-542, FM 20-11, FM 31-20-4, Helocast/soft duck air worthiness release, SOCOM Regulation 350-6, and TC 3-05.212.

TASK 2079

Perform Amphibious Craft Recovery Operations

CONDITIONS: In a CH-47D/F helicopter with water operation brief complete and all drain plugs removed.

STANDARDS: Appropriate common standards and the following additions/modifications:

1. RCM.
   a. Ensure that water operations briefing is completed to include a review of mission-related EPs.
   b. Ensure that the aircraft is prepared for water operations IAW TM 1-1520-240-10, TM 1-1520-271-10 and that the static line is installed. (During ramp down operations, remove the ramp drain plugs.)
   c. Observe water operation limitations IAW TM 1-1520-240-10 or TM 1-1520-271-10.
   d. Do not exceed ground control limitations.
   e. Maintain HVR altitude 15 feet ±5 feet above the water.
2. NCM.
   a. Configure the aircraft for water operations IAW TM 1-1520-240-10 or TM 1-1520-271-10.
   b. Assist the PIs in a reconnaissance of the intended landing area.
   c. Clear the aircraft during landing and takeoff.
   d. Advise the PIs before the water reaches fuselage station 400.
   e. Perform crew coordination actions.
   f. Enter appropriate information on the DA Form 2408-13 and ensure that required inspections and servicing are completed IAW TM 10-1520-240-23-1 and TM 10-1520-271-23-1.

DESCRIPTION:

1. Crew actions.
   a. The PC will conduct a crew and passenger briefing and ensure that all personnel are familiar with aircraft safety and EPs IAW the unit's SOP.
   b. The P* should make the approach into the wind if possible.
   c. The P will provide the P* with information regarding airspeed and altitude. The P will also monitor the cockpit indications. The P will ensure that the PITOT HEAT switch is turned "ON", both searchlight switches are "OFF" and the control switches are in the "RET" position. The P and NCM will announce when their attention is focused inside the aircraft and again when their attention is re-established outside.
   d. The NCM will advise the PIs of any unusual water accumulation in the cargo area. During ramp down operations, the NCM will advise the PIs of the water level before it reaches fuselage station 400.
2. Procedures.
   a. RCM.
      (1) Upon arrival at the landing area, perform a VMC approach to arrive at a 15-foot HVR with no forward movement. During the approach, inspect the landing area for debris and abort the landing if the landing site is not clear of obstructions. When landing, reduce the thrust control to a PWR setting that prevents the water form coming forward of fuselage station 400, IAW the water landing AWR.
      (2) Maintain the controls at neutral for a forward speed of 4 to 6 KTS. During ramp down operations, do not apply AFT cyclic or adjust the RRPM to 97 percent to slow the taxi speed. At speeds up to 5 KTS, use the pedals and cyclic to make turns. Turning will not be performed during ramp down operations.

(3) Raise the thrust control to make a vertical ascent to approximately 15 feet above the water. Perform HVR PWR check and before takeoff checks. Perform a VMC takeoff. Place the PITOT HEAT switch to the "OFF" position.

Note. CH-47 Aft landing gear switches are not actuated in the water. The DASH actuators will continue to respond to longitudinal stick inputs. Longitudinal cyclic movements of 0.1 inch, if held, may cause the DASH actuators to hard-over. If longitudinal cyclic movement is required for taxing, set the AFCS/DAFCS SEL switch to "OFF".

Note. Hovering over water with minimum drift is difficult and requires proper scanning techniques and proper crew coordination. If possible, select a stationary object as a visual reference.

---

(4) Water operation (ramp down) considerations:

(a) A safety boat is present when performing recovery operations.

(b) Brief medical support available.

(c) Communication must be maintained during recovery operations.

b. NCM.

(1) Before the flight, ensure that the center cargo hook is stowed and the lower rescue door secure. Install all fuselage drain plugs (during ramp down water operations, do not install ramp drain plugs). Inspect the seal on all lower antenna mounts and inspect access panels for security. Install static line for use as a handhold.

(2) During the approach, perform a reconnaissance of the landing area. Assist the PIs with determining the suitability of the landing area.

(3) During the descent, advise the PIs, in 25 foot increments, of the height of the aircraft above the water. Advise the PIs if any debris or submerged objects are near the landing site. At 10 feet, advise the PIs, in 1-foot increments, of the height of the aircraft until the AFT wheels contact the water. During descent for ramp down operations, the crewmember positioned at the forward cabin door will report altitudes from 100 feet to 25 feet to 10 feet in 5 foot increments, 10 feet to 1-foot in 1-foot increments, followed by a report of ramp contact with the water.

(4) While in the water, the NCM will advise the PIs of any unusual water accumulation in the cargo area. During ramp down operations the NCM will advise the PIs of the water level before it reaches fuselage station 400.

(5) During takeoff, the NCM will advise the PIs when the wheels are clear of the water (ramp clear during ramp down operations).

(6) At the completion of the mission, enter appropriate information on DA Form 2408-13. Ensure that all required inspections and service are performed.

OVERWATER CONSIDERATIONS:

1. All crewmembers will wear floatation devices IAW AR 95-1.

2. Overwater flight, at any altitude, is characterized by a lack of visual cues, and, therefore, has the potential of causing visual illusions. To minimize spatial disorientation, the crew should use "RAD ALT" hold during overwater flight.

3. Be alert to any unannounced changes in the flight profile and be prepared to take immediate corrective actions. The "RAD ALT" low bug should be set to assist in altitude control.

4. Operations become increasingly more hazardous as references are reduced (open water versus a small lake), water state increases (calm to chop to breaking condition with increasing wave height), and visibility decreases (horizon becomes same color as water, water spray [or rain] on windshield, sunny mid-day versus twilight).

5. Hazards to flight such as harbor lights, buoys, wires and birds must be considered during overwater flight.

NIGHT OR NIGHT VISION GOGGLES CONSIDERATIONS: Spatial disorientation can be overwhelming during nighttime overwater operations. If there are visible lights on the horizon or if the shoreline can be seen, the PI may opt to approach the cast area so the aircraft is pointed toward these references, if the wind permits. Proper scanning techniques are necessary. Conditions specified in the aircraft operator's manual must be met before the aircrew conducts nighttime water operations.

TRAINING AND EVALUATION REQUIREMENTS:

1. Training will be conducted in the aircraft.
2. Evaluation will be conducted in the aircraft.

REFERENCES: Appropriate common references and AWR for CH-47D/F helicopters to conduct water landing.

TASK 2081

Operate Night Vision Goggles

CONDITIONS: In a CH-47D/F helicopter and given a set of NVGs.

STANDARDS: Appropriate common standards and the following additions/modifications:

1. Preflight the NVGs.
2. Mount and adjust NVGs.
3. Identify or describe indications and procedures of NVG failure.
4. Store unit after use IAW TM 11-5855-263-10.

DESCRIPTION:

1. Crew actions.
   a. Any crewmember will announce when his or her attention is focused inside the aircraft.
   b. After use, ensure batteries are removed. Store the unit IAW TM 11-5855-263-10.
2. Procedures.
   a. Ensure the NVGs are within inspection dates and check for serviceability.
   b. Adjust for proper fit, focus, and diopter setting.
   c. If the P*'s NVG fail or indicate impending failure, the P* will announce "GOGGLE FAILURE" and transfer the controls to the P if necessary. During NOE or contour flight, the P* will begin a climb at a rate that will ensure obstacle avoidance. During low-level flight or flight conducted at higher altitude, the P* will use the procedure described above. A climb is not required.
   d. If the P or other crewmembers NVG fail or indicate impending failure, that crewmember will announce "GOGGLE FAILURE" and switch batteries or troubleshoot the goggles. If the NVG are not restored to operation, make the appropriate report and modify the mission as briefed.

Note. NVG tube failure is infrequent and usually provides ample warning. Only occasionally will a tube fail completely in a short time. Rarely will both tubes fail at the same time. There is no remedy for inflight tube failure.

TRAINING AND EVALUATION REQUIREMENTS:

1. Training may be conducted in the aircraft or CH-47 FS/TFPS.
2. Evaluation will be conducted in the aircraft only.

REFERENCES: Appropriate common references and TM 11-5855-263-10.

TASK 2086

Operate Heads-Up Display System

CONDITIONS: In a CH-47D/F helicopter with a functioning HUD system.

STANDARDS: Appropriate common standards plus the following additions/modifications:

1. Describe and demonstrate correct terminology and usage of the ANVIS HUD IAW the appropriate operator's manual.
2. Program the ANVIS HUD as desired for mission requirements.

DESCRIPTION: Perform operational procedures for the ANVIS HUD. These include assembly, preparation for use, operating procedures and equipment shutdown.

> ***Note.*** The HUD display is considered supplemental equipment. Therefore, one RCM may fly with the HUD and the other without.

TRAINING AND EVALUATION REQUIREMENTS:

1. Training may be conducted in the aircraft or CH-47 FS/TFPS.
2. Evaluation will be conducted in the aircraft.

REFERENCES: Appropriate common references and TM 11-5855-300-10.

TASK 2112

Operate Armament Subsystem

Note. This task only applies to NCMs.

WARNING

This task may only be performed by personnel qualified to operate the weapon system IAW FM 3-04.140 and is not to be used a method of qualification. Observe all safety precautions for uploading ammunition IAW TM 9-1095-206-12&P. To prevent accidental firing, do not retract bolt and allow it to go forward if belted ammunition is in feed tray or a live round is in chamber. Move cocking handling forward by hand.

WARNING

Ensure that the M24 cabin window left side and M24 right door pintles are installed in the correct location. Ensure that each unique elevation stop cam follower is installed on the correct pintle. Failure to do so can result in firing the M240H weapon into the structure of the helicopter.

CONDITIONS: In a CH-47D/F helicopter with the armament subsystem installed with a qualified crewmember.

STANDARDS: Appropriate common standards and the following additions/modifications:

1. Install and preflight the armament subsystem IAW the aircraft and subsystem operator's manual and the weapon TM.
2. Load and safe the weapon.
3. Acquire and identify target.
4. Estimate range to target.
5. Engage targets IAW weapon control measures, mission briefing and ROE.
6. Apply appropriate firing techniques.
7. Suppress, neutralize or destroy as applicable.
8. Describe or perform EPs for misfire, hang-fire, cook-off, runaway gun, ruptured cartridge and double feeding.
9. Clear and safe the weapon.
10. Enter appropriate information, if required, on DA Form 2408-12, DA Form 2408-13, and DA Form 2408-13-1.

DESCRIPTION:

1. Crew actions.

a. The NCM will coordinate with and brief any additional ground support personnel before installing and loading the weapon system. Perform installation and preflight inspection of the weapons system.

b. The NCM will brief all necessary personnel on EPs. The NCM will direct assistance from any additional ground support personnel to aid with installing and loading the weapon. The NCM will ensure that the proper amount of ammunition is loaded onboard the aircraft IAW the mission briefing.

2. Procedures.

a. Brief additional ground support personnel as necessary.

b. Perform installation and preflight inspection of the weapon, ensuring that the gun is safetied to the pintle. Ensure that the ejector control bag and ammunition can are installed.

c. During loading of ammunition, observe all safety precautions while loading. After loading the ammunition, ensure that the safety button is in "S" position (safe).

d. To initiate the firing sequence, push the safety button to the "F" position (fire), press the trigger fully and hold. Low cycle rate of fire of the machinegun allows single round firing or short bursts. The trigger must be completely released for each shot.

e. Conduct weapons engagement IAW the mission briefing, ROE and crew briefing. After acquiring and identifying the target, estimate range and ensure that the target is within the weapons field of range and the kill zone is within the weapons effective range.

f. Use correct firing techniques and ballistic corrections to successfully suppress, neutralize, or destroy the threat, as applicable. Consideration must be given to the visibility of friendly and enemy positions and trying to preclude any undesirable collateral damage or fratricide incidents.

g. Perform any firing malfunctions EPs as required for misfire, hang-fire, cook-off, runaway gun, or double feeding of cartridges. Firing malfunctions and corrective actions must be committed to memory.

h. After target engagement, clear and safe the weapon. Ensure that the safety button is in the "S" position.

i. After completing the mission, record any information as required on DA Form 2408-12, DA Form 2408-13, and DA Form 2408-13-1. Refer to FM 3-04.140 for details on helicopter gunnery qualification.

MULTI-HELICOPTER DOOR GUNNER EMPLOYMENT:

1. Aircrews and DGs in the formation must use effective crew coordination procedures to visually acquire, identify and engage targets. Both aircraft and passengers are vulnerable to attack during air movement operations and throughout all phases of air assault operations.

2. Therefore, it is imperative that DGs respond by delivering direct and indirect fire on these targets. The unit must develop SOPs covering the employment of DGs during formation flights.

NIGHT OR NIGHT VISION GOGGLES CONSIDERATIONS:

1. During night or NVG operations, range estimations will be more difficult, which will require using proper scanning techniques. Correct firing techniques and ballistic corrections will be more critical for target suppression or destruction.

2. When wearing NVGs during firing, target loss may accrue momentarily due to muzzle blast and the brightness of the tracers.

3. Utilizing a LASER will increase target acquisition and ballistic corrections.

TRAINING AND EVALUATION REQUIREMENTS:

1. Training will be conducted in the aircraft and academically.

2. Evaluation will be conducted in the aircraft.

REFERENCES: Appropriate common references and FM 3-04.140.

TASK 2125

Perform Pinnacle/Ridgeline Operations

CONDITIONS: In a CH-47D/F helicopter with the before-landing check completed and HVR OGE PWR AVAIL.

STANDARDS: Appropriate common standards and the following additions/modifications:

1. RCM actions.
   a. Correctly determine PWR requirements/WT limitations before conducting this task.
   b. Cross major ridgelines at a 45-degree angle.
   c. Correctly determine wind direction for pinnacle landing.
   d. Maintain a constant approach angle.
   e. For transition from terrain flight, align aircraft with landing direction below 100 feet or as appropriate.
   f. MAX rate of descent during the last 100 feet of a pinnacle approach will not exceed 300 FPM.
2. NCM actions. Assist in determining the suitability of the landing area for the operation being performed.

DESCRIPTION:

1. Crew actions.
   a. Determine PWR requirements.
      (1) Use current/forecast PA and TEMP to determine PWR requirements for the conditions at takeoff, cruise and arrival.
      (2) Prior to takeoff, analyze winds, obstacles and density altitude. Perform a HVR PWR check, if required.
      (3) The P* will select a takeoff angle, depending on the wind (demarcation line), density altitude, GWT and obstacles. After clearing obstacles, accelerate the aircraft to the desired airspeed.
   b. When flying in a valley.
      (1) The aircraft should be flown in the smoother up-flowing air on the lifting side of the valley (windward side).
      (2) Under light winds, the aircraft should be flown closer to the side of the valley. This allows MAX distance to turn 180 degrees should it become necessary for Wx or enemy situation. Additionally, less populated areas are present on the side of the valleys as opposed to the center of the valley. Caution should be used when flying on the leeward side due to potentially significant downdrafts.
      (3) At higher GWTs and PAs, the MAX allowable airspeed will decrease. It may be necessary to decrease airspeed to remain within aircraft limitations and prevent blade stall.
   c. Select an approach angle.
      (1) Depending on winds (demarcation line), density altitude, GWT, and obstacles, select an approach angle. An approach angle of 30 degrees or less will minimize the possibility of settling-with-PWR.
      (2) During the approach, continue to determine the suitability of the intended landing point. The rate of closure may be difficult to determine until the aircraft is close to the landing area. Reduce airspeed to slightly above ETL until the rate of closure can be determined.
      (3) Before reaching the edge of the landing area, reconfirm performance planning and determine if sufficient PWR will be available.

(4) Base on the performance data, decide whether to continue the approach (or make a go-around). If a go-around is required, it should be performed before decelerating below ETL. If the approach is continued, terminate in the landing area to a HVR (or to the surface).

(5) After touching down, check aircraft stability as the thrust control is lowered.

Note. Performing this maneuver in certain environments may require HVR OGE PWR. Evaluate each situation for PWR required versus PWR AVAIL.

Note. A mountain environment is defined IAW the FAR Part 91 for the CONUS. Areas not depicted in FAR Part 91 or host country publications will be identified as mountainous when in an area of steeply sloping terrain, with more than 500 feet elevation relief and terrain elevation more than 5,000 feet above MSL).

Note. To successfully operate in small areas, it may be necessary to place the nose of the aircraft over the edge of the landing area. This may cause a loss of important visual references on final approach. In some locations, it may not be possible to lower the forward or aft landing gear on the ground while on/off loading. The description of performing a slope landing in Task 1062 in this ATM may be used for this type of landing. All crewmembers must assist in providing information on aircraft position in the landing area.

NIGHT OR NIGHT VISION GOGGLES CONSIDERATIONS: More detailed flight planning is required for nighttime flights. When selecting colors for navigational aid(s) (such as maps and kneeboard notes), interior cockpit lighting should be considered.

TRAINING AND EVALUATION REQUIREMENTS:

1. Training.

   a. Training may be conducted in the aircraft or FS. Academic and flight training may be conducted at high-altitude Army aviation training site (HAATS), or using the HAATS, mountain training POI if available or the recommended POI in FM 3-04.203, chapter 4.

   b. The optimal flight training area is an actual mountain environment. If unforeseen circumstances prevent the accomplishment of this training in the aircraft, then a compatible visual FS may be used for training and evaluation. If a FS is used for training, the datum plane will be set no lower than 5,000 feet MSL for the training area selected. The TEMP, wind, and aircraft GWT should be varied to achieve the MAX training effect.

2. Evaluation. An evaluation may be required at the discretion of the commander in the aircraft or FS/TFPS.

REFERENCES: Appropriate common references.

TASK 2127

Perform Combat Maneuvering Flight

CONDITIONS: In a CH-47D/F helicopter in a training area or tactical environment with combat maneuvering flight briefing complete.

STANDARDS: Appropriate common standards and the following additions/modifications:

1. Establish entry altitude, ±100 feet.
2. Establish entry airspeed, ±10 KIAS/KCAS.
3. Maintain the aircraft in trim ±1 ball width.
4. Maintain pitch attitude not to exceed 20 degrees.
5. Maintain roll not to exceed 60 degrees.
6. Maintain aircraft within limits and flight envelope.
7. Correctly perform crew coordination actions.

> **CAUTION**
>
> Do not exceed CGI limits during the execution of these maneuvers. Initiate training at altitudes of no lower than 500 feet AHO with a minimum recovery altitude of 200 feet AHO to ensure adequate room to recover.

DESCRIPTION:

1. Crew actions.

   a. The PC will consider and ensure the crew is aware of the effects of an ENG failure during combat maneuvering flight. Airspeed should be maintained between minimum and MAX SE airspeed. If an ENG failure occurs above or below these airspeeds, TQ will immediately double, associated with possible contingency PWR application.

   b. The P* will announce the maneuver to be performed and any deviation from the maneuver. The P* will remain primarily focused outside the aircraft throughout the maneuvers. The primary reference during these maneuvers will be the visible horizon. The P* will make smooth and controlled inputs. Desired pitch and roll angles are best determined by referencing aircraft attitude with the outside horizon and/or HUD symbology. The P* will only momentarily divert focus during critical portions of the maneuver to ensure trim, TQ and rotor control are maintained. The P* also will announce recovery from the maneuver.

   c. The P will maintain airspace surveillance and momentarily divert focus during critical portions of the maneuver to ensure trim, TQ, CGI control, maneuver parameters or aircraft limitations are not exceeded. The P will provide adequate warning to avoid enemy, obstacles or traffic detected in the flight path and any deviation from the parameters of the maneuver. The P will also announce when his or her attention is focused inside the cockpit; for example, when monitoring airspeed, altitude, attitude or CGI.

2. Procedures.

   Note. Performing these maneuvers in certain environments may require HVR OGE PWR. Evaluate each situation for PWR required versus PWR AVAIL.

   a. Decelerating turn. The decelerating turn is used to rapidly change the direction of the aircraft at low level altitudes while trading airspeed energy to maintain safe operational altitude. The angle of

bank, forward airspeed, GWT and environmental conditions at the initiation of the maneuver will determine the type/amount of deceleration necessary to slow the aircraft to maintain altitude.

(1) During flight with lower forward airspeed, typically below MAX R/C airspeed, the deceleration will require an increase of thrust control, resulting in an increase in TQ. While at airspeeds greater than MAX R/C, the airspeed may be traded off while adjusting thrust control to maintain TQ within limits and maintain altitude.

(2) Maneuver is typically initiated at airspeeds of 120 to 130 KIAS/KCAS to effect a direction change while maintaining altitude. For initial training, enter the maneuver at 110 KIAS/KCAS and the appropriate TQ. Apply directional cyclic to initiate turn. As aircraft begins to move about the roll axis, apply aft cyclic as necessary to maintain altitude by trading airspeed. Apply pedal as necessary to obtain the appropriate rate of turn. Adjust thrust control as necessary to maintain altitude and rotor within limits consistent TQ (±15 percent of target). To recover, apply opposite and forward cyclic while applying opposite pedal and adjusting thrust control to maintain TQ within limits as the rotor system unloads.

Note. For initial training, enter the maneuver at 110 KIAS/KCAS and appropriate TQ. Also, do not exceed cruise TQ setting throughout the maneuver to operating at MAX TQ AVAIL.

b. Break turn. The break turn is used at terrain and cruise flight altitudes to rapidly change the direction of the helicopter while maintaining or gaining airspeed. As altitude allows, this turn also enables a simultaneous three-axis change of position and direction. This maneuver is effective when performing evasive maneuver against small arms and air defense artillery or to employ weapons.

(1) At cruise altitudes, apply directional cyclic to the initiate turn. The P* will focus his or her attention outside using the horizon as the primary reference for this maneuver. As roll rate and angle increases, the nose may begin to drop. Allow this to occur while maintaining aircraft in trim. Recovery is affected by applying opposite cyclic (roll) when reaching the desired heading. Once the aircraft is wings-level, adjust thrust and cyclic control to obtain the desired airspeed and altitude.

(2) At terrain flight altitudes, consider desired direction of turn before initiating. Initiate with aft cyclic to ensure adequate obstacle clearance, followed immediately by directional cyclic to initiate turn. Angles of bank are much lower than those utilized during cruise flight since sufficient recovery altitude may not be available.

(3) Maintain trim with pedals. Adjust cyclic as necessary to maintain the pitch attitude as necessary to prevent excessive nose-low attitude to prevent sink-rate build-up.

(4) To recover, apply opposite and forward cyclic.

