CHAPTER 6

RESCUE OPERATIONS

SECTION A - GENERAL INFORMATION

6-1. SYNOPSIS.

a. This chapter covers the tactical maneuvers peculiar to H-3 rescue units. You will receive training in air refueling procedures under both day and night conditions. Air refueling has substantially increased the range of the helicopter and thus its effectiveness in the search and rescue mission.

b. Many rescue units are located near water; therefore, it is highly possible that you will be involved in a rescue mission utilizing water hoist procedures.

c. You will be introduced to operational approaches. These approaches are designed to increase your confidence in the aircraft and your ability to make the aircraft perform. You will be required to fly approaches into remote sites from different positions with a minimum of exposure time to simulated hostile ground fire.

d. This phase of training will provide you with the basic qualifications to perform the missions you will be exposed to in your unit.

e. Student pilots who will graduate as "copilot qualified" (CP) will fly all aircraft and simulator flights in the rescue phase from the left seat.

SECTION B - ACADEMIC LESSONS

6-2. MODULE R-1, Day Water Hoist. (0.7 Hour)

a. Objective (Standard - C) Answer questions concerning day water hoist operations IAW ARRSR 55-5:

(1) Smoke drop patterns.

(2) Approach.

(3) Hover.

(4) Takeoff.

b. Student Requirements and Tips:

(1) Prerequisite Training. Complete Academic Module 0-4.

(2) Assignment. Read supplemental Information.

(3) Part II of this module is a TV presentation.

c. Source Reference:

(1) ARRSR 55-5, Helicopter Aircrew Operational Procedures.

(2) 1550 ATTWR 60-1.

(3) TO 1H-3(C)E-1, Flight Manual.

d. Supplemental Information. Water Hoist Procedures:

(1) Required:

(a) All checklists:

1 Descent Checklist.

2 Before Landing Checklist.

3 Search Checklist (if applicable).

4 Smoke Drop Checklist.

5 Power Available Check.

6 Pilot/Flight Mechanic Hoist Checklist Complete.

(b) Speed selectors maximum on final approach.

(c) Smoke markers.

(2) Analysis. The traffic patterns and all checklists will be accomplished the same as for land hoist. An N_gT_5 relationship check will be accomplished prior to attempting water hoist. Smoke markers will be deployed to aid the pilot as a hover reference for the pickup. Once the hover is established, direct the hoist operator to "Hot Mike" and follow his directions.

(3) Many of the procedures covered in land hoist are also used in water hoist. Performance data is normally computed for a 15-foot hover height, although over salt water, you may have to hover as high as 40 feet to minimize salt spray ingestion into the engines.

(4) There are five general phases of water hoist. The first is the initial smoke deployment to mark the survivor and determine the wind direction and velocity. Normally a MK 6, which burns for approximately 42 minutes, is used.

(5) The second phase is the reference smoke drop and deployment. Normally three MK 5 smokes are dropped from an altitude of 300 feet at 70 KIAS and offset 30° to the right of the wind.

(6) The third phase is the pattern and the approach. The downwind and base leg is flown at 300 feet and 70 KIAS, the final at 300 feet and 50 KIAS. The approach is flown slower than normal due to the difficulty in judging your height and airspeed when flying over water. The pilot not flying should call the altitude in 50 foot increments below 300 feet. Crosscheck airspeed and altitude so as to arrive at 200 feet with approximately 30 KIAS (no wind). These parameters will aid in altitude control versus closure rate during the approach. Plan to arrive at hover altitude approximately 75 feet short of the survivor. The flight mechanic will be cleared to go "Hot Mike" when losing sight of the survivor.

(7) The fourth, or hover, phase of water hoist is the most difficult due to the lack of hover references. The most common error is over-controlling. It is advisable to crosscheck the attitude indicator while hovering. Be alert for the following tendencies while hovering; drifting backward while descending, drifting forward while climbing, and changing heading while making lateral corrections. The reverse is also true; descending while moving back and climbing while moving forward. The radar altimeter should be used to aid you in maintaining your desired hover altitude.

WARNING. The pilot must not attempt to watch the pickup, as spatial disorientation may result.

(8) The final phase, a normal takeoff, should be accomplished at the completion of the hoist maneuver; however, the pilot and copilot should always be ready to accomplish an ITO if the need should arise due to disorientation from smoke or spray.

6-3. MODULE R-2, Night Water Hoist. (0.5 Hour)

a. Objective (Standard - C). Answer questions concerning night water hoist operations IAW ARRSR 55-5:

(1) Smoke drop patterns.

(2) Approach.

(3) Hover.

(4) Takeoff.

(5) Use of lights.

b. Student Requirements and Tips:

(1) Prerequisite Training. Complete Academic Module R-1.

(2) Assignment. Read Supplemental Information.

c. Source Reference:

(1) ARRSR 55-5, Helicopter Aircrew Operational Procedures.

(2) 1550 ATTWR 60-1.

d. Supplemental Information. The night water hoist procedures are generally the same as those discussed for day. Because of the lack of depth perception and possibility of spatial disorientation, your instruments should be crosschecked continuously. If you overshoot the survivor at night, GO AROUND! DO NOT BACK UP since it is extremely difficult to judge your movement and height at night. Both the pilot and copilot should be ready to execute an ITO if necessary. The searchlight may be used to aid in maintaining the hover; however, caution must be exercised when adjusting the light as large movements may induce vertigo. If flares are being deployed, a left hand pattern is normally flown to preclude the possibility of flying through any flares. Scanners should be briefed to monitor the flares throughout the pattern and recovery. During the descent, the pilot not flying will call out altitudes in 100 foot increments when above 300 feet AGL and 50 foot increments when below 300 feet AGL. Crosscheck airspeed and altitude so as to arrive at 200 feet with approximately 30 KIAS (no wind). During the final approach phase, you should determine wind direction by viewing the smoke generated by the markers. Adjust the final approach as necessary to arrive at a hover into the wind. Plan to arrive at hover altitude approximately 75 feet short of the survivor. The flight mechanic will be cleared to go "Hot Mike" when losing sight of the survivor. The pilot must be smooth throughout the recovery phase.

NOTE. The radar altimeter is required and will be utilized and cross-referenced with the barometric altimeter throughout the entire approach phase.

6-4. MODULE R-3, Air Refueling Preflight. (0.3 Hour)

a. Objective (Standard - C). Answer questions pertaining to air refueling preflight IAW TO 1H-3(C)E-1:

(1) Special crew briefing items for air refueling.

(2) Special preflight inspection requirements.

b. Student Requirements and Tips: Assignment. Study Supplemental Information.

c. Source Reference:

(1) TO 1H-3(C)E-1, Flight Manual.

(2) TO 1-1C-1-20, Air Refueling Manual.

(3) ARRSP 55-5.

d. Required Materials/Equipment: TO 1-1C-1-20.

e. Supplemental Information:

(1) A comprehensive and thorough crew briefing is one of the keys to the success of any mission; air refueling is no exception. The following items, extracted from TO 1-1C-1-20, must be briefed and understood by both the helicopter and tanker crews before air refueling:

(a) Air refueling initial point.

(b) Air refueling track and type rendezvous.

(c) Air refueling control point (ARCP).

(d) Air refueling control time (ARCT).

(e) Air refueling altitudes and airspeed.

(f) Air refueling abort point.

(g) Air refueling exit point.

(h) Recovery and emergency bases.

(i) Fuel offload/onload requirements.

(j) Air traffic control clearance limits.

(k) Number of receivers.

(l) Tanker and receiver call signs.

(2) The preflight procedures for an air refueling flight are the same as normal except that the probe should be extended and checked for proper operation during the Engine Starting and Rotor Engagement Checklists.

6-5. MODULE R-4, Air Refueling Rendezvous and Joinup. (0.4 Hour)

a. Objective (Standard - C). Answer questions pertaining to air refueling rendezvous and joinup IAW TO 1-1C-1-20:

(1) Communications procedures.

(2) Receiver requirements for air refueling rendezvous:

(a) Head on.

(b) Overtaking.

(3) Observation position.

b. Student Requirements and Tips:

(1) Prerequisite Training. Complete Academic Module R-3.

(2) Assignment. Study Supplemental Information.

c. Source Reference. TO 1-1C-1-20, Air Refueling Manual.

d. Supplemental Information:

(1) A successful rendezvous and joinup must be complete before you can onload fuel. The first step in the rendezvous procedure is to establish radio contact with the tanker at least thirty minutes prior to ARCT. The following items should then be determined/confirmed by the tanker:

(a) Air refueling altitude and altimeter setting.*

(b) Air refueling track.

(c) Desired onload.*

(d) Type of air refueling rendezvous.

(e) ARCP/ARCT (if any change has occurred).

(f) Bingo time.*

(g) Refueling airspeed (IAS).

(h) Number of operational tankers available.

(i) Weather in the refueling area and at receiver recovery bases.

(j) Other pertinent information.

