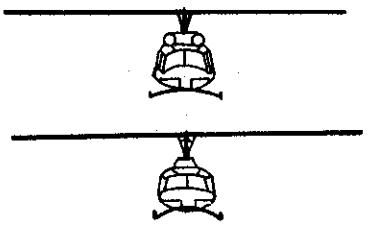

1550 ATTW

H1P/SG/FL

MARCH 1978

H-1 PILOT

STUDENT GUIDE

FLIGHT LINE

AEROSPACE RESCUE AND RECOVERY SERVICE

FOR INSTRUCTIONAL PURPOSES ONLY

1550 ATTW (ARRS)
KIRTLAND AFB, NM

H-1 FLIGHT LINE STUDENT GUIDE

F O R E W O R D

To accomplish today's helicopter missions, the professional pilot must have complete knowledge of the basic fundamentals, techniques, and procedures for operation of his aircraft. This student guide provides a foundation for developing these requirements. It was designed to expand upon the flight manual procedures for normal operation of the TH-1F, and UH-1N helicopters. It also provides continuity between existing publications for workability and comprehension. It establishes a norm for training and standardization of maneuvers by setting specific criteria selected from the various factors affecting aircraft performance. Most of the information in this student guide is applicable to both models of the H-1; however, major differences are noted where applicable. If regulations and/or flight manual procedures change, they will take precedence over this student guide.

This student guide will be reviewed in conjunction with the course evaluation schedule in 1550 ATTWR 51-1. Upon completion of the review, a report will be submitted IAW 1550 ATTWR 51-1. Any difference noted by the student between the material presented in the student guide and the information presented on the flight line or in the classroom should be reported to 1550 ATTW Training Division (DOTET).

James R. Miears

JAMES R. MIEARS, Colonel, USAF
Deputy Commander for Operations

SUMMARY OR REVISED, DELETED, OR ADDED MATERIAL.

Corrections in technical data, grammar, punctuation, and format were made throughout the guide. Overall guidance has been updated and realigned to correspond with the flying courses now taught. Additionally, a chapter on formation procedures has been added.

Supersedes the April 1977 edition.
OPR: 1550 FTS
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CHAPTER 1

SPECIAL INSTRUCTIONS

1. INTRODUCTION. This chapter contains H-1 local operating procedures and special instructions.

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

a. Duties and responsibilities.

b. Cockpit layout.

3. SUPPLEMENTAL INFORMATION.

a. Duties and Responsibilities. As a helicopter student your duties are:

(1) Complete all mission planning and prepare the TOLD card.

(2) Respond to all checklist items using the Challenge and Response System.

(3) Know the parameters and monitor engine and transmission instruments for proper indications during engine start, ground operations, inflight operations, and shutdown.

(4) Monitor the flight controls during start, shutdown, and whenever requested by the instructor.

(5) Be responsible for insuring both sides of the aircraft are clear during all operations.

(6) During taxi, takeoff, in flight, and landing, perform all maneuvers as directed by the instructor.

(7) Be prepared for each flight by knowing your procedures and what is expected of you.

b. Cockpit Time. Use free time to become better acquainted with the cockpit, instruments, aircraft controls, and cockpit procedures. As you go through the checklist, visualize the positions of the switches and instrument readings. Keep in mind that the sooner you become familiar with the checklist, the cockpit arrangement, and the aircraft in general, the sooner you can devote your attention to actually flying the aircraft. A word of caution: *CLEARANCE IS REQUIRED FROM CURRENT OPERATIONS MISSION MONITOR PRIOR TO ENTERING THE FLIGHT LINE.* To obtain clearance, come by 1550 FTS and contact your flight commander or any instructor pilot.

CAUTION: If at any time during student maneuvers there is a question as to whether a problem is student or mechanically induced, the instructor will assume aircraft control and make a determination as to the nature of the problem.

4. STUDY ASSIGNMENT. None.

5. SOURCE REFERENCES. None.

CHAPTER 2

ORIENTATION

1. INTRODUCTION. This chapter is designed as an introduction to the H-1 helicopter and should be used to amplify and provide a better understanding of preflight procedures, ground operations, basic flight maneuvers, and postflight procedures.

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

   a. Flight Crew Information File (FCIF) Procedures.

   b. Flight clearance.

   c. Takeoff and landing data (TOLD).

   d. Use of checklist.

   e. Preflight check/egress procedures.

   f. Cockpit and starting procedures.

   g. Flight characteristics.

   h. Postflight procedures.

   i. International aircraft marshalling signals.

3. SUPPLEMENTAL INFORMATION:

   a. The student should arrive at the briefing room in sufficient time to read the FCIF prior to the aircrew briefing. (Approximately 5-10 minutes should suffice.) The student is responsible for initialing and dating his MAC Form 447 (FCIF card) for the latest FCIF item. He is also required to read and initial for the latest Flight Crew Bulletin (FCB).

   b. Flight Clearance. 1550 ATTW Form 4 serves as a flight authentication and local clearance. In addition,a DD Form 175 and MAC Form 41 (Flight Order) will be accomplished for flight when required by AFR 60-16.

   c. Takeoff and Landing Data (TOLD). Use the charts contained in TO 1H-1(U)N-1 or 1H-1(U)F-1.

d. Takeoff and Landing Data (TOLD).

(1) Required:

(a) Flight crew checklist.

(b) Weather data.

(c) Flight manual, performance charts.

(2) Analysis.

(a) Takeoff Column:

1 Pressure altitude. From weather briefing.

2 OAT. From weather briefing.

3 Density Altitude. From appropriate chart.

4 Wind. From weather briefing. (Do not use wind in TOLD computations.)

5 Gross weight.

a Basic weight. From weight and balance data in squadron flight planning room.

b Oil. TH-1F, 34 pounds
UH-1N, 34 pounds

c Crew. 200 pounds/crewmember or actual crew weight.

d Fuel, TH-1F, 1414 pounds. (Allows for 23 pounds start and run-up.) UH-1N, 1917 pounds. (Allows for 26 pounds start and run-up.)

e Payload. Actual weight of cargo, equipment, or passengers. (If actual weight of passengers is unknown use 200 pounds each.)

6 Desired skid height. Hover - use 4 feet
Hoist - use 20 feet
(NOTE: Also compute OGE Hover)
Sling - use 15 feet

7 Desired rotor speed. Th-1F, 317 Nr.
UH-1N, 100% Nr.

(Use appropriate charts, as dictated by the mission, to compute items 8 through 11.)

8 Power required to hover.

9 Power available.

10 Max gross weight for hover.

11 Max KIAS (for flight altitude and gross weight).

(Additional items required for UH-1N 12 through 14.)

12 Single engine service ceiling.

13 Single engine Max Gross weight to hover 4 feet skid height.

14 Single engine takeoff distance - NA .

15 Minimum safe single engine speed.

(b) Landing column. Use of this column is required only when the landing conditions are worse than the computed takeoff conditions, however, it can be used at any time. Example: You depart Kirtland AFB (elevation 5352 MSL) and proceed into the east remote area and you are going to work a remote site at 9500 AGL. Your power available engine performance and aircraft performance will change due to different outside air temperature and pressure altitude.

1 Pressure altitude. From weather briefing or as follows: Assume that the air mass is the same for the takeoff and landing site and apply the difference in actual elevations between the sites. Inflight computation of pressure altitude may be obtained by setting 29.92 on the altimeter and reading pressure altitude directly from the instrument.

2 OAT. From weather briefing or apply the standard lapse rate of 2°C per 1000 feet.

3 Density altitude. From appropriate chart.

4 Wind. From weather briefing. (Do not use wind in TOLD computations.)

5 Gross weight. Takeoff gross weight, minus fuel used in transit.

6 Desired skid height. As applicable.

7 Desired rotor speed. (Same as listed for takeoff.)

(Use appropriate charts, as dictated by the mission, to complete the landing column.)

e. Use of Checklist. Refer directly to the Flight Crew Checklist during all ground and air operations. Use the challange and response method. The student pilot will be responsible for conducting all system checks as detailed in the Flight Manual. During flight control boost-off checks, the instructor will monitor the flight controls in order to assist the student in the event of a malfunction.

f. Cockpit and Starting Procedures.

(1) You should place the seat in the same position for each flight.

(2) The Flight Manual covers starting procedures thoroughly; however, there are some local procedures that are used to assure greater safety during training.

(a) Once power is applied to the aircraft, helmets will be donned and the primary radio will be monitored.

(b) When clearing the area before starting, visually check that the rotor blades are rotated to the 90° position, the blade tie-down has been removed, and that fireguard and firebottle are in position.

(c) Before engaging the starter, recheck that the throttle(s) are properly positioned.

(d) On the TH-1F, when conducting the manual fuel check, increase the manual fuel switch with one second "beeps" to obtain 6000 Nf. Upon reaching 6000, decrease the switch and hold down for 5 seconds after the manual fuel light has gone out. This will insure a reasonable rate of increase of the Nf, provide a free-wheeling check and insure that the system is completely closed.

(e) When opening the throttle(s), use slow, smooth pressures. Check that the low RPM audio switch comes on and that the low RPM light goes out when the rotor speed passes 295 $\pm$ 5 on the TH-1F, or 92% $\pm$ 2% on the UH-1N.

g. Flight Characteristics:

(1) TH-1F ONLY. Maintain maximum continuous operation rotor RPM for all maneuvers except for extended cruise or when practicing procedures which may require a different setting. Monitor the Nf at all times and especially when lowering the collective. As the load on the rotor is decreased the Nf may tend to increase slightly. The more rapid the reduction, the higher the increase. This situation may be controlled with slight adjustments of the throttle.

(2) TH-1F ONLY. During orientation with the TH-1F the instructor may demonstrate the "pitot system installation error." If used, this maneuver will be performed not lower than 500 feet AGL, with a maximum airspeed of 50 knots, and with not more than 30 degrees yaw. From level flight, with a right yaw, you will note only a minor decrease of indicated airspeed. With a left yaw the indicated airspeed may drop as low as zero. This is due, primarily, to the physical location of the pitot tube. This is the same type of installation error as shown on the Airspeed Correction chart in the performance section of the Flight Manual except the chart is based on coordinated flight. The yaw error will be noticed during approaches with a right crosswind.

(3) To establish common basic transition maneuver criteria for training and standardization, the following procedures will apply:

(a) NORMAL CLIMBS will be 70 KIAS.

(b) NORMAL CRUISE will be 90 KIAS.

(c) NORMAL DESCENT will be at cruise airspeed.

(d) TURNS may be made using the angle of bank necessary to accomplish the maneuver. Normally not more than 30^{0} of bank will be required.

h. Postflight Procedures--TH-1F ONLY. After the throttle is placed in the OFF position, continue to monitor the T-5. A slow buildup is not unusual during warm weather but be alert for any abnormal indications.

i. International Aircraft Marshalling Signals. Helicopters use the same marshalling signals as for fixed wing operation with a few additional signals for hovering type aircraft. Refer to Figures 2-1.1 through 2-1.10 for aircraft marshalling signals.

