Chapter 9

TRAINING POLICY

9-1. General. This chapter outlines procedures, requirements, and restrictions for qualification and continuation training or evaluation flights. See AFRs 60-1, 60-16; AFM 51-2; and MACR 51-1 for additional information.

9-2. Crew Complement and Scheduling:
a. Minimum Crew Complement. See paragraph 3-2.
b. Crew Qualification. See paragraph 3-1. If passengers other than mission essential ground personnel are carried, noncurrent or unqualified pilots will not perform crew duties.

9-3. Crew Duty Time. See paragraph 3-11.

9-4. Not Used

9-5. Debriefing:
a. Review and evaluate overall training performed.
b. Review training requirements fulfilled for each student and aircrew member. Each student or aircrew member should understand thoroughly what training has been accomplished.
c. Answer technical questions.
d. Training reports completed and recorded.

9-6. Training Aircraft Not Capable of Flight (Not applicable to ARF). If an aircraft is not in commission or otherwise capable of departure within four hours after scheduled departure time, the training mission will be cancelled and the crew rescheduled. Exceptions may be granted by the flying unit commander or operations officer with concurrence of the aircraft commander. The delayed departure is not to be charged as a crew delay.

9-7. Weather Criteria For Training. See paragraph 6-22.

9-8. Special Maneuvers:
a. Only the 1550 ATTW is authorized to conduct forced-landing training. This training is limited to the H-1F and will be held to the minimum necessary to meet proficiency requirements of the appropriate syllabus and course training standards. Procedures and minimum altitudes will be IAW 1550 ATTW directives.
b. Request radar traffic advisories for all phases of simulated instrument flight. (Not applicable for HH-53H low level TF operations.)
c. Initiate simulated instrument missed approaches no lower than the published minimum altitude for the approach being flown.
d. Accomplish H-3/53 touch-and-go landings IAW the flight manual. Touch-and-go landings do not require an instructor pilot at the controls as long as the throttles are set at maximum for the approach, landing, and takeoff.
e. Live Hoist Training (Non-Exercise). Restrict live hoist training to the minimum necessary to accomplish initial qualification, requalification, and proficiency training. Unit commanders determine eligibility of personnel to ride the hoist during training. Recommended hoist altitude is 10 feet, but may be higher when required by the mission. When over water or over vessels, hover at the minimum altitude necessary to avoid salt spray. Practicing hoist with or without a tag line is permissible.

9-9. Remote Area Operations Training:
a. Power Restrictions:
(1) Clear escape route—hover power +5% (*EXCEPTION:* H-1F/H—3 PSI or 24 pph)
(2) Restricted escape route—OGE +5% (*EXCEPTION:* H-1F/H—3 PSI or 24 pph)
b. Simulated Maximum Power Remote Operations Maneuver:
(1) Accomplish high and low reconnaissance and compute the power required to accomplish the maneuver. Use the computed power as the simulated maximum power available; however, do not hesitate to use all available power in the interest of safety.

NOTE: Prior to the first water hoist or remote area operations a power available check will be accomplished.

(2) Approach/Landing. Initiate the approach after careful consideration of all factors influencing the crew and aircraft performance. (See chapter 19 for operational considerations.) Try to fly the approach using no more than the power computed for the hover or landing. Vary closure rate, and vertical velocity to fly the desired approach angle and arrive at the specific landing/hover spot. As the aircraft decelerates, be cognizant of the influence that wind, ground effect, and translational lift have upon your ability to control vertical velocity. Attempting to arrest a high descent rate with power can result in settling with power, rotor droop and subsequent loss of tail rotor effectiveness and landing hard.
(3) Takeoff. Accomplish the takeoff using simulated maximum power takeoff techniques without applying more than the simulated maximum power available. Recompute takeoff power if required.