**The tanker pilot normally initiates this briefing. Responses are required by the receiver pilot. Plan your responses in advance.*

(2) Your primary responsibilities, after coordinating with the tanker, are to establish yourself on the refueling track, maintain the proper altitude and airspeed, and complete the Rendezvous and Joinup Checklists. Any change of altitude, airspeed, or heading should be reported to the tanker so he can adjust his rendezvous since he is using this information to complete his rendezvous. During the rendezvous phase, the aircraft making the first sighting (tanker or receiver) will notify his refueling partner with a sighting call. The call will provide the other aircraft with an approximate position, so as to aid the other aircraft in locating his partner. For example: "Tally Ho King 00, we are your 11 o'clock position 6 miles, Jolly 00."

(3) Joinup. As the tanker passes the helicopter's three o'clock position and the receiver pilot has the tanker in sight, the receiver pilot will announce visual contact by a "Tally Ho" to the tanker who slows to refueling airspeed and advises the helicopter that he is assuming formation lead. The helicopter acknowledges and maneuvers the helicopter into the observation position. During joinup, it is necessary to maintain the refueling airspeed to avoid overshoot. There is a natural tendency for the helicopter pilot to let the tanker get too far ahead before initiating joinup. At this point in a limited power situation, excessive collective input will cause rotor droop and require the tanker to fly another rejoin.

(a) Pilots in the left seat may have some difficulty sighting the tanker; if so, they will have to rely on the pilot in the right seat or a scanner in the cabin to advise on aircraft separation. For this reason, it may be necessary to descend, maintaining lateral separation, until the tanker comes into view. The pilot in the left seat can then maneuver into the observation position.

(b) Smooth and coordinated aircraft control coupled with small corrections is essential while maneuvering near the tanker. Caution must be exercised to avoid rapid power and altitude changes.

(4) Observation Position (Left and Right Side). The observation position is a position to the left or right of the tanker which the receiver maintains while observing or awaiting clearance to proceed to contact position. Check the tanker for leaks, loose panels, and proper hose extension.

(5) Observation Position Visual References:

(a) Superimpose the tip of the horizontal stabilizer on the star of the insignia.

(b) Fly the helicopter to a point approximately 5 to 10 feet outboard of the tanker wing tip.

(c) The pilot will have the tanker drogue at an approximate angle of 50 degrees off the nose of the helicopter if he looks out of the lower cockpit window. This position will place the helicopter at a distance of 5 to 10 feet behind the drogue. As an alternate reference, the pilots can use the opposite wing of the tanker. While in the left observation position, the pilot in the left seat will be able to see a small portion of the right wing tip of the HC-130; the pilot in the right seat will be able to see approximately 5 feet of the wing tip or the third static wick on the tanker aileron. The references are reversed when flying the right observation position.

6-6. MODULE R-5, Air Refueling Procedures. (0.5 Hour)

a. Objective (Standard - C). Correctly respond to questions concerning the following aspects of air refueling:

(1) Meaning of the tanker pod lights.

(2) Remedial procedures to follow after missing the drogue.

(3) Steps required to effect a disconnect.

(4) Crossover procedures.

(5) Refueling from the right hose.

b. Student Requirements and Tips:

(1) Prerequisite Training. Complete Academic Module R-4.

(2) Assignment. Study Supplemental Information.

(3) A TV presentation summarizing Academic Modules R-3, R-4, and R-5 should be viewed after completing R-5.

c. Source Reference. TO 1-1C-1-20, Air Refueling Manual.

d. Supplemental Information:

(1) Air refueling allows the helicopter to operate at high densit altitudes at a low operating gross weight since fuel requirements are less to return to a tanker than to a recovery base. Air refueling has enhanced the airborne alert concept used in combat, allowing increased station time and decreased reaction time.

(2) Pre-Contact Position (Left and Right Side): If the proper observation position is held, maneuvering into the pre-contact position is relatively easy. Maintain the lateral separation (5-10 feet off the wing tip of the tanker), descend until the probe is level with the drogue, and then fly the helicopter to the left or right until the probe head is aligned behind the drogue.

(a) Pre-Contact Visual References:

1 Lateral. Both pilots can use the probe/hose for relative alignment. Another lateral reference is the air refueling pod strut and flap relationship on the tanker.

2 Fore and Aft. Place the probe approximately 5-10 feet directly behind the drogue.

3 Vertical. Place the probe head level with the drogue. This will preclude a climbing or diving tendency when closing on the drogue for contact.

(b) Numerous other references can be established from the wing of the tanker: rotor tip path plane/wing alignment; tanker exhaust stacks; etc.

(c) Once the helicopter is established in the pre-contact position, the helicopter pilot will note that the torque required to maintain position is approximately 15-20% less than that required to maintain observation position. This is due to the drafting effect of the tanker wing. If the recommended distance behind the drogue (10 feet) is increased, power requirements will proportionately increase.

(d) It should also be noted that there are definite areas of increased turbulence behind the tanker due to prop wash. Entering these areas will cause moderate buffeting, and an increase in power will be required to maintain position. For practical purposes, the areas to be avoided can be defined as: on the left side, no farther right than the refueling hose; on the right side, no farther left than the refueling hose, and no farther back than 10 feet behind the drogue.

(e) Wake Turbulence. To demonstrate the effects of wake turbulence, attempt a level crossover, approximately 100 feet behind the tanker at the same altitude. As the turbulent area is entered, vibration will increase significantly and increased collective will most probably be ineffective. To exit the turbulent area, decrease collective, apply a slight amount of forward cyclic and permit the aircraft to descend to undisturbed air where controls will once again become effective.

CAUTION. Use care to avoid rotor droop below 100% N_r during this maneuver.

(3) Contact (Left and Right): Once established in the pre-contact position, the helicopter pilot should check to see that the yellow "TANKER READY" light on the HC-130's refueling pod is illuminated before moving in for the contact. Recheck the hose for full extension.

(a) The pre-contact envelope is no closer than 5 feet nor further than 10 feet behind the drogue. Align the probe with the tanker's hose and drogue and smoothly increase power to assure a positive rate of closure. While closing on the drogue, the helicopter pilot should keep a continual crosscheck of his references, i.e., probe/hose relationship, rotor tip path plan/wing surface of the tanker, refueling pod strut/flap relationship, etc. There will be a natural tendency to stare at the drogue; if this occurs, poor aircraft control and a miss will most likely result.

(b) If corrections in elevation are required, they should be accomplished by use of the collective. Use of the cyclic for elevation corrections will cause an attitude change and will result in diving or climbing on the drogue. Use of the tail rotor control pedal for lateral corrections should be used judiciously, as a small amount of jaw pedal movement will move the probe head several feet.

(c) If it appears that a miss on the drogue is apparent, discontinue the closure and return to the pre-contact position for another attempt.

(d) As previously stated, smooth and coordinated aircraft control, coupled with small corrections is essential while maneuvering near the tanker. Caution must be exercised to avoid rapid power and altitude changes. When operating on the right refueling hose, request the tanker to use asymmetrical power in order to reduce turbulence.

(4) Air Refueling Position. When the helicopter probe contacts the reception coupling in the drogue, the helicopter pilot will advise the tanker and receive confirmation that contact has been made. At this time, the helicopter pilot should start a coordinated climbing turn into the air refueling position.

(5) Refueling Position Visual References:

(a) Lateral. The wing tip of the tanker will be the primary means for lateral references. Generally, from the wing tip to a point two to five feet outboard from the tip is considered best.

(b) Vertical. A general reference is eye-level with the dump pipe on the tanker's wing tip. This point may have to be adjusted due to the turbulence from the wing of the tanker. A point slightly above or below can usually be found that is in relatively smooth air. This area of smooth air will be dependent on the tanker's attitude, speed, and weight. Once this area is found, it should be used as the primary vertical reference. Alternate vertical references that may be used are engine exhausts/flap relationship. Choose the ones that work the best for you.

(c) Fore and Aft. The refueling hose is extended 81 feet when fully trailed. After contact and while climbing into the air refueling position, the hose should be pushed in past the 76 foot position. At that time, the yellow "TANKER READY" light will go out and the green "FUEL FLOW" light will illuminate. Fuel will continue to flow as long as the helicopter maintains the hose extension between 76 and 56 feet. The 20 foot refueling range is indicated by markings or painted bands on the refueling hose. By placing the edge of one of the 5 foot bands on the lip of the pod fairing, any fore and aft movement is readily discernible.

(6) Disconnects. The tanker crew will notify the helicopter pilot when the fuel transfer is complete. A disconnect should not be initiated until the fuel flow indicator lights on the pressure refueling panel are extinguished. At this time, the helicopter pilot will advise that he is ready for disconnect and wait until cleared by the tanker pilot before disconnecting.

