CHAPTER 5

INSTRUMENTS

1. INTRODUCTION. This chapter presents the procedures and recommended techniques used to perform helicopter instrument flight maneuvers. The instrument training you will receive is based on the fact that you are instrument qualified. You are expected to know the procedures contained in AFM 51-37 and Flight Information Publications (FLIP) so that you can spend more time practicing airborne procedures, and your instructor can spend more time introducing techniques which will aid your instrument flight proficiency in the H-1.

2. OBJECTIVES.

a. The student will become fully proficient in:

(1) Instrument cockpit procedures.

(2) Instrument takeoff (Induced Restricted Visibility).

(3) Basic instrument maneuvers.

(4) Approaches.

(5) Missed approach.

b. The student will become familiar with:

(1) Recovery from unusual attitudes.

(2) Instrument steep turns.

(3) Autorotative descents.

3. STUDY ASSIGNMENT. Review AFM 51-37 and FLIP General Planning prior to your first instrument sortie. Additionally, review your Flight Manual, Chapter 9, All Weather Operations.

4. SUPPLEMENTAL INFORMATION.

a. Instrument Cockpit Procedures. Before any instrument flight, perform a complete instrument cockpit check as outlined by the Flight Manual and AFM 51-37.

(1) Publications. Insure that appropriate, up-to-date publications are in the aircraft. The 1550 FTS mission kits should contain all necessary Enroute and Terminal FLIPs. Thoroughly review the AFTO 781 for any open discrepancies on aircraft systems required for instrument flight.

(2) Aircraft lighting. Check for proper operation of instrument and external lights at night. (Reference: AFR 60-16)

(3) Flight Instruments.

(a) Attitude indicators. Align bank and pitch pointers with indices. Check that the warning flags are not visible. (TH-1F ONLY) The copilots J-8 should be erect, and the miniature aircraft should be aligned with the 90^{o} bank indices.

(b) Pitot-static instruments:

1 Airspeed indicators. Check for zero indication.

2 Vertical velocity indicators. Check for zero indication.

3 Altimeter. Check that the difference between the barometric pressure setting and the field elevation setting does not differ from current altimeter by more than .07 Hg.

(c) Heading indicators. Compare the RMI/BDHI indications with the standby magnetic compass. Adjust the synchronizing knob until the indication is centered or fluctuates between plus and minus. Be aware that a 180^{o} ambiguity can result.

(d) Check the radar altimeter (UH-1N if installed). Press the test button. The indication should be 100 $\pm$ 15 feet.

(4) Navigation Equipment:

(a) The necessary steps in checking the navigation equipment are:

1 Tune the station.

2 Identify the morse code/voice identifier.

3 Monitor the station. Check for OFF flags.

4 Select the NAVAID for input to the CI/(BDHI).

NOTE: If you are unable to satisfactorily complete steps 1 through 4 (TIMS CHECK), the check on that NAVAID is not reliable.

(b) Check the VOR, TACAN, Localizer, and Marker Beacon IAW AFM 51-37.

(c) Icing equipment:

1 Check the pitot heater.

2 Check the engine anti-icing system (TH-1F ONLY).

3 Check defrosters.

(d) Clock. Set correct time.

b. Instrument Takeoff (Induced restricted visibility):

(1) Required:

(a) Normal takeoff power.

(b) 70 knots.

(c) Constant heading.

(d) Positive rate-of-climb.

(2) Analysis. Determine hover power and position the helicopter on a level or near level surface aligned with the desired takeoff heading. Crosscheck the heading indicator and, if available, set the heading select cursor to the desired takeoff heading. Adjust the attitude indicator pitch and roll IAW the Flight Manual. Start the takeoff by increasing the collective smoothly to the determined climb power setting. Check for climb indication on the vertical velocity indicator and altimeter. Adjust the nose attitude to 5^{0} nose low on the indicator and maintain a level bank indication. Maintain the takeoff heading with the tail rotor pedals. As the speed of the aircraft increases to approximately 40 KIAS, expand to a normal instrument crosscheck. As the airspeed approaches 70 KIAS, adjust the attitude to establish a 70 KIAS climb, then adjust power as required to attain the desired climb rate.

c. Basic Instrument Maneuvers. Instrument cruise airspeed will normally be 90 knots. Airspeeds below 90 knots, or up to long-range-cruise, may be used when the altitude, gross weight or flight conditions dictate. (The instructor will establish the desired airspeed.) Optimum climb airspeed is 55 KIAS/TH-1F and 50 KIAS dual engine or 55 KIAS single engine UH-1N. When optimum performance is not required, recommended climb airspeed is 70 KIAS/TH-1F; 70 - 80 KIAS dual engine and 55 KIAS single engine/UH-1N. Climbs and descents during cruise flight may be conducted at cruise airspeed. You should not exceed 1000 feet per minute in descents nor 1500 feet per minute in climbs. Approximately 15 degrees of bank is normally used to attain a standard rate turn. Bank angles up to 30 degrees may be used if necessary. Above the area of 20 degrees of bank, you are approaching a high rate of turn that may cause overshooting headings and difficulty with pitch control.

Steep turn practice is accomplished using a 30 degree angle of bank. ANY PITCH OR BANK CORRECTIONS SHOULD BE MADE USING THE ATTITUDE INDICATOR AND CROSSCHECKING THE PERFORMANCE INSTRUMENTS. A technique to aid your crosscheck is to adjust your attitude indicators, altimeters, etc., when in unaccellerated level flight.

d. Recovery From Unusual Attitudes. See the procedures contained in AFM 51-37.

e. Instrument Autorotative Descent. Before any instrument flight, the pilot should make the decision as to which emergency procedure (bailout, autorotation, etc.) would be required for different types of emergencies that may arise.

(1) Required:

(a) Minimum rate-of-descent Nr (295 Nr TH-1F/91% Nr UH-1N).

(b) Minimum rate of descent A/S (60 KIAS UH-1N) (57 KIAS TH-1F).

(c) Appropriate emergency checklist.

(2) Analysis. Smoothly lower the collective and establish a coordinated autorotation with a one-bar width nose high and zero bank attitude. Decrease the airspeed to 60 KIAS while adjusting collective to maintain desired rotor RPM. If terrain and altitude allow, turn into the wind if the direction is known. If time permits, radio the nature of the emergency and your intentions.

f. Approaches.

(1) Required:

(a) Instrument approach briefing.

(b) Before landing checklist.

(2) Analysis.

(a) Before starting every instrument approach, the student pilot will brief the instructor on the procedures he intends to follow during approach, landing or missed approach IAW current directives.

(b) The Before Landing Checklist will be accomplished prior to the final approach fix for non-precision approaches, or prior to glide slope interception for precision approaches.

g. Missed Approach.

(1) Required:

(a) 70 knots.

(b) Radio Call.

(2) Analysis. The missed approach will be initiated by obtaining a positive rate of climb and transitioning to a 70 KIAS climb at a desired climb rate. A technique at the missed approach point is to adjust the aircraft to a 4 degree nose high indication, crosscheck the VVI and altimeter for positive climb indication. As the aircraft approaches 70 KIAS, readjust the attitude and power to continue a 70 KIAS climb at a desired climb rate. As this climb is being accomplished you should execute the published or instructed missed approach procedure and advise the controlling agency that you are "missed approach."