9-10. Unaided (Non-NVG/PAVE LOW) Night Remote Area Operations Training Site:
a. Site Selection:
(1) The minimum size of the landing area must be at least two rotor diameters.
(2) Sites must be selected where the vertical development of the surrounding terrain does not restrict the pilot's option to execute a go-around, with a minimum maneuvering, at any point in the approach. Additionally, the terrain within 3 NM of the site will not exceed 200' above the site elevation. **NOTE:** This requirement may be satisfied by restricting the approach and departure route to directions which will avoid terrain exceeding the above criteria.
b. Prior to full darkness:
(1) A visual survey of the site will be made to check for obstacles, general site condition and wind.
(2) Position lights to outline the landing site. Refer to figures 19-5 and 19-6 for optional lighting pattern.
b. Prior to making the first approach, determine wind direction. Forecast winds may be used when wind

direction cannot be determined otherwise. When using forecast winds insure an adequate power margin is available in the event winds differ from forecast.

c. Do not leave flight altitude until the location of the LZ has been positively identified.

d. Plan night navigation and remote area operation in such a way that a realistic training scenario is created. A ground party may be utilized to increase the realism of the training.

e. For 37 ARRS: This training may be accomplished at launch control facilities (LCFs) or launch control centers (LCCs).

9-11. Simulated Instrument Flight. The use of a hood or other artificial vision-restricting device is not authorized for any phase of flight. (*EXCEPTION:* A vision-restriction device is authorized for PAVE LOW system training providing an instructor with unrestricted vision has access to a set of flight controls.) Simulated instrument flight may be flown and logged without use of a vision-restricting device.

9-12. Helicopter Maneuver Standards and Simulator Emergency Flight Procedures. See tab 9-1.

TRAINING GUIDE

1. Maneuver standards are provided to supplement the flight manuals. These procedures are intended for use on all missions, but may not reflect the optimum performance required for some operational situations. Deviations from this guide may be made, if required, to accomplish mission objectives. Operational/special mission maneuvers not addressed in this tab will be conducted IAW the appropriate directive/technical order that defines such maneuvers.

2. Emergency procedures training is designed to develop aircrew proficiency, reaction time, planning, and judgment in preparation for actual emergencies. Simulated emergencies must provide realistic training without unacceptably increasing risk. Instructors should be alert and take prompt action to terminate simulated emergency maneuvers and execute a go-around at the first indication of deteriorating aircraft performance or serious student proficiency problems. Place emphasis on the procedures for positive identification of the simulated emergency condition before initiating corrective action. System failures must not be unreasonably compounded and must not be simulated in conjunction with a simulated engine failure unless normally associated with that engine failure. The surprise approach of initiating emergency procedures, aircraft system failures, or unusual attidue training must be tempered to allow for a possible wrong reaction/ mistake which could jeopardize safety; therefore, such emergencies will only be practiced with sufficient airspeed and altitude to insure a safe recovery. In high density traffic areas, emergencies which could require an in-depth analysis/discussion or detailed cockpit duties should only be simulated when traffic congestion is at a minimum. Accomplish all simulated emergency maneuvers IAW the flight publication and this tab.

3. Simulated Emergency Restrictions/Procedures:

a. Prohibited Maneuvers. The following maneuvers will not be accomplished in the aircraft:

(1) Actual engine shutdown
(2) Blade stall and power settling
(3) Dual fuel control failures
(4) Dual hydraulic system failures
(5) Boost-off to a hover (H-1F/H)
(6) Manual fuel to a hover (H-1F)
(7) Water landing (except H-3)
(8) Slide takeoff (H-1) (Exception: UH-1N for overriding operational requirements, providing max gross weight is not exceeded.)

b. Special Restrictions. Unusual attitude training and emergency procedures involving engines, engine fuel systems, flight controls, or hydraulic systems will be accomplished only:

(1) During daylight visual meteorological conditions.

(2) During training/currency/evaluation flights.

(3) When passengers are not aboard.

(4) When an instructor/flight examiner pilot is designated on flight orders under "Crew Position" as IAC or FEAC and occupies a pilot seat with a set of controls. Instructor pilot candidates may perform or supervise simulated emergencies and touch-and-go landings during initial evaluations under the supervision of a flight examiner pilot not in a pilot seat if the other pilot at the controls is qualified in the aircraft. (*EXCEPTION:* HH-53H certified aircraft commanders may perform AFCS/hydraulics off.)

c. Practice Autorotations. The following policy is established for practice autorotations:

(1) Due to the risk associated with this maneuver, carefully consider wind, density altitude, aircraft gross weight, and individual pilot proficiency prior to training/currency.

(2) The initial autorotation for training/currency will be a straight-ahead autorotation accomplished by the instructor to evaluate aircraft performance (not required for evaluation).