(a) To effect a normal disconnect, the helicopter pilot should reduce power slightly and slowly decrease airspeed by applying aft cyclic. At the same time, the helicopter should be maneuvered laterally to the point where contact with the drogue was established. For vertical reference, the helicopter pilot should maintain at least 5 feet and no more than 10 feet above the point where contact was made. (Care should be exercised to avoid descending during the disconnect to assure maximum rotor blade to drogue clearance.) A normal disconnect will occur when the refueling hose reaches its maximum extension.

(b) After disconnect, the tanker will maintain level flight and refueling airspeed until the receiver is confirmed clear.

(7) Crossover. If a crossover is required, the helicopter pilot should initiate the maneuver from the observation position only after receiving clearance to perform the maneuver from the tanker. Slowly decrease airspeed and increase altitude until the helicopter is 100 feet aft and 50 feet above the tanker's horizontal stabilizer. A crossover will then be made by slightly altering the helicopter's heading. There is a natural tendency to let the helicopter fly back further than the required 100 feet. Keep the tanker in sight during the complete crossover maneuver.

(a) A fore and aft reference that can be used, once the vertical clearance (50 feet) is reached, is to align the probe head with the leading edge of the tanker wing during the crossover.

(b) The helicopter should be flown to a position outboard the opposite wing tip before starting the descent. The helicopter pilot can then maneuver into observation position.

(c) If the crossover has been made to the right side, the receiver pilot may request the pilot to use asymmetrical power to reduce turbulence.

6-7. MODULE R-6, Night Refueling Procedures. (0.3 Hour)

a. Objective (Standard - C). Answer questions regarding the use of lights during night air refueling.

b. Student Requirements and Tips:

(1) Prerequisite Training. Complete Academic Module R-5 and the Air Refueling TV tape.

(2) Assignment. Study Supplemental Information.

c. Source Reference:

(1) TO 1H-3(C)E-1, Flight Manual.

(2) TO 1-LC-1-20, Air Refueling Manual.

d. Supplemental Information.

(1) The procedures used for night air refueling are essentially the same as for day air refueling. The main differences are the use of lights and the lack of perception associated with night flying.

(2) Prior to night air refueling, insure that your anti-collision lights, position lights, and searchlight are operational.

(3) During the rendezvous, the tanker may request the helicopter pilot to turn on his landing or searchlight 20 minutes prior to ARCT to assure positive identification.

(a) After the tanker passes the helicopter's three o'clock position, the helicopter pilot can adjust his searchlight to illuminate the tanker and maneuver into the observation position. By positioning the searchlight on the wing root of the tanker, adequate references can be obtained. This particular light position precludes shining the searchlight into the cockpit of the tanker.

(b) For the pre-contact position, the light should be positioned to illuminate the refueling hose. The light should not be placed on the drogue or in its immediate vicinity as it will increase your propensity to concentrate on the drogue, degrade overall aircraft control and can result in spatial disorientation.

(c) When the refueling is completed, the helicopter pilot should keep the searchlight illuminated on the refueling pod during the disconnect.

(4) The helicopter landing light can be used as a backup system in the event the controllable searchlight fails. However, the landing light should be used with caution, as it causes excessive glare off the drogue which could lead to spatial disorientation.

(5) The HH-3E is equipped with a probe light. When the master power switch, located on the pressure refueling panel, is turned ON, the searchlight becomes a controllable spot (probe) light. The intensity of the probe light can be controlled with the rheostat, marked PROBE LIGHT, located on the pressure refueling panel. The use of all lights will be demonstrated and practiced during the night aerial refueling missions.

NOTE. Never position the searchlight directly on the drogue as a blinding reflection will occur.

6-8. MODULE R-7, Air Refueling Emergency Procedures (0.4 Hour)

a. Objective (Standard - C). Answer questions concerning the following air refueling emergency situations:

(1) Receiver breakaway procedures.

(2) Lost visual contact procedures.

(3) Radio out refueling procedures.

(4) Single engine refueling procedures.

(5) Fuel transfer with a dead hose.

(6) Emergency disconnect.

b. Student Requirements and Tips:

(1) Prerequisite Training. Complete Academic Module R-5.

(2) Assignment. Study Supplemental Information.

c. Source Reference. TO 1-1C-1-20, Air Refueling Manual.

d. Supplemental Information:

(1) There are several abnormal and emergency procedures that you must be familiar with to insure the safe recovery of your aircraft and crew. This module covers breakaway procedures, loss of visual contact, radio and single engine refueling, and emergency disconnect.

(2) Breakaway. Whenever a crew member aboard either the tanker or receiver determines that an emergency exists, he will transmit the tanker's call sign and the word "Breakaway" three times. Aircraft do not necessarily have to be in radio contact in order to initiate a

breakaway. A breakaway may be initiated by aircraft refueling with loss of interplane communications by the tanker flashing a red aldis lamp rapidly on and off from the paratroop door window or the receiver initiating normal breakaway procedures. To effect a breakaway, the receiver pilot performs a normal disconnect, exercising caution so as to avoid contact with the tanker. The receiver should report when clear of the tanker, at which time the tanker will effect separation.

(3) Single Engine Air Refueling. In the event of a helicopter engine failure during flight, air refueling procedures are applicable, although due to the reduction in helicopter performance, some changes in procedures are required.

(a) The refueling may have to be accomplished at a lower altitude because of the power limitation of the helicopter. The helicopter pilot should maintain the highest single engine airspeed consistent with operating limitations.

1 The tanker should maneuver to pass 500 feet below and to the right of the helicopter during the joinup. The tanker will be at the refueling airspeed with drogues extended as he closes on the helicopter.

2 As the tanker passes the helicopter's three o'clock position, the helicopter pilot will initiate a shallow dive to accelerate and close on the tanker. The helicopter should be flown directly into the pre-contact position. Once established in the pre-contact position, the drafting effect off the wing of the tanker will compensate for the reduction in power of the helicopter. Clearance for contact is not required.

3 Sufficient power should then be available to make contact with the drogue and maneuver into the refueling position. Care should be taken not to lose airspeed or altitude as there will not be sufficient power to maneuver back into position.

(b) During helicopter single engine operations, the co-pilot should closely monitor rotor speed and advise the pilot any time the N_r begins to drop below 100%.

6-9. MODULE R-8, Combat Rescue: Preflight. (1.0 Hour)

a. Objective (Standard - B). Correctly respond to questions pertaining to combat rescue preflight preparations:

(1) Intelligence and weather briefing.

(2) Crew briefing.

b. Student Requirements and Tips. Assignment: Read supplemental information.

c. Source References:

(1) TO 1H-3(C)E-1, Flight Manual.

(2) ARRSR 3-1, Combat SAR (Secret).

d. Required Materials/Equipment. TO 1H-3(C)E-1, Flight Manual.

e. Supplemental Information. The information contained in this module and Module R-9 is intended to serve as an introduction to combat rescue. Academic Module R-8 is an H-53 module and only the first portion of the module applies to H-3 operations. If you have any questions on H-3 operations which are not covered in this H-53 module, please see an academic instructor.

6-10. MODULE R-9, Combat Rescue: Enroute. (0.9 Hour)

a. Objective (Standard - B). Correctly respond to questions pertaining to combat rescue enroute operations:

(1) Search and rescue task force.

(2) Airborne radio contact.

(3) High and low bird concept.

(4) Radio procedures.

(5) Secure Speech.

(6) Orbit Procedures.

b. Student Requirements and Tips. Prerequisite Training: Academic Module R-8.

c. Source Reference. ARRSR 3-1, Combat SAR (Secret).

d. Required Materials/Equipment. ARRSP 55-5, Aircrew Briefing Guide, Helicopters.

6-11. MODULE R-10, AN/ALE-20 Flare Ejector System. (0.7 Hour)

a. Objective (Standard - B). Answer questions pertaining to the AN/ALE-20 Flare Ejector System:

(1) Capability.

(2) Normal operation.

(3) Emergency operation.

b. Student Requirements and Tips. This module is an H-53 module and is intended to familiarize you with the AN/ALE-20 flare ejector system. Only a few H-3 aircraft have the system installed, but it could be installed in additional aircraft should the need arise. This module includes a TV presentation.

c. Source Reference. TO 1H-53(H)B-1, Flight Manual.

d. Supplemental Information. If you have any questions about the content of this module, see an academic instructor.

6-12. MODULE R-11, Helicopter Evasive Maneuvers. (Classified). (0.5 Hour)

a. Objective (Standard - A). The student will be familiar with helicopter evasive maneuvers.

b. Student Requirements and Tips. The information in this module will be discussed during the rescue seminar.

c. Source Reference. ARRSR 3-1, Combat SAR (Secret).

d. Supplemental Information. Since this TV videotape is classified secret, it will be viewed in a secure area and any study questions or discussion will be conducted in a secure area during the rescue seminar.

6-13. R-SEM. Rescue Mission Seminar. (2.0 Hour)

a. Objective (Standard - B). The student will discuss and answer questions on the rescue mission phase of training.

b. Student Requirements and Tips:

(1) Prerequisite Training. This seminar should be scheduled prior to Aircraft Lesson R-5; it must be complete prior to Aircraft Lesson RC-3.