CHAPTER 6

NIGHT OPERATIONS

1. INTRODUCTION. Night flying is an important phase of helicopter training. The transition from day to night flying will not prove to be exceedingly difficult.

a. Night flying is usually smoother than day flying due to the absence of thermal or convective air currents. Generally speaking, the one apprehension that presents itself while night flying is the loss of ground references.

b. Some commom phenomena the pilot will experience during night flying are vertigo, disorientation and problems with depth perception. The most likely times for these phenomena to occur are as visual reference to the runway field lights is lost. To overcome vertigo and disorientation, learn to trust your instruments completely. Depth perception can be improved by crosschecking outside references, such as the runway environment with your flight instruments (airspeed, VVI, and etc.). Probably the greatest problem will be that of becoming accustomed to the use of the landing and search lights. Proper use of the search light will aid in depth perception. It will also assist in overcoming the common fault of either having too high or too low an airspeed on approaches.

c. Night flying may seem more demanding than day flying because of the greater dependency upon your instruments to aid in determining aircraft attitude. Instrument lights should be adjusted to minimum brightness to avoid undue eye tiring and to keep cockpit reflections to a minimum. Proper light adjustment will also insure that outside vision and object identification will be at its best.

2. OBJECTIVE. The student will become thoroughly familiar with:

a. Preflight inspection.

b. Light operation.

c. Hovering.

d. Takeoffs.

e. Approaches.

3. STUDY ASSIGNMENT. Aircraft Flight Manual, Chapter 9; AFM 60-16, as supplemented.

4. SUPPLEMENTAL INFORMATION:

a. Preflight Inspection. It is important that the preflight inspection for night flights be thorough and complete. Defects which may be obvious during the day may be easily overlooked at night. The inspection should be made slowly and deliberately using a flashlight or some other approved light source. Accomplish the same inspection as required for day flights and make a thorough check on the condition of the windshield and all exterior lights. Remember flight safety is compromised whenever lights are inadequate or windshields are dirty.

b. Light Operation:

(1) Required: Nonessential bus - manual position.

(2) Analysis. While hover taxiing, the searchlight should be used to sweep the area in the taxi path. The nonessential bus switch will be in MANUAL ON for all night flying to insure search light operation in the event of generator failure or when operating on only battery power. Avoid directing any light at other aircraft or personnel as it has a blinding effect.

c. Hovering. While hovering or when near the ground, adjust the lights in such a position that they afford the best vision with the least reflective glare. Since the searchlight gets very hot, it is recommended that it be turned off upon landing to prevent a fire external to the aircraft. During night hovering, do not stare at any single point. Vertigo can occur resulting in unsafe aircraft control.

d. Takeoff. For takeoff, position the landing light approximately 15° down from horizontal. As soon as the takeoff is completed, reposition the search light to an angle which would give you a lighted autorotation area. DO NOT SACRIFICE AIRCRAFT CONTROL TO REPOSITION THE LIGHT. Upon reaching 300 feet AGL turn off the search light and landing light. (exception is noted below) Be careful not to place the search light in the stow position. The landing light may be positioned in an apparent 45° angle for; (1) search light failure, (2) an autorotation, (3) as an initial position for approaches. Your instructor will show you several techniques for setting up lights for takeoff.

NOTE: The landing light will be illuminated at all times except when it is distracting to the pilot or the aircraft is equipped with strobe type anti-collision lights.

e. Approaches. Your instructor will demonstrate several techniques regarding use of lights during night approaches. You may choose the technique which affords you the best lighting and aircraft control. Upon turning final, turn the landing and search lights on.

5. SOURCE REFERENCE. Flight Manual.

NOTES, SKETCHES, ETC

CHAPTER 7

REMOTE AREA OPERATIONS

1. INTRODUCTION. The training you have received up to this point has been in preparation for learning how to fly helicopters on the missions for which they are designed. Operational necessity may require a combination or modification of the takeoffs and approaches you learned in the transition phase of training. During this phase of training, basic procedures for operational flying will be presented. These procedures can be applied to any type of helicopter operation. You will find that judgment is equally as important as fixed procedures or maneuvers. As you fly with different instructors during this phase, many techniques will be presented. Try them all and select one that works for you. Getting the mission accomplished safely, within the parameters of the governing directives and applicable flight manuals, is what this phase of training is designed to accomplish. Crew coordination is essential to getting the job done.

2. OBJECTIVES. The student will become thoroughly familiar with:

   a. Remote area patterns.

   b. High reconnaissance.

   c. Low reconnaissance.

   d. Approaches.

      (1) Traffic pattern.

      (2) Turning.

      (3) Operational (UH-1N ONLY).

   e. Landings.

   f. Takeoffs.

   g. Night operations (Not accomplished at 1550 FTS).

3. STUDY ASSIGNMENT. ARRSR 55-5, Chapter 4 (Prior to first remote ride).

4. SUPPLEMENTAL INFORMATION.

   a. Remote Area Pattern. Fly a pattern as dictated by the terrain, wind, and obstacles, keeping in mind areas which could be used for an emergency landing should the need arise. There is no one best or standard pattern for operational flying. If possible, fly a right hand rectangular pattern. Remain oriented at all times in relation to the wind and your landing spot. Airspeed and altitude are not fixed since operating conditions can vary the aircraft performance. On

downwind, maintain adequate terrain clearance and a minimum of 50 KIAS to afford a minimum safe autorotation capability. If a radar altimeter is installed it should be used to crosscheck with the barometric altimeter during all phases of flight.

b. High Reconnaissance.

(1) Required:

(a) Approximately 300 feet AGL.

(b) Minimum airspeed of 50 KIAS.

(c) Aircraft heading into the wind if wind direction is known.

(2) Analysis. The high reconnaissance is made at an altitude and airspeed from which the entire operating area can be surveyed and analyzed. Maintain an approximate altitude of 300 feet above the site and a minimum of 50 KIAS to afford better aircraft control, a greater safety margin, and more time to evaluate the area. The ground track should be offset to one side to evaluate the area from an apparent 45 degree angle. Evaluate the following:

(a) Site elevation. Estimate the elevation of the landing site.

(b) Area for suitability. Area should be judged to determine if the selected area is usable.

(c) Wind direction. There are several methods of determining the wind direction and velocity in remote areas. The most reliable method is the use of a smoke marker. However, the hand-held-day/night/distress signal (MK 13) and the smoke hand grenade (M 18), constitute a possible fire hazard. Smoke will not be used while you are in this phase of training. Observation of foliage will indicate the direction of the wind, however, it is of limited value in estimating wind velocity. Helicopter drift, determined by eyesight, is the method generally used by experienced pilots.

(d) Turbulence. Based on the wind direction, velocity and terrain features, areas of probable turbulence can be anticipated. Awareness of the location of updrafts, downdrafts, and null areas is of primary importance.

(e) Approach/Departure Routes. Select possible routes for approach and departure. Consider the terrain features and select the most desirable route.

(f) Free Air Temperature (OAT).

(g) Power Available/Power Required. To make this evaluation, one technique is to set 29.92 in one of the altimeters. Read the PA and OAT when passing over the site. Compare this information against that used during preflight planning. Recompute power requirements if current conditions are more adverse than preplanning. Don't forget to reset the altimeter to the current altimeter setting. Accomplish this check IAW ARRSR 55-5.

NOTES: 1. Do not use winds when computing power required to hover.
2. TH-1F will accomplish the power check IAW TO 1H-1(U)F-1, Figure 7-2.
3. Your instructor will brief you on the power reserve requirements for each site.

c. Low Reconnaissance.

(1) Required:

(a) Approximately 50 feet above the highest obstacle along the aircraft flight path.

(b) 40 KIAS minimum.

(2) Analysis. The low reconnaissance is a more in depth evaluation of items noted on the high reconnaissance. Fly the selected approach route to the landing area. Consider obstructions, wind direction and velocity, and terrain clearance. Descend on the approach to an altitude approximately 50 feet above the highest obstacle along the selected flight path and level-off. Fly to the side of the site, approximately 45^{0} apparent angle, at a minimum of 40 KIAS. Evaluate the following items:

(a) Approach route.

(b) Wind.

(c) Size, slope, and surface.

(d) Determine a specific landing spot.

(e) Site elevation.