4. STUDY ASSIGNMENT. None.

5. SOURCE REFERENCE. Flight Manual, AFR 60-11.

INTERNATIONAL AIRCRAFT MARSHALLING SIGNALS

Signals contained in this attachment are established in accordance with international standardization agreements (STANAG's) and where possible conform to ICAO signals.

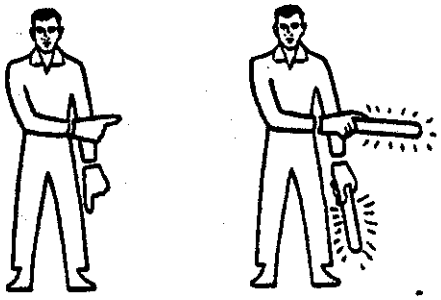
General Instructions:

a. When the marshaller signals an aircraft on a movement area, he is to face it, standing in the following position:
   For helicopters: within full view of the pilot.

b. For night operations the wands will be used in pairs of the same color and not too bright. During surface taxiing or parking the pilot will stop immediately if one or both of the marshaller's wands fail.

1. **PROCEED TO NEXT MARSHALLER**

Right or left arm down, other arm moved across the body and extended to indicate direction of next marshaller.



2. **THIS MARSHALLER**

Arms above head in vertical position with palms facing inward.

Conforms to ICAO and NATO signal "THIS WAY."

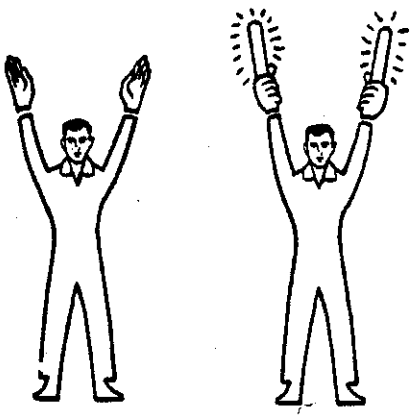
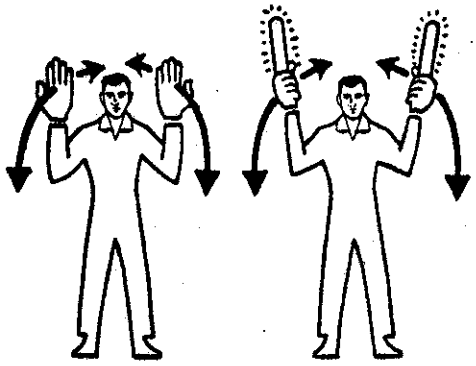


Figure 2-1.1 Aircraft Marshalling Signals

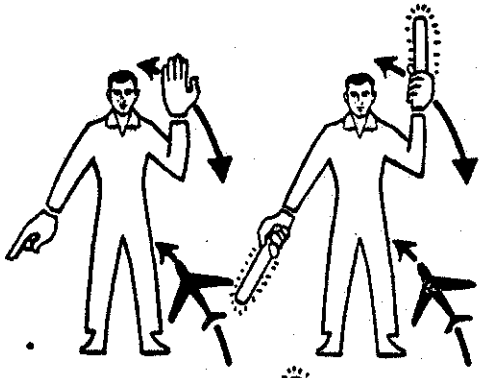
3. **MOVE AHEAD**

Arms a little aside, palms facing backwards and repeatedly moved upward-backward from shoulder height.



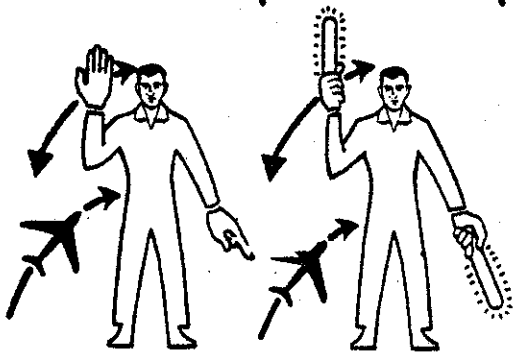
4. **TURN TO PORT (LEFT)**

Point right arm downward, left arm repeatedly moved upward-backward. Speed of arm movement indicating rate of turn.



5. **TURN TO STARBOARD (RIGHT)**

Point left arm downward, right arm repeatedly moved upward-backward. Speed of arm movement indicating rate of turn.



6. **SLOW DOWN**

Arms down with palms toward ground, then moved up and down several times.

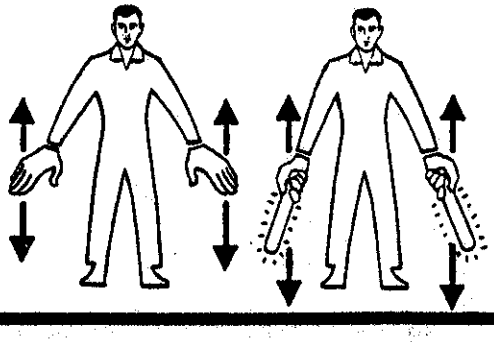


Figure 2-1.2 Aircraft Marshalling Signals

7. MOVE BACK

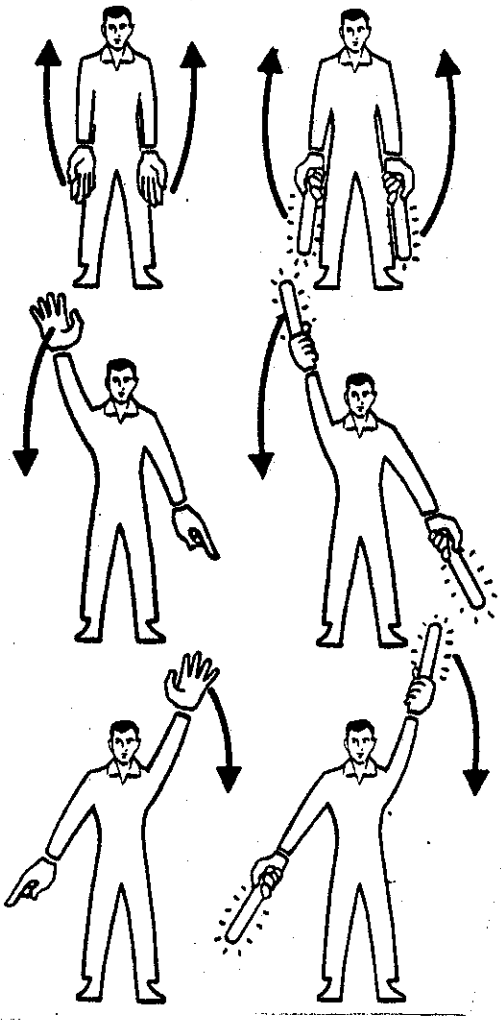
Arms by sides, palms facing forward, arms swept forward and upward repeatedly to shoulder height.

8. TURN WHILE BACKING--TAIL TO STARBOARD (RIGHT)

Point left arm down and right arm brought from overhead, vertical position to horizontal forward position, repeating right arm movement.

9. TURN WHILE BACKING--TAIL TO PORT (LEFT)

Point right arm down and left arm brought from overhead, vertical position to horizontal forward position, repeating left arm movement.



10. CLEARANCE FOR PERSONNEL TO APPROACH AIRCRAFT

A beckoning motion with right hand at eye level.

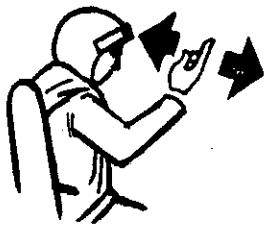
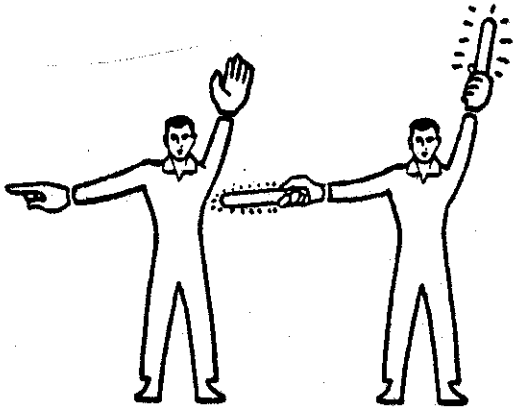


Figure 2-1.3 Aircraft Marshalling Signals

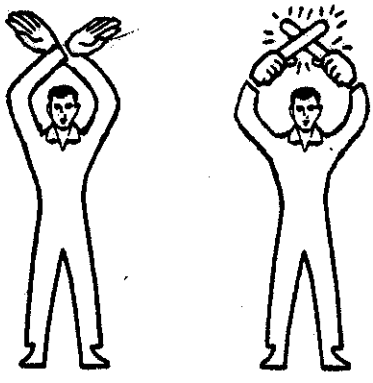
11. PERSONNEL APPROACH THE AIRCRAFT

Left hand raised vertically overhead, palm towards aircraft. The other hand indicates to personnel concerned and gestures towards aircraft.



12. STOP

Arms crossed above the head, palms facing forward.



13. START ENGINE(S)

Circular motion of right hand at head level with left arm pointing to engine.
ICAO and NATO: Number of fingers extended on left hand indicates engine to be started.

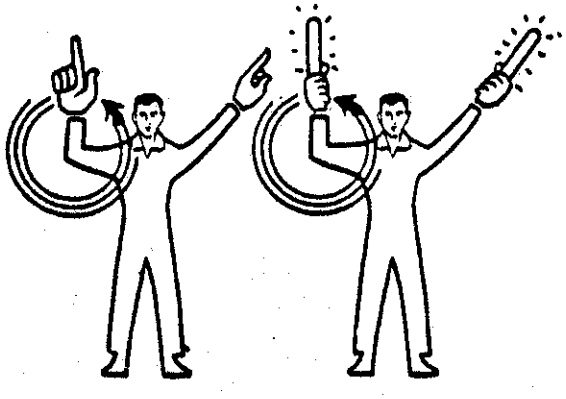
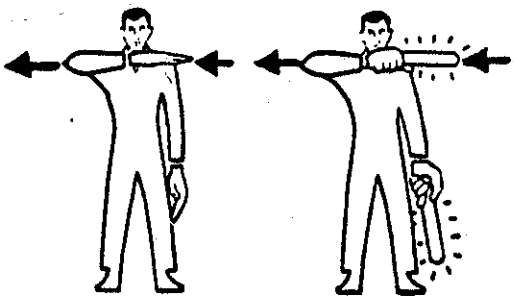


Figure 2-1.4 Aircraft Marshalling Signals

14. CUT ENGINE(S)/ROTORS

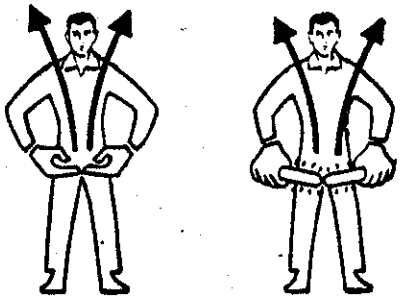
Either arm and hand level with shoulder, hand moving across throat, palm downward.