Note. Maneuver is typically initiated at airspeeds of 60 to 120 KIAS/KCAS. For initial training, enter the maneuver at 50 KIAS/KCAS at terrain flight altitudes and 100 KIAS/KCAS at cruise altitudes. Also, do not exceed cruise TQ setting throughout the maneuver to simulate operating at MAX TQ AVAIL.

CAUTION

Excessive bank angles at terrain flight altitudes may not allow sufficient recovery time. Airspeed (kinetic energy) may not be available to trade for lift and must be evaluated prior to and during the maneuver. This is aggravated as helicopter GWT and density altitude increase. Do not allow high sink rates to develop, as recovery altitude may not be sufficient. This is aggravated as helicopter GWT and density altitude increase.

c. Dive/dive recovery. This maneuver is used at altitudes above terrain flight to rapidly mask from a threat by placing the aircraft in a dive. This maneuver can be employed when necessary to break contact with enemy fire while maintaining intervisibility for suppressive fire.

(1) To dive the aircraft as a result of potential enemy contact, apply forward cyclic to obtain the desired dive angle. Adjust the thrust to facilitate the rapid descent and maintain the aircraft in trim above 40 KIAS/KCAS.

(2) Recover at an altitude that will allow sufficient time to arrest the sink rate after thrust and cyclic control has been applied to recover from the dive. The sink rate may be exacerbated by high GWT.

(3) If the aircraft may have been observed by enemy threat, it may be necessary to turn to an oblique angle of approximately 30 degrees to 45 degrees to evade while minimizing the profile of the aircraft and orienting crew served weapons for suppressive fire.

Note. Initiate the maneuver for training at no greater than 80 KIAS/KCAS, not less than 1,000 feet AGL and recover not less than 200 feet AGL.

Note. During this maneuver, airspeed will increase rapidly. Ensure airspeed does not exceed V_{NE} by initiating a recovery prior to the limit.

NIGHT OR NIGHT VISION GOGGLES CONSIDERATIONS:

1. Rapid evasive maneuvers will be more hazardous due to division of attention, limited visibility, and aircraft limitations. Be particularly aware of aircraft altitude and three-dimensional position in relation to threat, obstacles and terrain. Proper sequence and timing is critical in that the P* must announce intentions prior to initiating maneuvers that might cause spatial disorientation. Select a reference point to maintain orientation on threat or friendly troops to aid in maintaining SA. Reference points may be acquired by selecting a GPS reference point or prominent terrain feature.

2. As airspeed increases, altitude above the obstacles should also increase. Bank angle(s) should be commensurate with ambient light and altitude above the terrain. High bank angles will result in an inaccurate readout from the RAD ALT and therefore, is not reliable. Use of NVGs without HUD symbology display will require greater crew coordination to monitor TQ, airspeed, trim and rates of descent information not present with NVGs only.

Note. While performing combat maneuvering flight, visual contact with other aircraft in the formation may be lost due to maneuvering or reduced visibility. If this occurs, the crewmember should announce loss of visual contact and transmit a call to the other aircraft in the formation.

TRAINING AND EVALUATION REQUIREMENTS:

1. Training. It is recommended that DES conduct initial training on trainers, however units are authorized to "Self-start" by training and evaluating crewmembers using conditions, standards, and the description as outlined in this task. IPs and NCM instructors (FIs) will not train or evaluate this task until they have been successfully evaluated by an SP or SI (as appropriate). All other duty designations will be trained and evaluated by an SP/IP or an SI/FI prior to conducting this task. Continuation training may be conducted by qualified crewmembers in the aircraft or CH-47 FS/TFPS.

2. Evaluations will be conducted in the aircraft.

Note. Crewmembers will ensure that the appropriate authority has authorized this training.

Note. Training combat maneuvering flight with AFCS/DAFCS-OFF is not authorized.

REFERENCES: Appropriate common references, Task 1000, Task 1010, Task 1026, Task 1044, Task 1052, Task 1188, Task 1402, Task 1404, Task 1406, Task 1408, Task 1410, Task 1411, Task 1413, Task 2010, Task

2086, Task 2112, Task 2125, The Army Aviator's Handbook for Maneuvering Flight and Power Management, TM 1-1520-240-10, TM 1-1520-271-10, and unit SOP.

This page intentionally left blank.

Chapter 5

Maintenance Test Pilot Tasks

This chapter describes the tasks essential for maintaining maintenance crewmember skills. It defines the task title, number, conditions, and standards by which performance is measured. A description of crew actions, along with training and evaluation requirements is also provided. This chapter contains tasks to be performed by qualified CH-47 MP IAW AR 95-1 and chapter 2 of this document. This chapter also contains tasks and procedures to be used by contractor MPs IAW AR 95-20. If discrepancies are found between this chapter and TM 1-1520-240-MTF or TM 1-1520-271-MTF, the TM takes precedence.

5-1. **TASK CONTENTS**.

a. **Task number.** Each ATM task is identified by a 10-digit SAT number. The first three digits of each task are 011 (U.S. Army Aviation School) or 096 (EAATS); the second three digits are 240 or 271 (CH-47D or F cargo helicopter). For convenience, only the last four digits are listed in this TC. The last four digits correspond to the MP tasks listed in table 2-9, page 2-14:

- Base tasks are 1000-series numbers.
- Mission tasks are 2000-series numbers.
- Maintenance tasks are 4000-series numbers.

Note. Additional tasks designated by the commander as mission essential are not included in this ATM. The commander will develop conditions, standards, and descriptions for those additional tasks.

---

b. **Task title.** This identifies a clearly defined and measurable activity. Task titles may be the same in many ATMs, but task content will vary with the airframe.

c. **Conditions.** This specifies the common wartime or training/evaluation conditions under which the MP tasks will be performed.

d. **Standards.** The standards describe the minimum degree of proficiency (or standard of performance) to which the task must be accomplished. Standards are based on ideal conditions to which the task must be accomplished. The common standards listed in chapter 4 apply to all tasks listed in this section unless specifically stated otherwise. The following common standards apply to all MP tasks:

(1) Perform procedures and checks in sequence IAW the appropriate MTF manual, as required.

(2) Brief the RCM/NCM on the procedures, applicable warnings, and cautions for the task to be performed. If performing an autorotation RRPM/N_R check, or PAC, a detailed brief will be conducted to include limitations, thrust control positions of ground detent, full down, relax pressure, PWR recovery (autorotation), and EPs for SE or DUAL-ENG failure during the various stages of each maneuver.

(3) Perform crew coordination actions IAW the task description in chapter 6.

(4) Assess and address any malfunctions or discrepancies as they occur and apply appropriate corrective actions or troubleshooting procedures.

(5) Use the oral call out and confirmation method and announce the initiation and completion of each check.

(6) Direct assistance from other crewmembers and ground crew as required.

(7) When a system or ENG is not subject to a specific MTF manual check, ensure the system is checked IAW the appropriate operator's manual. An example is a limited maintenance test flight

(LMTF) for a No.1 ENG replacement; the No.2 ENG must have the appropriate operator's manual checks performed (such as FADEC REV system(s) check or PAT).

(8) Anytime an ECL is moved to the ground position, the MP will verify the ENG is stabilized at ground idle.

e. **Description.** The description explains how the elements of the task should be done to meet the standards. When specific crew actions are required, the task will be broken down into crew actions and procedures as follows.

(1) Crew actions. These define the portions of a task to be performed by each crewmember to ensure safe, efficient, and effective task execution. When required, MP responsibilities are specified. All tasks in this chapter are only to be performed by qualified MPs/MEs or student maintenance test PIs undergoing qualification training as outlined in AR 95-1. The MP is the PC in all situations, except when being trained or evaluated by an ME. For all tasks, MP actions and responsibilities are applicable to MEs. When two MEs are conducting training/evaluation together or two MPs are jointly performing TF tasks, the mission brief will designate the aviator assuming PC responsibilities.

(2) Procedures. This section includes additional information to augment the MTF manual.

(3) Crew stations. For general maintenance test flights (GMTFs), the MP will be in the left seat. For LMTFs, this section will identify when the MP must be in the left seat to ensure safe, efficient and effective completion of task execution. These tasks are listed below.

(a) Starting ENG checks-Control interference, neutral pedal measurement, cyclic position indicator measurement control and flight control HYDs check, ENG start abort, initial ENG start, over-speed (OVSPD), REV start.

(b) ENG Run-up checks-GEN under-frequency.

(c) Before HVR check-FADEC system and REV mode beep.

(d) HVR-Mechanical rig, control positions, and TQ differential check.

(e) Inflight checks-60 and 140 KIAS/KCAS speed sweep if lateral/pedal measurements are required, autorotation and PAC.

f. **Training and evaluation requirements.**

(1) Other than RL progression and APART, tasks can be performed/evaluated in the aircraft, FS/TFPS, or academic environment. The evaluation criteria are addressed in the standard section of this chapter and any additional standards in the specific task. If one (or more) checkis performed unsatisfactorily, the task will be graded with a "U" (unsatisfactory). However, when the task is reevaluated, only those unsatisfactory checks must be reevaluated.

(2) Checks. At a minimum, the following checks will be evaluated for MP/ME APART purposes:

(a) Preflight.

(b) Control interference.

(c) Control interlock.

(d) Control centering.

(e) ENG checks (one ENG only):

- Abort start.
- ENG Start-primary mode.
- OVSPD.
- ENG Start-REV mode.
- FADEC system (SYS) (including REV mode beep).
- Generator checks.
- Ground instability.
- AFCS/DAFCS Function, HVR and inflight (No.1, No.2, or BOTH) (No.1 or No.2 only [F]).

Note. DAFCS is not evaluated when the switch is in the "BOTH" position.

- TQ differential.
- Thrust control cockpit position transducer check.
- Autorotation.
- PAC including calculating a trigger value.

(3) Evaluator. The evaluator may evaluate any additional maintenance tasks during the evaluation in addition to the minimum required maneuvers for APART. For MP APART evaluation (MP is RL 1), the MP will be in the left seat during the evaluation and the ME may occupy any other crew station if authorized on the DA Form 7120-R. If the MP is in mission training for maintenance tasks (MP is RL 2), the ME may perform training from the left or right seat. During final evaluations intended on designating an MP RL 1 following the completion of mission training, the ME will be in the right seat. For ME APART evaluation, the evaluator may be in the left seat or other crew station, if authorized on DA Form 7120-R and there is a qualified MP in the left seat. The ME will be evaluated on his or her ability to evaluate, assist and recover from the minimum tasks and any additional task(s) as selected by the evaluator.

(4) If the MP/ME is required to perform MTFs in both the CH-47D and CH-47F, evaluation requirements will be conducted in the CH-47F due to CH-47F specific tasks. If this requirement cannot be met due to aircraft or personnel availability the evaluation may be conducted in the CH-47D with the approval of the ATP waiver authority.

(5) References. The references are sources of information relating to that particular task. In addition to the common references listed in chapter 4, the following references apply to all MTP tasks (These references apply to each of the tasks listed in this chapter and will not be listed for each task):

(a) Aircraft logbook and historical records.

(b) TM 1-1500-328-23.

(c) DA Pam 738-751.

(d) TM 1-1520-240-10.

(e) TM 1-1520-240-CL.

(f) TM 1-1520-240-MTF.

(g) TM 1-1520-271-10.

(h) TM 1-1520-271-CL.

(i) TM 1-1520-271-MTF.

(j) IETM 1-1520-240-23&P.

(k) TM 11-1520-240-23.

(l) IETM 1-1520-271-23&P.

(m) IETM 11-1520-271-23&P.

(n) AR 95-1.

(o) AR 750-1.

(p) AR 700-138

(q) TM 1-2840-265-23.

(r) TM 1-6625-724-13&P.

(s) Applicable airworthiness directives or messages from the U.S. Army Aviation And Missile Command (AMCOM) or Aviation Missile Life Cycle Management Command (AMLCMC).

5-2. **TASK LIST**.

a. **Standards versus descriptions.** The standards describe the minimum degree of proficiency or standard of performance to which the task must be accomplished. Attention to the use of the words “will,” “should,” “shall,” “must,” or “may” throughout the text of a task standard is crucial. The description explains one or more recommended techniques for accomplishing the task to meet the standards.

b. **Critical task.** The following numbered tasks are CH-47 MP critical tasks.

TASK 4000

Perform Prior-to-Maintenance Test Flight Checks

CONDITIONS: In a CH-47D/F helicopter and given the applicable MTF manual/CL.

STANDARDS: Appropriate common standards and the following additions/modifications:

1. Perform the preflight inspection IAW the appropriate aircraft MTF manual/CL.
2. Determine the suitability of the aircraft for flight and the mission to be performed.
3. Ensure that all follow-on maintenance checks or inspections are completed and/or entered in the logbook and entries made IAW DA PAM 738-751 and applicable TMs.
4. Determine the maneuvers, checks, and tasks required during the TF.
5. Verify rotor track and balance/vibration analysis equipment is secure/installed IAW the applicable TM as required.

DESCRIPTION:

1. Crew actions.
   a. The MP will contact maintenance/quality control personnel to determine the maintenance activity that has been performed on the aircraft.
   b. The MP will ensure a thorough preflight is conducted. The MP will personally preflight areas involved in the maintenance activity(s) with the appropriate aircraft MTF manual. He or she may direct the RCM to complete other elements of the preflight as appropriate. The RCM will complete the assigned elements and report results to the MP. The MP will ensure all preflight checks have been completed.
   c. The MP will ensure logbook forms and records are reviewed and appropriate entries made IAW DA PAM 738-751 and applicable TMs.
   d. The MP will determine checks necessary during the preflight and brief the crew on what checks are to be accomplished during the TF. The briefing will include required procedures and stress flight safety considerations during the TF maneuvers that will be performed.
2. Procedures. Perform IAW the applicable MTF manual and as follows:
   a. Conduct GMTF IAW the appropriate MTF manual and LMTF IAW the appropriate MTF manual and operators CL.
   b. The MP should direct assistance from the RCM and NCM. The RCM and NCM will assist the MP as directed. Since the checks are detailed with numerous steps required, the MP, RCM, and NCM will keep the other crewmembers informed of the actions they are taking.
   c. Record data as required for checks to be performed. Direct assistance from the RCM or NCM for recording of information as required.
   d. Verify all required steps are completed.

TRAINING AND EVALUATION REQUIREMENTS:

1. Training will be conducted in the aircraft or academically.
2. Evaluation will be conducted in the aircraft.

REFERENCES: Appropriate common references.

TASK 4081

Perform Before-Starting Engines Checks

CONDITIONS: In a CH-47D/F helicopter and given access to the applicable MTF manual/CL.

STANDARDS: Appropriate common standards and the following additions/modifications:

1. Visually verify first stage mixing unit stops during control interference check as required.
2. **D** Brief RCM on adjusted cyclic longitudinal neutral position (3/4 inches aft) if DASH actuator has been set to 36.0 inches and electrically disconnected in CH-47D.
3. **D** During the cyclic stick position indicator check, determine if measurement is to the bottom of the "ball" or the bottom of the red marking on the stick position indicator for CH-47D. (**F**) Verify stick position indicator is IAW the note in the MTF manual for CH-47F.
4. Ensure personnel and equipment are clear of the cargo ramp, and cargo ramp control valve prior to performing cargo ramp operational checks.
5. **F** Confirm proper GPS/INU/EGI operation/alignment.
6. **F** Ensure WT is entered accurately into the CAAS IAW the aircraft's current configuration.

DESCRIPTION:

1. Crew actions.

   a. The MP will personally perform the control interference check, obtain neutral pedal measurement, control break-out forces check, flight control and travel checks in BOTH, No.1 and No.2 flight control HYD system.

   b. The MP will direct assistance from RCM, NCM and ground crew (if applicable) and they will assist the MP as directed.

2. Procedures. Perform IAW the appropriate MTF manual and as follows:

   a. Physically check functionality of all cockpit switches and controls and set as required for the MTF. Include all CBs, alternating current gang bars, spring-loaded switches, guarded switches, knobs, and rheostats. Direct the NCM to assist with cabin area CBs as required.

   b. AN/ARC-186 Communication check. Select "MAN" (manual) with the "MAN/NORM/GUARD" switch on the "EMERG AUX" control panel to energize the AN/ARC-186 control set in the center console. Manually tune desired frequency, place "CAP TX" select function switch to "POS (position) 3" and verify transmit/receive capability. Program/check control set pre-sets as required. Place "MAN/NORM/GUARD" switch back to "NORM" after operation of control set if verified.

   c. Aircraft lighting. Ensure all interior and exterior lighting functions IAW the appropriate operator's manual and MTF manual. Direct assistance from the RCM as required to verify cockpit lighting functionality and the NCM to verify cabin and exterior lighting responses as required.

   d. Interphone check. Check pilot and co-pilot cyclic trigger switches at both detents floor switch and HOTMIC. Direct NCM to check additional ICS stations push-to-talk, HOTMIC and floor switch (if installed) and hoist operators panel ICS. (**F**)Verify VOX, CALL, HOTMIC, and private functionality at all stations in CH-47F.

   e. Cyclic trim. Check switches control their respective actuators and function as prescribed in the MTF manual.

   f. Control interference check. Depress centering device release switch and move either directional pedal to full forward travel. Check for contact between the aft positioned pedal adjustment lever and forward edge of cockpit floor structure. If contact exists, the MP or NCM will visually check the outboard bellcranks in the first stage mixing unit for contact with the mechanical stops IAW the note in the MTF to verify the floor structure is not the source of flight control range limiting. The left directional pedal in the forward position will require checking of the lower stop while the right directional pedal forward will require checking the upper stops. The bellcranks must make contact with

the stops prior to the pedal making contact with the floor structure. With the centering device release switch depressed, move the cyclic full forward then laterally towards the aft positioned directional pedal. The pedals should displace slightly (aft pedal moves forward away from cyclic and forward pedal moves aft) as the cyclic comes in close proximity to the aft pedal. Allowable contact between the cyclic tube and aft pedal adjustment lever will be IAW the note in the MTF manual. During the above stated procedures, check for interference between cyclic tube and floor structure and forward portion of the cyclic boot plate as well as for interference between the cyclic grip and instrument panel.

g. Obtain neutral pedal measurement. Depress centering device release switch and center the directional pedals. The pedals do not need to be perfectly centered. Place a tape measure flat on the floor structure and measure distance between the aft face of each pedal assembly and the forward edge of the cyclic boot plate. Noting each measurement, mathematically compute the average. The result of this computation is the neutral pedal measurement. This measurement reference will allow the MP to measure only one pedal to determine pedal separation during the rest of the MTF. If this measurement is not obtained, both pedals will need to be measured in order to determine separation.

h. Cyclic stick position indicator check. Verify the rigging/adjustment of the stick position indicator so that it may be used for future longitudinal stick position measurements during the MTF with the following procedures. Reference longitudinal and lateral measurement labels in the cockpit and place the cyclic in position according to the labels. The measurement will be made from placard target to the center of the FLARE DISP button on CH-47D and IAW the figure in Section 5 of the operator's manual for CH-47F (MTF manual). Once cyclic has been positioned to satisfy the measurements, note the stick position indicator. The indicator should read IAW the appropriate MTF manual. If this procedure is not completed or the stick position indicator is found to be in error, a tape measure must be used to obtain longitudinal stick position measurements until the error is corrected.

i. Flight control travel and HYDs check. The MP will perform all checks in BOTH, No.1 and No.2 systems IAW the appropriate MTF manual. NCM will reference the maintenance panel to verify pressure indications as directed by the MP. The RCM may check their flight controls for travel and binding after the MP completes all steps in the appropriate MTF manual and the HYD FLT CONTR switch has been set back to "BOTH".

j. Control interlocks check. Control interlock is designed to prevent inadvertent selection of a non-pressurized or non-operational system. Verify interlock between the flight control HYD systems exists with the following procedures. The MP will direct assistance from the NCM to view flight control HYD PRESS indications on the maintenance panel. Using the "FLT CONT HYD SEL" switch, select either the "No.1 ON or No.2 ON" position. Monitoring the selected flight control HYD system pressure, place the associated PTU switch to "OFF". This will cause the HYD pressure in the selected system to decrease. As the pressure continues to decrease, note the pressure indicated when the opposite/de-selected FLT CONT HYD returns to normal operating pressure. The pressure of the selected system at which the opposite/de-selected system returns to normal operating pressure shall be IAW the note in the appropriate MTF manual.

k. Control centering check. Verify flight control pallet rigging, centering spring and magnetic brake operation with the following procedures.

(1) Depress the centering device release switch and move the cyclic to the mechanical stop in any axis. Release the centering device release switch and verify the cyclic remains within ½ inch of where it was released. Without pressing the centering device release switch, move the cyclic to the opposite stop in the same axis checking for binding in the centering spring and ability to override magnetic brake control centering. Relax pressure on cyclic and allow it to slowly return to the original trimmed position in the same axis. Verify the cyclic returns to the approximate original position. Check the remaining three axis with the cyclic, using the same procedures.

(2) Check the yaw axis by pressing the centering device release switch and setting either pedal full forward, and release the centering device release switch. Verify the pedals maintain the trimmed position within ½ inch. Without pressing the centering device release, move the other pedal to the full forward position and then allow it to return to its original trimmed position. Verify that it returns to the approximate original position. The RCM may ride along on the pedals

to ensure the pedals are not inadvertently released while displacing them against the center springs which may cause damage to the flight controls.

(3) If the flight controls do not return to the approximate original position, the NCM will need to inspect the flight control closet to confirm any magnetic brake slippage while overriding control centering with the centering springs as required. Balance spring settings may affect the controls returning to the approximate original trimmed position and should be considered in the above checks.

TRAINING AND EVALUATION REQUIREMENTS:

1. Training will be conducted in the aircraft and CH-47 FS/TFPS.
2. Evaluation will be conducted in the aircraft.

REFERENCES: Appropriate common references.

TASK 4088

Perform Starting-Engine Checks

CONDITIONS: In a CH-47D/F helicopter and given access to the applicable MTF manual/CL.

STANDARDS: Appropriate common standards and the following additions/modifications:

1. Set ECL to stop and perform alternate REV starting procedures as required IAW the appropriate operator's manual if REV start results in indications associated with a rich hung start.
2. Physically man the ECL until the ENG has stabilized at ground idle during all ENG starts.
3. Conduct leak checks on ENGs with the lower ENG cowling lowered so the ENG may be viewed directly to identify leak sources.
4. Check associated DECU/ECU hexadecimal display prior to each ENG start procedure.