(f) Departure route(s). Plan your approach with an abort route, preferably downhill and into the wind without climbing. If it is necessary to make a turn during an abort, a right turn is preferable since it requires less power. Accelerate to a safe airspeed while establishing a climb. Turn to crosswind when safety permits.

d. Approach:

(1) Requirement. Before Landing Checklist (if not previously accomplished).

(2) Analysis. After the high and low reconnaissance, you have completed all but the final phases of the approach. During the approach phase many factors must be considered:

(a) Plan the approach to avoid high rates of descent. (800 FPM maximum rate of descent.)

(b) Remember the lag in turbine engine acceleration when changing from low to high power settings.

(c) Be alert for changes in wind direction, wind velocity, and downdrafts.

(d) Keep the Nr within operating limitations.

(e) Be aware of null areas where settling with power is more likely to occur.

NOTE: ARRSR 55-5 and the applicable flight manual provide general guidance for approaches and discuss the turbulence associated with remote area operations. Your angle of approach will depend on the conditions you have evaluated on the high and low reconnaissance and your experience. In general, all approaches can be divided into three general types: traffic pattern, turning and operational. ARRSR 55-5 places restrictions on turning and operational approaches. There are exceptions for hi/low reconnaissance and you must be familiar with these exceptions.

(f) Traffic Pattern Approach.

1 Requirement. Normal traffic pattern altitudes and airspeeds.

2 Analysis. This type of approach is particularly applicable to pinnacle approaches; that is, approaches where depth perception is a problem. It is most effective when operational considerations, such as time, make a large pattern practical. This approach is normally flown out of a rectangular or modified rectangular pattern where level flight can be established on the initial segment of the final approach prior to starting a descent. It closely resembles a normal traffic pattern.

(g) Turning Approaches - as discussed in Chapter 3.

(h) Operational Approach (UH-1N ONLY).

1 Requirements:

a 100 feet AGL minimum.

b 90 KIAS maximum.

c 50^{o} maximum bank angle.

2. Analysis. This approach may be started from any position in relation to the landing area and may constitute a straight-in or turning approach. The object is to position the helicopter on a short final from which a safe landing can be made. As the helicopter approaches translational lift you must not be in excess of 800 FPM rate of descent. This maneuver can require maximum performance of the helicopter. Nr control becomes especially important and the approach must be planned to avoid the requirement for a rapid flare prior to landing. This is a power on approach, not an autorotation with a power recovery over the spot. Your instructors will place you in numerous situations from which you must accomplish an approach. It is up to you to accomplish the approach based on your ability and knowledge of aircraft performance and site conditions.

e. Landing. During any landing, slowly lower the collective once the skids are on the ground. Always be prepared to raise the helicopter should any unusual circumstances occur. Downslope landings should be avoided since tail rotor clearance may not be adequate.

f. Takeoff.

(1) Requirement. Before Takeoff Checklist.

(2) Analysis. If you have added personnel or equipment re-evaluate your takeoff condition. Prior to takeoff, recheck wind velocity and direction. Departing a remote area may require a maximum performance takeoff. Depending on conditions, maximum power may be required until obstacles are cleared and 70 KIAS climb airspeed is attained. Your instructor may simulate a maximum power setting to allow you to practice maximum performance. Regardless of the takeoff you choose there are many factors to consider. Always plan an abort route. It may become necessary to abort a takeoff due to an aircraft malfunction. If conditions permit, attain translational lift before initiating a climb. Once a climb is established do not allow the aircraft to slow below translational lift.

NOTE: When operating at or near maximum power, rotor RPM and engine performance instruments must be monitored to prevent exceeding operating limits or drooping the rotor.

g. Night Remote Area Operations. During your training here, you will not fly night remote area operations. You should, however, know the differences in day and night operations in case you are called on to perform night operations at your next assignment. The biggest problem with night work is in performing an evaluation of the area. In general, the more illumination available the more accurately you can evaluate the site. Consider the use of flares and/or surface lights. Vehicle headlights can provide an excellent source of illumination provided

they do not blind you during approach. If used, the vehicle should be placed on the pilot's right and the lights directed toward the point of intended landing. Everything previously covered in this chapter applies to night operations as well as the following additional requirements:

(1) Do not fly a low reconnaissance at night.

(2) Pattern altitude will be adjusted to not lower than 500 feet AGL downwind.

(3) Final approach will be established to approximate a normal approach and will be initiated no lower than 300 feet AGL.

(4) The pilot not flying the aircraft will call out altitudes in 100 foot increments above 300 feet AGL and in 50 foot increments thereafter.

(5) The pilot will cross reference his instruments during the approach so as to reach 200 feet AGL with an approximate airspeed of 30 KIAS. (Exception: Single engine helicopters will be as slow as possible while remaining within the height velocity envelope.)

(6) During the last 100 feet of the approach the rate of descent will be a maximum of 300 feet per minute. AFR 60-16, MAC Sup 1 and ARRSR 55-1 contain additional restrictions on night operations.

5. SOURCE REFERENCES. Flight Manual, ARRSR 55-5, ARRSR 55-1, AFM 51-2, AFR 60-16.

CHAPTER 8

NAVIGATION/DIVERSION/LOW-LEVEL NAVIGATION

1. INTRODUCTION. This phase of training presents students with an opportunity to navigate VFR utilizing map reading and flight planning skills as well as the performance charts located in Appendix I of the flight manual.

2. OBJECTIVES. The student will become thoroughly familiar with:

   a. Navigation.

   b. Diversion.

   c. Low-level navigation.

3. SUPPLEMENTAL INFORMATION.

   a. Navigation.

      (1) Required:

         (a) Flight clearance as required.

         (b) Appropriate navigational charts.

         (c) A plotted route.

         (d) A completed AF Form 70.

      (2) Analysis. The flight will be conducted at 500 feet AGL or above. Students will navigate VFR without the use of radio aids to specific points using appropriate navigational charts. The day before the flight the student will receive from the instructor the appropriate navigational charts and the coordinates of checkpoints. In addition, the student will receive from the instructor a blank AF Form 70 which is to be completed prior to the flight. The student, using the plotted coordinates, will chart a course and apply variation to the course. The student is also responsible for measuring the course and determining the airspeed for best range. These figures will be used to complete the AF Form 70. In some cases, the instructor will give students a desired Nf and airspeed. During the flight the student is responsible for making groundspeed checks, for revising ETAs to checkpoints within a tolerance of + 2 minutes and for determining fuel consumption rates. Throughout the flight, the student should keep the instructor informed on the progress of the flight.

b. Diversion.

(1) Required:

(a) Flight clearance as required.

(b) Appropriate navigational charts.

(2) Analysis. While in flight, the instructor will give a diversion problem to a specific point or coordinates. The student will note the time, fuel on board, plot the given coordinates, locate his position, and turn to a heading in the direction of the navigation diversion point. In order to determine if it is possible to accomplish the mission, the student will compute the following in flight:

(a) Distance and ETE to the diversion point.

(b) Distance and ETE from the diversion point to the nearest recovery base.

(c) The fuel required from his present position to the diversion point.

(d) The fuel required from the diversion point to the recovery base (include a 200 pound fuel reserve).

(e) The maximum loiter time in the area of the diversion point.

(f) Payload capability upon arrival at the diversion point.

NOTE: Some things to consider in making the decision as to mission accomplishment are fuel, aircraft capability, weather, and the nature of the mission.

c. Low-Level Navigation (UH-1N ONLY).

(1) Required:

(a) Flight clearance as required.

(b) Appropriate charts with plotted course.

(c) Completed AF Form 70.

(2) Analysis. During low-level navigation, the student will navigate one leg of a low-level route and will fly one leg of the route as someone else navigates. Prior to the flight, the student will receive a map with a plotted course and a blank AF Form 70 from the instructor. The student will measure the course and complete the AF Form 70. The route will be flown at 100 feet AGL minimum and 90 KIAS while utilizing effective terrain masking techniques.