(3) Instructor pilots will terminate the maneuver and initiate a power recovery at the first indication of abnormally high/low rotor RPM, excessive sink rate, low airspeed, ineffective flare, or at any time an inadvertent touchdown might occur.

(4) Autorotations will be accomplished to a runway, taxiway, or approved slide area, if possible. When such an area is not available, a smooth level area is to be selected, and the instructor/flight examiner will insure it is free of obstructions prior to commencing training.

(5) Except for H-1F/H hovering autorotations, all practice autorotations will be terminated with a power recovery.

(6) Power recovery autorotations require the aircraft to be aligned within 45 degrees of the wind direction on final approach. For hovering autorotations, the wind must be aligned within 15 degrees. A functional wind indicating device must be close enough to the recovery point to provide readily discernible, accurate wind information.

(7) H-1 Autorotation Procedures:

(a) Minimum entry altitude is 800 feet AGL for 180-degree turning autorotations; 500 feet AGL for all others (except hovering autorotations H-1F/H). Minimum airspeed prior to the flare is H-1N - 60 knots, H-1F/H/P - 50 knots.

(b) For 180-degree turning autorotations the aircraft must be wings level, have a minimum of 60 KIAS - H-1N, 50 KIAS - H-1F/H, rotor RPM within limits, normal rate of descent and be aligned with landing/recovery heading at no lower than 200 feet AGL. If any of these conditions are not met, initiate a power recovery immediately. The wings level requirement does not prohibit minor heading corrections on final.

(c) The autorotation will be completed no lower than 4 feet.

(8) H-3 minimum entry altitude for 180-degree autorotations is 800 feet AGL; 500 feet AGL for all others. During 180-degree autorotations, the aircraft must be wings level, have a minimum of 60 KIAS, rotor RPM within limits, and be aligned with landing/recovery heading at no lower than 200 feet AGL. If any of these conditions are not met, initiate a power recovery immediately. The wings level requirement does not prohibit minor heading corrections on final.

(9) H-60A minimum entry altitude for 180-degree autorotations will be 800 feet AGL; 500 feet AGL

for all others. The power control levers will not be retarded. Initiate the flare between 125 and 75 feet AGL with a minimum of 80 KIAS. The power recovery will be completed no lower than 15 feet. For all autorotations, the aircraft must be wings level, have a minimum of 70 KIAS, rotor RPM within limits, and be aligned for landing/recovering heading at no lower than 150 feet. If any of these conditions are not met, initiate a power recovery immediately. The wings level requirement does not prohibit minor heading corrections on final.

(10) H-53 minimum entry altitude for autorotations will be 1,000 feet AGL. The throttles will not be retarded.

d. Simulated Single-Engine Emergencies. The following procedures apply to dual-engine helicopters:

(1) Single-engine approaches and landings must be practiced to a hard surface landing area or slide area.

(2) Initiation of practice single-engine emergencies will not be lower than the following:

(a) 150 feet AGL, 55 KIAS, for H-1N or in a hover (paragraph 5v(2), this tab)

(b) 300 feet AGL, 70 KIAS, for H-3

(c) 300 feet AGL, 80 KIAS, for H-53

(d) 300 feet AGL, 80 KIAS, for H-60A

NOTE: Practice single-engine emergencies may be initiated below the above listed altitude as long as torque available is limited on both engines versus reducing torque available on the simulated failed engine. Instructors must use caution when simulating single-engine emergencies at low altitudes and airspeeds.

(3) The following simulated single-engine maneuvers will be practiced by limiting the torque available on both engines versus reducing torque for the simulated failed engine:

(a) Single-engine join ups - air refueling

(b) Single-engine approaches to a spot (H-3)

(c) Water landings (H-3)

e. Boost—OFF (H-1), Aux Servo—OFF (H-3), and AFCS--OFF (H-53/60A). Conduct under the following limitations:

(1) Maneuvers will be initiated in straight and level flight at a minimum altitude of 300 ft AGL and 70 KIAS for H-3/53/60 and 500 ft AGL and 70 KIAS for H-1.

(2) Approaches to a hover/landing will be made to a hard surface landing area or slide area (H-1F/H must do a slide landing only).

(3) If any control difficulties are encountered while the system is off, the instructor/flight examiner will take control of the aircraft and restore the system as appropriate.