(2) Assignment. Review Chapter 5 of this student guide.

(3) Portions of this seminar will be classified.

c. Source References:

(1) TO 1H-3(C)E-1, Flight Manual.

(2) TO 1-1C-1-20, Air Refueling Manual.

(3) ARRSR 55-5, Helicopter Aircrew Operational Procedures.

(4) ARRSR 3-1, Combat SAR (Secret).

SECTION C - SIMULATOR LESSONS

6-14. SIMULATOR LESSON SR-1. (1.5 Hour)

a. Objectives:

(1) See figure 5-1.

(2) You should be prepared to combat any emergency.

b. Student Requirements and Tips:

(1) Prerequisite Training. Complete Academic Modules R-1 through R-7 and Simulator Lessons SP-2 and SO-2.

(2) Assignment:

(a) Review TO 1H-3(C)E-1, Flight Manual for maximum gross weight operations.

(b) Review TO 1-1C-1-20, Air Refueling Manual, as necessary.

(3) Instructor will establish conditions for maximum weight maneuvers and for extreme CG maneuvers.

c. Source References:

(1) TO 1H-3(C)E-1, Flight Manual.

(2) TO 1-1C-1-20, Air Refueling Manual.

(3) ARRSR 55-5, Helicopter Aircrew Operational Procedures.

SECTION D - AIRCRAFT LESSONS

~~6-15.~~ AIRCRAFT LESSON R-1, Air Refueling. (1.5 Hour)

a. Objectives:

(1) See figure 6-1/6-2.

(2) Be prepared to discuss:

(a) Utility hydraulic system malfunction/failure.

(b) Single engine joinup procedures.

(c) This lesson will include a demonstration of wake turbulence and the use of the Aldis lamp.

b. Student Requirements and Tips:

(1) Prerequisite Training:

(a) Simulator Lesson SR-1.

(b) Aircraft Lessons O-4, O-5, and O-6.

(2) Assignment:

(a) Study TO 1-1C-1-20.

(b) Review supplemental information, Chapter 6, paragraphs 6-4, 6-5, 6-6, and 6-8.

(c) Read supplemental information.

c. Source References:

(1) TO 1-1C-1, Basic Flight Crew Air Refueling Procedures.

(2) TO 1-1C-1-20, Air Refueling Manual.

d. Supplemental Information:

(1) Your instructor will demonstrate the initial contacts and crossover to you. Note particularly the visual references used and the smooth control movements. Don't rush yourself in this phase of training; take time to establish the visual references that work for you. Try to relax and make small control movements; it is more important to fly safely and smoothly than to make the contact on every attempt. Don't hesitate to have the instructor take the controls if you want him to demonstrate a particular maneuver again or if you need a break.

(2) As a minimum, copilot duties will include:

(a) Use of checklists. Understanding of all checklist items.

(b) Fuel Management/Transfer:

1 Operation of the refueling panel.

2 Operation of the fuel management panel.

3 Computation of "bingo time."

(c) Communications. Understanding of proper timing and terminology for all radio calls.

(d) Navigation. Before commencing and after completing air refueling operations.

(e) Knowledge of aircraft limitations, abnormal, and emergency procedures during air refueling operations.

(3) At the discretion of the flight instructor, copilots should have the opportunity to practice all air refueling maneuvers (left seat).

6-16. AIRCRAFT LESSON R-2, Air Refueling. (AC Qualified Students Only) (1.5 Hour)

a. Objectives:

(1) See figure 6-1.

(2) Be prepared to discuss:

(a) Abnormal engine indications.

(b) Use of emergency fuel control.

(c) Fuselage fire.

(d) Blade stall.

(e) Procedures for silent joinup.

b. Student Requirements and Tips:

(1) Prerequisite Training:

(a) Aircraft Lesson R-1.

(b) Copilot students will not receive this lesson.

(2) Assignment/Source References. Same as for Lesson R-1.

c. Supplemental Information. This lesson will include a simulated single engine joinup, a simulated C-130 engine failure, and a simulated breakaway.

6-17. AIRCRAFT LESSON NR-3, Night Air Refueling. (AC Qualified Students Only) (1.5 Hour)

a. Objectives:

(1) See figure 6-1.

(2) Be prepared to discuss:

(a) Lost visual contact procedures.

(b) Electrical system failure.

b. Student Requirements and Tips:

(1) Prerequisite Training:

(a) Aircraft Lesson R-1.

(b) Copilot students will not receive this lesson.

(2) Assignment:

(a) Review supplemental information, Chapter 6, paragraphs 6-7 and 6-8.

(b) Read Supplemental information.

c. Supplemental Information. Your instructor will demonstrate the proper use of lights. Take the time to set your searchlight to provide you with the best possible illumination before attempting a contact. Remember that everytime you move the helicopter, you will have to reposition the light. Night air refueling is a difficult mission; don't be discouraged if you have problems at first. Relax and take your time.

6-18. AIRCRAFT LESSON NR-4, Night Air Refueling. (1.0 Hour)

a. Objectives:

(1) See figure 6-1/6-2.

(2) Be prepared to discuss any air refueling abnormal/emergency procedures.

b. Student Requirements and Tips:

(1) Prerequisite Training:

(a) Rescue Seminar - 1.

(b) Aircraft Commander qualified students: Aircraft Lessons R-2 and NR-3.

(c) Copilot students: Aircraft Lesson R-1.

(2) Approximately one hour of this flight will be continuation of the training received on R-3. The balance of the flight will be an air refueling evaluation. Aircraft Commander qualified students will receive an air refueling check. Copilot qualified students will be evaluated on copilot duties and may be allowed to practice air refueling maneuvers at the discretion of the flight instructor/flight examiner. In addition, copilot students will be familiar with the use of aircraft lights during night air refueling operations.

c. Source References:

(1) TO 1-1C-1.

(2) TO 1-1C-1-20.

(3) 1550 ATTWR 60-1, 1550 ATTW Flying Training Operations.

d. Supplemental Information. The evaluation portion of this lesson may be scheduled/flown as a day or night air refueling mission. However, the student will normally fly the evaluation at night and must perform the designated maneuvers at "3" level proficiency.

6-19. AIRCRAFT LESSON RC-1, Air Refueling Evaluation. (0.5 Hour)

a. Objectives:

(1) See figure 6-1/6-2.

(2) Be prepared to discuss any abnormal/emergency situation associated with air refueling operations.

b. Student Requirements and Tips:

(1) Prerequisite Training:

(a) Aircraft Lesson NR-4.

(b) This evaluation will normally be given as part of NR-4.

c. Source References and Supplemental Information. See paragraph 14 above.

~~6-20~~. AIRCRAFT LESSON R-5, Combat SAR. (1.5 Hour)

a. Objectives:

(1) See figure 6-1/6-2.

(2) Be prepared to discuss:

(a) Power settling recovery procedures.

(b) Maximum gross weight procedures.

(c) Aux tank release.

b. Student Requirements and Tips:

(1) Prerequisite Training:

(a) Academic modules R-8 through R-11.

(b) Simulator Lesson SR-1 and Aircraft Lessons O-4, O-5 and O-6.

(2) Assignment:

(a) Review supplemental information, Chapter 6, paragraphs 6-9, 6-10, 6-11, and 6-12.

(b) Read supplemental information.

c. Source References:

(1) ARRSR 55-5.

(2) ARRSR 3-1, Combat SAR (Secret).

(3) TO 1H-3(C)E-1.

d. Supplemental Information:

(1) This lesson is your introduction to combat SAR procedures. It will be flown single ship and the primary emphasis will be on navigation (including low level navigation techniques) and on operational approaches. If scheduling permits, tactical formation may be practiced during the enroute portion of this lesson.

(2) Combat SAR procedures are covered in ARRSR 3-1 (secret). The procedures of Combat SAR will vary depending on the individual circumstances. Your instructor will cover some of the general procedures.

(3) Operational Hoist and Confined Approaches:

(a) Prior to the operational approach, assure that the before landing and landing checks are complete and assure that the hoist operator is aware of the location of the survivor. Due to the nature of the maneuver, he may well become disoriented. Throughout the approach, at least one member of the crew should maintain visual contact with the location of the survivor as determined by the direction of turn. It is the responsibility of the aircraft commander to coordinate with all crew members to assure constant visual contact with the area of the survivor.

(b) When on final approach, the hoist operator must be cleared to "Go Hot Mike" in time for him to become oriented to the situation. When the pilot loses sight of the survivor, it may be too late. Give the hoist operator sufficient time to establish his judgment on distance, altitude, and rate of closure to the survivor.

(c) Operational approaches may be flown at any airspeed (not necessarily maximum performance), but the patterns must be adjusted because of terrain or environment. Operational approaches are designed to build your confidence in the aircraft and in your ability to make the aircraft perform. Should you overshoot a straight-in approach, you may need an operational approach to complete the landing.