DESCRIPTION:

1. Crew actions.

   a. The MP will personally perform the ABORT START, ENG START (primary [PRI] and REV), and OVSPD checks. The RCM will be at the flight controls during ENG start checks and may assist the MP with the OVSPD switch during the OVSPD check as directed or required by the MP. The MP will ensure the RCM and NCM are fully briefed on their rolls during ENG starting and over-speed checks.

   b. If the MP elects to have the RCM assist in the OVSPD check, the MP will have to man the thrust control while the RCM is operating the OVSPD switch. The NCM will monitor the maintenance panel, DECUs/ECUs and ENGs as directed by the MP.

2. Procedures. Perform IAW the applicable MTF manual and as follows:

   a. Abort start. Prior to initiating ENG start, a visual check for fuel leaks on both ENGs is recommended after the fuel boost pumps are turned "ON" and the XFEED (crossfeed) switch "OPENED". During ENG motoring/starting it is not uncommon to experience a delay in or lack of ENG oil PRESS indications during the abort start procedure on a newly installed ENG, or on an ENG that has not been operated for a prolonged period of time. If no oil PRESS is indicated during the abort start procedure, complete the abort start check and re-check for oil PRESS indications during the primary start procedure.

   b. REV Start. Indications of a hot start resulting from a rich hung start may be experienced during an ENG start in REV mode. This is especially true if the ENG has been started and shutdown previously (with residual PTIT indications). The ENG may be motored IAW the operators manual to lower PTIT before performing a REV start. This motoring action will reduce residual PTIT and may reduce the likelihood of a hot start. If indications of a rich hung or hot start are encountered during the REV start procedure, abort the start by setting the associated ECL to stop and perform alternate REV starting procedures as required IAW the appropriate operator's manual.

   c. OVSPD Check. With both ENGs at ground idle, slowly move the ECL of the ENG that requires the OVSPD check from ground towards FLT until RRPM/N_R is 79 percent. While advancing the ECL, verify the ENG passes through 70 percent N_1/N_G to check ENG XMSN clutch engagement. Setting the N_1/N_G near 79 percent initially may be helpful in achieving 79 percent RRPM/N_R. Using both the index finger and the thumb while operating the OVSPD switch will ensure positive control and help to prevent inadvertently releasing of the switch. With RRPM/N_R set to 79 percent, place the OVSPD switch to 1 or 2 as required and hold it in position. Verify fuel flow indications decrease to approximately 300 pounds per hour, indicating the OVSPD solenoid is in the "CLOSED" position and reducing fuel flow. Monitor TQ/N_1/N_G/PTIT for abnormal indications. Continue to hold the "OVSPD" switch until fuel flow begins to increase, indicating the OVSPD solenoid is beginning to "RE-OPEN". When the increase in fuel flow is noted, place the ECL of the ENG being checked to "STOP" and release the OVSPD switch. Ensure the OVSPD switch is released only after the ECL is set to "STOP".

Verify ENG shutdown from cockpit indications and the NCM. After ENG shutdown is verified, slowly move the ECL of the opposite ENG from "GROUND" towards "FLT" and set as required for the OVSPD check, or to maintain RRPM/N_R above 45 percent as IAW the MTF.

d. Verify all required steps are completed.

3. Crew stations. The MP must be in the left seat for ABORT START, PRIMARY START, REV START, and OVSPD checks.

TRAINING AND EVALUATION REQUIREMENTS:

1. Training will be conducted in the aircraft and CH-47 FS/TFPS.
2. Evaluation will be conducted in the aircraft.

REFERENCES: Appropriate common references.

TASK 4110

Perform Engine Run-Up Checks

CONDITIONS: In a CH-47D/F helicopter and given access to the applicable MTF manual/CL.

STANDARDS: Appropriate common standards and the following additions/modifications:

1. During the GEN under-frequency check, do not allow RRPM/N_R into 82 to 85 percent range.
2. Perform ENG, power-train vibration checks, or rotor track and balance IAW the applicable TM.

DESCRIPTION:

1. Crew actions. The MP will personally perform the GEN under-frequency checks.
2. Procedures. Perform IAW the applicable MTF manual/CL and as follows:

   a. When performing ENG vibration analysis, the aircraft may become light on the wheels when attempting to acquire data with the thrust control set above the "GROUND" detent. This light loading of the landing gear may cause cycling of the LCTs. If cycling occurs, the LCTs may be placed to "MANUAL". If "MANUAL" is selected, ensure LCTs are programmed to the "GROUND" position. Applying up to 2 inches of AFT cyclic may also be used to correct/prevent cycling, however this may cause the forward gear to leave the ground. Once the data has been acquired, and the thrust control is lowered back to the ground detent, place LCTs back to "AUTO" and/or neutralize flight controls as required.

   b. Direct sunlight will occasionally cause blade tracking camera acquisition errors and the aircraft may have to be repositioned before blade track data can be obtained.

   c. Apply power-train vibration corrections as required IAW the applicable IETM.

   d. Verify all required steps are completed.
3. Crew stations. The MP must be in the left seat for the GEN under-frequency checks.

TRAINING AND EVALUATION REQUIREMENTS:

1. Training will be conducted in the aircraft and CH-47 FS/TFPS.
2. Evaluation will be conducted in the aircraft.

REFERENCES: Appropriate common references.

TASK 4112

Perform Taxi Checks

CONDITIONS: In a CH-47D/F helicopter, given access to the applicable MTF manual/CL, with the before taxi check complete and aircraft cleared.

STANDARDS: Appropriate common standards and the following additions/modifications:

DESCRIPTION:

1. Properly clear the aircraft for ground taxi.
2. Do not exceed ground control limitations.

DESCRIPTION:

1. Crew actions. The MP will brief the RCM and NCM on the taxi plan and required wheel brake inputs during brake system checks. The MP will ensure the directional pedals are blocked as required while independently checking brake pedals so ground control limitations will not be exceeded.
2. Procedures. Perform IAW with applicable MTF manual and as follows:

   a. Wheel brakes. With the parking brake released, and the aircraft cleared for taxi, increase thrust control as required to begin a forward roll. Apply both brake pedals on the pilot's side and check for the ability to bring the aircraft to a full stop. Release the brakes and allow aircraft to roll forward again. Blocking the left directional pedal with the foot, independently apply foot pressure to the right brake pedal only as required to bring the aircraft to a full stop. Release the right brake pedal and allow the aircraft to roll forward again. Blocking the right directional pedal, independently apply pressure to the left brake pedal only as required to bring the aircraft to a full stop. Check right and left brake systems for equal stopping performance. Repeat steps in the same sequence for the co-pilots brake pedals.

   b. Uneven landing gear struts, tire pressures, and terrain may influence taxi checks and should be considered while performing checks with swivel switch set to "STEER and LOCK." Visually verify swivel lock engagement prior to performing the taxi checks with swivel switch set to the "LOCK" position.

   c. Verify all required steps completed.

TRAINING AND EVALUATION REQUIREMENTS:

1. Training will be conducted in the aircraft and CH-47 FS/TFPS.
2. Evaluation will be conducted in the aircraft.

REFERENCES: Appropriate common references.

TASK 4113

Perform Before Hover Checks

CONDITIONS: In a CH-47D/F helicopter, given access to the applicable MTF manual/CL with the before HVR check complete.

STANDARDS: Appropriate common standards plus the addition/modification:

1. Direct the NCM to visually verify swivel lock engagement prior to performing ground instability check.
2. During the FADEC system check, do not allow the RRPM/N_R to exceed 106 percent.
3. Brief the RCM on aircraft handling characteristics while performing the FADEC system and REV mode beep checks.

DESCRIPTION:

1. Crew actions. The MP will perform the FADEC system checks,ground instability checks, and initial HVR flight control response checks. The MP will brief the RCM on control inputs required during FADEC system checks and required actions if the aircraft becomes airborne. The RCM will be at the controls and remain focused outside during the FADEC system checks and position the flight controls as directed by the MP.
2. Procedures. Perform IAW the appropriate MTF manual as follows:
   a. Ground instability check. With the parking brake set and swivels visually verified locked and engaged, apply up to 2 inches of aft cyclic and increase thrust control as required to lift the forward gear off the ground. If the wheel brakes do not hold initially, lower the thrust control and place the forward gear on the ground, reset the wheel brakes, and attempt the maneuver again. Check for stability and correct response in each axis one at a time using small and smooth flight control inputs. Once stability and correct response is verified, lower the forward gear to the ground and neutralize flight controls.
   b. FADEC system and REV Mode beep check. With aircraft stable on the ground and flight controls neutralized, perform steps IAW the appropriate MTF manual. When the thrust control and RRPM/N_R is increased during the REV mode beep check, the aircraft may become light on the wheels, or even airborne. “MANUAL” programming of the LCTs may be required due to thrust control positions and RRPM/N_R settings. If “MANUAL” programming is utilized, place LCTs back to “AUTO” mode prior to initial takeoff to HVR. If the aircraft does become airborne, the RCM will control the aircraft and land the aircraft as directed by the MP.
   c. Verify all required steps are completed.
3. Crew stations. The MP will be in the left seat for the ground instability and FADEC system checks.

TRAINING AND EVALUATION REQUIREMENTS:

1. Training will be conducted in the aircraft and CH 47 FS/TFPS.
2. Evaluation will be conducted in the aircraft.

REFERENCES: Appropriate common references.

TASK 4156

Perform Hover Checks

CONDITIONS: In a CH-47D/F helicopter, given access to the applicable MTF manual/CL and HVR check complete and aircraft cleared.

STANDARDS: Appropriate common standards and the following addition/modification:

1. Properly clear the aircraft before making flight control inputs.
2. Brief the RCM on possible malfunctions and required actions prior to performing AFCS/DAFCS engagement error check.
3. Brief RCM on required flight control inputs and expected hovering flight characteristics during the TQ differential check.
4. F Ensure WT is entered accurately into the CAAS IAW the aircraft's current configuration.
5. Perform rotor track and balance IAW the applicable TM.

DESCRIPTION:

1. Crew actions.

   a. The MP will perform the AFCS/DAFCS function check and direct assistance as required from the RCM during AFCS/DAFCS TRIM beep switch checks made from the RCM's flight controls. The MP will maintain the flight controls while the RCM operates the AFCS/DAFCS TRIM switch on their flight controls.

   b. The RCM will maneuver the aircraft as directed by the MP during the mechanical rig, controls positions, and TQ differential checks. The RCM will announce all thrust control inputs made during the TQ differential check.

   c. F The NCM may be directed to assist with estimating movement as required during TRC and PHOLD checks.

2. Procedures. Perform IAW the applicable MTF manual and as follows:

   a. Determine the wind azimuth using wind recognition cues, Wx reporting facility or ATS.

   b. Mechanical rig check. Maneuver the aircraft to a stabilized crosswind HVR with no drift. When stabilized, note the longitudinal stick position IAW the applicable MTF manual. Longitudinal stick position during mechanical rig checks will be determined using only a tape measure in CH-47F while the stick position indicator or a tape measure may be used in CH-47D. To ensure accurate measurements, hold the tape measure on its side during mechanical rig cyclic measurements in CH-47F. The "flat edge" of the tape measure should face left and right with the "knife edge" facing up and down. If cyclic placard values used to determine mechanical rig in CH-47F (longitudinal) are suspected to be in error, verify measurements with rigging fixtures as required IAW the appropriate IETM. Using recorded stick position, calculate corrections as required IAW the applicable IETM. GWT and CG for the CH-47F may be determined from CAAS values as long as they verified accurate IAW the aircraft weight and balance record.

   c. Controls positions check. For longitudinal measurements, maneuver the aircraft to a stabilized crosswind HVR with no drift. When stabilized, note the stick position indicator. A tape measure may be used if the stick position indicator was previously determined to be in error. For lateral and directional pedal separation measurements, maneuver the aircraft to a stabilized HVR into the wind with no drift. Using a tape measure note the distance from the lateral placard target to the center of the "FLARE DISP" button on the cyclic for CH-47D and IAW the note in the MTF manual for CH-47F. Determine pedal separation by placing the tape measure flat on the floor and note the distance between the aft face of one pedal assembly to the forward edge of the cyclic boot plate. Note the difference of the measurement to the neutral pedal measurement. The difference will need to be multiplied by two to determine separation. If a neutral pedal measurement was not obtained previously, both pedals will

need to be measured to determine separation. If cyclic placard values are suspected to be in error, verify measurements with rigging fixtures as required IAW with the appropriate IETM.

d. AFCS/DAFCS functional check. Adverse engagement transients/errors may be experienced during the engagement error check when the AFCS/DAFCS system SEL switch is cycled from the "BOTH position, to No.1, No.2 and to OFF". Prior to directing the RCM to cycle the AFCS/DAFCS system SEL switch, brief the possible malfunctions and corrective actions if a malfunction occurs. Ensure aircraft is re-trimmed before starting each AFCS/DAFCS check. (F) During the PHOLD and TRC beep/trim checks, descending to a 10 foot HVR may assist the NCM in estimating aircraft movement. Ensure all steps are completed.

e. TQ differential check. Prior to performing the TQ differential check, ensure the RCM is briefed on SE hovering flight characteristics. Once the aircraft is established at a trimmed stabilized hover, direct the RCM not to make further inputs to the thrust control. If inputs are inadvertently made to the thrust control, the maneuver must be aborted and started over. Hovering flight at a constant thrust control position will result un-commanded climbs and descents due to environmental effects such as gusting or variable winds. These climbs and descents are to be considered normal, and no adjustment of the thrust control should be made unless aircraft begins a decent that appears will terminate in abrupt ground contact. The thrust may be increased to soften the touchdown as required. The PAT may be completed during the TQ differential check IAW the MTF manual.

f. Verify all required steps are completed.

3. Crew stations. The MP must be in the left seat for mechanical rig, controls positions and the TQ differential checks.

TRAINING AND EVALUATION REQUIREMENTS:

1. Training will be conducted in the aircraft and CH-47 FS/TFPS.
2. Evaluation will be conducted in the aircraft.

REFERENCES: Appropriate common references.

TASK 4193

Perform Inflight Checks

CONDITIONS: In a CH-47D/F helicopter, given access to the applicable MTF manual/CL with the before takeoff check complete.

STANDARDS: Appropriate common standards and the following additions/modifications:

1. Do not allow the airspeed to exceed 100 KIAS/KCAS during the single AFCS/DAFCS evaluation.
2. F "MAN" the thrust control during the TQ limiting check.
3. Properly clear the aircraft before making flight control, or F coupled FD inputs.
4. Throughout the "DASH LOW RATE" check, NCM will be seated with seat belts fastened.
5. Perform rotor track and balance IAW the applicable TM.

DESCRIPTION:

1. Crew actions.

   a. The MP will be on the flight controls and perform the AFCS/DAFCS evaluation with the exception of the pedal separation check.

   b. F During the FD evaluation, the RCM will have all flight controls while the MP select cues on the MFD and enter commands on the CDU. The MP will brief the RCM on selected FD cues, command inputs and coupled axis.

   c. The RCM will maneuver the aircraft and make flight control inputs as directed by the MP. The MP will "MAN" the thrust control during the TQ limiting check to prevent over TQ. The MP will "MAN" the thrust control; however the RCM has all the flight controls.

2. Procedures. Perform IAW the applicable MTF manual and as follows:

   a. AFCS/DAFCS Evaluation. An un-commanded out of trim condition may occur when the AFCS/DAFCS system SEL switch is cycled from "BOTH" to "No.1 or No.2". Do not initially correct the out of trim condition if it one occurs so that the required input to the directional pedals to place the aircraft back in trim may be noted/measured. If no changes in aircraft trim are noted, a measurement is not required. If the out of trim conditions has a rapid onset, or is deemed excessive, direct the RCM to make immediate inputs to the directional pedals to place the aircraft back in trim.

   b. F During the FD evaluation ground-speed (GSPD) checks, note current GSPD and current winds to preclude commanding the aircraft to a GSPD that will result in airspeeds outside the operator's manual limitations. During the TQ limiting, check, physically "MAN" the thrust control to prevent the aircraft from over-torquing. Ensure all FD cues are validated prior to performing the go-around check.

   c. Navigation/communication, miscellaneous instrument readings, and instrument readings. Need to be completed for GMTFs, but only the applicable portion needs to be completed for LMTFs.

   d. Verify all required steps are completed.

3. Crew stations. The MP will be in the left seat for the 60 KIAS/KCAS and 140 KIAS/KCAS speed sweep checks to ensure if the lateral stick position/directional pedal separation measurement is required or if the longitudinal indicator has not been verified previously.

TRAINING AND EVALUATION REQUIREMENTS:

1. Training will be conducted in the aircraft and CH-47 FS/TFPS.
2. Evaluation will be conducted in the aircraft.

REFERENCES: Appropriate common references.

TASK 4236

Perform Autorotation Revolutions per Minute Check

CONDITIONS: In a CH-47D/F helicopter and given the applicable MTF manual/CL with all required inflight checks complete.

STANDARDS: Appropriate common standards and the following additions/modifications:

1. Re-brief the RCM just before the maneuver. As a minimum, include the thrust positions of ground detent, thrust control to the floor, relaxed position and power recovery.
2. Select a suitable autorotation area that will permit a safe descent and EMERG touchdown straight-in landing into the prevailing wind.
3. Accomplish the PWR recovery prior to 1,000 feet AGL.
4. Readings will be taken in a stabilized autorotational glide at 80, ±5 KIAS/KCAS, in trim, with thrust control full down.
5. The MP will "MAN" the thrust control and FADEC RPM switch throughout the maneuver.
6. Throughout this maneuver, the NCMs will be seated with seat belts fastened.

DESCRIPTION:

1. Crew actions.
   a. Prior to the maneuver, the MP will re-brief the RCM on the maneuver, especially the required thrust positions of ground detent, thrust control to the floor, relax pressure and power recovery. The RCM will be at the flight controls during the maneuver and will make flight control inputs as directed by the MP.
   b. The MP will "MAN" the thrust control throughout the maneuver to ensure it is placed in the appropriate positions until power recovery is confirmed. The MP will "MAN" and operate the FADEC RPM switch as required throughout the maneuver. During the autorotation, the MP will note and call out the RRPM/N_R and PA. The NCM may record the RRPM and PA as directed by the MP.
   c. If an EMERG situation occurs, the MP will announce the EMERG and take appropriate corrective action.
2. Procedures.
   a. Determine wind azimuth using wind recognition cues, Wx reporting facility or ATS.
   b. Establish straight and level flight at 80 KTS into the prevailing wind at an altitude that will allow for an autorotational decent and power recovery prior to descending below 1,000 feet AGL.
   c. Identify and select a suitable forced landing area ahead of the aircraft in the current ground track. Ensure the RCM has visual contact with the selected forced landing area.
   d. Once the aircraft is within glide distance of the selected forced landing area, clear the aircraft, and direct the RCM to place the thrust control to the ground detent. Do not hesitate in placing the thrust to the appropriate position at any time during the maneuver. As the aircraft begins a decent, note RRPM/N_R readings. Environmental factors such as wind, turbulence or aircraft airspeed changes may affect RRPM/N_R readings. If RRPM/N_R is increasing rapidly, the maneuver may need to be terminated to prevent a rotor OVSPD. If RRPM/N_R readings are stable, the maneuver may be continued by placing the thrust control below the ground detent and holding it to the floor while simultaneously placing the "FADEC RPM" switch to the 97 percent position. This will place the aircraft in an autorotational decent. Once the RRPM/N_R has stabilized in the auto-rotational glide, note RRPM/N_R and PA.
   e. After readings have been taken, note the RRPM/N_R. If it is above 100 percent, direct the RCM to relax pressure on the thrust control and allow it to come up to the ground detent and then place the "FADEC RPM" switch back to the 100 percent position/detent. There is no need to wait for RRPM/N_R to decrease prior to placing the "FADEC RPM" switch back to 100 percent position/detent. If

RRPM/N_R is less than 100 percent, place the "FADEC RPM" switch to 100 percent position/detent, then direct the RCM to relax pressure on the thrust control allowing it to come up to the ground detent. With the thrust control at the ground detent, and the "FADEC RPM" switch set to 100 percent, perform a power recovery by directing the RCM to slowly increase thrust as required to arrest the rate of decent.

f. After completion of the autorotation, direct the RCM to climb to the PA where the RRPM/N_R reading was taken and record the OAT.

g. Calculate aircraft GWT and density altitude to determine if autorotation RRPM/N_R is within limits and apply corrections as required IAW the applicable IETM.

h. F Note OAT from the FAT gauge in the cockpit for DA calculations. CAAS values may be used for GWT calculations as long as it is verified to be accurate when compared to the aircraft weight and balance record.

i Verify all required steps are completed.

3. Crew stations. The MP will be in the left seat for this maneuver.

TRAINING AND EVALUATION REQUIREMENTS:

1. Training will be conducted in the aircraft and CH-47 FS/TFPS.
2. Evaluation will be conducted in the aircraft.

REFERENCES: Appropriate common references.

TASK 4259

Perform Maximum Continuous Power Check/Perform Maximum Power Check

CONDITIONS: In a CH-47D/F helicopter and given the applicable MTF manual/CL with all required inflight checks complete.

STANDARDS: Appropriate common standards and the following additions/modifications:

1. Select a suitable flight track that will permit a safe descent and EMERG landing.
2. Re-brief RCM and NCM on their duties and possible EPs prior to performing the maneuver.
3. Perform the PAC at a minimum altitude of 1,500 feet AGL.
4. Maintain at or below any one of the following limits: 899 degrees C PTIT, N_1/N_G, 110 percent (F 111 percent), TQ of 123 percent or 140 KIAS/KCAS.
5. Throughout this maneuver, the NCMs will be seated forward of the cabin center rescue hatch with seat belts fastened.
6. Ensure sufficient autorotational RRPM/N_R exists prior to performing PAC.