4. General Procedures:

a. Takeoffs and landings will be made using a constant heading or ground track into the wind or alignment with the runway. Crosswind correction will be accomplished by using the wing-low method on takeoff until a climb is established and during the final 50 feet (100 feet for H-53) on an approach. At other times, the crab method may be used.

b. Maneuvers will be flown with emphasis on precise altitude, airspeed, and aircraft control.

c. Instrument flying will be IAW AFM 51-37 and the flight publication. Standardization tolerances for instrument maneuvers will be IAW MACR 60-1. H-3 unusual attitude training will only be performed in the simulator.

d. Minimum light/communications out procedures in chapter 30 may be used without NVG's by aircrews not qualified in NVG operations.

5. H-1 Procedures:

a. One hundred percent Nf will be used for all maneuvers in the H-1N; 6600 N2 in the H-1H; 6450 +50 Nf in the H-1F.

b. Entry altitude for all approaches will be 300 feet AGL unless specified otherwise in this regulation.

c. A 3- to 5-foot skid height will be used for all hovering maneuvers.

d. Landing/searchlights will be on for all night takeoffs and after turning final for night approaches unless safety, weather, excessive glare, or aircraft operational procedures dictate otherwise.

e. Takeoff to a Hover:

(1) Vertical ascent to 3-5 foot skid height.

(2) Constant heading

(3) Check power required to hover with precomputed data on the TOLD card.

f. Taxiing—5 knots maximum groundspeed.

g. Sideward/Backward Flight:

(1) Constant heading and groundspeed

(2) Five knots maximum groundspeed

h. Landing from a Hover:

(1) Vertical descent from 3-5 foot hover

(2) Constant heading

(3) Insure all side drift is stopped prior to touchdown

i. 360 Degree Hovering Turns:

(1) Constant rate of turn over a spot

(2) Fifteen knots maximum wind velocity for training

j. Crosswind Takeoff and Landing:

(1) Heading 90 degrees from wind direction

(2) Fifteen knots maximum wind velocity for training, except when taxiing to/from parking area on initial departure and termination

k. Normal Takeoff/Climbs:

(1) Hover power plus 5-8 PSI (40-60 pph) H-1F; 5 PSI H-1H; 10 percent H-1N

(2) Constant heading

(3) Seventy-knot airspeed

(4) Start the takeoff from a 3-5 foot hover maintaining heading and altitude. As translational lift is obtained, the aircraft will enter an accelerating climb. Increase collective to required setting and establish a 70 KIAS climb.

(5) To initiate the takeoff from the ground, increase collective smoothly as for takeoff to a hover. As the aircraft leaves the ground, accelerate forward to hover altitude passing translational lift, then continue the takeoff as described above.

l. Marginal Power Takeoff:

(1) Three-five foot skid height

(2) Hover power (simulated maximum power available)

(3) Fifty foot simulated obstacle

(4) Initiate the takeoff by smoothly applying forward cyclic. As the aircraft accelerates, it may tend to settle, especially with light or calm winds. (If necessary, compromise the maneuver by adding power to avoid ground contact.) Parallel the ground at three to five feet until translational lift is attained. After passing through translational lift, initiate a climb

(without decelerating below translational lift speed) so as to clear the 50 foot simulated obstacle. Continue to accelerate (without descending) to 50 KIAS. At 50 KIAS, the manuever is terminated and a normal climb (power and airspeed) will be established.

m. Maximum Performance Takeoff:

(1) Simulated maximum power available: Hover plus 5-8 PSI (40-60 pph) H-1F/H, 10-15 percent H-1N.

(2) Smoothly increase power to the required setting. After the aircraft has left the ground and is passing through normal hover altitude, establish a slightly nose-low attitude. Maintain attitude until passing 100 feet AGL (simulated obstacle), then smoothly lower the nose without descending and increase the airspeed to 70 KIAS. When this speed is attained, adjust power and attitude to maintain a normal climb.

n. Traffic Pattern. If a rectangular traffic pattern is flown, fly the downwind leg at 500 feet AGL and 80 KIAS (90 KIAS H-1N). During the turn to base descend to 300 feet AGL and slow the aircraft to 60 KIAS (70 KIAS H-1N). A level turn will be made to the final approach heading. The before landing checklist will be accomplished on the downwind leg. (Pattern altitudes specified above may be adjusted to comply with local traffic control rules.) Other pattern types may be flown as the situation warrants; however, caution must be exercised to avoid excessive bank angles/descent rates or low airspeeds. The point of rollout on final should allow a controlled, straight approach without a need for aggravated flares, abrupt control movements, or large collective input.