(d) The purpose of an operational approach is to place the helicopter in a position to land or establish a hover with the least possible exposure to hostile fire while keeping flying safety as a paramount consideration. One type operational approach allows the helicopter to make a high speed, low level pass to evaluate the area, turn into a small tight pattern, reduce airspeed and come to a hover in a minimum amount of time. These procedures are by no means hard and fast. Terrain, hostile forces, and weather will dictate the type of approach to be used. If the initial approach draws hostile fire, an immediate evaluation must be made to determine whether or not the approach should be continued. In either case, cover aircraft should be called in to suppress the hostile fire. If ground fire forces the discontinuation of the initial approach and suppressive fire appears to have been effective, successive attempts will be made. All turns will be made to the right when possible so the flight mechanic and pilot can keep the spot in view during the approach. Aircraft limitations and restrictions will be observed during the approach. Prelanding checks will be accomplished prior to beginning the initial descent. At higher altitudes and higher gross weights, the severity of the maneuver may have to be decreased to reduce the possibility of blade stall.

1 360 degree approach:

a Descent and Before Landing Checklists completed.

b Combat Checklist completed (if required).

c Maximum N_r.

d Entry and/or initial approach into the wind.

2 Analysis. Maintain cruise airspeed descending into the wind so as to pass 50 to 100 feet above the area. Just prior to the area of the landing zone, initiate a level to slight nose up steep turn, preferably to the right. Continue the turn for 360 degrees decreasing the airspeed in the last third of the turn so as to roll out into the wind on a short final. Keep the spot in sight and begin the approach anytime you are in a position to intercept the approach angle for the type approach being flown. The final part of the approach is the same as the approaches to a hover or a touchdown as outlined in the transition maneuvers.

3 180 degree approach:

a Checklists completed.

b Maximum N_r.

c Downwind entry.

d Maintain cruise airspeed while descending on a downwind entry. Continue descent to 50 to 100 feet above any obstructions in the area. After passing to the side of the spot, initiate a level to

slight nose up steep turn. Continue the turn for 180 degrees while decreasing the airspeed in the last half of the turn so as to roll out into the wind on a short final for the spot. A variation of this approach involves climbing for the first 90° and descending for the last 90°, similar to a lazy eight maneuver.

4 270 degree approach:

a Checklists completed.

b Maximum N_r.

c Entry/initial approach 90 degrees into the wind.

d Maintain cruise airspeed while descending with the wind 90 degrees to the aircraft heading until 50 to 100 feet above any obstruction in the area. After passing the spot, initiate a level to slight nose up turn. Continue the turn for 270 degrees, killing off airspeed in the last third of the turn so as to roll out into the wind on a short final for the spot.

NOTE. Remember when you are required to perform an operational approach, you are normally in a hostile environment and are not afforded the luxury of a landing site evaluation which involves a high and a low reconnaissance. You may be able to do some preplanning, but most likely you have to evaluate the spot while you are making your approach. This requires you to recognize and evaluate the same items which would normally be accomplished during the high and low reconnaissance in a greatly reduced time frame.

5 360 degree operational spiral approach:

a All checklists completed prior to beginning the approach.

b RPM - Maximum N_r during Final Approach.

c Entry - Over the spot at minimum of 2,000 feet.

d Analysis. Approach at least 2,000 feet AGL, or higher, above the spot at maximum/briefed airspeed. When over the spot, lower the collective to unload the rotor system and roll into a steep turn (to the right when possible). The angle of bank and power is varied as you spiral down and roll out on a short final into the wind. During this approach, powered flight as well as autorotative flight may be required. The challenge is to recognize the rate-of-descent necessary to complete the 360-540-720 degree of whatever degree of turn necessary and roll out on a short final into the wind. Beware of power settling and high rotor RPM!

6 Straight-in operational approach (high airspeed and high rate of descent):

a All checklists completed prior to beginning the approach.

b RPM - Maximum N_r during Final Approach.

c Entry - Straight-in to spot from a minimum of 2,000 feet AGL.

d Analysis. Start the approach from 2,000 feet or higher and far enough away to establish a normal to steep approach angle. The landing/hovering spot must be in sight prior to beginning the approach. The approach angle is flown at maximum/briefed airspeed to arrive at the spot on final approach into the wind. This type approach gives a high rate of descent. Use power, as necessary, to maintain airspeed until you start the flare for final approach. Powered flight, as well as autorotative flight, may be required. S-turns may be used to adjust the angle-of-approach. You may be required to jink the aircraft on final to avoid simulated ground fire. Avoid conditions conducive to power settling as you transition to a hover.

NOTE. Jinking the aircraft is altering the heading frequently to make the aircraft a difficult target. Nothing is standard, but 20-30 degrees for 20-30 seconds is a good rule of thumb.

The challenge on this approach is to not overshoot the spot or "balloon" on the approach.

7 Operational Hoist. Operational hoist is an operational approach to a hover with a hoist pickup. The operational approach and the hoist procedures are accomplished as previously outlined. All checklists must be completed prior to beginning the approach, including the Hoist Operator's Checklist. Scanners are posted and briefed. Upon turning short final, the pilot notifies the hoist operator to go "Hot Mike." The scanners and hoist operator clear the aircraft and talk the pilot over the spot. Once the hoist pickup is complete, the pilot may perform a rapid egress maneuver. This is accomplished by accelerating to maximum airspeed at tree top level (a minimum of 50 feet for training), using the terrain when possible to mask your movement, until the aircraft is in a relatively safe area and then execute a "pop-up" maneuver.

The "pop-up" is accomplished with a smooth application of aft cyclic (15-20 degrees) coupled with maximum power. The rate-of-climb should be 2500 FPM or better. Since you have accelerated to maximum airspeed, the bleed off of airspeed in the climb will be very slow if maximum power is applied.

NOTE. The aft cyclic movement must be smooth and steady to properly execute this maneuver. Do not rapidly jerk back on the cyclic.

The attitude and power is held until you reach a safe or briefed altitude or reach an engine limitation. If you experience ground fire during the pop-up, you may also combine jinking maneuvers.

NOTE. To avoid a rapid push over and the resulting negative "G"s at the completion of the "pop-up," you may roll into a left or right bank while lowering the nose.

8 Confined Area Operation. Confined area operation in the operational phase of training consists of an operational approach to a landing or hover into a confined area. This phase is a composite of several previous phases, e.g., remote area, operational maneuvers, etc., and requires precise procedures and complete attention by all aircrew members during the approach to maintain aircraft clearance. Complete all checklists and post scanners prior to beginning the approach and accomplish the maneuvers and procedures as outlined in this study guide.

(4) Navigation. Navigation training during this course is intended to update your navigation proficiency and to emphasize the importance of accurate pilotage navigation during helicopter operations. The ability to accurately locate holding areas and check points with the use of maps is necessary for successful mission accomplishment. The pilot who cannot locate himself due to lack of knowledge of his maps, or proficiency in using them, is not only ineffective but dangerous. Poor map reading techniques may result in flying over an extremely hostile area. Such an event would not only be embarrassing but could be disastrous and result in loss of life. The ability to accurately and continuously pinpoint your position is a vital factor in being rescued in the event you are forced down. The time devoted to navigational training in this course is limited, so use this time to your best advantage. Your life and the lives of your crew may rest solely on your navigational proficiency.

(a) Mission planning, selecting the correct map, reading map coordinates and map reading techniques are important parts of each operational mission. Each of these areas is covered in detail in this paragraph.

1 Mission Planning. Operational missions are often flown in a hazardous environment in which either part or all of the mission is flown at low altitude, in an unfamiliar area, and without the assistance of radio aids. Your destination is not going to be a 10,000 by 150 foot lighted runway with a control tower, TACAN, and approach control to assist you in your approach to a landing. Your destination may be a small remote clearing and the only aids available will be your prepared map and previous training. Since a navigator is not included as part of the helicopter crew, this duty rests on the shoulders of the pilots.

2 Map Selection. Select the map(s) that will be the most useful for your particular mission. Normally a 1:250,000 scale is used for medium to high altitude (2,000 to 10,000 feet AGL) enroute navigation. A 1:50,000 scale map is most useful for the target area and for mission planning. The maps used in the Air Force depict

the UTM grid and contour information. The contour information can assist immeasurably in the selection of the enroute course and approach course to the LZ or target area. The map should cover enough area to allow for course deviations and to give you the "big picture" as to where you are in relation to points of interest.