DESCRIPTION:

1. Crew actions.
   a. The MP will compute PAC values based upon current PA and OAT or verify pre-planned values as required.
   b. Before beginning maneuver, the MP will re-brief the RCM on the maneuver, especially the possible EPs. The MP may call out the N_1/N_G, PTIT, TQ, and fuel flow to the NCM, who can record them, as directed/required by the MP.
   c. Throughout the maneuver, the MP will MAN the ECL and the thrust control, but the RCM has control of all the flight controls. The MP will inform the RCM when making any inputs to the thrust control. The RCM will make flight control inputs as directed by the MP.
   d. If an EMERG situation occurs, the MP will announce the EMERG and take appropriate corrective action.
2. Procedures. Perform as IAW the applicable MTF manual and as follows:
   a. Stabilize aircraft in straight and level flight at the desired PA and chart/verify target TQ, N_1/N_G, and PTIT values for MAX CONT. PWR check, MAX PWR check, or both as required.
   b. Begin the maneuver by slowly moving the ECL of the ENG not being PACed towards ground until the target TQ is achieved on the ENG being PACed. Monitor the N_1/N_G and PTIT while establishing target TQ. If N_1/N_G or PTIT values are exceeded before reaching target TQ during the maximum continuous power check (MCPC), the maximum power check (MPC) must be performed using MPC values. If N_1/N_G or PTIT values are exceeded before reaching target TQ during the MPC, the ENG has failed the PAC. If engine indications are suspected to be in error, DECU/ECU engine values may be verified by use of a "SPORT" or "MSD" computer. This may assist in determining whether the engine is not meeting performance requirements versus engine instrument indication errors. An example would be an N_1/N_G being above charted limits with PTIT showing below charted limits.
   c. Under some conditions, the ECL may reach ground before target TQ is achieved on the ENG being PACed. If the ECL does reach ground while trying to achieve target TQ, verify the ENG is stable at ground idle. With the ECL at ground prior to reaching the target TQ setting, increase the thrust control as required to obtain the required TQ setting while monitoring N_1/N_G and PTIT. This increase in thrust control will cause the aircraft altitude to increase. In order to maintain a constant pressure altitude, direct the RCM to increase airspeed as required to maintain the desired altitude. With the aircraft stabilized at the pre-selected altitude, and the ENG stabilized at the required target TQ setting, note and call out TQ, N_1/N_G, PTIT, and fuel flow indications on the ENG being PACed.

f. After the readings have been taken on the ENG being PACed, slowly advance the ECL of the ENG not being PACed to the flight position and re-establish DUAL-ENG flight.

h. Using the recorded PTIT value on the ENG being PACed calculate a trigger value IAW the appropriate MTF manual.

i. F Note OAT using the FAT gauge in the cockpit when calculating required values for PAC.

j Verify all required steps are completed.

3. Crew stations. The MP must be in the left seat for this maneuver.

TRAINING AND EVALUATION REQUIREMENTS:

1. Training will be conducted in the aircraft and CH-47 FS/TFPS.
2. Evaluation will be conducted in the aircraft.

REFERENCES: Appropriate common references.

TASK 4262

Perform Communication and Navigation Equipment Checks

CONDITIONS: In a CH-47D/F helicopter and given the communication frequency(s) and navigation charts/equipment.

STANDARDS: Appropriate common standards and ensure all navigation and communication equipment functions IAW the appropriate operator's manual and the MTF manual.

DESCRIPTION:

1. Crew actions.
   a. The MP may perform these checks or direct assistance from the RCM to perform them as appropriate.
   b. The P* will remain focused outside during the procedures, maneuver as appropriate for the procedure, and maintain airspace surveillance. The MP should direct the NCM to assist with maintaining airspace surveillance.
2. Procedures.
   a. Perform IAW section IV of the appropriate MTF manual.
   b. Verify all required steps are completed.

TRAINING AND EVALUATION REQUIREMENTS:

1. Training will be conducted in the aircraft and CH-47 FS/TFPS.
2. Evaluation will be conducted in the aircraft.

REFERENCES: Appropriate common references.

TASK 4276

Perform Special Equipment or Detailed Procedures Checks

CONDITIONS: In a CH-47D/F helicopter and given access to the applicable MTF manual/CL or unit SOP.

STANDARDS: Appropriate common standards and the following additions/modifications:

1. When applicable, perform required checks outlined or as required for installation or modification of aircraft system.
2. Perform applicable checks from the MTF manual for systems affected during installation/modification.

DESCRIPTION:

1. Crew actions. The MP will direct assistance from the RCM and NCM. They will assist the MP as directed.
2. Procedures.
   a. Perform IAW the appropriate MTF manual or other appropriate reference.
   b. Verify all required steps are completed.

TRAINING AND EVALUATION REQUIREMENTS:

1. Training will be conducted in the aircraft and CH-47 FS/TFPS.
2. Evaluation will be conducted in the aircraft.

REFERENCES: Appropriate common references and additional authorized references including AWR.

TASK 4284

Perform After-Landing through Engine-Shutdown Checks

CONDITIONS: In a CH-47D/F helicopter and given access to the applicable MTF manual/CL.

STANDARDS: Appropriate common standards and the following additions/modifications:

1. Confirm minimum ENG coast down time IAW the appropriate MTF manual.
2. Complete or update applicable forms and records as required.
3. Brief NCM to go no higher than the lower ENG work platform if visually checking compressor blades for coast down time.

DESCRIPTION:

1. Crew actions. The MP will direct assistance from the RCM and NCM. They will assist the MP as directed.
2. Procedures. Perform IAW the appropriate MTF manual.
   a. ENG coast down time. Start ENG coast down timing when the ECL is placed to STOP. Reference for coast down will be the N_1/N_G indications in the cockpit. If minimum coast down time is not met based upon N_1/N_G indications, an alternate method will need to be used. The primary alternate method is verifying N_1/N_G indications electronically through the DECU/ECU by use of a "SPORT" or "MSD" computer. If a computer is not available, the NCM may be directed to view the compressor blades and announce when they stop rotating after the ENG is shut down. If this method is used, place the ECL of the ENG being checked to STOP, and start a timer. Once a normal ENG shutdown is verified from the cockpit and by the NCM, the NCM may inspect the compressor blades through the all weather (FOD) screen. This visual inspection method will not be used if operating with EAPS. If operating with EAPS, coast down time will be confirmed electronically through the DECUs/ECUs.
   b. Verify all required steps are completed.

TRAINING AND EVALUATION REQUIREMENTS:

1. Training will be conducted in the aircraft and CH-47 FS/TFPS.
2. Evaluation will be conducted in the aircraft.

REFERENCES: Appropriate common references.

Chapter 6

Aircrew Coordination

This chapter describes the background of aircrew coordination development. It also describes the aircrew coordination principles and objectives, as found in the aircrew coordination training-enhancement (ACT-E) program.

Note. Digitization of the crew compartments has expanded and redefined the lines of responsibility for each crewmember. The enhanced ability for either PI to perform most aircraft/system functions from their crew station breaks down the standard delineation of duties and has added capabilities and potential distractions, in training and in combat. This could mean that during an unforeseen event, one PI may attempt to resolve the situation rather than seeking assistance from or even communicating that action with the other crewmember. It is essential for the PC to brief specific duties prior to stepping into the aircraft. Effective sharing of tasks relies on good crew coordination and information management.

6-1. **AIRCREW COORDINATION BACKGROUND AND PLANNING STRATEGY.** An analysis of U.S. Army aviation accidents revealed that a significant percentage of aircraft accidents resulted from one or more aircrew coordination errors committed during and even before the flight mission. Often, an accident was the result of a sequence of undetected crew errors that combined to produce a catastrophic result. Additional research showed that even when crews actually avoided potential accidents, these same errors could result in degraded *performance that jeopardized mission success.* A systematic analysis of these error patterns identified specific areas where crew-level training could reduce the occurrence of such faults and break the *chain of errors* leading to accidents and poor mission performance.

a. Aircrew coordination patterns begin with the accomplishment of crew-level pre-mission planning, rehearsal, and AARs. Pre-mission planning includes all preparatory tasks associated with accomplishing the mission. This would include assigning crewmember responsibilities and conducting all required briefings and brief-backs. Pre-mission rehearsal involves the crew collectively visualizing and discussing expected and potential unexpected events for the entire mission. Through this process, all crewmembers discuss and think through contingencies and actions for difficult segments, equipment limitations and failures, or unusual events associated with the mission and develop strategies to cope with possible contingencies (METT-TC).

b. Each crewmember must actively participate in the mission planning process to ensure a common understanding of mission intent and operational sequence. The PC prioritizes planning activities so that critical items are addressed within the available planning time. Crewmembers must then mentally rehearse the entire mission by visualizing and discussing potential problems, contingencies, and assigned responsibilities. The PC ensures that crewmembers take advantage of periods of low workload to review or rehearse upcoming flight segments. Crewmembers should continuously review remaining flight segments to identify required adjustments, making certain their planning is consistently ahead of critical lead times.

c. After a mission or mission segment, the crew should debrief, review, and critique major decisions, their actions, and task performance. This should include identifying options and factors that were omitted from earlier discussion and outline ways to improve crew performance in future missions. Remember, this discussion and critique of crew decisions and actions must remain professional. "Finger pointing" is not the intent and shall be avoided; the emphasis should remain on education with the singular purpose of improving crew and mission performance.

6-2. **AIRCREW COORDINATION PRINCIPLES.** Broadly defined, aircrew coordination is the cooperative interaction between crewmembers necessary for the safe, efficient, and effective performance of flight tasks. The essential principles and qualities of aircrew coordination are described in figure 6-1.

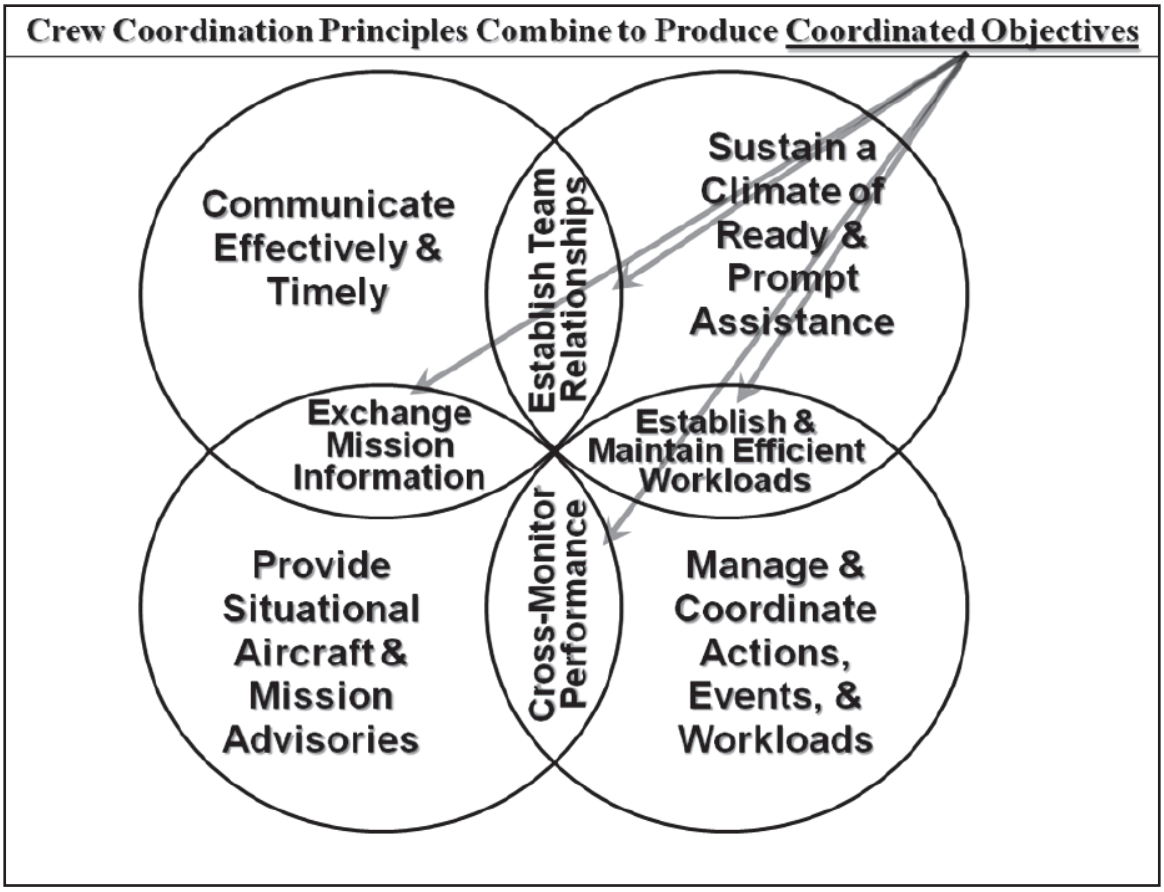


Figure 6-1. Crew coordination principles

a. Communicate effectively and timely. Good team relationships begin with effective communication among crewmembers. Communication is effective when the sender directs, announces, requests, or offers information; the receiver acknowledges the information; and the sender confirms the receipt of information, based on the receiver's acknowledgment or action. This enables the efficient flow and exchange of important mission information that keeps a crew on top of any situation that arises.

(1) Announce and acknowledge decisions and actions. To ensure effective and well-coordinated actions in the aircraft, all crewmembers must be kept informed and made aware of decisions, expected movements of crew and aircraft, and the unexpected individual actions of others. Each crewmember will announce any actions that may affect the actions of other crewmembers. In turn, communications in the aircraft must include supportive feedback that clearly indicates that crewmembers acknowledge and correctly understand announcements, decisions, or directives of other crewmembers.

(2) Ensure that statements and directives are clear, timely, relevant, complete and verified. These are qualities that must describe the kind of communication that is effective. Considering the fleeting moments of time in a busy aviation environment, only one opportunity may exist to convey critical and supporting information before tragedy strikes. That information must be clearly understood, not confusing, and said at the earliest opportunity possible. It must be applicable to the events at hand to support the needs and security of the mission. The information must include all elements needed to make the best decision based on its urgency, and the communication must come with ability of proven confirmation and without redundancy. It must also include the crew's use of standard terminology and feedback techniques that accurately validate information transfer. Emphasis is on the quality of statements associated with navigation, obstacle clearance, instrument readouts, and emergencies. Specific goals include the following:

(a) Crewmembers consistently make the required callouts. Their statements and directives are always timely. Their response to unexpected events is made in a composed, professional manner.

(b) Crewmembers actively seek feedback when they do not receive acknowledgment from another crewmember. Crewmembers should always acknowledge the understanding of intent and request clarification when necessary.

(3) Be explicit. Crewmembers should use clear, concise terms, standard terminology, and phrases that accurately convey critical information. Crewmembers must avoid using terms that have multiple meanings, such as "Right," "Back up," or "I have it." Crewmembers must also avoid using indefinite modifiers such as, "Do you see that tree?" or "You are coming in a little fast."

b. Sustain a climate of ready and prompt assistance. The requirement to maintain a professional atmosphere by all members of the team begins with the team leadership of the PC. However, all crewmembers must equally respect the value of other crewmember's expertise and judgment regardless of rank, duty or seniority. Every member has a responsibility to maintain SA for mission requirements, flight regulations, operating procedures, and safety. Each crewmember must be willing to practice advocacy and assertiveness should the situation demand a different course of action, as time permits. It is critical to maintain a crew climate that enables the opportunity to apply appropriate decision-making techniques for defining the best course of action when problems arise. Courses of action may demand that assistance be directed to other crewmembers or could be voluntary assistance that is offered in a timely manner, depending on time constraints and information available. All crewmembers must remain approachable, especially in critical phases of flight when reaction time is at a premium.

Note. The two-challenge rule allows one crewmember to assume the duties of another crewmember who fails to respond to two consecutive challenges automatically. For example, the P* becomes fixated, confused, task overloaded, or otherwise allows the aircraft to enter an unsafe position or attitude. The P first asks the P* if he or she is aware of the aircraft position or attitude. If the P* does not acknowledge this challenge, the P issues a second challenge. If the P* fails to acknowledge the second challenge, the P assumes control of the aircraft.

---

c. Effectively manage, coordinate, and prioritize planned actions, unexpected events, and workload distribution. The crew performing as a team should avoid distractions from essential activities while distributing and managing the workloads equally. Both the technical and managerial aspects of coping with normal and unusual situations are important. Proper sequencing and timing guarantees that the actions of one crewmember support and mesh with the actions of the other crewmembers. Responsible effort must be used to ensure that actions and directives are clear, timely, relevant, complete, verified and coordinated with minimal direction from the PC.

(1) Direct assistance. A crewmember will direct or request assistance when he cannot maintain aircraft control, position, or clearance. A crewmember will also direct assistance when being overloaded with tasks or unable to properly operate or troubleshoot aircraft systems without help from the other crewmembers. The PC ensures that all crew duties and mission responsibilities are clearly assigned and efficiently distributed to prevent the overloading of any crewmember, especially during critical phases of flight. Crewmembers should also watch for workload build-up on others and react quickly to adjust the distribution of task responsibilities.

(2) Prioritize actions and equitably distribute workload. Crewmembers are always able to identify and prioritize competing mission tasks. Crewmembers should never ignore flight safety and other high-priority tasks. Crewmembers appropriately delay low-priority tasks until those tasks do not compete with tasks that are more critical. Crewmembers consistently avoid nonessential distractions so that these distractions do not affect task performance (for example, a sterile cockpit) or ability to help another crewmember. Crew actions should reflect extensive review of procedures in prior training and pre-mission planning and rehearsal.

d. Provide situational aircraft control, obstacle avoidance, and mission advisories. Although the P* is responsible for aircraft control, the other crewmembers may need to provide aircraft control information regarding aircraft position (for example, airspeed or altitude), orientation, obstacle avoidance, equipment and personnel status, environmental and battlefield conditions, and changes to mission objectives or

evolving situations of the mission (SA). Crewmembers must anticipate and offer supporting information and actions to the decisionmaker, which is usually the PC or may be the AMC in a mission related situation. Specific goals include the following:

(1) SA. Crewmembers must anticipate the need to provide information or warnings to the PC or P* during critical phases of the flight or mission. The PC must encourage crewmembers to exercise the freedom to raise issues or offer information about safety or mission related matters. In turn, the crewmembers will provide the required information and warnings in a timely and professional manner. None of this could be accomplished without cross-monitoring performance and crew tasks.

(2) Mission changes and updates. Crewmembers should routinely update each other while highlighting and acknowledging mission changes. Crewmembers must take personal responsibility for scanning the entire flight environment, considering their assigned workload and areas of scanning. Each crewmember needs to appropriately adjust individual workload and task priorities with minimal verbal direction from the PC when responding to emergencies and unplanned changes of the mission.

(3) Offer assistance. A crewmember will provide assistance, information, or feedback in response to another crewmember. A crewmember will also offer assistance when he or she detects errors or sees that another crewmember needs help. In the case where safety or mission performance is at risk, immediate challenge and control measures must be assertively exercised. A crewmember should quickly and professionally inform and assist the other crewmember committing the error. When required, crewmembers must effectively implement the two-challenge rule with minimal compromise to flight safety. This means that crewmembers must continually cross-monitor the actions of other crewmembers and remain capable of detecting their errors. Such redundancy is particularly important when crews are tired or overly focused on critical task elements and thus more prone to make errors. Crewmembers must discuss conditions and situations that can compromise SA. These include, but are not limited to, stress, boredom, fatigue, and anger.

6-3. **AIRCREW COORDINATION OBJECTIVES.** Aircrew coordination principles and objectives originate from and are fundamentally supported by a set of individual, professional skills. Each crewmember is responsible for attaining the leadership skills of effective communication, resource management, decisionmaking, SA, team building, and conflict resolution. When crewmembers are actively using these skills and practicing aircrew coordination principles, results can be seen and measured to determine if the objectives of the aircrew coordination program are being met. The goals of the program have been defined by the following aircrew coordination objectives:

a. Establish and maintain team relationships. Establish a positive working relationship that allows the crew to communicate openly, freely, and effectively in order to operate in a concerted manner where a climate of professional assistance is easily found and promptly provided.

b. Establish and maintain efficient workloads. Manage and coordinate priorities and execute the mission workload in an effective and efficient manner with the redistribution of task responsibilities as the mission situation changes. Flight duty responsibilities are performed in a timely manner where mission needs are always anticipated.

c. Exchange mission information. Establish all levels of crew and mission communications using effective patterns and techniques that allow for the flow of essential data and mission advisories among all crewmembers in a timely and accurate manner.

d. Cross-monitor performance. Cross-monitor each other's actions and decisions to ensure workloads and crew actions are performed in a coordinated manner and to standard. Cross-monitoring crewmember performance keeps a crew ready to provide aircraft and mission advisories to each other and helps reduce the likelihood of errors affecting mission performance and safety.

6-4. **STANDARD CREW TERMINOLOGY.** To enhance communication and aircrew coordination, crews should use words or phrases that are understood by all participants. The crew must use clear, concise terms that can be easily understood and complied with in an environment full of distractions. Multiple terms with the same meaning should be avoided. DOD FLIP contains standard terminology for radio communications. The appropriate operator's manuals contain standard terminology for items of equipment.

a. Table 6-1 is a list of other standard words and phrases crewmembers may use.

Table 6-1. Examples of standard words and phrases

Standard word or phrase	***Meaning of standard word or phrase***
Abort	Terminate a preplanned aircraft maneuver.
Affirmative	Yes.
Arizona	No anti-radiation missiles remaining.
Bandit	An identified enemy aircraft.
Bingo	Fuel state needed for recovery.
Blind	No visual contact of friendly aircraft/ground position. Opposite of “VISUAL”.
Break	Immediate action command to perform an EMERG maneuver to deviate from the present ground track; will be followed by the word “RIGHT,” “LEFT,” “UP” or “DOWN.”
Call out	Command by the P* for a specified procedure to be read from the CL by the other crewmember.
Target/object Captured	Specific surface target/object has been acquired and is being tracked with an on-board sensor.
Cease fire	Command to stop firing but continue to track.
Clear	No obstacles present to impede aircraft movement along the intended ground track. Will be preceded by the word “nose,” “tail,” or “aircraft” and followed by the direction (for example, “LEFT,” “RIGHT,” “SLIDE LEFT” or “SLIDE RIGHT”). Also indicates that ground personnel are authorized to approach the aircraft.
Come up/down	Command to change altitude up or down; normally used to control masking and unmasking operations.
Contact	(1) Establish communication with….(followed by the name of the element). (2) Sensor contact at the stated position. (3) Acknowledges sighting of a specified reference point (either visually or via sensor). (4) Individual radar return within a GROUP or ARM.
Controls	Refers to aircraft flight controls.
Deadeye	LASER designator system inoperative.
Drifting	An alert of the unintentional or undirected movement of the aircraft; will be followed by the word “RIGHT,” “LEFT,” “BACKWARD,” or “FORWARD.”
Egress	Command to make an emergency exit from the aircraft; will be repeated three times in a row.
Execute	Initiate an action.
Expect	Anticipate further instructions or guidance.
Firing	Announcement that a specific weapon is to be fired.
Fly heading	Command to fly an assigned compass heading. (This term generally used in low-level or contour flight operations.)
Go ahead	Proceed with your message.
Go AJ	Directive to activate anti-jam communications.
Go plain/red	Directive to discontinue secure operations.
Go secure/green	Directive to activate secure communications.
Hold	Command to maintain present position.