CHAPTER 9

HOIST OPERATIONS (PILOT, COPILOT, AND FLIGHT MECHANIC) AND FREEFALL SWIMMER DEPLOYMENT

1. INTRODUCTION. This chapter presents recommended procedures and techniques used to perform hoist operations, day or night. The recommended minimum crew for day operations consists of a pilot and a hoist operator with the addition of a copilot for night operations. Check CG limits for single pilot operation. The first step in hoist operations is a thorough knowledge of the hovering capability of the helicopter. Consult the performance data in the flight manual to insure that the gross weight is within hovering capability, out of ground effect, under the flight conditions to be encountered.

NOTE: In computing hover capability, be sure to include the estimated weight of the survivor(s).

2. OBJECTIVES. The student will become thoroughly familiar with:

a. Preflight operations.

b. Hoist operations, general.

c. Normal day/night operations, land.

d. Normal day/night operations, water.

e. Normal hoist operations, hoist operator.

f. Emergency hoist operations.

3. SUPPLEMENTAL INFORMATION.

a. Preflight operations:

(1) Required:

(a) Flight crew briefing. Conduct a thorough crew briefing to include each crew member's responsibility during any emergency; inoperative pendant, lost communication, aircraft malfunction, etc.

(b) Insure all equipment is preflighted and secured.

b. Hoist operations, general. The success of any hoist operation is affected by the degree of crew coordination and training. Proficiency in hoist operations can only be gained and maintained by understanding and practicing hoist procedures. The aircraft commander is responsible for evaluating the situation and selecting the appropriate

rescue device to be used. An approved safety harness will be worn by the hoist operator during hoist operations. A power available check may be performed either enroute to, or at the recovery site. If conditions at recovery site are different than those encountered enroute, another power available check will be accomplished at the recovery site. The primary hoist operator is the flight mechanic.

c. Hoist Operation, Land, (Pilots).

(1) Required:

(a) Checklists: Smoke-drop, Pilot's Hoist Recovery, Hoist Operators, and Before Landing.

(b) 20 ft hover height minimum.

(c) Check power available prior to hoist pickup.

(2) Analysis:

(a) Rescue procedures for land pickups apply both day and night. At night, parachute flares provide the best illumination. However, aircraft lighting provides adequate illumination. If a smoke device is to be used to determine the winds, fly the approach as low and slow as terrain permits. The smoke device must land in a spot near the survivor to give accurate winds and to mark the survivor's location. For night or marginal weather hoist operations, see the special requirements in ARRSR 55-5.

NOTE: If a high/low recon is accomplished and smoke is used, the smoke should be deployed during the low reconnaissance at low reconnaissance airspeed and altitude.

(b) The pilot will keep the hoist operator informed of the aircraft's position in the pattern at all times. Example; "On downwind." Complete the Pilot's Hoist Recovery Checklist and Hoist Operators Checklist is "Hoist Operator Checklist, complete and ready for pickup." This must be acknowledged by you as the hoist operator is checking his Hot Mike.

(c) Plan your approach to a hover over the survivor and at the predetermined altitude. Prior to losing sight of the survivor and when the hoist operator has the survivor in sight, direct him to go "Go Hot Mike." At this time, the hoist operator will direct the aircraft to a position over the survivor.

(d) During the recovery phase, it is imperative that each crew member help maintain adequate blade tip clearance. After the survivor is on the penetrator, the hoist operator will remove slack from the hoist cable and then advise the pilot "raise the helicopter." The pilot will slowly raise the survivor off the ground with the helicopter.

This will allow you to compensate for shifting lateral CG and to monitor the power requirements. When the hoist operator states, "survivor clear of ground," hold your position and altitude and check power/controllability. If the aircraft is in a stable hover, the hoist operator will begin raising the survivor(s).

d. Hoist Operation, Water, (Pilots). Hoist operations for water recoveries apply to both day and night. For water hoist operations insure that an adequate number of proper pyrotechnics are on board and secured. Insure each member has been issued a survival vest and an LPU, briefed on their use, and directed to wear them during all overwater operations. Upon initial sighting of the survivor, a smoke marker will be deployed to mark his position and determine wind direction.

(1) Deployment of the smoke will be at 300 feet AWL, at 70 KIAS and offset plus 30° into the wind. When over the survivor, if cleared, the hoist operator will deploy all 3 smokes. The aircraft commander may delay deployment of the smokes up to 3 seconds when conditions warrant.

(2) Accomplish the Pilot's Hoist Recovery Checklist and the Hoist Operator's Checklist prior to commencing final approach. The pilot will keep the hoist operator informed of the position of the aircraft in the pattern at all times. The approach will be planned to arrive at 200 feet AWL with an approximate forward speed of 30 KIAS. The copilot will call out altitudes in 100 foot increments above 300 feet AWL and 50 foot increments below 300 feet AWL. During the last 100 feet of the approach, the rate of descent will be a maximum of 300 FPM. The hover altitude should be established approximately 75 feet short and downwind of the survivor while allowing the helicopter to continue moving slowly forward to the hover point. The pilot will direct the hoist operator to "Go Hot Mike" prior to losing sight of the survivor.

(3) During the recovery phase, crew coordination is extremely important. Each crewmember should aid the pilot in remaining oriented throughout the recovery. Brief the copilot to monitor the aircraft instruments. All procedures for raising the survivor and power check will be the same as discussed in land hoist operations.

(4) Do not allow the helicopter to descend during takeoff.

e. Hoist Operations, General, (Hoist Operator).

(1) Required:

(a) Safety harness.

(b) Heavy work gloves (leather).

(c) Ten pound weight, if Forest Penetrator or other rescue device is not used.

(d) Asbestos gloves (for operations involving pyrotechnics)

(2) Analysis. The cabin door must be open and locked on the pilot's side before the hoist power switch is turned on. This is to preclude the possibility of the hoist breaking through the cabin door. For water hoist operation, insure that an adequate number of pyrotechnics are on board and secured.

f. Hoist Operations, Land, (Hoist Operator).

(1) Required:

(a) Checklist.

(b) Safety harness.

(c) Heavy work gloves (leather).

(d) Weight or rescue device.

(e) Asbestos gloves (if pyrotechnics are used).

(2) Analysis. Complete the Hoist Operator Checklist when directed to do so by the pilot. You may be required to read each step during the first few training rides but once you are familiar with the checklist, only specific items require verbal responses. The pilot will keep you informed of the location of the aircraft in the pattern and you should acknowledge his report. You should inform him as soon as you have the survivor in sight. There may be times when the pilot must concentrate on flying the aircraft, and you will have to direct him through the pattern. References to the survivor location should be given by clock positions and distances, e.g., "survivor, 3 o'clock, 1 mile," etc. Once you have been instructed to "Go Hot Mike," you are responsible for directing the aircraft over the survivor and informing the aircraft commander of obstacle clearance. You will be assisting the pilot in maintaining adequate rotor tip clearance to the rear and right side of the helicopter at this time. Your action from this point until the survivor is on board will determine the effectiveness of the mission. To direct the pilot over the pickup point, use short, precise instructions for direction, distance, and speed. Distance references are in feet. Inform the pilot: when lowering the cable, what the survivor is doing during the hookup, when the hookup is completed, and when you are ready to raise the survivor. The pilot will initially raise the aircraft to lift the survivor off the ground. When the survivor clears the ground, inform the pilot "survivor clear of ground." Once the aircraft is in a stable hover, raise the survivor.

g. Hoist Operations, Water, (Hoist Operator).

(1) Required:

(a) Checklist.

(b) Safety harness.

(c) Heavy work gloves (leather).

(d) LPU.

(e) Rescue device/with flotation collar.