3 UTM Grid System. The Universal Transverse Mercator (UTM) grid system is simple in theory, but may become very confusing when airborne while pressed for time and trying to quickly locate a set of coordinates. Do not rush. Take your time and locate the coordinates correctly the first time.

a Relationship of Military Grids to Map Projections. Because military grids are designed to permit accurate identification of ground locations and the computation of distance and direction from one point to another, and because all map projections have inherent distortion on scale and angles, it is essential that military grids be superimposed upon projections having the least distortion. Conformal projections selected by the Department of Defense as having the least distortion of scale and angles for large and medium scale mapping are the Transverse Mercator and the Polar Stereographic. The military grid systems are applied to aeronautical charts primarily for use in Air Force support of ground operations. The Air Force uses the Universal Transverse Mercator (UTM) from latitude 80°S to 84°N and the Universal Polar Stereographic (UPS) from latitudes 84°N and 80°S to the respective poles. The standard unit of measure used with UTM and UPS grids is the meter.

b Military Grid Reference System. The Military Grid Reference System is designed for use with the UTM and UPS Grids. The world is divided into large, regularly shaped geographic areas, each of which is given a unique identification, called the Grid Zone Designation. These areas are subdivided into 100,000 meter squares, based on the grid covering the area. Each square is identified by two letters called the 100,000 meter square identification.

c Locating a Military Grid Reference. A Military Grid Reference consists of a group of letters and numbers which indicate the grid coordinates, the numerical reference, of the point expressed to the desired accuracy. A reference is written as a continuous number without space, parenthesis, dashes, or decimal points. Example: NL743385 - locating a point within 100 meters. To satisfy special needs, a reference can be given to the nearest 10 meters and the nearest 1 meter. Examples: NL74343856 - locating a point within 10 meters; NL7434328565 - locating a point within 1 meter. Normally all elements of a grid reference are not used. Those to be omitted depend upon the size of the area of activities and the scale of the map to which the reference is keyed (interval of grid lines). On some maps, the grid will have lettered squares with less than ten divisions. This presents no problem in the use of the map as the area is covered by the next square. When coordinates are given to you, they will

appear as two letters followed by four or six numbers. The two letters identify the 100,000 meter square (see figure 7-3). Move to the lower left corner of the lettered square. The numbers are divided into groups of two or three (up to five in some cases). The first number identifies a 10,000 meter square reading to the right. The next number identifies a 1000 meter square, and the third, if given, identifies a 100 meter square. Using the first number of the second group of numbers, read up to find the major square then find the 1000 or 100 meter square with the next numbers of the group. A plastic grid overlay as shown in figure 7-3 is handy to find the exact spot in the 100 meter square. The procedure is simple once you are familiar with it. Start at the lower left corner of the lettered square. Read right with the first group of numbers and up with the second group of numbers.

(b) Navigating in Hostile Territory:

1 Normally a course is selected before the checkpoints are determined; however, in some situations the reverse will be true. The course you select should be the most direct route possible consistent with the enemy position, terrain, and other mission requirements. Do not compromise security to facilitate navigation. Possible factors that influence course selection are:

a Known Enemy Defenses. The current intelligence situation should be studied and penetration of enemy defenses should be carefully planned so as to offer minimum risks.

b Populated Areas. Helicopters often receive ground fire from villages or small settlements even when such areas are not designated hostile. In addition to exposing yourself and crew to defenses near the village, you may tip off a communications net and alert other defenses further along your intended course.

c Terrain Features. You may want to take advantage of terrain cover during low altitude flying to minimize your exposure to threat areas and assist in concealing your position when security is a factor. Often a course is selected to utilize prominent terrain features as checkpoints.

d Roads and Rivers. These and other lines of communication should be avoided when they are located in hostile territory. If utilizing these features is absolutely necessary, select an altitude which offers the best security against enemy defenses reported to be positioned there. Remember, when using unprepared roads or trails for navigation, they are subject to change in direction and appearance; this is especially true in jungle terrain. Large rivers are by far the better of these terrain features to use for navigation. Even though the size will change with seasons, they are still easily identifiable.

e "Hot" Areas. Areas of extensive combat operations in which you are not involved, i.e., close air support strikes, bomb strikes, and artillery areas. Because of the diversionary effect, flight near these areas could be advantageous but are often denied by command directives.

f Checkpoints. Checkpoints should be easily identifiable on your planned course. In remote areas, a natural terrain feature is more reliable than man-made features. Use major terrain features for checkpoints whenever possible to avoid mistakes.

h Turning Points. Select turning points on the same basis as checkpoints. For clandestine missions, short course legs of 20-40 NM in length may be desirable.

(5) Hostile Aircraft Tactics:

(a) The best formation to provide surveillance against hostile aircraft is a variation of "tactical" formation. Flying two aircraft elements, each wingman should fly a position no more than 10 to 15 degrees back of his leader with 2000 to 2500 feet lateral separation. The second element leader should fly on the side away from the flight leader's wingman with slightly greater separation and with his wingman on the side away from the flight leader. Succeeding elements should be flown in similar formation 500 feet lower/higher and 3000 feet behind the lead flight if sufficient escorts are not available to provide greater separation. The escort aircraft should fly a weave pattern above and behind the helicopters, being always in position to see any attacking aircraft. The attack is normally from the rear. The following hostile aircraft tactics can, however, be implemented from any formation.

(b) When hostile aircraft are definately approaching the formation (20 miles by radio call or in sight), all helicopters should initiate a minimum collective, maximum airspeed descent toward tree-top level. Consideration should be given to the ground tactical situation, terrain limitations, and weather, before initiating this evasive action. The mission commander will commence this maneuver as appropriate. When it is determined that an aircraft, element, or flight is definitely being attacked, the endangered aircraft (element of flight), should start an immediate turn toward the attacker. A maximum rate of descent should be continued throughout the maneuver, but structural flight limits should not be exceeded. Door gunners should maintain continuous leading fire toward the attacker as long as the guns can be brought to bear. When the attacker overshoots the evading helicopter, the latter should turn to follow his attacker's line of flight remaining below and to the rear as long as possible. Rapid descent should be continued and guns fired whenever they can bear on the attacker. Terrain following flight will make continued fixed-wing attack almost impossible. Pilots should consider the relative dangers of ground fire and mid-air collisions versus the hazard presented by the attacker.

(c) Surface-to-Air Missiles. In the event of a SAM launch, enter a maximum airspeed, maximum rate of descent while turning so as to place the attacking weapon on a wingtip. This forces the missile to make maximum tracking corrections. If a missile is suspected to have infrared guidance, utilize the AN/ALE-20 Flare Ejector system if installed. If the flare system is not installed, and altitude permits, consider pulling the throttles to ground idle during this maneuver to reduce the infrared output of the aircraft.

(6) Copilot duties for Combat Search and Rescue Operations will Include:

(a) Use of checklists. Understanding of all checklist items for alert scramble and combat SAR.

(b) Fuel Management/Transfer:

1 Operation of the fuel management panel.

2 Status of all fuel in accordance.

3 Computation of "bingo time."

(c) Communications. Control of all radios as directed by the aircraft commander.

(d) Navigation, to include:

1 Enroute.

2 Low Level.

3 Doppler.

4 Ingress/Egress.

5 Home base/safe area recovery.

(e) Clearing, scanning, and monitoring of aircraft limitations during operational approaches.

(f) Computations for power/fuel requirements for operational hoist, to include monitoring of engine/transmission instruments during the hoist recovery.

(g) Knowledge of aircraft limitations, abnormal/emergency procedures during combat SAR operations.

~~6-21.~~ AIRCRAFT LESSON R-6, Water Hoist, VFR Low Level and VFR Navigation. (AC Qualified Students Only) (3.0 Hour)

a. Objectives:

(1) Be prepared to discuss:

(a) Emergency water operations.

(b) Smoke drop procedures.

(c) Freefall swimmer deployment.

(d) N_g/T_5 relationship check.

b. Student Requirements and Tips:

(1) Prerequisite Training. Simulator Lesson SR-1 and Aircraft Lessons O-4, O-5, O-6 and O-7.

(2) Assignment:

(a) Review supplemental information, Chapter 6, paragraphs 6-2 and 6-20 (4).

(b) Read supplemental information.

c. Source References:

(1) TO 1H-3(C)E-1.

(2) ARRSR 3-1 (Secret).

(3) ARRSR 55-5.

d. Supplemental Information:

(1) Water hoist operations are normally conducted at Elephant Butte Lake.

(2) Enroute to the area accomplish a N_g/T_5 relationship check and the Smoke Drop Checklist, as well as the normal checklists. Insure that all crew members are wearing LPUs. Establish communications with the boat prior to deploying any smoke markers. Avoid overflying the congested areas near the shoreline.

(3) Insure that the boat is clear of your flight path before deploying smoke markers.

(4) During the recovery phase, make smooth, small control inputs. Use your radar altimeter to aid in maintaining the desired height.

(5) The navigation portion of this mission will be a composite of VFR, VFR Low Level, and Doppler navigation training.

(6) Practice UHF/DF steers, using the boat radio, are desirable.

(7) Student pilot proficiency permitting, practice operational approaches (combat procedures) are desirable on this mission and on O-7.

(8) Student copilots will not fly this mission.