Table 6-1. Examples of standard words and phrases

Hover	Horizontal movement of aircraft perpendicular to its heading; will be followed by the word “LEFT” or “RIGHT.”
Inside	PRI focus of attention is inside the cockpit for longer than 5 seconds.
Jettison	Command for the emergency or unexpected release of an external (sling) load(s) or stores; when followed by the word "DOOR," will indicate the requirement to perform emergency door removal.
LASER On	Start/acknowledge LASER designation.
Lasing	The speaker is firing the LASER.
Maintain	Command to continue or keep the same.
Mask/unmask	To conceal aircraft by using available terrain features and to position the aircraft above terrain features.
Mickey	A HaveQuick time-synchronized signal.
Monitor	Command to maintain constant watch or observation.
Move aft	Command to “HOVER AFT”, followed by distance in feet.
Move forward	Command to “HOVER FORWARD”, followed by distance in feet.
Negative	Incorrect or permission not granted.
Negative contact	Unable to establish communication with (followed by name of element).
Negative LASER	Aircraft has not acquired LASER energy.
No joy	Aircrew does not have positive visual contact with the target/bandit/traffic/obstruction/landmark. Opposite of “TALLY”.
Now	Indicates that an immediate action is required.
Offset (direction)	Maneuver in a specified direction with reference to a target.
Outside	PRI focus of attention is outside the aircraft.
Put me up	Command to place the P* radio transmit selector switch to a designated position; will be followed by radio position numbers on the inter-communication panels (1, 2, 3). Tells the other crewmember to place a frequency in a specific radio.
Release	Command for the planned or expected release of an external (sling) load(s).
Remington	No ordnance remaining except gun or self-protect ammunition.
Report	Command to notify.
Roger	Message received and understood.
Say again	Repeat your transmission.
Slide	Intentional horizontal movement of an aircraft perpendicular to its heading; will be followed by the word "RIGHT" or "LEFT."
Slow down	Command to reduce ground speed.
Speed up	Command to increase ground speed.
Splash	(1) (A/S) Weapons impact. (2) (surface-to-surface) Informative call to OR/spotter, five seconds, prior to estimated time of impact. (3) Air-to-air target destroyed.
Stand by	Wait; duties of a higher priority are being performed and request cannot be complied with at this time.

Table 6-1. Examples of standard words and phrases

Stop	Command to go no further; halt present action.
Strobe	Indicates that the aircraft AN/APR-39 has detected a radar threat; will be followed by a clock direction.
Tally	Sighting of a target, non-friendly aircraft, enemy position, landmark, traffic, or obstruction positively seen or identified; will be followed by a repeat of the word “TARGET,” "TRAFFIC" or "OBSTRUCTION" and the clock position. Opposite of No Joy.
Target	An alert that a ground threat has been spotted.
Terminate	Stop LASER illumination of a target.
Traffic	Refers to friendly aircraft that present a potential hazard to the current route of flight; will be followed by an approximate clock position and the distance from your aircraft with a reference to altitude (high or low).
Transfer of controls	Positive three-way transfer of the flight controls between the crewmembers (for example, "I have the controls“, "You have the controls," and "I have the controls").
Turn	Command to deviate from present ground track; will be followed by words "RIGHT" or "LEFT," specific heading in degrees, a bearing ("Turn right 30 degrees), or instructions to follow a well-defined contour ("Follow the draw at 2 o'clock").
Unable	Indicates the inability to comply with a specific instruction or request.
Up on	Indicates PRI radio selected; will be followed by radio position numbers on the inter-communication panels ("Up on 1, up on 3").
Visual	Sighting of a friendly aircraft/ground position. Opposite of “BLIND”.
Weapons hot/cold/off	Weapon switches are in the “ARMED”, “SAFE” or “OFF” position.
Wilco	I have received your message, I understand and I will comply.
Winchester	No ordnance remaining.
Zoom In/Out	Increase/decrease the sensor’s focal length. Zoom “IN/OUT” is normally followed by “ONE, TWO, THREE or FOUR”: to indicate the number of fields of view (FOVs) to change. (Note. It is recommended only one change in or out at a time be used for the FOV.)

b. Table 6-2 is an example of crew coordination callout.

Table 6-2. Example of aircrew coordination callout

P:	“Wires, 12 o’clock.”
P*:	“Wires in sight; climbing right to cross at the pole. Clear right and above.”
CE:	“Clear right and above.”
P:	“Clear left and above.”
CE:	“Clear of the wires.”
P*:	“Descending left.”
P:	“Clear left and below.”

c. Table 6-3 is an example of acceptable navigation statements.

Table 6-3. Example of acceptable navigation statements

Orientation to terrain feature relative to the aircraft’s current heading:	“Directly ahead,” “Out your right door,” or “On your right side.”
Terrain locator information:	“The hill at your 2 o’clock position” or “Straight ahead to the pond.”

Initial turning command:	"Turn left" or "Turn right." When the aircraft is above nap-of-the-earth altitudes, a heading may be given; for example, "Turn right to 320 degrees."*
Command given when the P has verified that the desired heading has been achieved:	"Stop turn."
Clock position associated with a specific terrain feature to prevent the P* from misinterpreting the exact heading described:	"Along the tree line at 2 o'clock."

d. Table 6-4 is an example of properly sequenced and timed actions.

Table 6-4. Example of properly sequenced and timed actions

P*	While at a hover, announces his intent to turn right before doing so.
P	Focuses his attention outside the aircraft in the direction of movement to provide adequate warning of obstacles and announces, "Tail clear left."
CE	Depending on seat assignment announces, "Tail clear left' or "Tail clear right."
P*	Initiates the right turn.

e. Table 6-5 is an example of CH-47D call and response terminology.

Table 6-5. CH-47D call and response terminology

Checklist Steps	*NCM Response/Check*	*NCM Procedure/Remarks*
	Starting Engines	
BATT Switch-ON.	All stations check in with the PC.	
TROOP WARN ALARM and JUMP LT (light)-Test.	Two bells, two red, two green.	Forward CE confirms when not visible from ramp (verbal call only when not operational).
Fire guard posted-APU clear to start.	Posted at the APU.	Ramp CE confirms that the UTIL. HYD ACCUMs are fully charged before posting at the APU area.
APU-Start.	APU clear to start.	Ramp CE monitors the APU for any abnormal condition or fire, positioned by the EMERG fluid shut-off valve with access door open during the entire APU start sequence.
APU GEN Switch-ON.		Ramp CE checks UTIL. HYD PRESS is within normal range and confirms operation of the panel press to test lighting. Ramp CE ensures that ramp is not touching the ground prior to ENG start.
PWR XFER 1 and 2 Switches-ON.		Ramp CE confirms PRESS are within normal ranges.
Maintenance panel-Check.	PRESS and TEMPs normal, going to test, all latches IND, going to reset, maintenance panel is operational (Refer to Note 1).	Ramp CE places and holds the TEST/RESET switch to TEST until the PIs confirm the proper indications (Four master caution capsules and two master caution lights) and checks all the latches for tripped condition before stating test results.
Cargo hook(s), hoist/winch-Check operation as required.	**CAUTION** **All personnel must remain clear of MID hook at all times. Ready outside, ready aft (two man crew). Ready aft (one man crew).**	One CE will observe operation of the cargo hooks and make the appropriate responses for the operation. The other CE will be positioned in the cabin to operate the hoist operator's grip as required. If single crewmember, perform both.

Table 6-5. CH-47D call and response terminology

Checklist Steps	*NCM Response/Check*	*NCM Procedure/Remarks*
Armed and forward.	Forward hook operational.	Ensure manual release knob on forward hook ratchets.
Armed and MID.	MID Hook is clear.	
Checking MID hook.	MID Hook is open.	Ensure MID hook opens.
Armed and aft.	Hoist operator's panel armed, checking aft hook-Aft hook operational.	Ensure manual release knob on aft hook ratchets.
Resetting.	MID Hook clear, MID hook is closed.	
Armed and tandem.	Forward and aft hook operational.	Ensure forward and aft hook manual release knobs ratchet.
Armed and all.	Forward and aft hook operational, MID hook open.	Ensure forward and aft hook manual knobs ratchet and MID hook opens.
Resetting.	MID hook clear, MID hook is closed.	
Checking safe.	Safe in the rear.	Aft CE presses cargo release on hoist operators grip. Ensure hooks do not actuate.
Anti-ice system-Check as required.	**WARNING** **Pitot heat can cause severe burns. Ensure the PIs turn off the pitot heat when done. Pitot and yaw port heat operational.**	CE takes one flight glove off and feels for the presence of heat on two pitot static tubes and four AFCS/DAFCS yaw ports.
SLT-FIL switches-Check and set as required.	White light (or IR light) is on, extending, 45 degrees, off.	Forward CE observes the operation of the search lights.
Altimeters-Set and check.	On and set.	If the maintenance work order (MWO) is installed or as required.
Fuel quantity-Check as required.	Refuel station reads #### (outside). #### lbs internal (ERFS installed).	Aircraft fuel load verified from PMD/ Preflight.
Rotor blades-Check position.	Clear of the tunnel area.	Aft CE confirms that the position of the rotor blades is not within 30 degrees of aircraft centerline.
Flight control travel and HYDs-Check.	PRESS is normal on 1 (or 2), zero on 2 (or 1). Corresponding movement forward and aft heads. PRESS is normal 1 and 2.	Standing in a position to view the maintenance panel and both rotor heads the Aft CE observes the operation of the system PRESS, rotor heads, and flight controls for each system.
DECU PRESTART BIT-Perform.	88 on 1 and 2. (Refer to Note 2)	Do not read the DECU's digital displays until the ECLs are in ground or until requested by the PI.
Area-Clear for start.	1 and 2 ENG Areas are clear, fire guard posted, ready on 1 (or 2).	NCM will post 45 degrees off the nose of the ENG. (A good location is: even with the position lights, outside the rotor disk.) NCM confirms that the ENG areas are clear before clearing the PIs to start ENGs.
EAPS Fan switches-ON.	1(or 2) ENG air particle separator (EAPS) fans clear. EAPS fans operational.	If installed. Foreign object damage (FOD) may blow out during the purge, so be sure the area is clear prior to turning them on.
First ENG-Start.	1 (or 2) Clear for start.	If performing a two-crewmember run-up, the other CE will post on the opposite side prior to the start sequence. (Refer to Note 3)

Table 6-5. CH-47D call and response terminology

Checklist Steps	*NCM Response/Check*	*NCM Procedure/Remarks*
Second ENG-Start.	2 (or 1) Clear for start.	During two-crewmember run-up, wait until the Aft CE is posted on 1 before starting 2. (Refer to Note 3)
ENG COND levers-FLT.	1 and 2 Clear to flight.	Visually scan entire aircraft for abnormal conditions.
Fluid drain lines-Check.	Normal.	Verify any fluid draining from drain lines is not excessive.
DECU START BIT-Perform.	1 and 2 Clear towards ground, 88 on 1 and 2.	(Refer to Note 2)
APU Switch-OFF.	APU Clear off.	Aft CE monitors APU for fire, then closes EMERG fluid shutoff access door after APU is off.
Engine Ground Operation		
FUEL CONTR switches-Set.	XFEED(s) closed lights out.	Aft CE ensures LH and right-hand (RH) crossfeed valves close and transition lights come on then go out.
FADEC System-REV System check.		CE is positioned forward of the ramp hinge and clear of ENGs.
RAD ALTs-Check and set.	Aft RAD ALT Operational.	If the MWO is installed or as required.
Before Taxi		
M-130 or AN/ALE-47 safety pin-Remove and stow.	Removed and stowed or remaining installed.	If AN/ALE-47 is not installed, the M-130 safety pin must be removed and stowed.
Chocks-Removed and secured.	Removed and secured.	Ensure chocks are secured by some means in the cabin area.
Ramp and cabin door-As required.	Ramp is up, cabin door secured. (Refer to Note 4)	Ramp should be up for taxi, takeoff, hover flight, and landings (unless there is a load(s) on it that prevents placing the ramp in the “UP” position).
Crew, passengers and mission equipment-Check ready for taxi.	Aft ready, forward ready. (Refer to Note 5)	Aft CE will always call first.
Taxi director and blade watchers-Positioned.	Internal or outside.	Call made as appropriate for the conditions.
Before Hover		
PAT Check-Perform first flight of the day.	1 (or 2) Clear to/towards ground, testing 1 (or 2). Read the last hexadecimal digit series displayed and apply the temp bias. Announce the adjusted PAC # and trigger value. 1 (or 2) Clear to flight.	For example, “OA24 on 1” (or 2).
Hover Check		
Ground contact-Indicating lights-Check both off.	Both off (out).	Verify that both ground contact indicating lights are extinguished.
Before Takeoff		

Table 6-5. CH-47D call and response terminology

Checklist Steps	*NCM Response/Check*	*NCM Procedure/Remarks*
Crew, passengers and mission equipment-Check.	Aft ready, forward ready. (Refer to Note 5)	Aft CE will always call first.
Cruise Check		
Ramp area – Check every 30 MINs.	Ramp check in progress. Ramp is inside. Ramp is outside. Cabin door inside. Ramp and cabin check complete. #### lbs of fuel internal (or system normal if the ERFS tanks are not installed). Cabin door is outside.	If single crewmember, combine the calls. For example, ramp and cabin check in progress. Ramp is inside. Ramp and cabin check complete, system normal. #### lbs of fuel internal. Ramp is outside.
Before Landing		
Crew, passengers and mission equipment-Check.	Aft ready, forward ready. (Refer to Note 5)	Aft CE always calls first.
After Landing		
Ground contact lights-Check both on.	Both on/off/cycling.	
Engine Shutdown		
Ramp-As required.	Ramp is level.	Ramp is not on the ground, but Aft CE can exit the aircraft via the ramp.
Wheels-Chocked.	Wheels are chocked.	
Mission equipment-Safe as required.	Safe in the rear or not installed.	Once the M-130 or AN/ALE-47 safety pin is installed.
Fire guard-Posted.	Posted at the APU.	Ramp CE monitors the APU for any abnormal condition or fire, positioned by the EMERG fluid shut-off valve with access door open during the entire APU start sequence.
APU-Start.	APU clear to start.	After APU is started, NCMs post for ENG shutdown.
ENG COND levers-Ground	1 and 2 clear to ground.	
DECU shutdown BIT-Check.	88 on 1 and 2. (Refer to Note 2)	Or other code as displayed on the DECU digital display.
Droop stops-Engaged.	Droops are in.	Aft CE visually looks at the aft head and confirms droop stop engagement.
ENG COND levers-STOP.	Fire guard posted on 1 (or 2), 1 (or 2) clear to stop.	One ENG at a time.
RAD ALTs-OFF.	Off in the rear.	If the MWO is installed.
Maintenance panel-Check.	Maintenance panel normal.	CE visually confirms all appropriate lights, no latches, and TEMPs and PRESS are normal.
APU Switch-OFF.	APU clear off.	Aft CE monitors the APU for fire.
Note 1. The entire maintenance panel must be checked to include all lights, latches, gauges and indicators. Note 2. For DECU checks, verify 88 on 1 and 2 or other codes displayed on DECU when called for by the PI. Note 3. During the ENG start sequence, NCMs will monitor entire aircraft for unusual conditions such as smoke, flames, fluid leaks and vibrations by visually scanning all areas. After the first ENG is stabilized at ground idle, the AFT		

Table 6-5. CH-47D call and response terminology

Checklist Steps	*NCM Response/Check*	*NCM Procedure/Remarks*
CE is clear to reposition to check the maintenance panel for proper indications and APU area for leaks. After the second ENG is stabilized at ground idle, the aft CE must reposition to check the maintenance panel for proper indications and APU area for leaks prior to repositioning to clear ENGs to flight. Note 4. If flight has two NCMs, the aft NCM will call "Ramp UP" and forward NCM will call "Cabin Door Secure". If the flight only has one NCM, the aft NCM will make both calls. Note 5. If the flight has two NCMs, the aft NCM will call "Aft Ready" and the forward NCM will call "Forward Ready". If the flight has one NCM, the aft NCM will call "Aft Ready".		

f. Table 6-6 is an example of CH-47F call and response terminology.

Table 6-6. CH-47F NCM call and response terminology

Checklist Steps	*NCM Response/Check*	*NCM Procedure/Remarks*
	Before Starting Engines	
BATT Switch-ON.	All stations check in with the PC.	
TROOP WARN ALARM and JUMP LTS-As required.	Two bells, two red, two green.	Forward CE confirms when not visible from ramp (verbal call only when not operational).
Fire guard-Posted	Posted at the APU.	Ramp CE confirms that the UTIL. HYD ACCUMs are fully charged before posting at the APU area.
APU-Start.	APU clear to start.	Ramp CE monitors the APU for any abnormal condition or fire, positioned by the EMERG fluid shut-off valve with access door open during the entire APU start sequence.
APU GEN Switch-ON.		Ramp CE checks UTIL. HYD PRESS is within normal range and insures the cargo ramp is not touching the ground prior to ENG start.
PWR XFER 1 and 2 switches-ON.		Ramp CE confirms PRESS are within normal ranges.
Maintenance Panel-Check.	PRESS and TEMPs are normal, going to test, all PWR train and HYD lights indicated, going to reset. Maintenance panel is operational. (Refer to Note 1).	Ramp CE places and holds the TEST/ RESET switch to TEST until the PIs confirm the proper indications (Debris, chips, hots, and two master caution lights) and checks all the maintenance panel PWR train and HYD lights before stating test results.
Anti-Ice-Check as required	**WARNING** **Pitot heat can cause severe burns. Ensure the PIs turn off the pitot heat when done. Pitot and yaw port heat operational.**	CE takes one flight glove off and feels for the presence of heat on three pitot static tubes and four AFCS/DAFCS yaw ports.
External lights-Check as required	White light (or IR light) is on, extending, 45 degrees, bright, dim, off, as required. Left, right, and aft position light operational (If required). Upper and lower anti-collision lights operational (As required)	Forward and aft CE (As applicable) observes the operation of the search lights, position lights, and anti-collision lights.
Rotor blades-Check position.	Clear of the tunnel area.	Aft CE confirms that the position of the rotor blades is not within 30 degrees of aircraft centerline.
Flight control travel and HYDs-Check.	PRESS is normal on 1 (or 2), zero on 2 (or 1). Corresponding movement forward and aft heads. PRESS is normal 1 and 2 (After FLT CONT switch is placed back to BOTH).	Standing in a position to view the maintenance panel and both rotor heads the Aft CE observes the operation of the System PRESS, rotor heads, and flight controls for each system. Forward CE observes the operation of the rotor heads and flight

Table 6-6. CH-47F NCM call and response terminology

Checklist Steps	*NCM Response/Check*	*NCM Procedure/Remarks*
		controls from his position.
Fuel quantity-Check.	Refuel station reads #### (outside). #### lbs internal (ERFS installed).	Aircraft fuel load verified from PMD/ Preflight.
Cargo hooks, hoist/winch-Check operation as required.	**CAUTION** **All personnel must remain clear of MID hook at all times. Ready outside, ready aft (two] man crew). Ready aft (one man crew).**	One CE will observe operation of the cargo hook(s) and make the appropriate responses for the operation. The other CE will be positioned in the cabin to operate the hoist operator's grip as required. If single crewmember, perform both.
Armed in FORWARD.	Forward hook operational.	Ensure manual release knob on forward hook ratchets.
Armed in MID.	MID Hook is clear.	Ensure all crew members are clear of the MID hook.
Checking MID hook.	MID hook is open.	Ensure MID hook opens.
Armed in Aft.	Hoist operator's panel armed, checking AFT hook – Aft hook operational.	Ensure manual release knob on Aft hook ratchets.
Resetting.	MID hook clear, MID hook is closed.	Resetting.
Armed in tandem.	Forward and aft hook operational.	Ensure forward and aft hook manual release knobs ratchet.
Resetting.	MID hook clear.	Resetting.
Armed in all.	Forward and aft hook operational, MID hook open.	Ensure forward and aft hook manual release knobs ratchet and MID hook opens.
Resetting.	MID hook clear, MID hook is closed.	Ensure MID hook closes.
Checking safe.	Safe in the rear.	Aft CE presses cargo release on hoist operators grip. Ensure hooks do not actuate.
DECU Prestart BIT-Perform.	88 on 1 and 2. (Refer to Note 2)	Do not read the DECU's digital displays until the ECLs are in ground or until requested by the PI.
Area-Clear for start.	1 and 2 ENG areas are clear, fire guard posted, ready on 1 (or 2).	NCM will post 45 degrees off the nose of the ENG. (A good location is, even with the position lights, outside the rotor disk.) NCM confirms that the ENG areas are clear before clearing the PIs to start ENGs.
Starting Engines		
EAPS Fan switches-ON.	1(or 2) ENG air particle separator (EAPS) fans clear. EAPS fans operational.	If installed. FOD may blow out during the purge, so be sure the area is clear prior to turning them on.
First ENG-Start.	1 (or 2) Clear for start.	If performing a two-crewmember run-up, the other CE will post on the opposite side prior to the start sequence. (Refer to Note 3)
Second ENG-Start.	2 (or 1) Clear for start.	During two-crewmember run-up, wait until the aft CE is posted on 1 before starting 2. (Refer to Note 3)
ENG COND Levers-FLT.	1 and 2 Clear to flight.	Visually scan entire aircraft for abnormal conditions.
Fluid drain lines-Check.	Normal.	Verify any fluid draining from drain lines is not excessive.