15. ABANDON AIRCRAFT

Marshaller first gives signal to cut engines, followed by signal simulating unfastening seat belt and shoulder straps and throwing them up and off.

No ICAO signal.
No NATO signal.



16. AUXILIARY POWER UNIT—CONNECTED

Hands above head, left fist partially clenched, right hand moved in direction of left hand with first two fingers extended and inserted into circle made by fingers of the left hand.
No ICAO signal.

17. AUXILIARY POWER UNIT—DISCONNECTED

Hands above head, left fist partially clenched, right hand moved away from left hand, withdrawing first two fingers from circle made by fingers of the left hand.

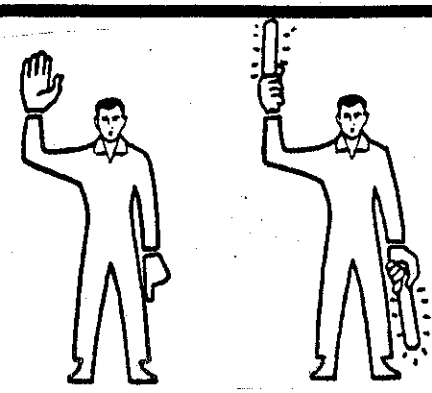
No ICAO signal.

Figure 2-1.5 Aircraft Marshalling Signals

18. MARSHALLING FINISHED

Right arm raised with elbow at shoulder height with palm facing forward

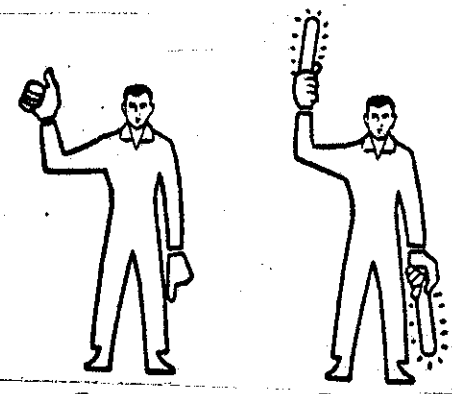
No ICAO signal.
No NATO signal.



19. AFFIRMATIVE (ALL CLEAR OR "OK")

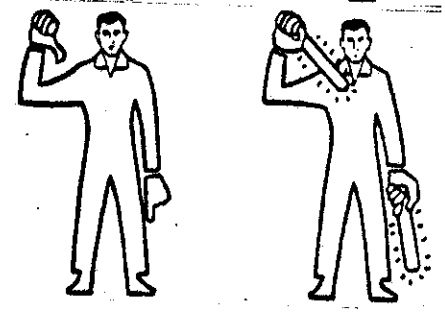
Hand raised, thumb up.

ICAO Signal for "ALL CLEAR"



20. NEGATIVE (NOT CLEAR)

Hand raised, thumb down.
No ICAO signal.



21. LANDING DIRECTION

Marshaller turns and faces toward point where aircraft is to land, the arms are lowered repeatedly from a vertical position to a horizontal position, stopping finally in the horizontal position.

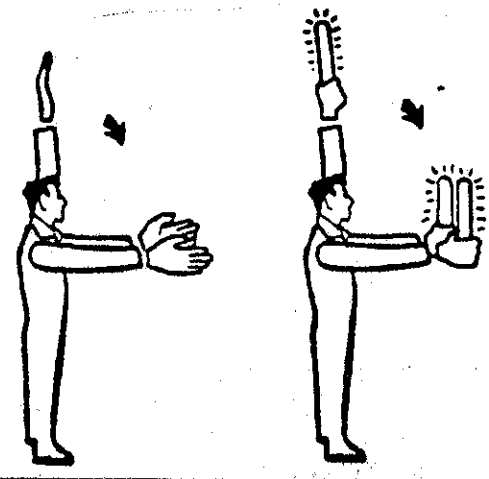
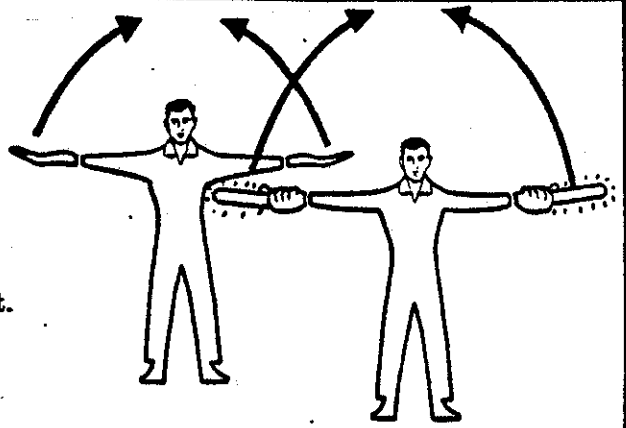


Figure 2-1.6 Aircraft Marshalling Signals

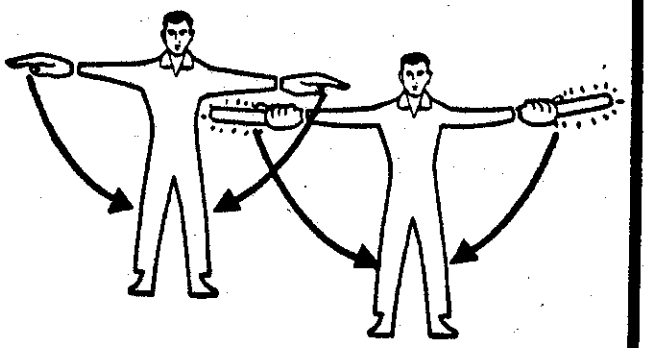
22. VERTICAL MOVEMENT—MOVE UPWARD

Arms extended horizontally sideways beckoning upwards, with palms turned up. Speed of movement indicates rate of ascent.



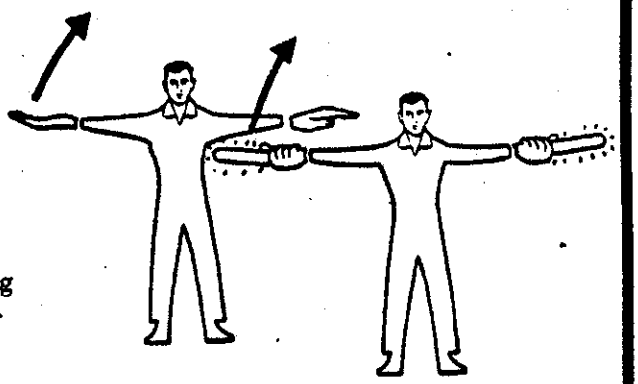
23. VERTICAL MOVEMENT—MOVE DOWNWARD

Arms extended horizontally sideways beckoning downwards with palms turned down. Speed of movement indicates rate of descent.



24. HORIZONTAL MOVEMENT—MOVE TO RIGHT (STARBOARD)

Left arm extended horizontally sideways in direction of movement and other arm swung over the head in same direction, in a repeating movement.



25. HORIZONTAL MOVEMENT—MOVE TO LEFT (PORT)

Right arm extended horizontally sideways in direction of movement and other arm swung over the head in the same direction, in repeating movement.

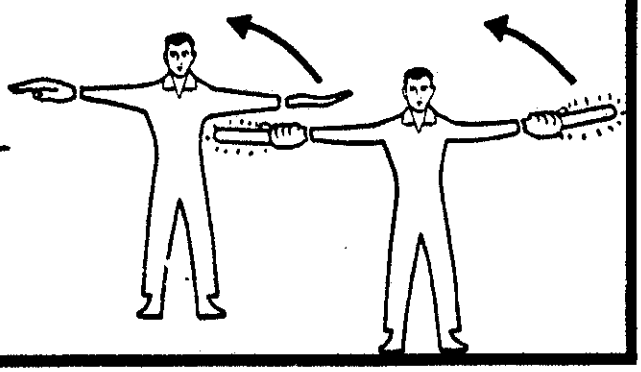
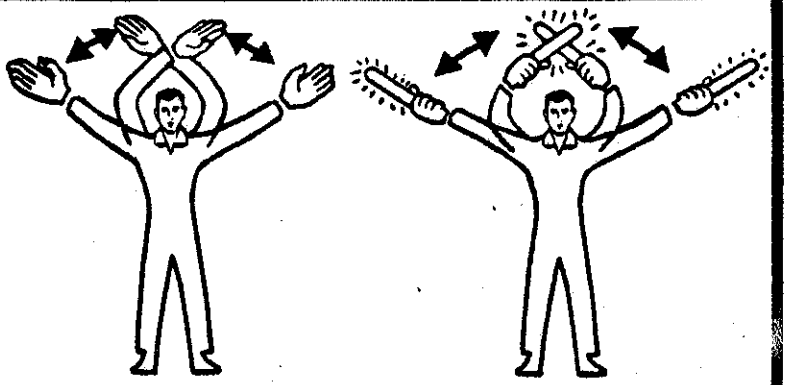


Figure 2-1.7 Aircraft Marshalling Signals

26. **WAVE OFF**

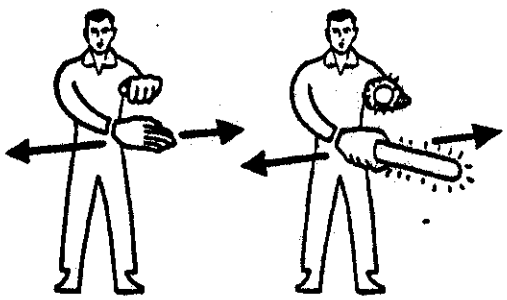
Waving of arms over the head.



27. **RELEASE LOAD**

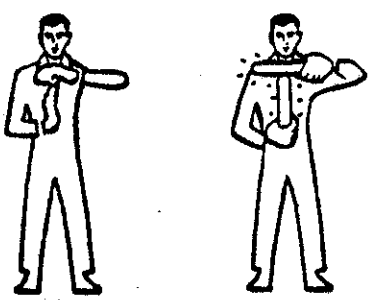
Left arm extended forward horizontally, fist clenched, right hand making horizontal slicing movement below the left fist, palm facing body.

No ICAO signal.



28. **LOAD HAS NOT BEEN RELEASED**

Bend left arm horizontally across chest, with fist clenched, palm downward; open right hand pointing up vertically to center of left fist.



29. **HOVER**

Arms extended horizontally sideways, palms downward.