(9) Inflight use of the doppler:

(a) Analyzing Doppler Errors. No one component malfunction of the doppler system necessarily renders all features inoperative. If used properly, parts of the system can be used and will present useful and reliable information. The Air or Memory Mode will present reliable information, provided the computer receives accurate data, such as wind information. Check this in the wind read position and verify by surface wind smoke, if at a low altitude. Another aircraft in the flight may have current wind information from his doppler. Forecast winds at that altitude or a local pilot-to-forecaster service may provide the latest wind direction and velocity. Check all other information against your pilotage, such as ground speed, present position, distance to destination and track-made-good. In this manner reliability of the memory mode operation can be determined. Although one piece of information be invalid, it may not invalidate all of the data.

(b) Area Search with Doppler. When a search is to be conducted over water or desolate area, the doppler is an excellent means to establish a pattern and search area.

1 For an expanding square pattern, begin at the center of the area to be searched and insure that the present position agrees with the point selected. From this point, use cardinal headings for all legs. By use of the velocity steering indicator, determine how far and in what direction to fly by observing the vertical and horizontal bar against the VSI grid. This pattern must be flown with one selected scale on the VSI, small, medium or long. Initially, the small scale should be selected. When beyond 10 miles of the central point, the scale will automatically go to medium scale.

2 For a creeping line search, similar techniques will be used with the VSI as on the expanding square. At the beginning of the pattern, select an arbitrary destination along the search line. Select the scale within range of the destination and fly headings perpendicular to the selected line and follow the progress with the use of the grid on the VSI.

6-22. AIRCRAFT LESSON R-7, Water Hoist, VFR Low Level and VFR Navigation. (2.0 Hour)

a. Objectives:

(1) See figure 6-1/6-2.

(2) Be prepared to discuss any abnormal emergency procedures applicable to water hoist and navigation operations.

b. Student Requirements and Tips:

(1) Prerequisite Training. Aircraft Lesson R-6 (Aircraft Lesson R-8 for copilot qualified students), and Rescue Seminar - 1.

(2) Assignment. Review supplemental information for O-6 as required.

c. Source References. Same as for O-6.

d. Supplemental Information. Review as required.

6-23. AIRCRAFT LESSON RC-2, Water Hoist, VFR Low Level and VFR Navigation Evaluation. (1.0 Hour)

a. Objectives:

(1) See figure 6-1/6-2.

(2) Be prepared to discuss any abnormal/emergency procedures applicable to water hoist and navigation operations.

b. Student Requirements and Tips:

(1) Prerequisite Training:

(a) Aircraft Lesson R-7.

(b) This evaluation will be flown as a part of R-7.

c. Source References. Same as for Lesson O-7.

d. Supplemental Information:

(1) You will be evaluated on your ability to plan, brief, and execute a navigation profile. This will include the use of the doppler and a simulated water hoist pickup.

(2) Copilot students will be evaluated on copilot duties for the above maneuvers to include:

(a) Use of checklists. Understand all checklist items for a water hoist recovery.

(b) Fuel Management/Transfer:

1 Operation of the fuel management panel.

2 Status of all fuel in accordance with the directives of the aircraft commander.

(c) Communications:

1 Control of all radios, as directed by the aircraft commander.

2 Correct procedures for UHF/DF location of a simulated survivor.

(d) Navigation for a simulated overwater search and recovery mission, to include:

1 Enroute.

2 Low Level.

3 Doppler.

4 Ingress/Egress.

5 Home base/safe area recovery.

(e) Computations for power/fuel requirements for water hoist operation, to include monitoring of engine/transmission instruments and the use of the windshield wipers during the hoist recovery.

(f) N_g/T_5 relationship check, to include monitoring T_5 during hover and knowledge of hover time limitations.

(g) Knowledge of aircraft limitations, abnormal/emergency procedures during water hoist operations.

(3) Student copilots will fly this mission in the left seat and, at the discretion of the flight instructor, may practice any water hoist maneuvers.

~~6-24.~~ AIRCRAFT LESSON R-8, Low Level Navigation and Tactical Formation. (1.5 Hour)

a. Objectives:

(1) See figure 6-1/6-2.

(2) Be prepared to discuss:

(a) Tactical formation procedures.

(b) Helicopter evasive tactics.

b. Student Requirements and Tips:

(1) Prerequisite Training. Simulator Lesson SR-1 and Aircraft Lesson OC-1.

(2) Assignment:

(a) Review as required.

(b) Read supplement information.

c. Source Reference:

(1) ARRSR 3-1 (Secret).

(2) ARRSR 55-5.

d. Supplemental Information:

(1) This lesson will normally be a two ship, tactical formation SAR profile to prepare you for aircraft lesson RC-3.

(2) Copilot students should fly this lesson prior to R-7/RC-2.

(3) If your instructor feels you need additional training, he can coordinate with scheduling and make this aircraft lesson a "review" ride.

~~6-25~~ AIRCRAFT LESSON R-9, Combat SAR and Low Level Navigation. (3.0 Hour)

a. Objectives:

(1) See figure 6-1/6-2.

(2) Be prepared to discuss any abnormal/emergency procedures applicable to Combat SAR or low level navigation.

b. Student Requirements and Tips:

(1) Prerequisite Training. Aircraft Lesson R-5 and Rescue Seminar 2.

(2) Assignment:

(a) Review supplemental information, as necessary.

(b) Read supplemental information.

c. Source References:

(1) TO 1H-3(C)E-1.

(2) ARRSR 3-1 (Secret).

(3) ARRSR 55-5.

d. Supplemental Information:

(1) This mission will be flown as a single ship operation. Aircraft lessons R-8 and RC-3 will expose you to the classic "high" and "low" bird concepts which were effective in the past.

(2) Future combat and peacetime search and rescue mission may be single ship. Such missions require a great deal more proficiency from the rescue crewmembers because you will not be able to split the navigation and communications responsibilities. Regardless of the number of rescue forces involved, the primary concern of the recovery crew is to evaluate all aspects of a particular mission and make sound decisions based on the exposure to tactics and familiarization training received at this school and in your unit.

(3) During this mission, the student pilot will practice flying the aircraft in a simulated orbit with body armor, survival vest, parachute, and gas mask. Students must coordinate with life support personnel early (as soon as you see you are scheduled for this mission) to be fitted for body armor. Plan to pick up the body armor, survival vests, and gas mask prior to proceeding to the aircraft.

(4) During your next flight, you will be exposed to the problems of a large SAR force, with the confusion of numerous radio transmissions and the difficulties of coordinating and directing the diverse elements of FAC, Sandy's, fighters, tankers, and cover/ECM/Command Post aircraft. This mission will expose you to the problems of a single helicopter penetrating a hostile environment to effect an opposed rescue. Future rescue efforts may not be like Southeast Asia and may require new tactics involving use of a single helicopter.

(5) Standardized procedures/tactics do not permit the flexibility necessary to cope with a particular rescue mission. The guidance offered here is intended to challenge you to formulate your own "crew briefing."

(6) For example, for an opposed pickup, the "ideal pilot" would be wearing his body armor over his flight suit. He would also wear his survival vest, parachute, and perhaps a gas mask. For an opposed pickup over water, he would also wear his LPU. Obviously, if you wore all this gear, you would not be able to fly the helicopter. If you are

larger than the average crewmember, you may not be able to get your survival vest on over your body armor and still fit a parachute over the survival vest. Your gas mask may not allow you to talk to other crewmembers, since the gas masks presently available are not compatible with the aircraft intercom/communications system. Therefore, you must be selective when chosing the gear you will need to accomplish the mission and directing which crewmembers will wear specific gear. For example, the copilot might wear the gas mask and the pilot and flight mechanic would try to fly a hoist recovery without using the masks. If you wear glasses, you might not be able to use a standard issue gas mask.

(7) Prior to attempting an opposed hoist recovery, the pilot must insure the following checklists are complete:

(a) Descent Checklist.

(b) Combat SAR Pre-pickup Checklist.

(c) Pilot's Hoist Recovery Checklist.

(d) Before Landing Checklist.

These checklists can be accomplished enroute or while in a holding orbit. Note that these checklists are all covered in the Combat SAR Pre-pickup Checklist.

(8) Descent Checklist. Brief your crew on any changes or special items which were not covered during the alert/intelligence briefings. If all crewmembers have been listening on the primary radios, this briefing may be completed by asking if any crewmember has any questions.

(9) Combat SAR Pre-pickup Checklist:

(a) Have all crewmembers check their ICS.

(b) Assign "primary" and "monitor" radio responsibilities.

(c) Arm the weapons. Briefly review the "Rules of Engagement."

(d) Insure body armor is on.

(e) Coordinate with the flight mechanic and copilot to determine desired fuel configuration for the run-in, the hoist recovery, and the requirements for fuel after completing the pickup. This item requires considering transferring fuel prior to jettisoning external auxillary tanks or dumping fuel, computing the maximum allowable fuel for OGE hover, the minimum fuel required to effect the pickup, egress, and hit the tanker or recover at a secure forward operating location.