Table 6-6. CH-47F NCM call and response terminology

Checklist Steps	*NCM Response/Check*	*NCM Procedure/Remarks*
EAPS ENG 1 and ENG 2 FAN switches-ON as required.	1 and 2 EAPS Fans clear.	Verify the No.1 and No.2 ENG EAPS fans are clear of any personnel.
DECU Start BIT-Perform.	1 and 2 Clear towards ground, 88 on 1 and 2.	(Refer to Note 2)
FADEC System-REV System check (first flight of day)		CE is positioned forward of the ramp hinge and clear of ENGs.
APU Switch-OFF.	APU clear off.	Aft CE monitors APU for fire, then closes EMERG fluid shutoff access door after APU is off
Ground Operation		
FUEL PUMP and XFEED-Check operation.	XFEEDs closed lights out.	After PI completes FUEL PUMP switches check, aft CE ensures LH and RH crossfeed valves close and transition lights come on then go out when PI places XFEED switch to “CLOSED”.
Before Taxi		
Chocks-Removed and secured.	Removed and secured.	Ensure chocks are secured by some means in the cabin area.
Flare/chaff dispenser safety pin-As required	Removed and stowed.	Aft CE removes and secures the CMWS safety pin.
Ramp and cabin door-As required.	Ramp is up, cabin door secured. (Refer to Note 4)	Ramp should be in the full up position for taxi, takeoff, hover flight, and landings (unless there is a load(s) on it that prevents placing the ramp in the “UP” position).
Crew, passengers, and mission equipment-Check ready for taxi.	Aft ready, forward ready. (Refer to Note 5)	Aft CE always calls first.
Taxi director and blade watchers-Positioned.	Internal or outside.	Call made as appropriate for the conditions.
Before Hover		
PAT check-Perform first flight of day (may be deferred to hover).	1 (or 2) Clear to/towards ground, testing 1 (or 2). Read the last hexadecimal digit series displayed and apply the temp bias. Announce the adjusted PAC # and trigger value. 1 (or 2) clear to flight.	For example, the DECU will begin its BIT and flash 88 0A and a two digit value. The BIT is not complete until the DECU stops flashing codes. Note the last two digit value displayed and apply the PACN adjustment.
Hover Check		
Ground CONTACT indicating lights-Off.	Both off (out).	Verify that both ground contact indicating lights are extinguished.
PAT-Perform as required.	Refer to PAT check above.	Refer to PAT check above.
Before Takeoff		
Crew, passengers, and mission equipment-Check.	Aft ready, forward ready. (Refer to Note 5)	Aft CE always calls first.
Cruise Check		
Ramp and cabin area-Check every 30 minutes.	Ramp check in progress. Ramp is inside. Ramp is outside. Cabin door inside. Ramp and cabin check complete. #### lbs of fuel internal (or SYSs normal if the ERFS tanks are not installed). Cabin door is outside.	If single crewmember, combine the calls. For example, ramp and cabin check in progress. Ramp is inside. Ramp and cabin check complete, SYSs normal. #### lbs of fuel internal. Ramp is outside.

Table 6-6. CH-47F NCM call and response terminology

Checklist Steps	*NCM Response/Check*	*NCM Procedure/Remarks*
	Before Landing	
Crew, passengers, and mission equipment-Check.	Aft ready, forward ready. (Refer to Note 5)	Aft CE always calls first.
	After Landing	
Ground CONTACT indicating lights-Check "ON".	Both on/off/cycling.	
	Engine Shutdown	
Ramp -As required.	Ramp is level.	Ramp is not on the ground, but aft CE can exit the aircraft via the ramp.
Wheels-Chocked.	Wheels are chocked.	
Mission equipment-OFF or SAFE as required.	Safe in the rear or not installed.	Once the CMWS safety pin is installed.
Fire guard-Posted.	Posted at the APU.	Ramp CE monitors the APU for any abnormal condition or fire, positioned by the EMERG fluid shut-off valve with access door open during the entire APU start sequence.
APU-Start.	APU clear to start.	After APU is started, NCMs post for ENG shutdown.
END COND levers-Ground, start 2 minute cool-down if not previously started.	1 and 2 Clear to ground.	
DECU SHUTDOWN BIT-Check.	88 on 1 and 2. (Refer to Note 2)	Or other code as displayed on the DECU digital display.
Droop stops-Engaged.	Droops are in.	AFT or FORWARD CE visually looks at the Aft head and confirms droop stop engagement.
ENG COND levers-STOP, after 2 minute cool-down.	Fire guard posted on 1 (or 2), 1 (or 2), clear to stop.	One ENG at a time.
Maintenance panel-Check.	Maintenance panel normal.	CE visually confirms all appropriate lights, and TEMPs and PRESS are normal.
APU Switch-OFF.	APU Clear off.	AFT CE monitors the APU for fire.

Note 1. The entire maintenance panel must be checked to include all lights, gauges, and indicators. HYDs: The ramp CE must insure that all three HYD systems indicate normal PRESS and TEMP ranges, fluid quantity levels are at the "Full" line (verified visually with the linear variable differential transducer on the reservoir cooler), and no filter change or pump fault lights are illuminated.
PWR Train: Prior to testing no CHIP, DEBRIS, or TEMP HI (High) should be illuminated. At this time only the PRESS LO (Low), MAIN PRESS LO, and AUX PRESS LO lights should be illuminated.
Ground contact: The LH ground CONT. and RH ground CONT. indicating lights should be illuminated anytime the aircraft is on the ground in a WT-on-wheels condition.

Note 2. For DECU checks, verify 88 on 1 and 2 or other codes displayed on DECU when called for by the PI.

Note 3. During the ENG start sequence, NCMs will monitor entire aircraft for unusual conditions such as smoke, flames, fluid leaks, vibrations by visually scanning all areas. After the first ENG is stabilized at ground idle, the aft CE is clear to reposition to check the maintenance panel for proper indications and APU area for leaks. After the second ENG is stabilized at ground idle, the aft CE must reposition to check the maintenance panel for proper indications and APU area for leaks prior to repositioning to clear ENGs to flight.

Note 4. If flight has two NCMs, the aft NCM will call "RAMP UP" and forward NCM will call "CABIN DOOR SECURE". If the flight only has one NCM, the aft NCM will make both calls.

Note 5. If the flight has two NCMs, the aft NCM will call "AFT READY" and the forward NCM will call "FORWARD READY". If the flight has one NCM, the aft NCM will call "AFT READY".

This page intentionally left blank.

Appendix A

NonRated Crewmember and Trainer Training and Qualification

A-1. **NONRATED CREWMEMBER TRAINING AND QUALIFICATION.** MOS qualification is conducted at DA-approved training sites. CEs must complete the aircraft qualification training listed for system subjects, required academic subjects, and flight training subjects for MOS 15U.

a. Academic qualification training. The NCM must receive sufficient instruction to be knowledgeable in the aircraft manuals, systems, and flight training subjects listed below. The academic instruction may be completed in any order, but must be completed (to include the examination) and documented in the IATF on DA Form 7122-R before flight training. The academic classes are mandatory, but the hour requirements are based on crewmember retention. Commanders will develop written examinations covering the subject areas listed in this appendix. Each of the following subject areas requires a 50 question open book examination:

(1) Operators manual/systems subjects (to include EPs).

(2) Maintenance manuals.

(3) Academic subjects.

(4) Flight training subjects.

Note. Crewmembers must pass the examinations with a grade of at least 70 percent. The required examinations for each subject area are identified in table A-1.

Table A-1. Training and qualification subjects

System subjects	
Aircraft system, structure and airframe	Maintenance forms and records
Avionics and mission equipment	Weight and balance
Flight control hydraulic systems	Electrical system
Power-plant and related systems	Flight control system
Auxiliary power unit	Rotor system
Transmission and drive systems	Fuel and oil systems
Landing gear, wheels and brake systems	Environmental systems
Utility systems.	Prepare aircraft for preflight
Inspection requirements	Cargo winching and loading
Aircraft limitations.	Cargo tie-down and storage
Advanced flight control system/digital advance flight control system	Armaments subsystems
Aircraft mooring	Refueling operations

Table A-1. Training and qualification subjects

Academic subjects	
Aeromedical factors	Department of the Army regulations and publications
Aviation life support equipment	Passenger briefings
Unit standing operating procedures and local regulations	Aircrew training program introduction
Hand and arm signals	Aircrew training manual introduction
Logbook and forms	Inflight duties
Crew mission briefing	Confined area and slope operations
Engine start-through-before takeoff checks	Aircraft refueling procedures
External (sling) load(s) operations	Internal load(s) operations
Crew coordination training/qualification	Armament system/operations
Environmental operations	Aircraft survivability equipment
Night mission operations and deployment	Operating limits and restrictions
Emergency procedures	
Flight training subjects	
Operating limitations and restrictions	Preflight/PMD procedures
Internal/external (sling) load(s) operations	Inflight duties
Start and run-up procedures	Radio communication procedures
Health indicator test check procedures	Before takeoff checks
Power assurance test check procedures	Refueling procedures
Confine area and slope operations	Aircraft survivability equipment
Clearing aircraft during flight	Environmental operations
Required examinations: Flight training subject written examination	Egress procedures

b. Flight training. The NCM will be required to demonstrate proficiency in all individual base tasks listed in table 2-4, page 2-5, and demonstrate crew coordination and airspace surveillance proficiency. An "X" in the "N" column of table 2-4, page 2-5, identifies night tasks required for qualification training. Flight hour requirements for aircraft qualification training are based on individual crewmember proficiency. The flight time shown in table A-2 may be used as a guide. Total flight training for aircraft qualification will not be less than 10 hours. Table A-3, page A-3, may be used as a guide for flight time allotted during each training day.

Table A-2. Guide for flight training of nonrated crewmembers

Flight Instruction	*Flying Hours*
Base tasks[1]	8.0
Emergency procedures[2]	2.0
Evaluation[3]	3.0
Total hours	**13.0**

Notes:
1 – A minimum of one hour will be at night.
2 – Emergency procedures are required in each mode of flight.
3 – The evaluation may be a continual evaluation.

Table A-3. Guide for flight training sequence

Flight Training Sequence					
Training day	***1***	***2***	***3***	***4****	***5***
Daily	2.5	2.5	2.5	2.5	3.0E
Cumulative time	**2.5**	**5.0**	**7.5**	**10**	**130**
Note. The * denotes night flight and "**E**" denotes evaluation. All measurements are in hours.					

c. Documentation. Upon completion of training, an entry will be made in the remarks section of DA Form 7122-R of the NCM's IATF. At the NCM's next closeout, training will be documented on the crewmember's DA Form 759 (Individual Flight and Flight Certificate-Army), part V, remarks section. A separate entry in the closeout is required for completion of aircraft qualification training.

(1) NVG qualification will be accomplished IAW paragraph 2-1b.

(2) Refresher training will be accomplished IAW paragraph 2-2.

(3) Mission training will be accomplished IAW paragraph 2-3.

(4) Continuation training will be accomplished IAW paragraph 2-4.

(5) CBRNE training will be accomplished IAW paragraph 2-7.

A-2. STANDARDIZATION INSTRUCTOR, FLIGHT ENGINEER INSTRUCTOR, NONRATED CREWMEMBER UNIT TRAINER TRAINING AND QUALIFICATION.

a. SI/FI training/qualification.

(1) Prerequisites for FI qualification. 15U NCM in the rank of sergeant through staff sergeant (SSG) with a minimum of 1 year experience as a CH-47D/F FE, possess a current flight physical, and on crewmember orders.

(2) Initial FI training. This training is conducted at USAACE, Fort Rucker, AL. An SP, IP or SI will conduct initial validation of a crewmember's qualification following this course of instruction and in the aircraft at each new duty station. Additional academic and flight hour requirements are at the discretion of the unit commander.

(3) SI qualification. An SI must be an FI and it is recommended the SI have a minimum of 1 year experience as a CH-47D/F FI. The SI must be able to supervise and implement the commander's ATP for NCMs and assist the unit SP with the supervision and maintenance of the standardization program.

(4) Documentation. Upon completion of the SI/FI qualification training and evaluation, the SP/IP/SI/FI (as appropriate) will enter the evaluation results on the NCM's IATF DA Form 7122-R. Upon completion of a satisfactory evaluation, the DA Form 7120-R will be changed to reflect the new flight duty position and obtain the commander's approval (initial and date on the DA Form 7120-R). At the NCM's next closeout, training will be documented on the crewmember's DA Form 759, Part V-Remarks Section.

b. NCM UT/qualification training. The NCM UT was created to lessen the training burden on the FIs/SIs. The UT can instruct RL 2/RL 1 crewmembers on certain tasks for which they show an expert knowledge. It was not created to make additional FIs/SIs. Once designated as a UT, he or she may conduct FE duties or conduct training in the mission/additional tasks that he or she is designated to instruct. UTs will not conduct training on RL 3 crewmembers, nor will they perform evaluations.

Note. The goal should not be to make all FEs into UTs in all mission/additional tasks, but rather to give the FEs the ability to instruct tasks in which they are subject matter experts.

---

(1) Prerequisites for UT qualification. The unit commander is responsible for conducting UT qualification IAW this ATM. Recommended active Army, NG, and RC personnel in grade of specialist through SSG must be a current CH-47D/F RL 1 FE, possess a current flight physical, and on crewmember orders.

(2) Academic training. Academic training will be conducted at the unit level. The NCM must receive sufficient instruction to demonstrate proper method of instruction (MOI) and be knowledgeable in the

mission/additional task(s) the NCM is designated to instruct. The NCM must be able to effectively impart that knowledge to an RL 2 crewmember.

(3) Flight training. The UT will be evaluated on his or her ability to perform, train, and provide MOI for the specific mission/additional tasks in which he or she is designated to instruct. The UT will be required to demonstrate MOI proficiency in designated task(s) and must be able to instruct crew coordination and airspace surveillance in those tasks. All flight tasks will be performed to proficiency.

(4) Documentation. Upon completion of the UT qualification training and evaluation, the SP/IP/SI/FI (as appropriate) will enter the evaluation results on the NCMs IATF DA Form 7122-R. Upon completion of a satisfactory evaluation, the DA Form 7120-R will be changed to reflect the new flight duty position and obtain the commander's approval (initial and date on the DA Form 7120-R). At the NCM's next closeout, training will be documented on the crewmember's DA Form 759, Part V-Remarks Section.

A-3. **NON-CREWMEMBER/DOOR GUNNER TRAINING AND QUALIFICATION.** Non-crewmember/DG training and qualification will be IAW table 2-7 in this ATM and FM 3-04.140, appendix A.

Appendix B

Heads-Up Display Qualification

B-1. **GENERAL.** HUD qualification will be conducted IAW this ATM or applicable POI. HUD qualified UTs, IPs, or SPs will conduct academic training and flight training. A HUD-qualified IP or SP will conduct the flight evaluations; if an aviator is not previously HUD qualified, qualification must be completed prior to progressing to NVG RL 1.

B-2. **QUALIFICATION TRAINING.** Qualification training will provide the aviators with the knowledge, skills, and techniques required to integrate HUD operations into flight. Training in the aircraft will be with the aviator at a station with access to the flight controls, wearing the HUD. A HUD qualified IP, SP or UT will be at the other station with access to the flight controls. HUD qualification training may be conducted concurrently during NVG qualification, refresher, and mission training.

Note. Academic training and training flights may be conducted by an UT designated by the commander to conduct HUD training. When flight training is conducted by a UT, the trainee must be designated at least NVG RL 2 or "***D***/***N***" RL 2 for day HUD training. A HUD-qualified IP/SP must conduct the evaluation.

Note. Once qualified, the RCM has no currency requirements for HUD operations unless specified by the commander. One RCM may fly with the HUD and the other without. There is no requirement for both RCMs to fly with the HUD, unless specified by the commander. Academic training must be completed before flight training begins.

B-3. **ACADEMIC TRAINING.**

a. CH-47D-Using the NVG TSP that incorporates HUD academic training or the HUD computer based trainer, and the HUD operator's manual the trainee will receive instruction in the subjects listed below.

b. CH-47F-Using the interactive multimedia instruction (IMI) and referencing the HUD operator's manual, the trainee will receive instruction in the subjects listed below:

(1) AN/AVS-7 HUD system components.

(2) HUD symbology.

(3) HUD system operations (programming, adjusting, and operating).

B-4. **FLIGHT TRAINING.** This program outlines the minimum flight hour requirements for HUD qualification. Some RCMs may require additional flight periods to achieve a satisfactory level of proficiency with the ANVIS HUD. Because initial HUD training can cause the aviator to be distracted, NCM should be stationed on the same side of the aircraft as the trainee. HUD training requires the RCM to develop new scanning habits. Time must be allowed to absorb this new information and develop new scan patterns; therefore, training days will not be combined. Each training day involving aircraft flights will be completed sequentially on separate nights.

Note. Training Day I includes 1 hour of static aircraft HUD training concentrating on programming. The 1 hour of static aircraft training in programming and operations must be completed before the first flight. Training days 1 and 2 may be completed in the aircraft or CH-47D/F FS/TFPS. Hours included in table B-1, page B-2, denote the minimum hours per flight training period; flight training periods will not be reduced. The program in table B-1, page B-2, gives the minimum required flight training for qualification.

Note. Training can be conducted "D/N" or "NVG;" however, a minimum of 2 hours will be completed during NVG flight.

Table B-1. Heads-up display training program

Training Day	*1*	*2*	*3*	*4*
Aircraft (hours)		1.0	1.0	1.0
Static training (hours)	1.0			
Cumulative hours	**1.0**	**2.0**	**3.0**	**4.0**

B-5. **TRAINING DOCUMENTATION.** After crewmembers complete AN/AVS-7 initial qualification, units will ensure an entry is made on the crewmember's DA Form 7122-R and transcribed to the DA Form 759.

Appendix C
Instructor Pilot Supplemental Information

C-1. **EMERGENCY PROCEDURES TRAINING.**

a. EPs. The following procedures will only be performed in the aircraft in an actual EMERG:

(1) Touchdown autorotation.

(2) Roll-on landing to water.

(3) SE takeoff from the ground.

(4) Actual ENG stoppage inflight or during taxi.

(5) PWR transfer unit switches "ON" or No.1 or No.2 HYD CONTR switches out of the "BOTH" position during taxiing or flight.

(6) Both ECLs out of the "flight" position during taxiing or flight.

(7) Bus-tie relay disabled or gang bar placed down.

(8) APU operations during taxiing or flight.

(9) Jettison of external (sling) load(s).

(10) EMERG descent.

(11) ECL out of flight position with other ENG FADEC switch in REV.

(12) ENG shutdown with APU inoperative.

(13) Dual GEN failure.

(14) Dual RECT failure.

(15) AFCS/DAFCS–OFF/External (sling) Load(s) Hook-up.

(16) AFCS/DAFCS–OFF/Combat Maneuvering Flight.

(17) AFCS/DAFCS–OFF/Fast-Rope Insertion and Extraction Operations.

(18) AFCS/DAFCS–OFF/Rappelling Operations.

(19) AFCS/DAFCS–OFF/Special Patrol Infiltration/Exfiltration Operations.

(20) AFCS/DAFCS–OFF/Rescue-Hoist/Winch Operations.

(21) AFCS/DAFCS–OFF/Caving Ladder Operations.

(22) AFCS/DAFCS–OFF/Shipboard Operations.

(23) Dual FADEC PRI and/or REV failure (Dual PRI failure both ENGs operating in REV may be performed in the aircraft by DES-trained SP, IP, or ME at USAACE, EAATS, or other DA-approved training sites and by DES-trained instructors. DES-trained instructors may train other instructors who then may perform this task.)

(24) EGI 1and EGI 2 failure.

b. Additional EPs. In addition to the EPs listed in paragraph C-2, SPs/IPs may also demonstrate—

(1) Cargo hook(s) manual release.

(2) Cargo hook pneumatic release, if the pre-charge is low and requires servicing.

c. The EPs listed herein are demonstrated, practiced, and evaluated during training. Any EP may be performed in the CH-47D/F FS/TFPS. The performance of EP training in the aircraft will be briefed prior to the flight and all emergencies will be considered actual unless stated otherwise. Aircraft EMERG conditions, procedures, restrictions, and the only authorized methods of simulating the condition in the aircraft are outlined in paragraph C-2.

WARNING

Simulation of emergency conditions, other than verbal, in the actual aircraft will only be accomplished while the aircraft is operating in VMC.

Note. Pulling of CBs, other than those listed below, is not authorized in the CH-47D/F to demonstrate or simulate an EMERG procedure.

C-2. **INSTRUCTOR PILOT TECHNIQUES.**

a. Autorotate. This may only be performed in the FS/TFPS.

b. EMERG ENG shutdown. This may be performed in the CH-47D/F or in the FS/TFPS.

(1) CH-47D/F. Initiated on the ground with the ECL in the ground position and the required ENG cool down met. Not to be performed while ground taxiing.

(2) FS/TFPS. No restrictions.

c. Abort start. This may be performed in the CH-47D/F or in the FS/TFPS.

(1) CH-47D/F initiated during the ENG start sequence or when the aircraft is parked, brake set, ECL in the ground position, and the required ENG cool down met. Abort start may also utilize the FE/CE verbally stating simulated conditions requiring the ENG start be aborted.

(2) FS/TFPS. Verbally direct the crewmember to abort the start, or initiate at the instructor operator station (IOS) of the FS/TFPS.

d. Dual-ENG failure.

(1) Conditions. This may only be performed in the FS/TFPS.

(2) FS/TFPS. Initiate at IOS of the FS/TFPS.

e. SE failure-Low altitude/low airspeed/abort takeoff and cruise.

(1) Low altitude/low airspeed-This may be performed in the CH-47D/F or in the FS/TFPS.

(a) CH-47D/F. SE OGE HVR capability is required when performing this maneuver. This condition may be simulated during external (sling) load(s) operations in the aircraft if the cargo hook master switch is "off" to prevent inadvertent load(s) jettison. IP should be especially vigilant and ready to use EMERG release, as required when the master switch is "off". Using the ECL, decrease the N_G or N_1 to ground idle. The crewmember should state the indications and the IP announces "ENG FAILURE", illumination of the appropriate ENG fail warning CH-47F/ENG fail caution CH-47D, or states the N_G is simulated below 48 percent.

(b) FS/TFPS. Initiate at IOS of the FS/TFPS or place one ECLs to stop.

Note. An associated ENG FAIL caution is associated with an actual ENG failure.

(2) Abort takeoff-This may be performed in the CH-47D/F or in the FS/TFPS.

(a) CH-47D/F. Abort takeoff can be performed any time the aircraft is operating in a position over a suitable landing area to abort or operating above minimum SE airspeed and 100 feet AGL in a position to continue the SE takeoff. This EMERG condition will not be simulated during external (sling) load(s) operations unless SE HVR OGE capability exists.

(b) FS/TFPS. Same as paragraph C-2e(1)(b).

(3) Cruise-May be performed in the CH-47D/F or in the FS/TFPS.

(a) CH-47D/F. Performed any time the aircraft is above 200 feet AGL in a cruise profile. When conducting external (sling) load(s) operations, the cargo hook master switch shall be "OFF".

(b) FS/TFPS: Same as paragraph C-2e(1)(b).

Note. When operating with only one ENG online, that ENG must remain in the primary FADEC mode of operation.

f. ENG Re-start(s) during flight.

(1) Conditions. This may only be performed in the FS/TFPS.

(2) FS/TFPS. After a SE failure, the crewmember should determine if it is feasible to perform an ENG re-start.

g. FADEC 1 or FADEC 2 caution.

(1) Conditions. This may be performed in the CH-47D/F or in the FS/TFPS.