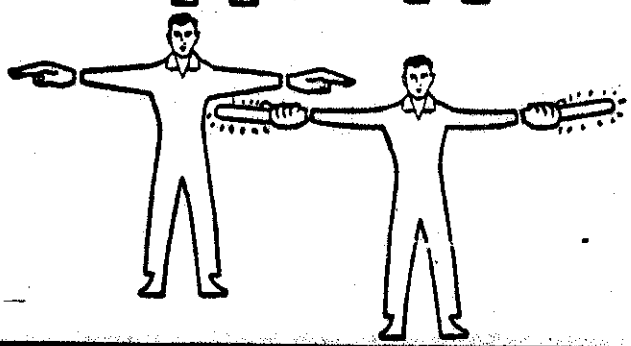
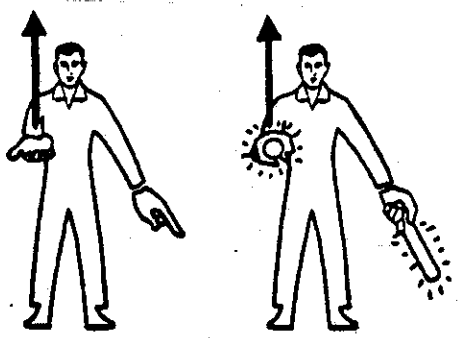


Figure 2-1.8 Aircraft Marshalling Signals

30. SPOT TURN

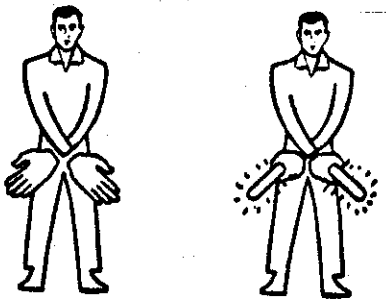
Left or right hand moving upward and backward, from a horizontal position, to indicate direction of tail movement. Other hand pointing to center of spot turns. Marshaller must remain in full eye-view with pilot.

No ICAO signal.
No NATO signal.



31. LAND

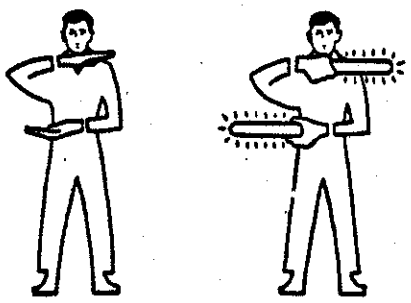
Arms crossed and extended downwards in front of the body.



32. WHEELS OR SLING LOAD THIS HIGH

Hands extended before body and palms facing each other. The bottom hand indicates the ground and the top hand the wheels or bottom of sling load. The distance between the hands will indicate the height of the wheel or bottom of sling load above the ground.

No ICAO signal.
No NATO signal.



33. CARGO LOAD SECURE

Arms extended forward, elbows flexed, right hand grasping left fist.

No ICAO signal.
No NATO signal.

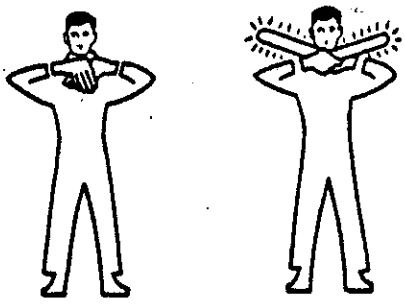
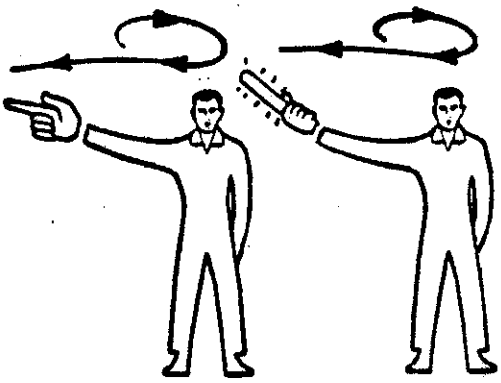


Figure 2-1.9 Aircraft Marshalling Signals

34. TAKE OFF THIS WAY (at pilot's discretion)

Marshaller conceals left hand and makes circular motion of right hand over head in horizontal plane ending in a throwing motion of arm towards direction of take-off.

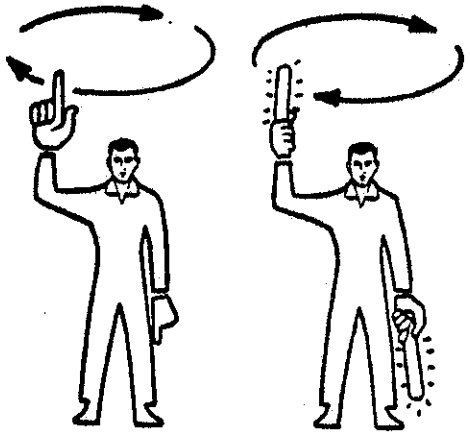
No ICAO signal.



35. ENGAGE ROTOR(S)

Circular motion in horizontal plane with right hand above head.

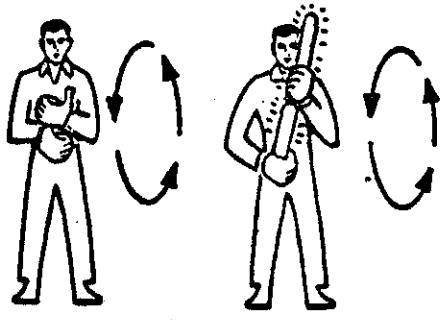
No ICAO signal.



36. HOOK UP LOAD

Hands make a rope climbing motion.

No ICAO signal.



37. CUT CABLE

A signal similar to "Release Load" except that the right hand has the palm downwards and not clenched. Rapid repetition of right hand movement indicates urgency.

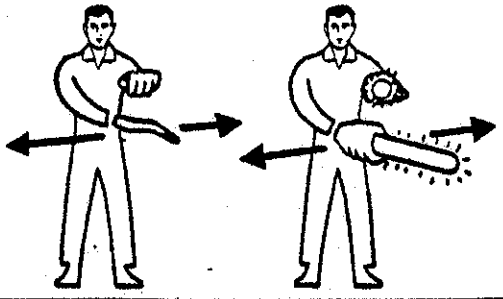
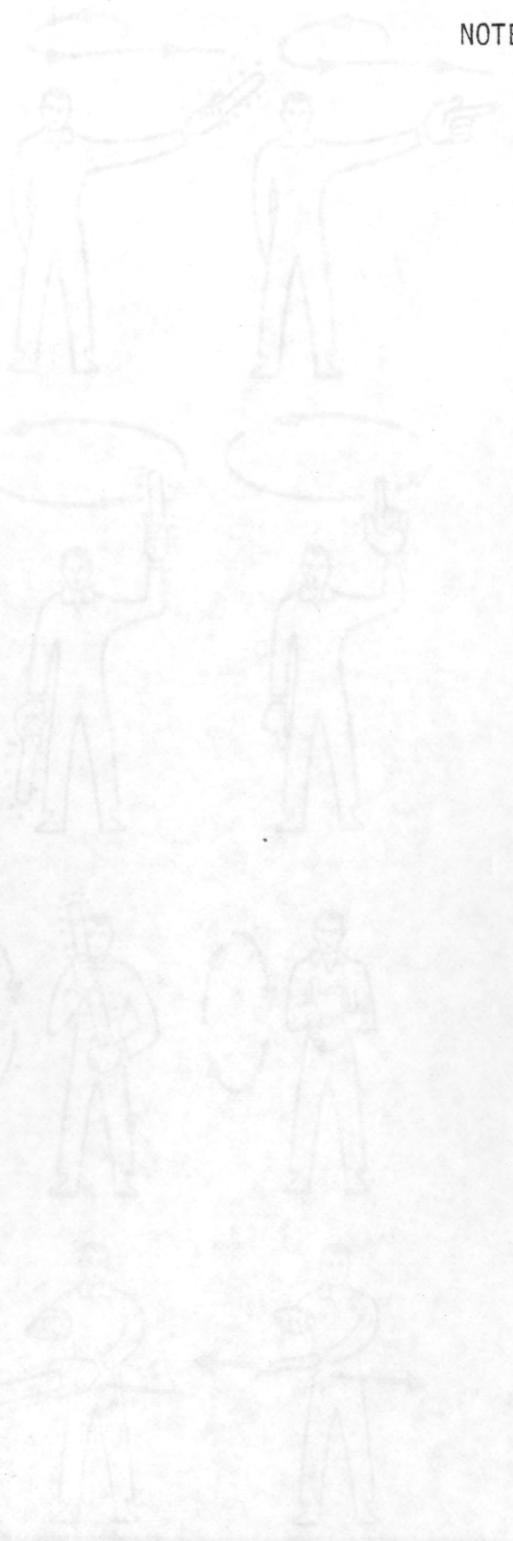


Figure 2-1.10 Aircraft Marshalling Signals

NOTES, ETC.



CHAPTER 3

TRANSITION MANEUVERS

1. INTRODUCTION. This chapter presents the recommended procedures and some of the techniques used to perform the maneuvers outlined in Section II of the H-1 Flight Manual. To establish a norm for training and standardization, specific criteria have been selected for each maneuver. Operationally, you would use Appendix I of the Flight Manual to select the best power setting, altitude, and airspeed to obtain optimum aircraft performance.

2. OBJECTIVES. The student will become thoroughly familiar with and be able to perform:

a. Takeoff to hover.

b. Taxiing.

c. Landing from a hover.

d. Traffic pattern.

e. Normal takeoff.

f. Crosswind takeoff and landing.

g. Hovering and hovering turns.

h. Sideward and backward flight.

i. Maximum performance takeoffs (simulated):

(1) Level accelerate takeoff.

(2) Climb and accelerate takeoff.

j. Normal approach.

k. Shallow approach.

l. Steep approach.

m. Approach to a touchdown.

n. Turning approach.

o. Slide landing.

3. SUPPLEMENTAL INFORMATION.

a. Takeoff to a Hover.

(1) Required:

(a) Before Takeoff Checklist. (Performed before all takeoffs.)

(b) Vertical ascent to a 4 ft skid height.

(c) Takeoff Checklist. (Performed only on first takeoff or when configuration is changed.)

(d) Constant heading.

(2) Analysis. Accomplish the Before Takeoff Checklist. Slowly increase the collective at a constant rate while maintaining heading, using the tail rotor pedals. Anticipate the need for use of left tail rotor pedal but do not use excessive pressure. As the collective is increased for takeoff, adjust the cyclic to maintain a position over the takeoff spot allowing the fuselage to seek its own attitude. Center of Gravity (CG) location has a marked effect upon the H-1 hover attitude. After the aircraft is stabilized in a hover, complete the Takeoff Checklist.

NOTE: Hovering clearing turns are required prior to takeoff except when: takeoff clearance is received from a control tower, performing takeoffs from a remote landing area, or a takeoff is initiated from the ground and the area is visually cleared prior to increasing collective.

b. Taxiing.

(1) Required:

(a) 4 ft skid height.

(b) 5 knots ground speed maximum. (Speed of a fast walk.)

(2) Analysis. Follow the taxi lines keeping the aircraft straight. You should taxi slowly enough so that turns are made with the cyclic and tail rotor pedals. Do not taxi in a crab unless encountering control problems due to wind or to keep from exceeding crosswind limitations. Do not perform spot turns unless directed by a marshaller. If in doubt about aircraft clearance stop, set down, and obtain a marshaller.

c. Landing from a Hover.