(f) The copilot and/or flight mechanic will compute performance data based on the considerations listed above. These computations require knowledge/estimate of the survivor's position, evaluation (PA), temperature (OAT), and the aircraft weight.

(g) Bingo fuel requires two computations. One figure reflects a bingo time prior to going in for the pickup ("End Mission Capable Time") and the second figure is your bingo time figured from your estimate of the fuel on board when you have the survivor on board ("Depart Hover Fuel").

(h) Normally, you will not put your gas/smoke mask on until you have completed the remaining checklist items.

(i) Complete the normal Gear Down, Before Landing Checklist. This would be a good time to remind the copilot of your intentions for jettisoning external/dumping fuel.

(j) Completing the pilot's hoist recovery checklist should be easy - tell the crew your intentions for the approach, and which rescue device you want the flight mechanic to have ready.

(k) At this point, the FM will have completed the Hoist Operator's Checklist by requesting you acknowledge the "Hot Mike" check.

(l) Turn on all fuel boost pumps.

(m) Open the crossfeed.

(n) Normally you will want to place the IFF in "standby."

(o) Place the TACAN in "receive."

(p) Place the doppler in "Air Mode." These last three items may help to reduce your radar return for enemy radar controlled weapons. If you use terrain masking, "skin-paint" radar acquisition amid ground clutter at low airspeeds may be difficult.

(q) Turn off all exterior lights to reduce the ease of enemy visual acquisition.

(r) Depending on the nature of the mission, the location of the orbit, and the composition of the SAR force, many of the above items may have been accomplished earlier, and a few might have to be delayed until you are closer to the survivor.

(s) Turn the vent fan "off" if you anticipate "gas/smoke" being present during the pickup.

(t) Both pilots should lock their shoulder harness to preclude either pilot from slumping over the controls in the event one pilot becomes incapacitated.

(u) Place your helmet visors down if you are not wearing gas masks.

(v) Complete the final approach checklist.

(10) Copilot duties for a Combat SAR may include any or all of the following:

(a) Communications. One technique is to have the pilot control the primary radio (normally UHF) while the copilot handles the secondary radio (either VHF or FM) and monitors the remaining radios (VHF, FM, or HF). This allows the copilot to coordinate with the SAR force for refueling requirements (tanker), escort (Sandys, FAC, or fast movers), and the other helicopter (if available). The primary frequency for each radio should have already been established.

(b) Navigation. The copilot is responsible for all navigation, to include the use of the doppler, pilotage (headings and times) to the survivor, to safe areas, egress route, to the refueling track, and best altitudes for terrain masking.

(c) Fuel management. Either the copilot or the flight mechanic will manage the fuel configuration as directed by the pilot. Normally the copilot will transfer fuel, keep track of total fuel on board, dump fuel, or jettison the external tanks. This includes computing bingo times, OGE hover power, and air refueling requirements.

(d) The copilot also (normally) will compute density altitude, power required, power available, and assist the pilot in determining wind direction/hover heading, particularly if an operational approach to a hover is used.

(e) The copilot should keep a record/sequence of events for the mission.

~~6-26.~~ AIRCRAFT LESSON RC-3, Combat SAR Tactical Formation, and Low Level Navigation (Ingress/Egress), Operational Hoist, and Helicopter Evasive Tactics Evaluation. (3.0 Hour)

a. Objectives:

(1) See figure 6-1/6-2.

(2) Be prepared to discuss any abnormal/emergency procedures applicable to Combat SAR, tactical formation, low level navigation (ingress/egress), operational hoist, or helicopter evasive tactics.

b. Student Requirements and Tips:

(1) Prerequisite Training:

(a) All academic modules and the Rescue Seminar.

(b) Simulator Lesson SR-1/SP-3.

(c) Aircraft Lessons RC-2, R-8, and R-9.

(d) Copilot students will fly this mission from the left seat and, at the discretion of the flight instructor/flight examiner, may practice any of the AC qualified maneuvers associated with Combat SAR.

c. Source References. Same as for R-9.

d. Supplemental Information. Review as necessary.

TEST COURSE

COURSE NUMBER H3P2	DESIGNATION H-3 (ARRS) (AIRCRAFT)												TRAIN
FLIGHT TIME	HOURS	1	1	1	1	0	1	3	2	1	1	3	3	
	TENTHS	5	5	5	0	5	5	0	0	0	5	0	0	
LESSON	PHASE/SUBJECT	~~N~~	R	NR	NR	RC	~~N~~	~~R~~	R	RC	~~N~~	~~N~~	~~N~~	
	NUMBER	~~1~~	2	3	4	1	~~5~~	~~6~~	7	2	~~8~~	~~9~~	~~8~~	
FLIGHT PREPARATION		3	3	3	3	3	3	3	3	3	3	3	3	
AIR REFUELING: Checklist Procedures		2	3	2	3	3								
Rendezvous		2	3	2	3	3								
Joinup		2		2	3	3								
Left Contacts/Disconnects		2	3	2	3	3								
Right Contacts/Disconnects		2	3	2	3	3								
Crossover		2	3	2	3	3								
Breakaway		2	3	2	3									
Single Engine Joinup			2											
Silent Joinup														
WATER HOIST: Checklist Procedures								2	3	3				
Pattern								2	3	3				
Smoke Drop								2	3	3				
Wind Evaluation								2	3	3				
Approach								2	3	3				
Hover/Pickup								2	3	3				
Freefall Swimmer Deployment Procedures								2	3					
Combat Procedures														
UHF/DF Procedures									2					
N_g/T_5 Relationship Check								2	3	3				
NAVIGATION: Flight Planning								3	3		3	3	3	
Normal								3	3		3	3	3	
Low Level								2	2		3	3	3	
Doppler								2	3	3				
FORMATION											3		3	
COMBAT SAR: Checklist Procedures							2					3	3	
Alert Scramble														
Operational Approaches							2					3	3	
Operational Approach to TD							2					2		
Operational Hoist							2					3	3	
Ingress/Egress							2					3	3	
Helicopter Evasive Tactics							2					3	3	
REVIEW MANEUVERS: Transition														
Autorotations														
Single Engine Approach/Landing														
AFCS/Servo OFF Approach/Landing														
USE OF CHECKLISTS		3	3	3	3	3	3	3	3	3	3	3	3	
ABNORMAL/EMERGENCY PROCEDURES		3	3	3	3	3	3	3	3	3	3	3	3	
CREW COORDINATION		1	2	3	3	3	3	3	3	3	3	3	3	
AIRMANSHIP		S	S	S	S	S	S	S	S	S	S	S	S	

Figure 6-1. H-3 (ARRS) (AIRCRAFT) - CPTS

TEST COURSE

COURSE NUMBER H3CP2	DESIGNATION H-3 (ARRS)(COPILOT)(AIRCRAFT)									TRAIN
FLIGHT TIME — HOURS	1	1	0	1	2	1	1	3	3	
FLIGHT TIME — TENTHS	5	0	5	5	0	0	5	0	0	
LESSON — PHASE/SUBJECT	R	NR	RC	R	R	RC	R	R	RC	
LESSON — NUMBER	1	4	1	5	7	2	8	9	3	
FLIGHT PREPARATION	3	3	3	3	3	3	3	3	3	
AIR REFUELING: Checklist Procedures	2	3	3							
Rendezvous										
Joinup										
Left Contacts/Disconnects										
Right Contacts/Disconnects										
Crossover										
Breakaway	2									
USE OF LIGHTS		1	1							
WATER HOIST: Checklist Procedures					3	3				
Pattern					2					
Smoke Drop					2					
Approach					2					
Hover/Pickup					0					
Freefall Swimmer Deployment					2					
UHF/DF Procedures					2					
N_g/T_5 Relationship Check					3	3				
NAVIGATION: Normal					3	3	3	3		
Low Level					2		3	3	3	
Doppler					3	3				
FORMATION							2		2	
COMBAT SAR: Checklist Procedures				2				3	3	
Alert Scramble										
Operational Approaches				1				2	2	
Operational Hoist				2				3	3	
Ingress/Egress				2				3	3	
Helicopter Evasive Tactics				2				3	3	
COMMUNICATIONS	2	3	3	3	3	3	3	3	3	
FUEL MANAGEMENT/TRANSFER	2	3	3	3	3	3	3	3	3	
USE OF CHECKLISTS	3	3	3	3	3	3	3	3	3	
ABNORMAL/EMERGENCY PROCEDURES	3	3	3	3	3	3	3	3	3	
CREW COORDINATION	2	3	3	2	3	3	3	3	3	
AIRMANSHIP	S	S	S	S	S	S	S	S	S	

NOTE: *"OPEN AREAS"*
Every attempt should be made to allow the student to perform these items, however, it is not mandatory. Grade all training actually accomplished.

Figure 6-2. H-3 (ARRS)(COPILOT)(AIRCRAFT) - CPTS