(2) CH-47D/F. Place the appropriate PRI/REV switch to the "REV" position. It is important to ensure TQ indications are matched and operating RRPM is obtained before placing the switch again to the "PRI" position

(3) FS/TFPS. Initiate at IOS of the FS/TFPS or place the appropriate PRI/REV switch to the "REV" position.

h. FADEC 1 and FADEC 2 cautions.

(1) Conditions. This may only be performed in the FS/TFPS. (This EP can be performed in the aircraft by a DES-trained SP, IP, or ME at USAACE, EAATS, or other DA-approved training sites and by DES-trained instructors. DES-trained instructors may train other instructors who then may perform this task).

(2) CH47D/F. Special training required.

(3) FS/TFPS. Initiate at IOS of the FS/TFPS or place the PRI/REV switches to the "REV" position.

i. REV 1 and/or REV 2 cautions without FADEC cautions.

(1) Conditions. This may only be performed in the FS/TFPS.

(2) FS/TFPS. Initiate at IOS of the FS/TFPS or verbally describe the indications.

j. REV 1 and/or REV 2 cautions with FADEC cautions.

(1) Conditions. This may only be performed in the FS/TFPS.

(2) FS/TFPS. Initiate at IOS of the FS/TFPS or verbally describe the indications.

k. TQ measuring system malfunction.

(1) Conditions. This may only be performed in the FS/TFPS.

(2) FS/TFPS. Initiate at IOS of the FS/TFPS or demonstrated by pulling the "DC TQ CB" (CH-47D [A-5]) or (CH-47F [A-20]).

l. ENG XSMN clutch failure to engage.

(1) Conditions. This may be performed in the CH-47D/F or in the FS/TFPS.

(2) CH-47D/F. Verbally describe the indications.

(3) FS/TFPS. Initiate at IOS of the FS/TFPS or verbally describe the indications.

m. ENG shutdown–complete electrical failure.

(1) Conditions. This may only be performed in the FS/TFPS.

(2) FS/TFPS. Verbally describe the indications.

n. ENG shutdown–ENG condition lever failure.

(1) Conditions. This may be performed in the CH-47D/F or in the FS/TFPS.

(a) CH-47D/F. Initiated on the ground with the ECL in the ground position and the required ENG cool down met.

(b) Not to be performed while ground taxiing. Verbally state failure of ECL(s) pull appropriate fire pull handle(s).

(2) FS/TFPS. Initiate at IOS of the FS/TFPS or verbally describe the indications.

o. ENG shutdown–with APU or APU GEN inoperative.

(1) Conditions. This may only be performed in the FS/TFPS.

(2) FS/TFPS. Initiate at IOS of the FS/TFPS or verbally describe the indications.

p. **D** ENG oil–low quantity/high TEMP low PRESS.

(1) Conditions. This may be performed in the CH-47D or in the FS.

(2) CH-47D. Verbally describe the indications or pull "CB A-14" No.1 PDP or "CB A-19" No.2 PDP to fail the "ENG OIL PRESS" gauge.

(3) FS. Initiate at IOS of the FS or verbally describe the indications.

Note. If failed using the CB after ENG start, the ENG oil PRESS indication on the oil PRESS gauge will remain static (frozen) at the indication present when the CB was pulled.

q. ENG chip DET caution.

(1) Conditions. This may be performed in the CH-47D/F or in the FS/TFPS.

(2) CH-47D/F. Verbally describe the indications.

(3) FS/TFPS. Initiate at IOS of the FS/TFPS or verbally describe the indications.

r. **D** No.1 or No.2 ENG XSMN HOT caution.

(1) Conditions. This may be performed in the CH-47D or in the FS.

(2) CH-47D. Verbally describe the indications.

(3) FS. Initiate at IOS of the FS or verbally describe the indications.

s. **F** ENG 1 or ENG 2 XMSN warning.

(1) Conditions. This may be performed in the CH-47F or in the TFPS.

(2) CH-47F. Verbally describe the indications.

(3) TFPS. Initiate at IOS of the TFPS or verbally describe the indications.

t. XSMN debris screen latches.

(1) Conditions. This may be performed in the CH-47D/F or in the FS/TFPS.

(2) CH-47D/F. Verbally describe the indications.

(3) FS/TFPS. Initiate at IOS of the FS/TFPS or verbally describe the indications.

u. XSMN OIL PRESS caution.

(1) Conditions. This may be performed in the CH-47D/F or in the FS/TFPS.

(2) CH-47D/F. Verbally describe the indications.

(3) FS/TFPS. Initiate at IOS of the FS/TFPS or verbally describe the indications.

v. XSMN OIL PRESS and XSMN AUX OIL PRESS caution.

(1) Conditions. This may be performed in the CH-47D/F or in the FS/TFPS.

(2) CH-47D/F. Verbally describe the indications.

(3) FS/TFPS. Initiate at IOS of the FS/TFPS or verbally describe the indications.

w. XSMN AUX OIL caution.

(1) Conditions. This may be performed in the CH-47D/F or in the FS/TFPS.

(2) CH-47D/F. Verbally describe the indications.

(3) FS/TFPS. Initiate at IOS of the FS/TFPS or verbally describe the indications.

x. XSMN CHIP DET caution.

(1) Conditions. This may be performed in the CH-47D/F or in the FS/TFPS.

(2) CH-47D/F. Verbally describe the indications.

(3) FS/TFPS. Initiate at IOS of the FS/TFPS or verbally describe the indications.

y. XSMN OIL HOT caution.

(1) Conditions. This may be performed in the CH-47D/F or in the FS/TFPS.

(2) CH-47D/F. Verbally describe the indications.

(3) FS/TFPS. Initiate at IOS of the FS/TFPS or verbally describe the indications.

z. ENG HOT START.

(1) Conditions. This may be performed in the CH-47D/F or in the FS/TFPS.

(2) CH-47D/F. Verbally describe the indications.

(3) FS/TFPS. Initiate at IOS of the FS/TFPS or verbally state the PTIT is rising at an abnormal rate and smoke and flames are visible from the tail cone.

aa. Residual fire during shutdown.

(1) Conditions. This may be performed in the CH-47D/F or in the FS/TFPS.

(2) CH-47D/F. Verbally describe the indications.

(3) FS/TFPS. Initiate at IOS of the FS/TFPS or verbally state the PTIT is rising/smoke and flames are visible from the tail cone.

bb. APU fire.

(1) Conditions. This may be performed in the CH-47D/F or in the FS/TFPS.

(2) CH-47D/F. Day only initiated on the ground with the ECLs in the ground position and the required ENG cool down met or before engine starting.

(3) FS. Initiate at IOS of the FS/TFPS or verbally describe the indications.

cc. ENG or fuselage fire-flight.

(1) Conditions. This may be performed in the CH-47D/F or in the FS/TFPS.

(2) CH-47D/F. Place the fire DET test switch to "TEST" in the CH-47D, press the "LAMP TEST" switch in the CH-47F or verbally announce a fire. If external load(s) operations are being performed, the cargo hook master switch shall be "OFF".

(3) FS/TFPS. Initiate at IOS of the FS/TFPS, or verbally describe the indications.

dd. ENG compartment, fuselage, or electrical fire.

(1) Conditions. This may be performed in the CH-47D/F or in the FS/TFPS.

(2) CH-47D/F. Initiated on the ground with the ECLs in the "GROUND" position and the required ENG cool down are met or before engine starting. Place the fire DET test switch to "TEST" in the CH-47D, press the "LAMP TEST" switch in the CH-47F or verbally announce a fire. Do not allow the RCM to place the APU or BATT switch "OFF" as you will be unable to monitor PTIT's, motor ENGs or communicate with the FE.

(3) FS/TFPS. Initiate at IOS of the FS/TFPS or verbally describe the indications.

ee. Electrical fire inflight.

(1) Conditions. This may be performed in the CH-47D/F or in the FS/TFPS.

(2) CH-47D/F. Verbally state a fire.

(3) FS/TFPS. Initiate at IOS of the FS/TFPS or verbally describe the indications.

ff. Smoke and fume elimination.

(1) Conditions. This may be performed in the CH-47D/F or in the FS/TFPS.

(2) CH-47D/F. During day VMC flight only.

(3) FS/TFPS. State the presence of smoke and fumes in the cockpit.

gg. AUX fuel pump(s) failure.

(1) Conditions. This may be performed in the CH-47D/F or in the FS/TFPS

(a) CH-47D. Anytime provided fuel is remaining in the AUX tanks. Verbally state the indications, or pull the "AUX FUEL PUMP" DC CB A-1 or A-4. The crewmember should detect unbalanced fuel consumption or should note the "AUX PRESS" light illuminated.

(b) CH-47F. Anytime, provided fuel is remaining in the AUX tanks. Verbally state the indications, or pull the "AUX FUEL PUMP" DC CB A-10 or A-13. The crewmember should detect unbalanced fuel consumption or note the "AUX PRESS" advisory activated on the WCA.

(2) FS/TFPS. Initiate at IOS of the FS/TFPS, verbally describe the indications, or perform the steps listed in paragraph gg(1)(a) or (b).

hh. Fuel venting.

(1) Conditions. This may be performed in the CH-47D/F or in the FS/TFPS.

(2) CH-47D/F. Anytime provided fuel is remaining in the AUX tanks.

(3) FS/TFPS. Initiate at IOS of the FS/TFPS or verbally describe the indications.

ii. L or R FUEL PRESS caution.

(1) Conditions. This may be performed in the CH-47D/F or in the FS/TFPS.

(2) CH-47D/F. Anytime, operating below 6,000 feet PA. Verbally state the indications, or turn both fuel pump switches for a main tank "OFF". It can also be accomplished by pulling the main forward and main aft "FUEL PUMP" DC CBs (CH-47D A-2 and A-3), (CH-47F A-11 and A-12).

(3) FS/TFPS. Initiate at IOS of the FS/TFPS, verbally describe the indications, or perform the steps listed in paragraph ii(2).

jj. Fuel low caution.

(1) Conditions. This may be performed in the CH-47D/F or in the FS/TFPS.

(2) CH-47D/F. Verbally describe the indications.

(3) FS/TFPS. Initiate at IOS of the FS/TFPS or verbally describe the indications.

kk. FUEL LOW and FUEL PRESS cautions.

(1) Conditions. This may be performed in the CH-47D/F or in the FS/TFPS.

(2) CH-47D/F. Verbally describe the indications.

(3) FS/TFPS. Initiate at IOS of the FS/TFPS or verbally describe the indications.

ll. No.1 or No.2 GEN OFF caution.

(1) Conditions. This may be performed in the CH-47D/F or in the FS/TFPS.

(2) CH-47D/F. Verbally describe the indications, or place either GEN CONTR switch to "OFF". You may simulate the appearance of a single GEN failure without a bus-tie by turning off the associated AFCS/DAFCS, "MAIN FUEL PUMP" switches and by pulling the "REV CURR cut out CB" (CH-47D C-10 No.1 PDP or D-7 No.2 PDP), (CH-47F B-9 No.1 PDP or B-11 No.2 PDP).

(3) FS/TFPS. Initiate at IOS of the FS/TFPS or verbally describe the indications.

mm. No. 1 and No. 2 GEN OFF cautions.

(1) Conditions. This may only be performed in the FS/TFPS.

(2) CH-47D/F. Verbally describe the indications.

(3) FS/TFPS. Initiate at IOS of the FS/TFPS or verbally describe the indications.

nn. No.1 or No.2 RECT OFF cautions.

(1) Conditions. This may be performed in the CH-47D/F or in the FS/TFPS.

(2) CH-47D/F. Verbally describe the indications or by pulling the "REV CURR cut out CB" (CH-47D C-10 No.1 PDP or D-7 No.2 PDP), (CH-47F B-9 No.1 PDP or B-11 No.2 PDP).

(3) FS/TFPS. Initiate at IOS of the FS/TFPS or verbally describe the indications.

oo. No.1 and No.2 RECT OFF cautions.

(1) Conditions. This may be performed in the CH-47D/F or in the FS/TFPS.

(2) CH-47D/F. Verbally describe the indications.

(3) FS/TFPS. Initiate at IOS of the FS/TFPS or verbally describe the indications.

pp. BATT SYS MAL Cautions.

(1) Conditions. This may be performed in the CH-47D or in the FS/TFPS.

(2) CH-47D/F. Verbally describe the indications.

(3) FS/TFPS. Initiate at IOS of the FS/TFPS or verbally describe the indications.

qq. No.1 or No.2 HYD FLT cautions.

(1) Conditions. This may be performed in the CH-47D/F or in the FS/TFPS.

(2) CH-47D/F. Verbally describe the indications.

(3) FS/TFPS. Initiate at IOS of the FS/TFPS or verbally describe the indications.

rr. No.1 and No.2 HYD FLT CONTR cautions.

(1) Conditions. This may be performed in the CH-47D/F or in the FS/TFPS.

(2) CH-47D/F. Verbally describe the indications.

(3) FS/TFPS. Initiate at IOS of the FS/TFPS or verbally describe the indications.

ss. UTIL HYD SYS caution.

(1) Conditions. This may be performed in the CH-47D/F or in the FS/TFPS.

(2) CH-47D/F. Verbally describe the indications.

(3) FS/TFPS. Initiate at IOS of the FS/TFPS or verbally describe the indications.

tt. EMERG descent.

(1) Conditions. This may only be performed in the FS/TFPS.

(2) FS/TFPS. Verbally state conditions requiring an EMERG descent.

uu. LCT system(s) failure.

(1) Conditions. This may be performed in the CH-47D/F or in the FS/TFPS.

(a) CH-47D. Verbally describe the indications. Select "MANUAL" on the cyclic trim switch or pull "CB B-9" No.2 PDP for AFT LCT actuator or "CB B-10" No.1 PDP for FWD LCT actuator.

(b) CH-47F. Verbally describe the indications. Select "MANUAL" on the cyclic trim switch or pull "CB B-18" No.2 PDP for AFT LCT actuator or "CB B-17" No.1 PDP for FWD LCT actuator.

(2) FS/TFPS. Initiate at IOS of the FS/TFPS or verbally describe the indications or perform the steps listed in paragraph uu(1)(a) or (b).

CAUTION

Ensure the following airspeeds are met to ensure there is no additional stress placed on the aft vertical shaft and rotor systems. Failure retracted will be executed at airspeeds less than V_{NE} for LCT RET. Failure extended at cruise airspeed not below 70 KIAS/KCAS.

vv. Single AFCS/DAFCS failure.

(1) Conditions. This may be performed in the CH-47D/F or in the FS/TFPS.

(2) CH-47D/F. Ensure airspeed is no greater than 100 KIAS/KCAS or V_{NE} whichever is slower. Manually turn "OFF" the appropriate system as required with the "AFCS/DAFCS SYSTEM SEL" switch.

(3) FS/TFPS. Initiate at IOS of the FS/TFPS or verbally describe the indications.

ww. Dual AFCS/DAFCS failure.

(1) Conditions. This may be performed in the CH-47D/F or in the FS/TFPS.

(2) CH-47D/F. Ensure airspeed is at or below 100 KIAS/KCAS prior to turning AFCS/DAFCS "OFF".

(3) FS/TFPS. Initiate at IOS of the FS/TFPS or verbally describe the indications.

xx. Vertical gyro malfunction.

(1) Conditions. This may be performed in the CH-47D or in the FS/TFPS.

(2) CH-47D/F. Pull the pilot's or co-pilot's vertical gyro indicator (VGI) CB (B-16 No.1 PDP or C-15 No.2 PDP).

(3) FS/TFPS. Initiate at IOS of the FS/TFPS or verbally describe the indications.

Note. If altitude hold is engaged and the co-pilot's VGI CB is pulled, a thrust cockpit-control driver actuator (CCDA) runaway will occur.

yy. DASH failure.

(1) Conditions. This may be performed in the CH-47D/F or in the FS/TFPS.

(2) CH-47D/F. Verbally describe the indications.

(3) FS/TFPS. Initiate at IOS of the FS/TFPS or verbally describe the indications.

zz. CCDA failure.

(1) Conditions. This may be performed in the CH-47D/F or in the FS/TFPS.

(a) CH-47D. Pull the "CLTV DRIVER ACTR" CB B-12 on the No. 1 PDP (causes "ALT HOLD" feature to become inoperative and the thrust brake to remain released. Pull the "THRUST BRAKE" CB D-6 on the No.1 PDP (causes the thrust brake to fail locked).

(b) CH-47F. Verbally describe the indications.

(2) FS/TFPS. Initiate at IOS of the FS/TFPS or verbally describe the indications.

1a. F EGI 1 or EGI 2 failure.

(1) Conditions. This may be performed in the CH-47F or in the TFPS.

(2) Manually turn off "EGI 1 or EGI 2" through the power page on the CDU. Ensure airspeed is at or below 100 KCAS prior to failing EGI.

(3) TFPS. Initiate at IOS of the TFPS or manually turn off desired EGI.

1b. F EGI 1 and EGI 2 failure.

(1) Conditions. This may be only performed in the TFPS.

(2) TFPS. Initiate at IOS of the TFPS or manually turn off the EGIs.

1c. F MFD failure(s).

(1) Conditions. This may be performed in the CH-47F or in the TFPS.

(2) Manually dim MFD(s) using "BACK LIGHT/BRIGHT (BK LT/BRT)" switch to desired level.

(3) TFPS. Initiate at IOS of the TFPS or using BK LT/BRT switch to desired level.

1d. F CDU failure(s).

(1) Conditions. This may only be performed TFPS.

(2) TFPS. Initiate at IOS of the TFPS or verbally describe the indications.

1e. F Data concentrator system (DCS) 1 or DCS 2 failure.

(1) Conditions. This may only be performed in the TFPS.

(2) TFPS. Initiate at IOS of the TFPS or verbally describe the indications.

1f. F DCS 1 and 2 failure.

(1) Conditions. This may only be performed in the TFPS.

(2) TFPS. Initiate at IOS of the TFPS or verbally describe the indications.

Glossary

AAR	after action review
AC	alternating current
ADF	automatic direction finding
AFCS	advanced flight control system
AFRM	assistant fast-rope master
AGL	above ground level
AHO	above highest obstacle
AIM	aeronautical information manual
AKO	Army knowledge online
ALSE	aviation life support equipment
AMC	air mission commander
AMCOM	Army aviation and missile life cycle management command
ANCD	automated net control device
ANVIS	aviator's night vision imaging system
APART	annual proficiency and readiness test
APU	auxiliary power unit
AR	Army regulation
ARNG	Army National Guard
ASE	aircraft survivability equipment
ASET	aircraft survivability equipment trainer
ATC	air traffic control
ATGM	antitank guided missiles
ATM	aircrew training manual
ATP	aircrew training program
ATTP	Army tactics, techniques, and procedures
AVA	aviation vibration analysis
AWR	airworthiness release
BIT	built-in test
C	Celsius
CAAS	common avionics architecture system
CBRNE	chemical, biological, radiological, nuclear and high explosives
CCDA	cockpit-control driver actuator
CDI	course deviation indicator
CDU	central display unit
CE	crew chief
CG	center of gravity
CGI	cruise guide indicator
CH	cargo helicopter
CL	checklist

CMWS	common missile warning system
COMSEC	communication security
CONUS	continental United States
CPU	central processing unit
CRRC	combat rubber raiding craft
CSAR	combat search and rescue
CTL	commander's task list
DA	Department of the Army
DA PAM	Department of the Army pamphlet
DAC	Department of the Army civilian
DAFCS	digital advance flight control system
DAFIF	digital aeronautical flight information file
DASH	differential airspeed hold
DC	direct current
DCS	data concentrator system
DECU	digital engine control unit
DES	Directorate of Evaluation and Standardization
DG	door gunner
DH	decision height
DLU	data loader unit
DOD	Department of Defense
DOT	Department of Transportation
DSN	defense switched network
DTS	data transfer system
DTU	data transfer unit
EAATS	Eastern Army Aviation Training Site
EAPS	engine air particle separator
EAT	external air transportability
ECL	engine condition lever
ECU	electronic control unit
EGI	embedded global positioning system-inertial navigation unit
ELA	en route low altitude
EM	electronic manual
EP	emergency procedure
ERFS	extended range fuel system
ETA	estimated time of arrival
ETE	estimated time en route
ETL	effective translational lift
ETP	exportable training package
FAA	Federal Aviation Administration
FAC	flight activity category

FADEC	full authority digital engine control
FAF	final approach fix
FAR	Federal Aviation Regulations
FARE	forward area refueling equipment
FARP	forward arming and refueling point
FAT	free air temperature
FD	flight director
FE	flight engineer
FI	flight engineer instructor
FIH	flight information handbook
FLIP	flight information publication
FM	field manual
FOD	foreign object damage
FOV	field of view
FPM	feet per minute
FLPN	flight plan
FRIES	fast-rope insertion and extraction
FRM	fast-rope master
FS	flight simulator
GPS	global positioning system
GMTF	general maintenance test flight
GWT	gross weight
HA	holding area
HAATS	high-altitude Army aviation training site
HF	high fidelity
HIT	health indicator test
HQDA	Headquarters, Department of the Army
HSD	horizontal situation display
HSDH	horizontal situation display-hover
HSI	horizontal situation indicator
HUD	heads-up display
IAF	initial approach fix
IAS	indicated airspeed
IATF	individual aircrew training folder
IAW	in accordance with
ICS	internal communications system
IDM	improve data modem
IE	instrument examiner
IETM	interactive electronic technical manual
IF	intermediate approach fix
IFF	identification, friend or foe

IFH	instrument flying handbook
IFR	instrument flight rules
IGE	in-ground effect
IIMC	inadvertent instrument meteorological conditions
IMC	instrument meteorological conditions
IMI	interactive multimedia instruction
ILS	instrument landing system
INTERCOMM	intercommunication
INU	inertial navigation unit
IOS	instructor operator station
IP	instructor pilot
IPAC	integrated performance and aircraft configuration
IR	infrared
ITO	instrument takeoff
JP	joint publication
KCAS	knots calibrated airspeed
KIAS	knots indicated airspeed
KTAS	knots true airspeed
KTS	knots
LASER	light amplification by stimulated emission of radiation
LCT	longitudinal cyclic trim
LSE	landing signal enlisted
LMTF	limited maintenance test flight
MAHF	missed approach holding fix
MAP	missed approach point
MCPC	maximum continuous power check
MDA	minimum descent altitude
ME	maintenance test flight evaluator
MEF	maximum elevation figures
METL	mission essential task list
METT-TC	mission, enemy, terrain and weather, troops and support available, time available, civil considerations
MFD	multi-function display
MIJI	meaconing, interference, jamming, and intrusion
MO	medical officer
MOC	maintenance operational check
MOI	method of instruction
MOPP-IV	mission-oriented protective posture-4
MOS	military occupational specialty
MP	maintenance test pilot
MPC	maximum power check

MPS	mission planning software/system
MSA	minimum safe altitude
MSL	mean sea level
MTF	maintenance test flight
MTP	maintenance test pilot
MWO	maintenance work order
N_1	gas producer
N_2	power turbine
N_G	engine speed
N_R	rotor speed
NAVAID	navigational aid
NCM	nonrated crewmember
NDB	non-directional beacon
NGR	National Guard regulation
NM	nautical mile
NOE	nap-of-the-earth
NOTAM	notice to airmen
NVD	night vision device
NVG	night vision goggles
NVS	night vision system
OAT	outside air temperature
OGE	out-of-ground effect
OEM	original equipment manufacture
OR	observer
P3	pressure third stage
P	pilot not on the controls
P*	pilot on the controls
PA	pressure altitude
PAC	power assurance check
PAR	precision approach radar
PAT	power assurance test
PC	pilot in command
PCMCIA	personal computer memory card international association
PDP	power distribution panel
PFE	proficiency flight evaluation
PHOLD	position hold
PI	pilot
PMD	preventive maintenance daily
POI	program of instruction
POL	petroleum, oil, and lubricants
PPC	performance planning card

psi	pounds per square inch
PPS	precise positioning service
PTIT	power turbine inlet temperature
PTU	power transfer unit
PZ	pickup zone
RC	Reserve component
R/C	rate of climb
RCM	rated crewmember
RL	readiness level
ROE	rules of engagement
RP	rally point
RPG	rocket-propelled grenade
RPM	revolutions per minute
RRPM	rotor revolutions per minute
SA	situational awareness
SACLOS	semi-automatic command to line of sight
SAFIRE	surface-to-air fire
SAR	search and rescue
SE	single engine
SESC	single-engine service ceiling
SFD	standby flight display
SFTS	synthetic flight training system
SI	standardization instructor
SM	statute mile
SOCOM	Special Operations Command
SOI	signal operating instructions
SOP	standing operating procedure
SP	standardization instructor pilot
SSG	staff sergeant
TACAN	tactical air navigation
TACOPS	tactical operations
TAMMS-A	The Army Maintenance Management System-Aviation
TAS	true airspeed
TC	training circular
TDH	time distance heading
TEAC	turbine engine analysis check
TERPS	terminal instrument procedures
TFPS	transportable flight proficiency simulator
TM	technical manual
TOF	time of flight
TQ	torque

TRADOC	Training and Doctrine Command
TRC	translational rate command
TSP	training support package
TTP	tactics, techniques, and, procedures
U.S.	United States
USAR	United States Army
USAACE	United States Army Aviation Center of Excellence
USASOC	United States Army Special Operations Command
USSOCOM	United States Special Operations Command
UT	unit trainer
VFR	visual flight rules
VGI	vertical gyro indicator
VHF	very high frequency
VMC	visual meteorological conditions
V_{NE}	velocity, not to exceed
VOR	very high frequency omni-directional range
VSI	vertical speed indicator
WEZ	weapon engagement zone

This page intentionally left blank.