(1) Required:

(a) Vertical descent from 4 ft skid height.

(b) Constant heading.

(2) Analysis. From a hover, slowly decrease the collective to start a constant rate of descent. Do not allow the aircraft to move forward, aft, or sideways. After ground contact, continue to slowly decrease the collective to the full down position. On the TH-1F, a slight amount of throttle adjustment may be necessary to prevent the Nf from increasing as the collective is reduced to minimum.

d. Traffic Pattern.

(1) Required:

(a) 500 ft AGL and 80 knots TH-1F/90 knots, UH-1N downwind.

(b) 300 ft AGL and 60 knots TH-1F/70 knots UH-1N base.

(2) Analysis. Enter the pattern on a 45° angle to the center of the downwind leg, or as directed by the controlling agency, and accomplish the Before Landing Check (see figure 3-1). Maintain a straight ground track in the traffic pattern by use of the crab method. Immediately prior to turning base, clear, then start a descending turn, leveling off at 300 ft AGL and 60 KIAS TH-1F/70 KIAS UH-1N. Make a level turn to final approach to use the first available, or tower assigned, pad. Crosswind correction will be accomplished by using the wing low method on takeoff until a climb is established and during the final 50 feet AGL portion of the approach. At other times, the crab method will be used. Perform clearing turns as required prior to initiating any takeoffs. For all other takeoffs, visually clear to the sides and overhead before increasing collective. Following a takeoff, turn to crosswind after reaching a minimum altitude of 300 feet AGL and continue to climb to level off at 500 ft AGL. On level off, lower the nose to accelerate to pattern airspeed prior to reducing power. In the UH-1N, a partial reduction of power may be required when lowering the nose for level off in the traffic pattern. Once the aircraft is leveled at traffic pattern altitude, further reduce power to maintain desired airpseed. When departing the pattern, turn 45° away from traffic on the crosswind leg. Be sure to visually clear the area before entering any turns, (see figure 3-1.)

e. Normal Takeoff. A normal takeoff is one in which the aircraft exposure time to the Red/Danger area of the height velocity chart is minimized.

(1) Required:

(a) Constant Ground Track.

(b) Takeoff power (hover plus 5-8 p.s.i. (40-64 pph)/TH-1F; 10%/UH-1N).

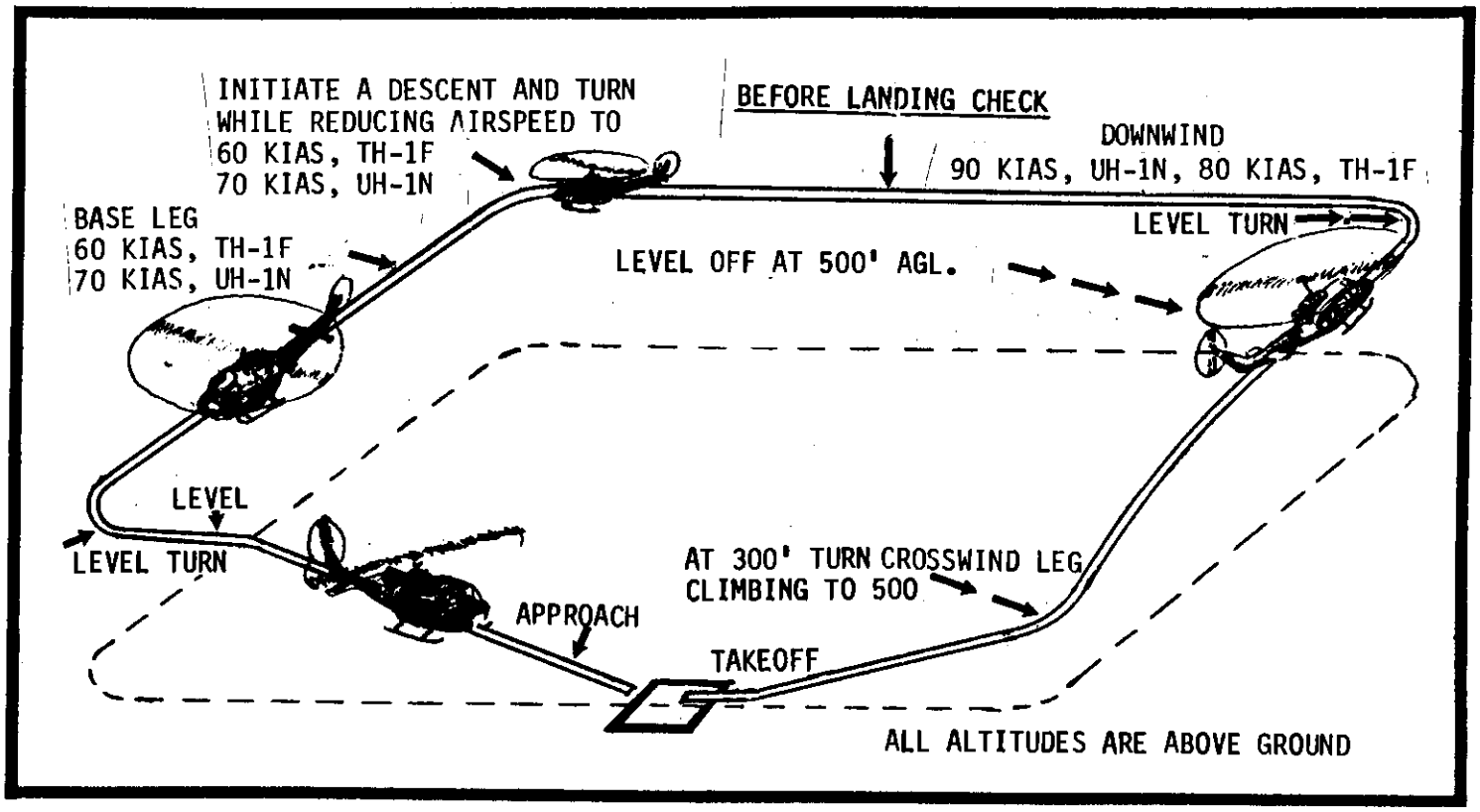


Figure 3-1. Normal H-1 Pattern

(2) Analysis.

(a) Complete the Before Takeoff Checklist prior to hovering. To start the takeoff from a 4 foot hover, apply forward cyclic and accelerate smoothly into forward flight using a near level attitude. Maintain heading with the tail rotor pedals and maintain altitude with collective. As translational lift is attained, the aircraft will enter a climb. Adjust the power to 5-8 p.s.i. (40-64 pph)/TH-1F and 10%/UH-1N above that required for hover. To continue accelerating, additional forward cyclic will be required. (You should reach 70 KIAS approximately 100 feet AGL.) As you approach 70 KIAS, adjust the attitude and power to establish a 70 KIAS climb at a desired climb rate.

(b) To initiate the takeoff from the ground, increase the collective smoothly as for a takeoff to a hover. As the aircraft leaves the ground, use the cyclic to accelerate forward at a hover altitude (4 ft) until effective translational lift is attained, then continue the takeoff as described above.

f. Crosswind Takeoff and Landing.

(1) Required:

(a) 4 ft skid height.

(b) Heading 90^{0} from wind direction.

(2) Analysis. The same basic aircraft control techniques apply for crosswind takeoff and landing. Hold the desired heading with the tail rotor pedals, and position with cyclic. Correct for any wind drift with the cyclic. Anticipate the need for larger pedal changes due to the flat surface of the aircraft being placed into the wind. During landing, the upwind skid touches first and the aircraft must be flown until the downwind skid is completely on the ground. The reverse will be true on takeoff. It is very important to use slow, smooth control movements.

NOTE: Fifteen knots maximum crosswind velocity for training.

g. Hovering Turns.

(1) Required:

(a) 4 ft skid height.

(b) Stable position.

(c) Constant rate of turn.

(2) Analysis. Hovering turns are normally made around the cockpit with a slow, constant rate of turn. Be alert for adverse aircraft movement as the position of the aircraft changes relative to the wind. Maintain positive aircraft control.

NOTE: Three hundred sixty degree hovering turns will not be accomplished when the wind velocity exceeds 15 knots.

h. Sideward and Backward Flight:

(1) Required:

(a) 4 ft skid height.

(b) Constant heading and ground speed.

(2) Analysis. Make at least a 90° clearing turn in the direction of flight and clear the intended track of the aircraft before starting the maneuver. The ground speed will not exceed 5 knots. When performing sideward flight, select visual references to insure heading, ground track and altitude are being maintained.

i. Maximum Performance Takeoffs (Simulated). The LEVEL ACCELERATE, and CLIMB AND ACCELERATE takeoffs are used to achieve the performance listed in Appendix I of the Flight Manuals. The following criteria have been selected for developing the techniques necessary to perform these maneuvers:

(1) Level Accelerate Takeoff. A level accelerate takeoff may be required when operating from small and/or restricted areas when sufficient power to hover out-of-ground effect is NOT available.

(a) Required:

1 4 ft skid height.

2 Hover power.

3 30 KIAS.

4 50 ft simulated obstacle.

(b) Analysis. Complete the Before Takeoff Checklist prior to the takeoff. Initiate the takeoff by smoothly applying forward cyclic as for a normal takeoff. As the aircraft accelerates it may tend to settle (depending upon wind velocity), but do not allow the skids to touch the ground. A slight amount of power may be added to prevent ground contact.

At approximately 20 KIAS, smoothly apply aft cyclic to enter and maintain a 30 KIAS climb. Continue the climb until reaching 50 ft above the ground (simulated obstacle), then lower the nose of the aircraft and accelerate without descending. After passing through 50 KIAS, the maneuver is terminated and power and airspeed will be increased to establish a 70 KIAS climb at a desired climb rate.

(2) Climb and Accelerate Takeoff. A climb and accelerate takeoff may be required when operating from small or confined areas if power to hover out-of-ground effect is available.

(a) Required:

1 Hover power plus: TH-1F, 5-8 p.s.i. (40-64 pph); UH-1N, 10-15% torque (simulated maximum available).

2 100 ft simulated obstacle.

(b) Analysis. Complete the Before Takeoff Checklist prior to the takeoff. (The takeoff may be initiated from the ground or a hover.) To perform the takeoff smoothly increase collective to the required power setting. After the aircraft has left the ground and is passing through the normal hover altitude, establish a slight nose low attitude. Maintain directional control with the tail rotor pedals throughout the maneuver. Maintain the attitude until clearing a 100 ft simulated obstacle, then smoothly lower the nose without descending and increase the airspeed to 70 KIAS. As 70 KIAS is approached, adjust the attitude and power to climb at 70 KIAS at a desired climb rate.

j. Normal/Shallow Approach. The only difference between these approaches is the apparent angle. They are both flown in the same manner. As its name implies, the NORMAL APPROACH is the one most normally utilized, (see figure 3-2). The SHALLOW APPROACH is a type that is used for Hydraulic Power System Failure, Manual Fuel Operation, etc., (see figure 3-3).