o. Normal/Shallow Approach:

(1) Normal approach - 30° apparent angle

(2) Shallow approach - 10° apparent angle

(3) Initiate the approach from 300 feet AGL with 60 KIAS (70 KIAS H-1N). When the desired angle is intercepted, start a gradual reduction of airspeed. The apparent angle at which the approach is started will be maintained throughout the approach.

p. Steep Approach:

(1) Thirty knots groundspeed

(2) Forty-five-degree apparent angle

(3) Initiate the approach from 300 feet AGL with 30 knots groundspeed. Use 30 KIAS for little or no wind. As the wind velocity increases, increase the entry airspeed accordingly. Maintain the apparent angle at which the approach is started throughout the approach. After the approach is entered, reduce the rate of descent to 800 feet a minute maximum.

q. Approach to a Touchdown:

(1) Zero, or near zero, groundspeed

(2) Landing attitude

(3) Initiate and fly the desired approach angle. As hover altitude is approached, continue the descent and angle while slowing the groundspeed and vertical velocity to have a landing attitude, at or near zero groundspeed, upon touchdown. Cushion the touchdown with collective and continue to fly the aircraft fully onto the ground.

r. Slide Landing:

(1) Airspeed slightly above translation lift

(2) Landing attitude

(3) Execute a shallow approach to the approach end of the desired landing area. As hover altitude is approached, establish a landing attitude and allow the aircraft to slowly settle to the ground. The collective should be used as necessary to cushion the landing, then slowly reduced, allowing skid friction to stop the aircraft.

s. Manual Fuel Operations:

(1) H-1F Simulated Fuel Control Failure:

(a) Enter inflight at normal traffic pattern altitude and airspeed, within autorotational distance of a suitable landing area. The minimum ceiling for manual fuel training is 1,000 feet.

(b) Simulate a fuel control malfunction and accomplish the fuel control failure checklist. Slowly rotate the throttle to 6200 Nf while increasing the collective to maintain altitude. Activate the manual fuel switch with equally spaced on-off periods to obtain an increase of Nf. Maintain Nf in the normal operating range with the manual fuel switch and roll the throttle to flight idle. To minimize manual fuel switch inputs, maintain a minimum of 500 feet AGL until intercepting your desired approach angle. Execute a shallow approach to a slide landing only. If the approach is begun while on base leg (due to traffic pattern size constraints or by choice), fly the approach angle thru the turn to final. Attempt to avoid descent below 300 feet AGL before turning final. Emphasis should be on maintaining proper RPM (6000-6450 Nf) during the approach and sufficient RPM to cushion the landing. After landing, attempt to maintain Nf at 6000-6450 until the aircraft has stopped and the collective is at minimum. To return to automatic fuel mode on the ground, slowly rotate the throttle to full open and hold the manual fuel switch down until the manual fuel light goes out, plus 5 seconds. To return to automatic fuel mode inflight, slowly open the throttle. As RPM increases above the manual setting, hold the manual fuel switch down until the manual fuel light goes out, plus 5 seconds.

(c) The initial inflight operation of the manual fuel system will be accomplished by the instructor to evaluate the system. Manual fuel training may be done once the instructor has determined the system is operating normally within a power range required for an approach and landing (fuel flow of approximately 300-450 pph). Limit manual fuel operations to the minimum required for training. To avoid system overheat, do not fly back-to-back manual fuel approaches.

(2) H-1H Simulated Fuel Control Failure:

(a) Inflight entry will be at normal traffic pattern altitude and airspeed, within autorotational distance of a suitable landing area.

(b) Simulate fuel control malfunctions and accomplish the fuel control failure checklist. Slowly lower the collective to maintain rotor RPM while rotating the throttle to flight idle. Visually verify the fuel control switch, then move it to the emergency position. Slowly open the throttle to maintain approximately 6400 N2 while coordinating an increase of collective to maintain rotor RPM and power required for flight. Complete the remaining checklist items and execute a shallow approach to a slide, touchdown, or hover. To return to automatic fuel control after landing, reduce the throttle to flight idle after the collective is at minimum. Return the governor switch to automatic when N1 is below 70 percent, but before it reaches 60 percent. Entry to emergency may be made on the ground with the throttle at flight idle. After entry, the N2 should be increased to 6400, the aircraft raised to a hover, landed throttle returned to flight idle, and governor returned to automatic.