(f) Asbestos gloves.

(g) Exposure suits (when required).

(h) Life raft (when required).

(2) Analysis. The smoke marker pattern is normally completed prior to accomplishing the hoist pattern. The Hoist Operator's Checklist will be completed when directed by the pilot. After attaching the Forest Penetrator, place one seat paddle in the down position and pull out one corresponding strap. The rescue device will be lowered approximately 20 feet when 100 feet AWL is obtained. Lowering the device prior to this could result in the hoist cable becoming entangled in the tail rotor. The rescue device will be trolled in the water prior to reaching the survivor. Insure it floats. Use the standard aircraft movement commands to maintain hover altitude and position. Keep the pilot advised on the survivor's movements during the hookup and advise him when the survivor is ready to be raised by saying, "raise the survivor." As on the land hoist pickup, keep the crew advised of the survivor's progress on the way up. Once the survivor is inside, complete the Hoist Operator's After Pickup Checklist. Throughout the water pickup operation you should periodically glance at the horizon to prevent possible spatial disorientation.

h. Smoke Marker Pattern Procedures: (Hoist Operator)

(1) Required:

(a) Checklist.

(b) Asbestos gloves.

(2) Analysis:

(a) For our operations, the pyrotechnics are placed in the pyrotechnic box. The container is secured in front of the transmission by the crew members. Once in the area of operation, the required number of devices will be prepared for drop. Once prepared for drop they will be placed in the area behind the right hand door post and inside the hinged panel on the floor. When using the MK 25, insure the closure plug end is pointed out the door during or after arming. The devices, once prepared, should be placed under one knee to prevent rolling.

(b) Deployment of the devices will be completed by the hoist operator after the pilot has cleared him to do so. Caution should be exercised to prevent injuring the survivor with the device or possible fires started by the device.

i. Emergency Procedures: In the event of an emergency situation, the particular circumstances at the time will dictate actions required. Carefully read ARRSR 55-5 and Section III of your flight manual for emergency and safety procedures.

j. Emergency Procedures for Pyrotechnics:

(1) Required. Asbestos gloves.

(2) Analysis. With proper training and handling, emergency situations should not occur when handling the pyrotechnics. However, they do constitute a potential hazard and could accidently ignite. Should this happen, the device should be thrown overboard as soon as possible, utilizing the asbestos gloves to prevent personal injury. The rest of the crew will be advised of the problem and any resulting aircraft fire should be extinguished immediately.

k. Free Fall Swimmer Deployment (UH-1N Only)

(1) Required:

(a) 10 ft AWL minimum.

(b) Left-hand pattern.

(c) Approximately 10 knots forward speed.

(2) Analysis:

(a) The pilot not flying will call out altitudes in 100 foot increments above 30 ft AWL and in 50 ft increments below 300 ft AWL.

(b) This maneuver is designed for deployment of pararescue personnel over water. Crew coordination is critical because of the left-hand traffic pattern. The pilot must rely on the copilot and the flight mechanic for spacing from the survivor, altitude above the water and ground speed. Use the same parameters (200'/30^{K}) as for a water hoist operation final approach. The angle into the wind can vary from 0° to 90° depending upon wind speed (the stronger the wind, the smaller the angle) however, it is normally 45°. The swimmers are deployed approximately 10-30 yds downwind of the survivor. After completion of the deployment, a right or left pattern can be flown for the approach for the hoist recovery.

4. STUDY ASSIGNMENTS. Flight Manual, ARRSR 55-5, Chapter 3.

5. SOURCE REFERENCES. Flight Manual, ARRSR 55-5, Helicopter Aircrew Operational Procedures.

CHAPTER 10

SLING OPERATIONS (PILOT, COPILOT, AND NONRATED CREW MEMBERS)

1. INTRODUCTION.

a. The external cargo suspension unit is used to expedite loading and off-loading cargo when the helicopter is unable to land but can hover. It is also used to carry cargo that is too large in size or weight for the cabin compartment.

b. This chapter presents procedures and recommended techniques used to perform sling operations. A thorough knowledge of cargo sling procedures and associated aircraft equipment coupled with careful preplanning and practice are required to insure safe and skillful cargo sling operations.

2. OBJECTIVES. The student will become thoroughly familiar with:

a. Cargo suspension unit preflight.

b. Sling operations.

3. SUPPLEMENTAL INFORMATION.

a. Terms Defined.

(1) Hook-up Man. A qualified aircrew member, if available, who performs the task of attaching the load to the cargo hook. A hook-up man is required for all cargo sling operations.

(2) Marshaller. A qualified person who, utilizing AFR 60-11 aircraft marshalling signals, directs the pilot to maneuver the aircraft over the load for hook-up and over the delivery spot for release. A marshaller is not mandatory for cargo sling operations. The hook-up man and the marshaller may be the same individual.

(3) Safety Man. A qualified aircrew member, normally the flight mechanic, located in the cabin compartment. A safety man is required for all cargo sling operations. The safety man's duties include, but are not limited to:

(a) Providing directions to the pilot to maneuver the aircraft over the load for hook-up, over the deployment point, and directing the pilot when to release the load.

(b) Directing the hook-up man under the rotors, if not prepositioned at the load.

(c) Advising the pilot on the status of the load during flight and of obstruction clearance during operations within 100 feet of the ground.

NOTE: When a marshaller is used, the safety man acts as a backup and assists in positioning the aircraft.

b. Preflight.

(1) Required:

(a) Complete TOLD data (Pilot).

(b) Flight crew briefing (Pilot).

(c) Preflight equipment (Nonrated crew member).

(2) Analysis.

(a) The importance of preplanning and briefing cannot be overemphasized. The pilot will compute the TOLD information IAW Chapter 2, this publication, for hover height and power requirements. The pilot will not use winds when computing power required to hover. The pilot will conduct a thorough crew briefing utilizing the "Crew Briefing (General)" and "Cargo Sling Briefing" Checklists in ARRSP 55-5. During this briefing, the pilot should stress the actions to be taken during an emergency either in flight or while hovering, with or without a load attached.

(b) The flight mechanics, if available, will preflight the cargo suspension systems and will advise the pilot that the preflight is complete and systems are operating normally. This preflight is contained in the Dash One and CL-2.

c. Sling Operations.

(1) Required:

(a) Cargo release arm switch - ON.

(b) Power available check accomplished.

(c) Qualified safety man and a hook-up man.

(2) Analysis.

(a) Prior to commencing cargo sling operations, accomplish a power check to insure an adequate power required/available differential exists and arm the Cargo Release Arm Switch.

NOTE: The sling arming switch will normally be turned off at altitudes above 500' AGL and turned on below 500' AGL.

(b) Maneuver the aircraft to a spot short of the load at 4' AGL, then follow the safety man's or marshaller's directions to position the helicopter over the load at the correct hover height. Make slow, smooth, control movements. The hook-up man is normally positioned at the load (for an immediate hook-up) but can remain at the 2 or 3 o'clock position until directed in by the safety observer. Once the hook-up is accomplished, the hook-up man will depart at the 2 or 3 o'clock or 10 to 11 o'clock positions depending on the situation. A steady and stable hover is extremely important anytime anyone is under the helicopter.

(c) After the hook up is completed and the hook-up man is clear of the aircraft, the safety man or marshaller will direct the pilot to raise the helicopter until the load is approximately 6 to 8' AGL. Once the load is off the ground and a stable hover is achieved, the pilot will recheck power required and insure sufficient power is available to complete the mission. When the area is clear, accomplish a normal takeoff using caution not to allow the helicopter to settle or the load to contact the ground or other obstacles.

(d) Fly a traffic pattern so as not to fly over any livestock, personnel, or dwellings. The pattern, airspeed, bank angle, and rate of turn should be consistent with the sling load, turbulence, terrain and Dash One limits.