(1) Required:

(a) Apparent angle for:

1 Normal approach - 30°

2 Shallow approach - 10°

(b) Before Landing Checklist.

NOTE: During any approach, care should be exercised to avoid tail low attitudes near the ground. At 12° nose up attitude, the tail rotor guard and the rear of the skids contact the ground simultaneously.

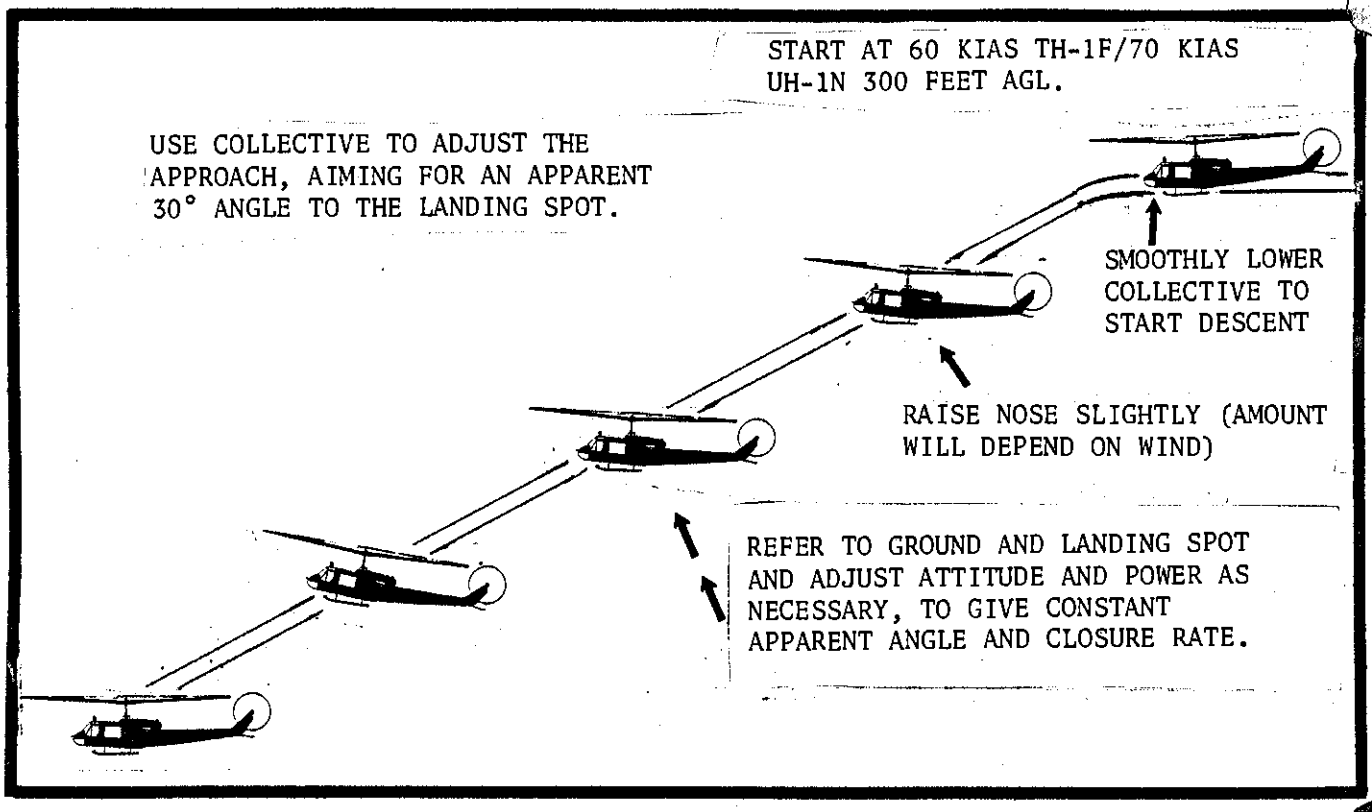


Figure 3-2. Normal Approach

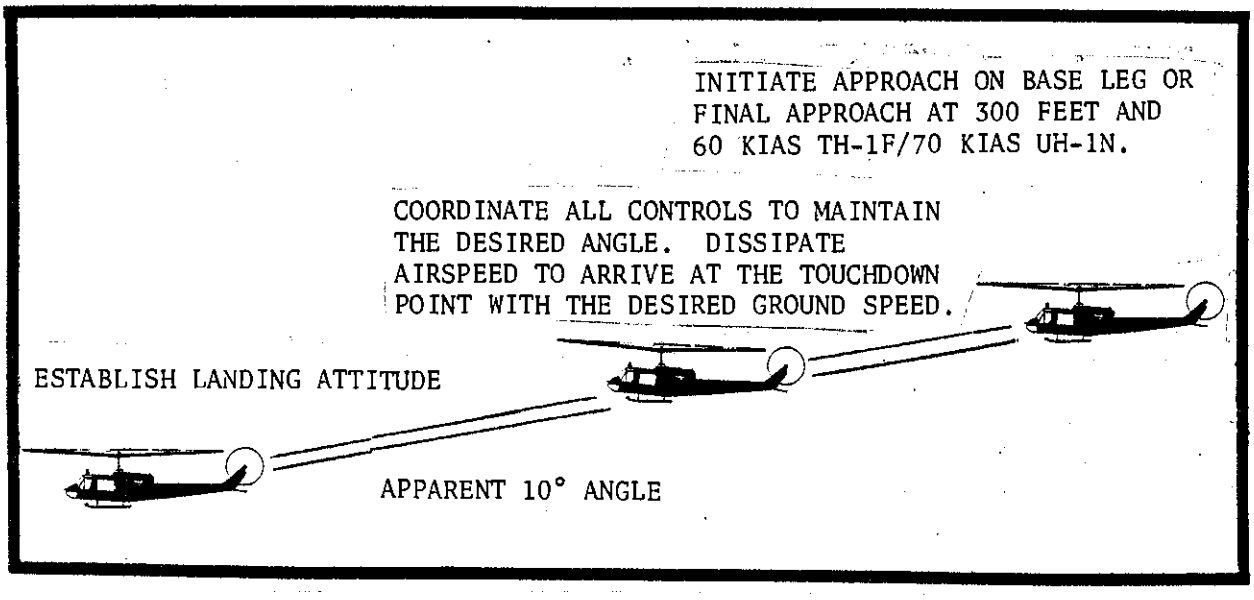


Figure 3-3. Shallow Approach (Slide Landing)

(2) Analysis. The approach is initiated from 300 ft AGL at 60 KIAS TH-1F/70 KIAS UH-1N. When approaching the desired angle, lower the collective to establish the descent, then start a gradual reduction of airspeed/ground speed. The power required (collective position), aircraft attitude and approach speed will vary with different aircraft weights, density altitude, and winds. Primarily, the rate of closure is controlled by the cyclic and the angle of the approach and rate of descent are controlled by the collective. An occasional crosscheck of the airspeed should indicate a gradual decrease. Coordinated movements of the cyclic and collective will be required to maintain the desired angle and to decrease forward speed resulting in a steady closure rate. Allow a smooth transition to zero ground speed at a 4 ft hover over the landing spot. As power is applied to slow the rate of descent and to establish the hover, apply left tail rotor pedal to compensate for the increase of torque (yaw). Entering ground effect and adding power causes the nose to rise slightly, requiring forward pressure on the cyclic.

k. Steep Approach. The steep approach is used for clearing obstacles and to land in confined areas.

(1) Required:

(a) 30 knots ground speed.

(b) 45° apparent angle.

(c) 800 fpm rate of descent maximum.

(d) Before Landing Checklist.

(2) Analysis. The approach is initiated from 300 ft above the landing spot with 30 knots ground speed. Use 30 KIAS for little or no wind. As the wind velocity increases, increase the entry airspeed. When the desired angle is intercepted, lower the collective to begin the descent. The apparent angle at which the approach is started will be maintained throughout the approach. After the approach is entered, use the collective to control the angle and the rate of descent. Use the cyclic to control the ground speed. Combine the two controls to effect a smooth transition (rate of closure) to zero ground speed at a 4 foot hover over the landing spot or a touchdown. (See figure 3-4.)

l. Approach to Touchdown. The approach to touchdown may be made from any desired approach angle and is used when there is a shortage of power; the possibility of a restriction to visibility, such as blowing sand or snow; or any time hovering is not desired. The touchdown area must be free of obstructions and practically level.

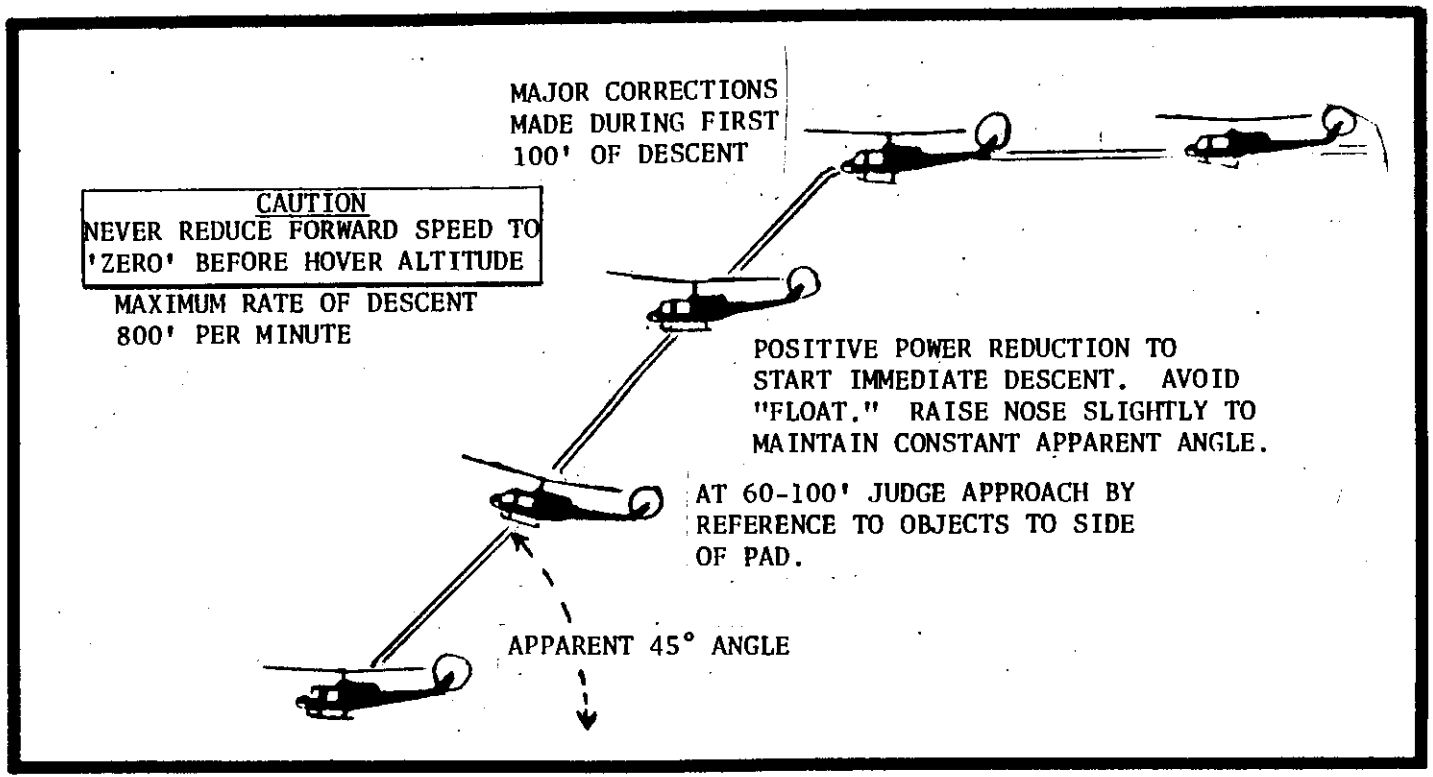


Figure 3-4. Steep Approach

(1) Required:

(a) Zero, or near zero, ground speed.