(3) H-1N Simulated Fuel Control Failure:

(a) Inflight entry will be at normal traffic pattern altitude and airspeed.

(b) Entry in a hover requires single-engine hover capability.

(c) Entry may also be made while on the ground.

(d) Simulate fuel control failure on engine one or two, and accomplish the manual fuel checklist. Insure collective setting is below maximum single-engine torque available prior to retarding the throttle to flight idle. Positively identify and place the corresponding fuel governor switch to manual position. Increase the throttle to maintain torque approximately 5-10 percent below the governed engine. Complete the landing with manual fuel checklist, fly a normal traffic pattern, and execute a shallow approach to a slide, touchdown, or hover. To return to automatic fuel mode, use the same procedure as for entering manual fuel.

t. Boost-off Flight and Landing:

(1) Enter at normal traffic pattern altitude and airspeed.

(2) To simulate system failure, identify the hydraulic control switch and place it in the off position (select sys 2, H-1N). Monitor the switch until confirmation of satisfactory control response, then accomplish the boost failure checklist. Fly a normal traffic pattern and execute a shallow approach to a slide landing (H-1N, slide or hover). If difficulties in aircraft control are encountered, initiate a go-around and accelerate to 50 KIAS if possible before attempting any maneuvers.

u. Power Recovery Autorotations:

(1) Altitudes specified for entry and flare are minimum altitudes and will be raised to accommodate higher than normal gross weights/density altitudes, or in situations where an added margin of safety is needed while developing pilot proficiency.

(2) Throttle(s) will be set at 5600-6000 Nf H-1F; flight idle H-1H; zero torque but not below flight idle H-1N.

(3) To enter practice autorotation, smoothly lower the collective to minimum and roll the throttle(s) to the desired setting, adjust airspeed to desired and turn into the wind if applicable. Insure Ng/N1 has stabilized. Maintain rotor RPM within limits with the collective. Avoid abrupt pitch changes and excessive bank angles during turns as dangerously high rates of descent can develop. Initiate the flare at 100-75 feet AGL to reduce rate of descent and airspeed. No lower then 25 feet AGL, begin rotating the aircraft to a near-level landing attitude smoothly increase the throttle(s) to full open, and maintain directional control with tail rotor pedals. Increase collective to complete the autorotation no lower than four feet AGL.

NOTE: Flare effectiveness is reduced at increased density altitude and gross weight. Initiate a full-power recovery (go-around) immediately at any time the rate of descent seems excessive or is not appreciably reduced by the flare maneuver. Additionally after flare completion, if unintentional ground contact appears imminent sufficient collective will be used (all available rotor RPM if necessary) to cushion the touchdown. The technique of lowering the collective to aid rotor acceleration will not be used during the last few feet of descent as it will increase descent rate and impact forces.

v. H-1N Simulated Single-Engine Flight and Landing:

(1) Inflight entry will be above 55 KIAS and 150 feet AGL and will not be initiated when indicated torque is at or above the maximum computed single-engine torque available.

(2) Entry in a hover will not be initiated unless single-engine hover capability exists.

(3) Simulate engine failure by rotating number one or two throttle to flight idle and accomplish the engine failure checklist. Check 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 at least a 100-ft/min rate of climb can be obtained. Execute a shallow approach to a hover or slide landing as power/terrain dictates. The decision to go-around will be made before 55 KIAS and 150 feet AGL are reached on approach, and if any unsafe conditions exist, both engines will be used for the go-around.

w. Unusual Attitude Training. Instructors simulating unusual attitudes for training will not exceed 30 degrees of bank, a 20 degree nose high attitude, or a 10 degree nose low attitude. Unusual attitude training is recommended for pilots receiving or maintaining NVG qualification. This training should be kept to a minimum. Unusual attitude training will not be initiated below 1000 feet AGL.