(e) Fly an approach as dictated by the operating area so as to transition to a hover at the desired release point with the load approximately 6 to 8' AGL. To avoid overshooting, you may want to plan your approach to a point short of the desired release point. Follow the safety man's or marshaller's directions to the release point and when placing the load on the ground. Release the load only when directed to do so. When confirmation of load release is received, raise the helicopter to confirm load release and either takeoff or hover to a clear area and land. During training, releases will be accomplished utilizing both the electrical and manual release systems.

WARNINGS:
1. The safety man must be secured in a gunners belt at all times during sling operations. The belt must be adjusted to prevent the safety man from falling out of the aircraft.
2. Anytime an aircraft emergency occurs, other than simulated, terminate the sling operation. If in flight, jettison the external load as soon as possible. During ground operations, attempt to release the load, if attached, and move the aircraft forward to clear the load and ground personnel.

4. STUDY ASSIGNMENT: ARRSR 55-5, Chapter; Dash One, Section 5.

5. SOURCE REFERENCE: ARRSR 55-5, Helicopter Aircrew Operational Procedures.

CHAPTER 11

FORMATION PROCEDURES

1. INTRODUCTION. During this phase of operational training, you will learn the procedures and develop techniques for formation flight. You will perform tactical and tactical trail formation as both lead and wing with and without radio contact. Formation flight is demanding. It requires precise and smooth aircraft control, sound judgment, and a high level of crew coordination.

NOTE: Only tactical and tactical trail formation are authorized in the H-1, IAW ARRSR 55-5.

2. OBJECTIVE. The student will become thoroughly familiar with and perform lead and wingman responsibilities during two ship tactical and tactical trail formation.

3. STUDY ASSIGNMENT. ARRSR 55-5, Chapter 8.

4. SUPPLEMENTAL INFORMATION.

a. Briefing.

(1) Required:

(a) Formation Briefing (lead).

(b) Crew Briefing.

(c) Knowledge of ARRSR 55-5, Chapter 8 and AFR 60-15.

(2) Analysis. In addition to the aircrew briefing, the designated lead will conduct a formation briefing. It is imperative that all crew members be familiar with the procedures and limitations of ARRSR 55-5 prior to any formation flight.

b. Communications. Prior to departure, a communications check will be accomplished between all aircraft in the formation.

(1) Radio Procedures. After initial radio contact has been established between aircraft, the lead aircraft is responsible for making all normal communications pertaining to the flight. The following procedures will be adhered to:

(a) Radio frequencies will be changed only when directed by the flight lead, i.e., "Save Flight go 348.6."

(b) Wingmen will acknowledge an ordered channel change prior to switching to the new frequency, i.e., "Two."

(c) Lead will check in when coming up on the new frequency, i.e., "Save Lead," and wingmen will check in, in order, i.e., "Two," "Three," etc.

(d) Radio checks will be acknowledged by the individual flight member repeating his numerical position in the flight. Acknowledgement by the individual flight member indicates the appropriate check or briefing has been accomplished.

(e) If a flight member fails to check in after a reasonable length of time, the flight leader will direct member(s) of the flight back to the previous (or briefed) frequency to regain radio contact.

(f) Only essential transmissions will be made.

(2) Signals.

(a) Hand signals.

1 Radio Failure. Tap microphone for transmitter failure. Tap earphone for receiver failure.

2 Change Lead. Indicate with number of fingers which aircraft is to assume the lead. Point forward several times to indicate "Take Lead."

3 Acknowledgement. Tap helmet.

4 Fuel Check. Make a drinking motion. Respond using fingers with number of pounds in thousands then hundreds. (Hold fingers vertically for numbers up to five and horizontally for numbers from six to ten.)

(b) Aircraft Signals.

1 Slow wing rock - Tighten formation or rejoin if out of formation. (The first rotor dip indicates the side to rejoin on, straight ahead.)

2 Yaw - Loosen formation.

3 Wing dip - Crossover or assume tactical formation if in tactical trail. (The dip indicates the side to join on straight ahead.)

4 Rapid wing rock - Attention.

5 Porpoise (by going nose down first, you will not balloon as much) - Assume trail position.

6 Hold - Rapid wing rock followed by a sharp turn-over the desired holding point and a sharp turn back to course.

(c) Emergencies (during radio silence or radio failure) attract lead's attention by extending and turning on both landing and search lights. System failures are indicated using the HEFOE acronym as follows:

1 One finger - hydraulic.

2 Two fingers - electrical.

3 Three fingers - fuel.

4 Four fingers - oxygen (N/A).

5 Five fingers - engine.

c. Lost Visual Contact.

(1) Required: Knowledge of ARRSR 55-5 procedures.

(2) Analysis. The procedures in ARRSR 55-5 will insure that all aircraft obtain and maintain adequate separation should visual contact be lost, for any reason, during formation flight. Climbs will be at 500 FPM.

d. Engine Start.

(1) Required:

(a) Start time.

(b) Communications.

(2) Analysis. During the formation briefing, lead will determine when engines will be started and what frequency will be used. Lead will initiate the formation engine start sequence using one of the following methods:

(a) Visual signal.

(b) Pre-briefed engine start time.

(c) When directed on the radio.

e. Taxi.

(1) Required:

(a) Communications check.

(b) Before takeoff checklist.

(c) Hover check.

(d) Taxi.

(2) Analysis. Prior to requesting taxi clearance, flight lead will check in the flight. Wingmen will acknowledge with their position in the formation when all applicable checklists are complete and ready to taxi, i.e., "Save Flight, lead ready to taxi." Two will respond, "Two Ready." The flight will normally taxi in numerical order with a minimum of 200 feet between aircraft. The hover check will be accomplished prior to commencing taxi; however, no radio call is required.

f. Line-up.

(1) Required:

(a) Spacing.

(b) Before takeoff checklist.

(c) Communications.

(d) Transponder.

(2) Analysis. Normally formation takeoffs will be accomplished from helipads 2 and 3. Any helipads may be used. Two will position on lead to the left of lead with approximately 100 feet rotor-tip to rotor-tip clearance and far enough forward to see cockpit hand signals. The Before Takeoff (multiple takeoffs/landings) Checklist will be accomplished and when ready for takeoff, two will notify lead, i.e., "Two Ready." Two will then turn off landing/searchlights. Lead is the only aircraft to squawk transponder codes; however, two should keep the current code set in case he must assume lead.

g. Takeoff.

(1) Required:

(a) Tactical formation takeoff.

(b) Five second interval.

(c) Abort Procedure.

(2) Analysis. Tactical formation takeoffs may be initiated either from the ground or hover as prebriefed by lead. When the tower has cleared, the formation for takeoff, lead will execute a normal takeoff and climb at 70 KIAS. Wingmen will take off at five second intervals. If an abort occurs prior to takeoff, lead will be notified. If an abort occurs during takeoff, the aborting aircraft will call abort three times using its call sign, i.e., "Save Two Abort, Abort, Abort." Prebriefed alternate mission(s) will be accomplished in the event one of the aircraft aborts.

h. Join-up.

(1) Required:

(a) Types of join-up.

(b) Position.

(c) Communications.

(2) Analysis. During the formation briefing lead will determine the type of join-up to be accomplished after takeoff. (Either straight ahead or turning). Lead will maintain 70 KIAS until join-up is completed. When Two is in position (as prebriefed/or directed by lead), Two will call in, i.e., "Two, In." At this point, lead will increase airspeed to prebriefed or cruise airspeed.

i. Cruise.

(1) Required:

(a) Airspeed.

(b) Altitude.

(c) Turns/Maneuvering.