(b) Landing attitude.

m. Turning Approach. This maneuver is designed to allow the pilot to shorten the approach by maneuvering the helicopter to a landing from traffic pattern altitudes and airspeeds. The pilot may be required, or elect, to fly a turning approach when: landing in a confined area, complying with local traffic control requirements, positioning to land into the wind when a conventional traffic pattern is not possible, or during proficiency training.

(1) Required:

(a) Completion of Before Landing Checklist.

(b) 300' minimum (90^{o} turning approach).

(c) 500' minimum (180^{o} turning approach).

(d) 60 knots minimum entry airspeed.

(2) Analysis. The approach is entered by initiating a descent and a turn toward the landing site. The angle of bank, rate of descent, and airspeed should be controlled so as to position the helicopter at a point on final where a controlled straight approach can be flown to the landing site. The point of rollout on final will vary with the entry point, altitude, power reserve and technique but should be accomplished high enough to avoid the need for aggravated flares, abrupt control movements, or large collective inputs.

WARNING: Avoid low airspeeds while on downwind, especially in strong winds. Avoid high angles of bank and the use of more than an 800 FPM rate of descent. These factors are most critical at high density altitudes and/or high gross weights. If speed becomes too slow/fast, or the rate of descent too high, GO AROUND.

n. Slide landing. The slide landing is normally used in conjunction with a shallow approach (see figure 3-3).

(1) Required:

(a) Airspeed slightly above translational lift.

NOTE: TH-1F approximately 10 knots ground speed.

(b) Landing attitude.

(2) Analysis. Plan the approach to the near end of the landing area. As you approach hover altitude, establish a landing attitude and smoothly fly the aircraft to the ground. The collective will be used as necessary to cushion the landing. Upon touchdown, maintain directional control with the tail rotor pedals and cyclic as required. The collective should be slowly reduced to allow skid friction to stop the aircraft. An abrupt reduction of collective pitch may cause the helicopter to nose over and result in rotor contracting the fuselage.

4. STUDY ASSIGNMENT. None.

5. SOURCE REFERENCE. Flight Manual.

CHAPTER 4

PRACTICE EMERGENCY PROCEDURES

This chapter is divided into two sections. Section one covers the practice emergency procedures that will be accomplished in the TH-1F. Section two covers the practice emergency procedures that will be accomplished in the UH-1N.

Both sections present the recommended procedures to perform the various emergency procedures practiced during training. All bold print emergency items in the Flight Crew checklist and Flight Manual will be committed to memory. At least one procedure will be orally reviewed on each flight. You will be required to physically locate, without hesitation, the designated instrument, switch, lever, or circuit breaker to perform these procedures.

NOTE: Boost off, manual fuel and UH-1N single engine approaches will be executed to a hard surface landing area or slide area.

SECTION I

(TH-1F ONLY)

1. INTRODUCTION. This chapter presents procedures and techniques to perform the various emergency procedures practiced during training.

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

a. Manual fuel operations (Simulated Fuel Control Failure).

b. Boost-off flight and landing.

c. Autorotations.

d. Forced landings.

e. Hovering autorotations.

3. SUPPLEMENTAL INFORMATION.

a. Manual Fuel Operation. This maneuver is designed to familiarize you with the minute corrections and coordination necessary to fly the aircraft in manual fuel control. Flying in manual fuel requires much more attention to RPM and power settings. Your proficiency, therefore, will depend upon your alertness and ability to plan ahead.

(1) Simulated fuel control failure.

(a) Required:

1 Minimum entry 500 feet AGL.

2 Checklist.

(b) Analysis:

1. Slowly rotate the throttle to 6200 Nf while increasing collective to maintain altitude. Activate the manual fuel switch with one second beeps until obtaining an increase in Nf. The manual fuel light will come on almost immediately but an Ng/fuel flow increase is usually the first indication of manual fuel becoming effective. The manual fuel control actuation varies between aircraft so there is no way to determine the exact RPM change for a single beep. When an increase of Ng or fuel flow is observed, slowly rotate the throttle to flight idle and continue to maintain Nf in the normal operating range (62-6450 HF). At this time, verbally complete the BOLD FACE procedures for fuel control failure. To climb, increase manual fuel with short beeps, then adjust the collective. To descend, decrease manual fuel with short beeps, then adjust the collective. After each beep,

check the Nf or fuel flow for the power changes achieved. As a technique, level flight at 80 knots requires approximately 90% Ng or 400 pph fuel flow. Base leg descent normally can be made with decrease to 87% Ng or 300 pph. Final approach, because of its descent, decreasing airspeed, and headwind, may vary, but normally, 85% Ng or 280 pph fuel flow is a good power setting to start the approach.

(b) To land while in manual fuel, make a shallow approach to a slide, to a touchdown, or to a hover. After landing, maintain Nf at 6000 to 6450 RPM until the aircraft has stopped and the collective has been reduced to a minimum. To return to automatic fuel mode, slowly rotate the throttle to full open, then hold the beep switch down until the manual fuel light goes out plus 5 seconds.

(c) To return to automatic fuel mode in flight, slowly open the throttle. As the RPM increases above the manual setting, hold the beep switch down until the manual fuel light goes out plus 5 seconds.

b. Boost-off Flight and Landing:

(1) Required:

(a) Entry minimum: Normal traffic pattern airspeed and altitude.

(b) Checklists.

(2) Analysis. The instructor will turn off the hydraulic control switch and will tell you it is in the off position. He will monitor the switch until you tell him the controls are responding normally. At this time, complete the checklist for boost failure. The approach will be made using a shallow approach to a slide landing. The main requirement is to land using the least possible control movement and to touchdown above translational lift. Any amount of headwind is an obvious aid to boost-off approaches. Conversely, you should be aware that calm winds make aircraft control more difficult. Use the force trim throughout the approach to neutralize the increased control pressures. Minimize your collective movements to prevent directional control problems when landing. If difficulties in aircraft control are encountered, smoothly initiate a go-around; do not turn the boost switch on until the aircraft has accelerated to 50 KIAS.

WARNING: Turning the boost switch on at low speed or in a hover may induce a sudden and perhaps uncontrollable release in control pressures.

c. Practice Autorotations (Power Recovery). Despite being a power recovery autorotation, this maneuver should be planned as though it were an actual autorotation to a touchdown. For example, if an inadvertent touchdown or a power loss occurred during this maneuver, a safe landing can be accomplished. During the power recovery it is important that the aircraft be in a landing attitude. A landing attitude is basically a hover attitude (very slightly nose high so that the aft end of the skids contact the ground first). In the recovery phase of the autorotation, NEVER HAVE ANY DRIFT OR EXTREME NOSE HIGH ATTITUDE.

WARNING: Avoid low airspeed/high vertical descent during the final portion of any practice autorotation. Engine power/rotor inertia may not be sufficient to safely recover the aircraft under the above conditions.

(1) Procedural autorotation.

(a) Required:

1 Entry minimum: 500 feet AGL, 80 KIAS.

2 50 KIAS minimum prior to the flare.

3 Nr 295 to 339 RPM.

(b) Analysis:

1 There are three types of procedural autorotations: the straight ahead, the 90 degree, and the 180 degree. To enter the procedural autorotation, smoothly lower the collective to minimum while adjusting the throttle to 5600-6000 Nf and apply right tail rotor pedal to maintain coordinated flight. During the glide, use the collective to maintain Nr within limits. Adjust glide airspeed slowly for your gross weight and turn into the wind if applicable. If airspeed drops off in a steep turn, do not dive excessively to get airspeed back. This diving attitude and steep turn together can produce dangerously high rates of descent. (See figure 4-1.)

2 Initiate the flare at approximately 100 to 75 feet by smoothly raising the nose of the aircraft. This is done to reduce the rate of descent, to reduce the ground speed, and to allow the rotor RPM to increase (not to exceed the maximum limit). As the desired ground speed is approached, begin rotating the aircraft to a landing attitude NO LOWER THAN 25 FEET ABOVE THE GROUND. Any turning should be stopped at this point. As the aircraft is rotated to the landing attitude, increase the throttle not to exceed normal operating Nf. A slight amount of collective pitch may be used to further decrease the rate of descent and airspeed (ground speed). Recover no lower than four feet above the ground with 0 to 15 knots ground speed forward motion. This aids in control response and depth perception. Parallel the ground momentarily, checking instrument indications, then initiate a normal climb. A key element in the

success of this maneuver is to obtain and maintain a stable glide speed. To accomplish this, maintain an aircraft attitude which will give you the desired airspeed. Chasing airspeed by rapidly changing the aircraft attitude is a common error and makes it extremely difficult to maintain RPM and rate of descent.