References

These publications are sources for additional information on the topics in this TC. Most JPs are found at: http://www.dtic.mil/doctrine/doctrine.htm. Most Army publications are found online at: http//www.apd.army.mil.

SOURCES USED

These are the sources quoted or paraphrased in this publication.

STANDARIZATION AGREEMENTS

STANAG 3114 (Edition Eight)/Air Standard 60-16. *Aeromedical Training of Flight Personnel*. 22 October 1986.

JOINT PUBLICATIONS

JP 3-50. *Personnel Recovery.* 20 December 2011.

JP 3-04. *Joint Shipboard Helicopter Operations*. 30 September 2008.

ARMY PUBLICATIONS

AR 95-10. *Department of Defense Notice to Airmen (NOTAM) System.* 01 August 2004.

AR 95-27. *Operational Procedures for Aircraft Carrying Hazardous Materials.* 11 November 1994.

AR 385-10. *The Army Safety Program.* 23 August 2007.

AR 700-138. *Army Logistics Readiness and Sustainability.* 26 February 2004.

ATTP 3-18.12. *Air Assault Operations.* 01 March 2011.

DA Pam 350-38. *Standards in Commission Training.* 13 May 2009.

FM 2-0. *Intelligence.* 23 March 2010.

FM 3-01.80. *Visual Aircraft Recognition.* 17 January 2006.

FM 3-04.120. *Air Traffic Services Operations.* 16 February 2007.

FM 3-04.203. *Fundamentals of Flight.* 07 May 2007.

FM 3-04.300. *Airfield and Flight Operations Procedures (Including C1 & C2).* 12 August 2008.

FM 3-25.26. *Map Reading and Land Navigation.* 18 January 2005.

FM 10-67-1. *Concepts and Equipment of Petroleum Operations.* 2 April 1998.

FM 21-60. *Visual Signals.* 30 September 1987.

TM 1-1500-250-23. *Aviation Unit and Aviation Maintenance for General Tie-Down and Mooring on all Series Army Models AH-64, UH-60, CH/MH-47, UH-1, AH-1, and OH-58 Helicopters.* 24 August 1990.

TM 1-1500-328-23. *Technical Manual Aeronautical Equipment Maintenance Management Policies and Procedures.* 30 July 1999.

TM 1-1520-240-23&P. *Interactive Electronic Technical Manual Field Maintenance for Helicopter, Cargo Transport CH-47D Including Repair Parts and Special Tools List (NSN 1520-01-088-3669) (EIC:RCD).* 20 December 2011.

TM 1-2840-265-23&P. *Interactive Electronic Technical Manuals (IETM) For Field Maintenance For For Engine, Gas Turbine (Model T55-GA-714A) Including Repair Parts And Special Tools List (NSN 2840-01-458-5361).* 10 February 2012.

TM 1-6625-724-13&P. *Operator's, Aviation Unit, and Intermediate Maintenance Manual Including Repair Parts and Special Tools List for Test Set, Aviation Vibration Analyzer (AVA) with Version 7.01 (NSN 6625-01-282-3746).* 07 March 2002.

TM 9-1005-224-10. *Operator's Manual for Machine Gun, 7.62-MM, M60 W/E (NSN 1005-00-605-7710 (EIC: 4AJ) and Machine Gun, 7.62-MM, M60D W/E (NSN 1005-00-909-3002) (EIC: 4A8) (TO 11W2-6-3-1).* 02 April 1998.

TM 9-1005-262-13. *Operators, Aviation Unit and Aviation Intermediate Maintenance Manual for Armament Subsystem, Helicopter, 7.62-MM Machine Gun Mounts: Door Mounted, Lightweight,Model M23 P/N 11691604 (NSN 1005-00-907-0720); Door Mounted, Lightweight, Model M24 P/N 11691606 (NSN 1005-00-763-1404); Ramp Mounted, Lightweight, Model M41 P/N 8436598 (NSN 1005-00-087-2046), and Window Mounted, Lightweight, Model M144 P/N 12011812 (NSN 1005-01-193-4878).* 29 December 1986.

TM 11-5810-262-10. *Operator's Manual for Speech Security Equipment KY-58 (NSN 5810-00-449-0154).* 31 May 1990.

TM 11-5855-263-10. *Operator's Manual for Aviator's Night Vision Imaging System (ANVIS) AN/AVS-6(V)1 (NSN 5855-01-138-4749) (EIC:IPR) AN/AVS-6(V)2 (NSN 5855-01-138-4748) (EIC:IPQ) AN/AVS-6(V)1A (NSN 5855-01-439-1745) (EIC:IPW) {TO 12S10-2AVS6-1}.* 01 February 2004.

TM 55-1500-342-23. *Joint Service Technical Manual for Aircraft Weight and Balance (NAVAIR 01-1B-50) (USAF TO 1-1B-50) (USCG TO 1-1B-50).* 30 September 2011.

DEPARTMENT OF DEFENSE PUBLICATIONS

DOD AIM 86-100. *Operation and Maintenance Overview General Tri-Service Mode 4 Handbook.* May 1987.

FEDERAL AVIATION ADMINISTRATION PUBLICATIONS

FAA-H-8083-15. *Instrument Flying Handbook.* 2008.

FAA Order 7110.65R. *Air Traffic Control.* 16 February 2006.

FAA Order 7130.3. *Holding Pattern Criteria.* 18 March 1998.

FAA Order 8460. *Helicopter Global Positioning System Nonprecision Approach Criteria.*

DOT-FAA Order (7110.65 P/CG). *Air Traffic Control.* 16 February 2006.

FAR Part 91. *General Operating and Flight Rules.* March 1974.

Flight Information Handbook.

These publications are available from Director, U.S. Army Aeronautical Services Agency, ATTN: MOAS-AI, Cameron Station, Alexandria VA 22304-5050, or the FAA webstite at www.faa.gov.

DOCUMENTS NEEDED

These documents must be available to the intended users of this publication. The asterisk (*) indicates that the source was also used to develop this publication.

ARMY PUBLICATIONS

*AR 40-8. *Temporary Flying Restrictions Due to Exogenous Factors.* 16 May 2007.

AR 70-62. *Airworthiness Qualification of Aircraft Systems.* 21 May 2007.

*AR 95-1. *Flight Regulations.* 12 November 2008.

*AR 95-2. *Airspace, Airfields/Heliports, Flight Activities, Air Traffic Control, and Navigational Aids.* 10 April 2010.

*AR 190-11. *Physical Security of Arms, Ammunition and Explosives.* 15 November 2006.

*AR 190-51. *Security of Unclassified Army Property (Sensitive and Nonsensitive).* 30 September 1993.

*AR 600-105. *Aviation Service of Rated Army Officers.* 22 June 2010.

*AR 600-106. *Flying Status for Nonrated Army Aviation Personnel.* 08 December 1998.

*AR 750-1. *Army Material Maintenance Policy.* 20 September 2007.

ATTP 3-18.11. *Special Forces Waterborne Operations*. 14 October 2011.

*DA Pam 738-751. *Functional Users Manual for the Army Maintenance Management System-Aviation (TAMMS-A).* 15 March 1999.

*FM 1-230. *Meteorology for Army Aviators.* 30 September 1982.

FM 3-04.111. *Aviation Brigades.* 07 December 2011.

*FM 3-04.113. *Utility and Cargo Helicopter Operations.* 07 December 2007.

FM 3-04.126. *Attack Reconnaissance Helicopter Operations.* 16 February 2007.

*FM 3-04.140. *Helicopter Gunnery.* 14 July 2003.

*FM 3-04.203. *Fundamentals of Flight.* 07 May 2007.

*FM 3-04.240. *Instrument Flight for Army Aviators.* 30 April 2007.

FM 3-05.203. *Special Forces Direct Action Operations (U).* 30 January 2009.

FM 3-05.212. *Special Forces Waterborne Operations.* 30 September 2009.

FM 3-21.38. *Pathfinder Operations.* 25 April 2006.

FM 3-21.220. *Static Line Parachuting Techniques and Tactics (MCWP 3-15.7; AFMAN 11-420; NAVSEA SS400-AF-MMO-010).* 23 September 2003.

FM 3-34.210. *Explosive Hazards Operations*. 27 March 2007.

FM 3-52. *Army Airspace Command and Control in a Combat Zone.* 01 August 2002.

FM 4-20.142. *Airdrop of Supplies and Equipment: Rigging Loads for Special Operations*. 19 September 2007.

*FM 4-20.197. *Multiservice Helicopter Sling Load: Basic Operations and Equipment {MCRP 4-11.3E, VOL I; NTTP 3-04.11; AFMAN 11-223(1), VOL I; COMDINST M13482.2B}*. 20 July 2006.

*FM 4-20.199. *Multiservice Helicopter Sling Load: Single Point Load Rigging Procedures {COMDINST M13482.4B; MCRP 4-11.3E, VOL III; NTTP 3-04.13; AFMAN 11-223(1), VOL III}*. 20 February 2009.

*ADP 7-0. *Training Units and Developing Leaders.* 23 August 2013.

FM 8-10-6. *Medical Evacuation in a Theater of Operations Tactics, Techniques, and Procedures.* 14 April 2000.

*FM 55-450-2. *Army Helicopter Internal Load Operations.* 05 June 1992.

*TC 3-04.7. *Army Aviation Maintenance*. 02 February 2010.

*TC 3-04.11. *Commander's Aircrew Training Program for Individual, Crew, and Collective Training.* 19 November 2009.

*TC 3-04.93. *Aeromedical Training for Flight Personnel*. 31 August 2009.

*TM 1-1520-240-10. *Operator's Manual for Army CH-47D Helicopter (EIC: RCD).* 22 February 2011.

*TM 1-1520-240-CL. *Operator's and Crewmember's Checklist for Army CH-47D Helicopter.* 22 February 2011.

*TM 1-1520-240-MTF. *Maintenance Test Flight Manual for Army Model CH-47D Helicopter.* 22 February 2011.

*TM 1-1520-240-PMS1. *Preventative Maintenance Services Modular Daily Inspection Checklist CH-47D Helicopter.* 16 June 2008.

*TM 1-1520-240-PMS2. *Preventative Maintenance Services Cycle Service Program Intermediate Inspection CH-47D Helicopter.* 16 June 2008.

*TM 1-1520-240-PMS3. *Preventative Maintenance Services Cycle Service Program Inspection CH-47D Helicopter.* 16 June 2008.

*TM 1-1520-240-PMS4 . *Preventative Maintenance Services Corrosion Prevention for CH-47D Helicopter.* 01 September 2011.

*TM 1-1520-271-10. *Operator's Manual for Army CH-47F Helicopter (EIC).* 31 October 2011.

*TM 1-1520-271-CL. *Operator's and Crewmember's Checklist for Army CH-47F Helicopter.* 31 October 2011.

*TM 1-1520-271-MTF. *Maintenance Test Flight Manual for Army Model CH-47F Helicopter.* 31 October 2011.

*TM 1-1520-271-PMS1. *Preventative Maintenance Services Modular Daily Inspection Checklist CH-47F Helicopter.* 16 June 2008.

*TM 1-1520-271-PMS2. *Preventative Maintenance Services Cycle Service Program Intermediate Inspection CH-47F Helicopter.* 16 June 2008.

*TM 1-1520-271-PMS3. *Preventative Maintenance Services Cycle Service Program Inspection CH-47F Helicopter.* 16 June 2008.

*TM 1-1520-271-PMS4. *Preventative Maintenance Services Corrosion Prevention for CH-47F Helicopter.* 15 March 2012.

TM 1-1560-312-10. *Operator's Manual for Extended Range Fuel System II (ERFS II) Configured for the Army CH-47D Helicopter P/N HM022-509 (NSN 1560-01-456-2704) (EIC: RCG).* 30 September 2000.

TM 1-1560-312-23&P. *Aviation Unit and Intermediate Maintenance Manual and Repair Parts and Special Tools List for the Extended Range Fuel System II (ERFS II) Configured for the Army CH-47 Helicopter.* 28 February 2011.

TM 1-1680-377-13&P. *Interactive Electronic Technical Manual* (*IETM) for Air Warrior.*15 December 2009.

TM 1-2840-248-23&P. *Interactive Technical Manual (IETM) for Aviation Unit and Intermediate Maintenance Manual Including Repair Parts and Special Tools List for Engine, Aircraft Turboshaft T700-GE-700, T700-GE-701, T700-GE-701D (EIC:N/A).* 31 August 2010.

TM 11-1520-240-23. *Aviation Unit and Aviation Intermediate Maintenance Manual for Army Model CH-47D Helicopter (NSN 1520-01-088-3669) (EIC: RCD) Avionics Configuration (Includes C1-C9).* 15 April 1996.

TM 11-1520-240-23P. *Aviation Unit and Intermediate Maintenance Repair Parts and Special Tools List for CH-47D Electronic Equipment Configuration (NSN 1520-01-088-3669) (EIC: KTD).* 01 June 2001.

TM 11-5855-300-10. *Operator's Manual for Heads Up Display AN/AVS-7 (NSN 5855-01-350-0349) (EIC: N/A), Heads Up Display AN/AVS-7(V)1 (5855-01-424-2284) (EIC: N/A), Heads Up Display AN/AVS-7(V)2 (5855-01-424-2285) (EIC: N/A), Heads Up Display AN/AVS-7(V)3 (EIC: N/A) (5855-01-424-2286) (EIC: N/A), Heads Up Display AN/AVS-7(V)4 (5855-01-424-2287) (EIC: N/A), Heads Up Display AN/AVS-7(V)5 (5855-01-447-1071) (EIC: N/A), Heads Up Display AN/AVS-7(V)6 (5855-01-447-1887) (EIC: N/A).* 01 December 1997.

*TM 11-5895-1199-12. *Operator's and Organizational Maintenance Manual for the Mark-XII IFF System.* 01 July 1984.

TM 38-250. *Preparing Hazardous Materials for Military Air Shipments (AFMAN 24-204; NAVSUP PUB 505; MCO P4030.191; DLAI 4145.3 DCMAD1, CH3.4[HM24]).* 01 September 2009.

TM 55-1560-307-13&P. *Operator, Aviation Unit and Aviation Interediate Maintenance Manual with Repair Parts and special Tools Lost for Extended Range Fuel System Army Model CH-47 Helicopter Part Number 855DSCC-D-0007-2 (NSN 1560-01-221-7600) (Including C1 & C2).* 11 December 1990.

TM 55-1680-317-23&P. *Aviation Unit and Aviation Intermediate Maintenance Manual with Repair Parts and Special Tools List for Army Aircraft Survival Kits (Includes C1-C9).* 26 March 1987.

TM 55-1680-351-10. *Operator's Manual for SRU-21/P Army Vest, Survival (NSN 8465-00-177-4819) (Large), (8465-01-174-2355) (Small)(Includes C1-C3).* 22 April 1987.

DEPARTMENT OF THE ARMY FORMS

DA Form 759. Individual Flight Record and Flight Certificate-Army.

DA Form 2028. Recommended Changes to Publications and Blank Forms.

DA Form 2408-12. Army Aviator's Flight Record.

DA Form 2408-13. Aircraft Status Information Record.

DA Form 2408-13-1. Aircraft Inspection and Maintenance Record.

DA Form 4186. Medical Recommendation for Flying Duty.

DA Form 5701-47-R. CH-47 Performance Planning Card.

DA Form 5484. Mission Schedule Brief.

DA Form 7120-R. Commander's Task List .

DA Form 7120-1-R. Crew Member Task Performance and Evaluation Requirements.

DA Form 7120-2-R. Crew Member Task Performance and Evaluation Requirements Continuation Sheet.

DA Form 7120-3-R. Crew Member Task Performance and Evaluation Requirements Remarks and Certification.

DA Form 7122-R. Crew Member Training Record .

DA Form 7382. Sling Load Inspection Record.

DEPARTMENT OF DEFENSE FORMS/PUBLICATIONS

DD Form 365-4. Weight and Balance Clearance Form F-Transport/Tactical.

DLAM 8210.1. *Contractor's Flight and Ground Operations.* 30 April 2008.

OTHER

The following publication can be obtained by contacting Aviation Facilities Team Lead, Naval Air Warfare Center Aircraft Division, Code 4.8.2.5, Highway 547, Lakehurst, NJ 08733-5052 or at the following website:https://airworthiness.navair.navy.mil/.

*NGR (AR) 95-210. *Army National Guard: General Provisions and Regulations for Aviation Training.* 1 July 1991.

Requests for contractor flight releases, airworthiness releases, or interim/complete airworthiness qualification for Army aircraft for which USAAMCOM has engineering cognizance will be forwarded to the Commander, USAAMCOM, ATTN: AMSAM-RD-AE-I, Redstone Arsenal, AL 35898-5000. Requests normally will come through the materiel developer (such as the program executive office or the system's program/project/product manager) or from the field through a major command.

Requests for airworthiness approval for major modifications installed on aircraft not under USAAMCOM engineering cognizance will be forwarded to the appropriate engineering cognizant agency (such as the FAA, National Aeronautics and Space Administration, U.S. Air Force, or U.S. Navy). (Refer to AR 70-62, paragraph 2-3.)

READINGS RECOMMENED

These readings contain relevant supplemental information.

AR 385-10. *Army Aviation Accident Prevention.* 23 August 2007.

FM 3-11.3. *Multiservice Tactics, Techniques, and Procedures for Chemical, Biological, Radiological, and Nuclear Contamination Avoidance (MCWP 3-37.2A, NTTP 3-11.25, AFTT P(1) 3-2.56).* 2 February 2006.

FM 3-11.11. *Flame, Riot Control Agents, and Herbicide Operations (MCRP 3-3.7.2).* 19 August 1996.

FM 3-22.68. *CrewServed Weapons.* 21 July 2006.

FM 17-95. *Cavalry Operations.* 24 December 1996.

TM 10-1670-201-23. *Organizational and Direct Support Maintenance Manual for General Maintenance of Parachutes and Other Airdrop Equipment (TO 13C-1-41; NAVAIR 13-1-17)(Includes C1-C7).* 30 October 1973.

TM 11-5841-283-12. *Aviation Unit Maintenance Manual for Radar Signal Detecting Set, AN/APR-39(V) (NSN 5841-01-023-7112)(NAVAIR 16-30 APR 39-1).* 9 August 1983.

TM 11-5855-238-10. *Operator's Manual for Night Vision Goggles Ground Use: AN/PVS-5 and AN/PVS-5A (NSN 5855-00-150-1820) (EIC:IPD) AN/PVS-5B (5855-01-228-0938) (EIC:IPV) AN/PVS-5C (5855-01-228-0936) (EIC:IPU) Aviation Use: GM-6(V)1 Goggles GM-6(V)2 Goggles.* 15 May 1993.

TM 11-5865-263-12. *Operator's and Aviation Unit Maintenance (AVUM) Manual for Countermeasures Sets AN/ALQ-156(V)1, (V)2, (V3), (V)1 (NSN 5865-01-145-5197) (EIC: KDP) (V) 2 (NSN 5865-01-156-0460) (EIC: KD3) (V3) (NSN 5865-01-156-0459) (EIC: KD2).* 1 September 1996.

Index

This page intentionally left blank.

TC 3-04.34(TC 1-240)
5 April 2013

By order of the Secretary of the Army:

RAYMOND T. ODIERNO
General, United States Army
Chief of Staff

Official:

JOYCE E. MORROW
Administrative Assistant to the
Secretary of the Army
1309505

DISTRIBUTION:

Active Army, Army National Guard, and U.S. Army Reserve: To be distributed IAW the initial distribution number 116030 requirements for TC 3-04.34.

This page intentionally left blank.

This page intentionally left blank.

This page intentionally left blank.