(2) Analysis. During training, normally, 90 KIAS UH-1N (80 KIAS TH-1F) will be used. Cruise airspeed may be used; however, mission accomplishment must be taken into consideration. The minimum altitude for tactical formation and formation lead changes is 500 feet AGL. During tactical trail formation training, the minimum altitude is 100 feet AGL while operating within designated low level routes. Maximum altitude during all formation training without parachutes is 1500 feet AGL. Normally, lead will not execute turns into two; however, gentle turns, 5 to 15 degrees of bank, are permissible.

j. Fuel Checks/Bingo Fuel.

(1) Required:

(a) Fuel check.

(b) Bingo fuel.

(2) Analysis. Lead will initiate a fuel check when auxiliary tanks are empty or anytime a wingman suspects a fuel tank malfunction. Lead is responsible for determining Bingo Fuel for the formation. It will be determined based on the aircraft using the most fuel or the aircraft having the least amount of fuel. Lead will initiate the fuel check by calling, "Save Flight, Fuel Check." Wingmen will respond, "Two, 1050." If radio silence is required, use appropriate hand signals.

k. Tactical.

(1) Required:

(a) Position.

(b) Site picture.

(2) Analysis. Wingman (Two) will be positioned on lead at appriximately a 45 degree angle, 500 to 1000 feet horizontally and 0 to 100 feet vertically (above). Lead will designate the wingman position, i.e., left or right. The sight picture for tactical formation is skids level with the aft crossover tube on the near side aligned with the forward crossover tube on the far side. It may be necessary to alter this position to maintain an unobstructed view of the lead aircraft, due to your seat position. Minor adjustments in angle and/or site picture should permit an unobstructed view of lead.

l. Tactical Trail.

(1) Required:

(a) Position.

(b) Site picture.

(2) Analysis. Above 100' AGL wingman (two) will maintain a position 500 to 1000 feet directly behind and slightly above lead. At 100' AGL wingman should vary his flight path as much as possible and avoid the same ground track as lead. During radio silence/failure, both lead and wingman may need to alter position to facilitate use of visual hand signals.

m. Crossovers.

(1) Required:

(a) Communication.

(b) Position.

(2) Analysis. Lead will direct the wingman to a crossover using either the radio or aircraft signal to initiate this maneuver. The wingman will pass approximately 100 feet behind and 50 feet above lead. Lead will maintain a stable heading during crossovers.

n. Rejoins.

(1) Required:

(a) Communications.

(b) Position.

(2) Analysis. Lead will initiate the rejoin maneuver by either using the radio or the aircraft signal. When the radio is used, two will call "tally-ho" when lead is in sight and will obtain verbal clearance from lead to rejoin. Lead should give altitude, direction of turn (if turning), and location to two to facilitate visual acquisition. Cruise airspeed, 90 KIAS or as briefed, and a maximum of 15^{o} of bank will be utilized for turning rejoins. If out of formation, a slow wing rock indicates rejoin. If in formation, it indicates tighten formation. For a rejoin, the direction of the first rotor dip indicates the side to rejoin on. If a turn is used, the direction of the turn and the direction of the first rotor dip will be in the same direction. During turning rejoins, care must be taken to prevent overshoots. If an overshoot is imminent, pass behind and below lead. DO NOT LOSE SIGHT OF LEAD. Normally, all that is required is a level attitude and a reduction in collective.

o. Formation change from tactical trail to tactical formation.

(1) Required:

(a) Communication.

(b) Position.

(2) Analysis. Lead will initiate the maneuver by either using the radio or the aircraft signal. If in tactical trail, a rotor dip indicates to move into tactical formation. The direction of the rotor dip indicates the side to join on, straight ahead. Lead may preface this signal by a rapid wing rock to gain two's attention. Remember that as lead, two cannot move into tactical formation until lead is above 500' AGL.

p. Lead changes.

(1) Required:

(a) Communication.

(b) Position.

(2) Analysis. Lead will initiate lead changes using the radio or visual hand signals. Lead changes will not be initiated when the formation is in trail. When lead initiates a lead change, Two will acknowledge and accelerate to pass lead at a minimum of 200 feet. When Two is abeam, he will call, "abeam," and lead will acknowledge, "Tally-ho." Two will then respond, "assuming lead." The formation call sign will remain the same and lead assumes all of leads responsibilities.

q. Leaving Formation.

(1) Required:

(a) Communications.

(b) Position.

(2) Analysis. Normally, when an aircraft must leave a formation, the pilot will so state, while maintaining altitude, until clear of the formation. A pilot who has left a formation will not rejoin until he has requested and received permission to do so from lead.

r. Recovery.

(1) Required:

(a) Individual recovery.

(b) Communication.

(c) Before Landing Checklist.

(d) Runway or helipads.

(e) Position.

(2) Analysis. If the formation is broken up for recovery, each aircraft is responsible for its own clearances and landing. During a tactical recovery (tactical or tactical trail formation), lead will initiate required radio calls with controlling agency(ies). The Before Landing Checklist will be accomplished individually without radio transmissions. If the recovery/landing is accomplished to a runway, a hot lane and cold lane will be established. Normally, the cold lane is that side of the runway which will be used to turn off of the runway. If an emergency should develop during landing, the aircraft with the emergency will take the HOT LANE and state, "Save Two, Hot Lane." EXCEPTION: If lead develops an emergency, he will remain in the cold land/and or maintain the lane to which a landing is being made. When helipads are used for a recovery/landing, a minimum of 500 feet separation must be maintained throughout the approach and landing unless aircraft are assigned separate helipads.

5. SOURCE REFERENCES. AFR 60-15, AFM 51-2 as supplemented, ARRSR 55-1, and ARRSR 55-5.

CHAPTER 12

MISSILE SUPPORT TRAINING

1. INTRODUCTION. This chapter discusses procedures and maneuvers which apply only to the pilots who will be engaged in the SAC Missile Support Mission.

2. OBJECTIVES. The student will become thoroughly familiar with:

a. Mission planning for missile sites.

b. Missile site evaluation, pattern, approach and landing.

c. Missile site takeoff.

d. Operational configuration mission (Heavyweight).

3. SUPPLEMENTAL INFORMATION.

a. Mission planning for missile sites:

(1) Required:

(a) Route of flight.

(b) Appropriate takeoff and landing data for configurations that may be encountered during the mission.

(c) Appropriate maps and publications.

(2) Analysis:

(a) Prior to departing for a missile support mission, the mission should be planned based on route of flight and forecast weather. Takeoff and landing data will be computed on the gross weights at the various enroute stops, if conditions are worse than initial takeoff weight. Accurate fuel computations are required to insure proper gross weights and adequate fuel reserve are maintained.

(b) The pilot must be prepared to divert as requested by his controlling agency. When a diversion is required, the pilot should compute his flight data as outlined in the navigation/diversion chapter of this manual. Accurate and rapid computations should be made to insure the pilot does not exceed his aircraft's capabilities.

b. Missile Site Evaluation, Approach and Landing Pattern.

(1) Required:

(a) Entry Point. 300 feet AGL minimum.

(b) Downwind leg. 500 feet AGL minimum.

(c) Turn to Final. 300 feet AGL minimum, or as required for turning approach.

(d) Final Approach. 300 feet AGL minimum, or as required for turning approach.

(2) Analysis:

(a) Prior to flying into any missile site, the appropriate landing area diagram should be reviewed for the following:

1 Site elevation.

2 Obstruction to flight.

3 Location of wind indicator.

4 Prominent landmarks.

5 Approach/Departure zones.

(b) Entry from downwind/base leg or straight-in approach without a flyover may be accomplished at pilots discretion, provided that wind direction and helipad clearance are known. Normally a flyover is required and will be flown in the following manner (see figure 12-1).

1 Entry point. Flyover the wind sock at a minimum of 300 feet above the landing area elevation. Maintain airspeed so as not to enter red area on height velocity chart. Determine wind direction, helipad clearance, and location of obstructions.