3 This maneuver will teach you the aircraft's autorotative glide characteristics at a fixed airspeed.

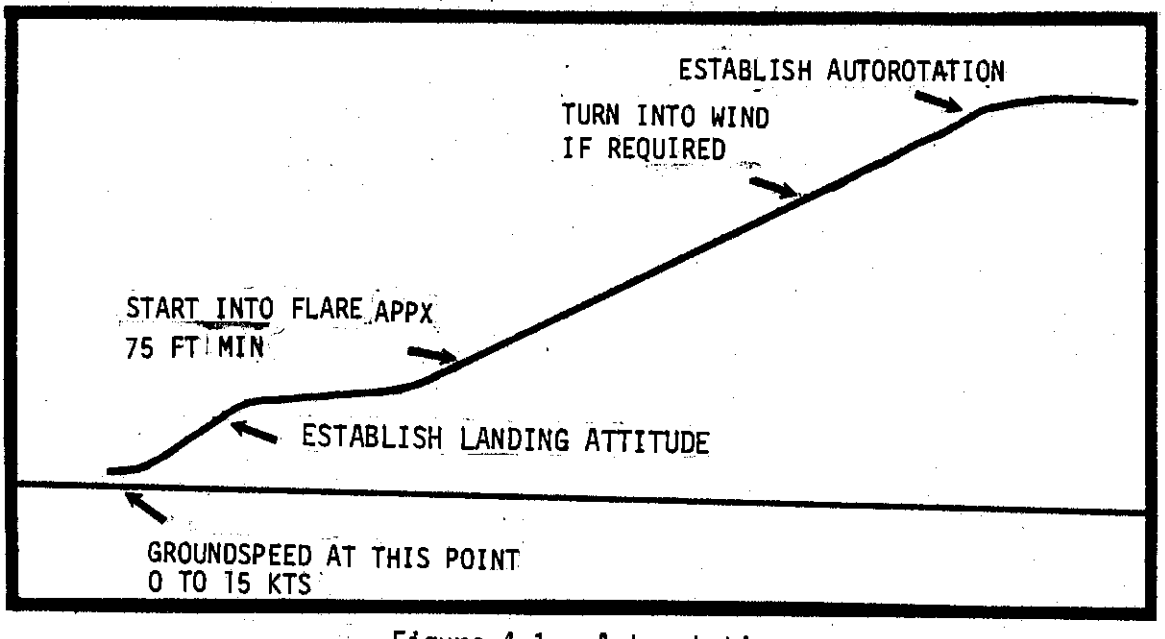


Figure 4-1. Autorotation

(2) Maneuvering autorotation:

(a) Required:

1 Entry: 500 feet AGL minimum, 65-100 KIAS.

2 50 KIAS minimum prior to flare.

3 Nr - 295 to 339 RPM.

(b) Analysis. This maneuver differs from the procedural autorotation in that airspeed, rate and amount of turn, can be varied (within prescribed aircraft limits) to arrive at the selected spot.

d. Forced landings. There is no one best autorotational procedure which can be applied to all situations. Gross weight, altitude, terrain, and wind are some of the variables that will dictate desired ground speed, flare altitude, etc. Also the flare effect is a function of airspeed, gross weight, and density altitude. To be effective and to distinguish between autorotations and forced landings, the element of surprise is necessary. The techniques will be the same as for autorotations except that you must select a suitable area. Airspeeds may be varied to obtain maximum glide distance, minimum rate of descent, or desired performance. The instructor will monitor the throttle, collective, and instruments to insure no limits are exceeded and the engine is still functioning properly. Forced landings will be given only at altitudes and areas where they can be accomplished without compromising flying safety.

(1) Required:

(a) Entry minimum: 500 feet AGL, 60 KIAS.

(b) Establish autorotation.

(c) 50 knots minimum prior to flare.

(d) Nr 295 to 339 RPM.

(e) Checklist.

(2) Analysis. When the instructor calls, "Forced Landing," you will immediately lower the collective to minimum, reduce the throttle to 5600-6000 Nf, and maintain coordinated flight. From this point, complete the forced landing using the basic procedures as outlined for autorotations. If time and aircraft control permit, call for the appropriate checklist and simulate accomplishing the items.

e. Hovering Autorotation. Hovering autorotations will be performed from a maximum height of 4 feet AGL. This training will be held to a minimum and is done to give you a feel of how the aircraft will react during autorotations from a hover. You, or the instructor, may rotate the throttle to flight idle. You must hold the throttle in flight idle to insure that power is not accidently applied when the collective is raised. When the throttle is rotated to flight idle, the aircraft will tend to move to the aft and left. Use the cyclic to maintain your position. Do not move the collective until the aircraft has settled near the ground and then cushion the landing with as much collective as is required. A common error is to raise collective early which bleeds off rotor RPM too soon for the proper cushioning at touchdown. Another error is to allow the aircraft to drift; continue to fly the helicopter to the touchdown.

4. STUDY ASSIGNMENT. Read Section III of the Flight Manual.

5. SOURCE REFERENCE: AFM 51-2, Flight Manual.

SECTION II

(UH-1N ONLY)

1. INTRODUCTION. This section presents the recommended procedures to perform the various emergency procedures practiced in the UH-1N aircraft.

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

a. Manual fuel operations (simulated single fuel control failure).

b. Boost-off flight and landing.

c. Autorotations.

d. Single engine flight and landing.

3. SUPPLEMENTAL INFORMATION.

a. UH-1N Simulated Fuel Control Failure. Simulated fuel control failure will be practiced separately on engine #1 and engine #2.

(1) Required:

(a) May be entered in flight, hover, or ground.

(b) Checklists.

(2) Analysis.

(a) For entry in forward flight, you must be at normal traffic pattern altitude and airspeed. For entry while in a hover, you must have single engine hover capability. When an automatic fuel control failure has been identified or when directed by the instructor to enter manual fuel, call for the Manual Fuel Control Actuation Checklist and complete the steps as indicated by the checklist.

NOTE: When the throttle is rotated to flight idle you must maintain Nr with collective. (Also insure that you are below single engine power available prior to rotating the throttle to flight idle.) DO NOT move the governor switch to manual until you have verified that you have the correct governor switch, and the corresponding engine is at flight idle.

(b) Once the engine is in manual mode, slowly increase throttle to position the engine 5 - 10% below the governed engine.

(c) Once the Manual Fuel Control System Actuation Checklist has been accomplished, complete the Landing With Manual Fuel Control System Activated Checklist and the Before Landing Checklist. Execute a shallow approach to a hover or slide landing. Make all power changes slowly and smoothly.

b. Boost-off Flight and Landing:

(1) Required:

(a) Entry minimum: Normal traffic pattern altitude and airspeed.

(b) Checklist.

(2) Analysis.

(a) Only hydraulic system #1 failures will be practiced as no flight characteristic changes occur with system #2 failures. Both systems WILL NOT be turned off simultaneously in flight.

(b) The IP will initiate the maneuver by placing the hydraulic control selector switch in the system #2 position. The IP will monitor the switch until you tell him the controls are responding normally. You should call for and accomplish the steps required by the Hydraulic Power System Failure Checklist (Single Failure). The boost-off approach will be made using a shallow approach to a hover or slide landing. Crosswinds or calm winds make it more difficult to control the aircraft. Use of the force trim will, in most cases, aid in positive control throughout the approach and landing.

(c) If any difficulties in aircraft control are encountered, or you desire to make a go-around, accelerate the aircraft to 50 KIAS before attempting any maneuvers.

c. Autorotations.

(1) Required:

(a) Entry minimum: 65-100 KIAS and coordinated flight.

1 Straight ahead: 500' AGL.

2 90° turning: 500' AGL.

3 180° turning: 800' AGL.

(b) 60 KIAS minimum prior to flare.

(c) Nr within normal operating range.

(d) All turns completed not lower than 200' AGL.

(e) Throttles full open prior to completion of the flare.

(f) Power recovery not lower than 10' AGL.

NOTE: The instructor must accomplish the first autorotation, which will be straight ahead, to insure proper aircraft responses.

(2) Analysis.

(a) Enter an autorotation by slowly lowering the collective to minimum and adjusting the throttles to insure that you have a zero torque indication and that Nr is above Nf. Check engine instruments for normal indications and Ng above 62%. Maintain Nr within the normal operating range and execute any required turns. At approximately 75-100 feet AGL, initiate a flare to reduce the rate of descent and ground speed and to build Nr. Begin rotating the aircraft to a near level landing attitude no lower than 25 feet AGL as the desired ground speed is attained. Prior to completion of the flare the throttles must be full open. Recover no lower than 10 feet AGL with 0-15 kts ground speed. Depending on terrain, 10-15 kts ground speed is preferable. Parallel the ground momentarily, check instrument indications, then initiate a normal takeoff or other maneuver as briefed by your instructor.

(b) There is no one best autorotational procedure which can be applied under all conditions. However, there are certain basic UH-1N flight/performance characteristics that must be understood. The Nr in the UH-1N will tend to overspeed at high gross weights, high density altitudes and when maneuvering, such as in turns or flares. The Nr is also affected by airspeed. The higher the indicated airspeed, the higher the stabilized Nr and the lower the indicated airspeed the lower the stabilized Nr. Nr, in all conditions, must be controlled to insure that an overspeed or low Nr condition does not result.

(c) Turning autorotations do not present any special problems other than Nr control. Collective is often necessary to maintain Nr within limits. It is also imperative that you monitor the rate of descent. Steep bank angles require a more nose down attitude to maintain airspeed. The combination of the two produces much higher rates of descent. In addition, slips/skids will increase the rate of descent. Keeping the aircraft in coordinated flight will minimize this effect. Rates of descent can occur which will force you to expend valuable Nr to recover the aircraft and accomplish a safe power recovery or landing.

NOTE: During any autorotation, the pilot must be aware of the tail rotor's proximity to the ground. A late and or low flare will force you to rotate to a landing attitude sooner than desired to insure that the tail rotor does not contact the ground. This condition will normally result in a higher than desired touchdown ground speed.

d. UH-1N Single Engine Flight and Landing:

(1) Required:

(a) May be entered at altitude or in a hover.

(b) Checklist.

(2) Analysis.

(a) In-flight entry will be above 55 KIAS and 150 feet AGL and will not be initiated when torque is at or above maximum single-engine torque available. During hover, you must have single engine hover capability. The instructor will introduce the problem by rotating one throttle to flight idle and saying "simulated engine failure." The procedure to follow will depend upon whether you are hovering or at altitude. If you are hovering, keep the aircraft level and land. At altitude, accomplish the BOLD FACE emergency procedures, simulate engine shutdown, and check for the presence of fire. Check for fire in the following manner:

1 Check "T" handle for FIRE warning lights.

2 Check ITT gages for abnormal indications.

3 Execute a turn and check for trailing smoke (may be simulated).

(3) Landing.

(b) To land from altitude with a single engine, perform a shallow approach to a hover, slide, or touchdown. Prior to beginning the approach, check maximum power available on the operating engine. If single engine hover power is not available, determine that, at-or-above best rate-of-climb speed and at-or-below maximum power on the operating engine, a 100ft/min rate of climb can be obtained. Accomplish the single engine power check by:

1 Check heater OFF.

2 Slowly increase collective.

3 Monitor ITT, Ng, Nr.

4 When any one of the following limits are met note your torque (%Q) and rate of climb:

a ITT - 810° C

b Ng - 100% Ng

c Nr - 97% Nr

NOTES:
1. When one of the limits is met, your indicated torque is your single engine power available throughout your approach and landing. The single engine power available MUST NOT BE EXCEEDED.

2. If a go-around is required, the decision should be made at or before 150 feet AGL and 55 KIAS. If at anytime either pilot decides the approach to be unsafe, an immediate go-around will be initiated using both engines.

4. STUDY ASSIGNMENT. Read Section III of Flight Manual.

5. SOURCE REFERENCES. AFM 52-2 and Flight Manual.