6. H-3 Procedures:

a. Maneuvers will be planned and executed to use a minimum of 103 percent Nr.

b. Entry altitude for approaches will be 300 feet AGL.

c. Taxiing:

(1) One hundred three (103) percent Nr minimum

(2) AFCS on

(3) Minimum pitch necessary

(4) To start the aircraft rolling, increase collective to approximately 25 percent torque and use a small amount of cyclic if required. Once the aircraft starts to roll, collective may be lowered to the minimum necessary to maintain taxi speed.

d. Hovering (Initial Takeoff). Altitude five feet wheel clearance, or sufficient altitude to clear obstruction.

e. Sideward/Backward Flight:

(1) Altitude at least five feet wheel clearance above the surface or obstructions

(2) Constant heading or ground track

(3) Maximum five knots apparent groundspeed

f. Three Hundred Sixty Degree (360°) Hovering Turns:

(1) Altitude five feet wheel clearance above the surface or obstructions

(2) Constant rate of turn over a spot.

(3) Three hundred sixty-degree (360°) hovering turns will not be practiced when winds exceed 20 knots.

g. Landing from a Hover. Use caution to avoid landing while drifting sideways. After touchdown, the collective pitch should be placed smoothly in the full down position.

h. Normal Takeoff from a Hover:

(1) Throttles Maximum

(2) Use 20 percent torque above hover power (not to exceed 103 percent torque), or until Nr droops to 100 percent, whichever occurs first.

(3) Gradually move forward from the hover while smoothly pulling in the power listed in (2), above. Maintain hover altitude while accelerating. After accelerating through translational lift, bring the nose up and establish a 70-80 KIAS climb. Accomplish the after takeoff check after passing 100 feet AGL and 70 KIAS. Climb airspeed is 70-80 KIAS.

i. Normal Takeoff from the Ground:

(1) Throttles Maximum

(2) Use 20 percent torque above hover power (not to exceed 103 percent torque), or until Nr drops to 100 percent, whichever occurs first.

(3) Smoothly and steadily increase collective until reaching power listed in (2), above. As the helicopter clears the surface, adjust pitch altitude (approximately 5 degrees nose low) until approaching 70-80 KIAS, then raise the nose slightly (approximately 3-5 degrees nose high) to establish a 70-80 KIAS climb.

CAUTION: Avoid an excessive nose low attitude while near the ground.

j. Normal Running Takeoff:

(1) Align with wind on smooth hard surface or runway heading.

(2) Increase collective to 30 percent torque and initiate ground roll.

(3) At approximately 30 KIAS, move cyclic aft and smoothly increase collective to desired power (approximately 20 percent more than hover power), and allow aircraft to fly off the ground.

(4) Climb IAW the single-engine height velocity diagram and accelerate to 50 knots.

(5) At 50 KIAS, adjust power as desired, initiate climb, and accelerate to climb airspeed.

k. Running Takeoff (Simulated Heavy Weight):

(1) Use a paved or smooth, hard surface only

(2) Speed selectors maximum

(3) Limit torque to 10 percent less than that required to hover with a five foot wheel clearance.

(4) Start the aircraft rolling forward by applying forward cyclic and approximately 30 percent torque. Approximately 30 knots indicated airspeed, apply simulated maximum power available, and aft cyclic to fly the aircraft smoothly off the ground. After takeoff, climb IAW the single-engine height velocity diagram and accelerate to 50 KIAS (runway and terrain permitting). The simulated maneuver will be terminated upon reaching 50 KIAS and a normal climbout will be accomplished.

l. Maximum Performance Takeoff (Simulated):

(1) Throttles maximum

(2) Use 30 percent torque above hover power (not to exceed 103 percent torque) or until Nr drops to 100 percent, whichever occurs first.

(3) Initially increase power so the aircraft becomes light on the wheels. Then increase power smoothly to maximum or simulated maximum. Airspeed should be increased until reaching 200 feet altitude and 50 KIAS. At this point, accelerate to safe single-engine airspeed (70-80 KIAS) before establishing a normal climb profile.

m. Traffic Pattern. If a rectangular pattern is flown, the downwind leg will be flown at 500 AGL and 90 knots airspeed; during the turn-to-base descend to 300 feet AGL and slow the aircraft to 70 knots. A level turn will be made to the final approach heading. The before landing check will be accomplished on the downwind leg.