2 Turn to downwind. At a point over the helipad begin to turn to the downwind leg.

3 Downwind leg. Fly downwind leg at 500 feet AGL or a minimum of 300 feet AGL if a turning approach is to be accomplished. Maintain airspeed in accordance with the flight handbook.

4 Turn to final approach. From the downwind leg, enter a descending turn to base leg 300 feet AGL. If a turning approach is to be accomplished, start a 180° descending turn to final approach so as to arrive on the desired approach angle for the landing area.

5 Final approach. Initiate approach from a minimum of 300 feet AGL when utilizing retangular traffic patterns. If doing a turning approach, use procedures for 180° descending turn as stated in 4 above. The type of approach to be made will be at the pilot's discretion.

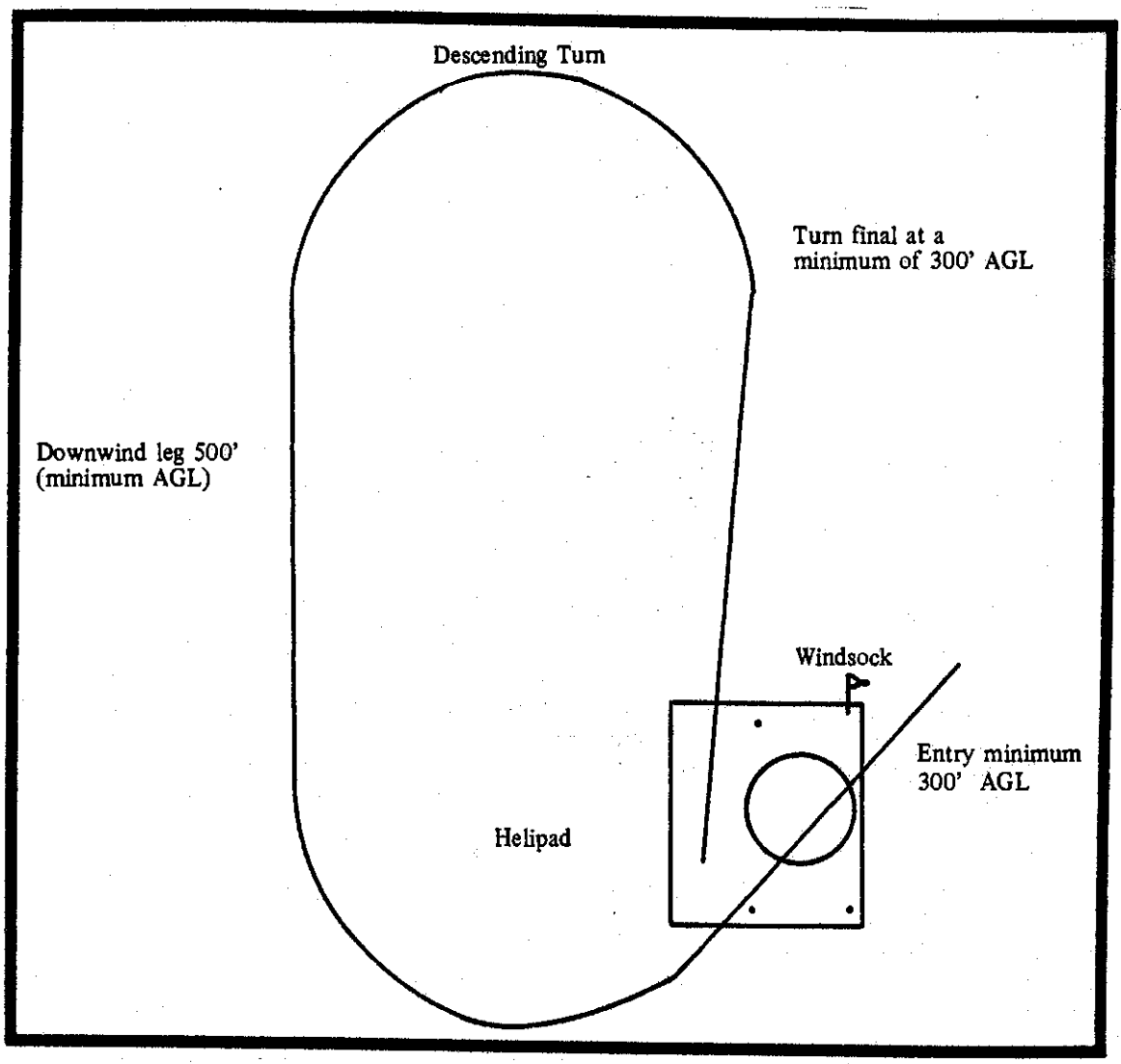

Figure 12-1. Typical Helicopter Traffic Pattern at Missile Launch Site

NOTE: Pilots must insure that adequate tail rotor clearance is maintained when approaching/landing inside fenced areas.

c. Missile Site Takeoff:

(1) Required:

(a) Determine takeoff route.

(b) Complete Before Takeoff Checklist.

(c) Perform hover check.

(d) Angle as required.

(2) Analysis:

(a) Takeoff route will be determined by reference to the approved departure route published on the landing area diagrams. Any route outside the shaded area meets the approved SAC takeoff criteria, but many low obstacles may be present. The takeoff route should be aligned as near as possible with the prevailing wind, but consideration should be given to the area of least ground obstruction in the event of engine failure on departure.

(b) Prior to lifting off to a hover, perform Before Takeoff (Multiple takeoffs and landings) Checklist. In addition to the normal clearing of the area, special care should be taken to insure that all personnel are clear of the aircraft. It is especially important to clear the area around the baggage compartment. The baggage door caution light will indicate whether or not the door is open, but a visual check of the vicinity should be made.

(c) A takeoff to hover and a hover check will be performed prior to departure. The hover check as indicated in the Dash One consists of a hover power check, a recheck of engine and transmission instruments, and proper CG conditions. Under certain configurations a shift of ballast weights is required in missile support aircraft.

(d) The departure takeoff should be a normal takeoff if possible. Because of the fence, this will be a modification of the normal takeoff practiced during transition, but one that remains in the safe area of the Height Velocity diagram. The pilots first concern is to clear the missile site fence while accelerating to a safe climb airspeed. A maximum performance takeoff may be required under some circumstances. The exact type of takeoff will be determined by the pilot for conditions which exist at the time.

d. Operational Configuration Mission:

(1) Required:

(a) Takeoff data.

(b) Cargo loaded and properly secured.

(c) Required maneuvers.

(2) Analysis:

(a) The operational configuration mission is designed to give you the feel of the aircraft under conditions similiar to those you will experience on missle support missions. The flight will be flown at 8000 pounds gross weight or a weight not to exceed maximum gross weight for hovering (maximum power), 4 foot skid height, whichever is lower. Power reserve for unprepared area operations will be IAW ATTWR 60-1.

(b) The aircraft will be loaded with ammunition cans which weigh 115 pounds each. The maximum number of weights used will be 10. The weights are secured with both a cargo net and a cargo strap.

(c) There are two types of missions which will be flown during this phase. The first will be a transition mission which will include all the transition maneuvers you have practiced. The second type mission will be operational and will include missile site and remote work. Both missions will be flown on the same sortie.

(d) These missions require no basic changes in your aircraft techniques, but there are a few points for which you should remain alert. The first will be the increased rotor build even during straight ahead autorotations. Collective control of Nr will be even more important than under the configurations you normally fly. The hovering autorotations require judicial use of the collective. The second point to watch for will be the forward shift of the CG. It will be most noticeable in the hover. As the fuel is burned down the CG will move even further forward. Other minor points will be covered by your IP prior to your mission.

(e) At the option of your instructor, you may be asked to fill out a form 365F for one of your missions to help increase your awareness of what the CG figures mean.

5. SOURCE REFERENCES. Flight Manual, ARRSR 55-1, Chapter 8.