NOTE: These altitudes will be used whenever possible if local conditions will permit, otherwise comply with appropriate local traffic patterns.

n. Normal Approach:

(1) Seventy knots entry airspeed

(2) Thirty-degree apparent angle of descent

(3) Control rate of descent so it does not exceed 500 FPM. Constantly decrease airspeed during the approach so the aircraft leaves translational lift as it enters ground effect.

o. Steep Approach:

(1) Fifty knots entry airspeed

(2) Forty-five degrees apparent angle of descent

(3) Control rate of descent so it does not exceed 500 FPM throughout approach or 300 FPM during the last 100 feet. Constantly decrease airspeed during the approach so the aircraft leaves translational lift as it enters ground effect.

p. Shallow Approach:

(1) Seventy knots entry airspeed

(2) Ten-degree apparent angle of descent

(3) Control rate of descent so it does not exceed 500 FPM. Constantly decrease airspeed during the approach so the aircraft leaves translational lift as it enters ground effect.

q. Running Landing:

(1) Seventy knots entry airspeed

(2) Ten-degree apparent angle of descent

(3) Adjust collective pitch, as necessary, to maintain the desired approach angle and dissipate speed gradually throughout the approach so the landing can be accomplished while maintaining translational lift. Use caution so as not to have an excessive nose high altitude at touchdown. After aircraft is firmly on the ground, apply wheel brakes.

r. Practice Single-Engine Landing:

(1) Simulated engine failure will not be initiated (retarding throttle) below 300 feet AGL/70 KIAS.

(2) Practice single-engine landings will only be made on smooth, hard surfaces approved for such training maneuvers.

(3) Engine failure will be simulated by retarding either speed selector until the Nf needle decreases to 96-98 percent Nf. Simulate those checklist items which would shut down the engine, cause auxiliary tanks to jettison, or create any unsafe condition.

(4) Accomplish the single-engine failure checklist. Simulate as necessary.

(5) Simulated single-engine landing to minimum roll and simulated single-engine water landings will be accomplished by limiting torque available on both engines. In no case will the throttle be retarded.

(6) A normal traffic pattern may be flown or a straight-in-approach initiated; however, avoid unnecessary delay in establishing an approach for a safe landing and if possible maintain or climb to a minimum of 500 feet AGL and 70 KIAS until intercepting the desired approach angle.

(7) Follow procedures outlined in TO 1H-3(C)E-1, section III.

s. Night Operations. Night transition will be flown the same as day transition except that emergencies will not be practiced. Landing/searchlights will be on for all night takeoffs and on final for night approaches, unless safety, weather, excessive glare or operational procedures dictate otherwise.

t. Water Operations. Water transition will be accomplished the same as day transition with the follow ing exceptions:

(1) Prior to initiating a water landing, the pilot in command will evaluate the water landing area for suitability and drop a smoke device to be used as a reference (*EXCEPTION:* When wind direction can be determined by other means; i.e., flags, ponds, fires, or other wind indications, and an adequate shore line is available for reference, a smoke device need not be dropped for reference.)

(2) The first landing will be accomplished from a hover.

(3) Practice single-engine landings will be accomplished by limiting torque available on both engines.

(4) A slightly nose high attitude should be maintained during running landings in the water.

(5) Rotor shutdown will not be accomplished if sea conditions exceed sea state 2

(6) Extreme caution must be exercised when landing on water to avoid nose high attitudes near the surface due to reduced tail rotor clearance on touchdown.

u. Marginal Power Takeoff

(1) One hundred one (101) percent Nr (set in a five-foot hover).

(2) Takeoff path smooth, level, and clear of all obstacles.

(3) Initiate takeoff by paralleling the ground until translational lift is attained. After passing through translational lift climb IAW the height velocity diagram and continue to accelerate until reaching 50 KIAS. (DO NOT HESITATE TO BEEP THROTTLES TO MAXIMUM SHOULD IT BE NEEDED TO AVOID GROUND CONTACT.) After a positive climb has been established, adjust engine power, accelerate to climb airspeed, and perform a normal climbout.

7. H-53 Procedures:

a. One hundred (100) percent Nr will be used for all maneuvers unless maximum Nr is specified. Maintain matched torques. Maximum Nr may be simulated when conditions permit.

b. Entry altitude for all approaches except autorotations will be 500 feet AGL.

c. Ten-foot wheel clearance will be used for all hovering maneuvers.

d. Landing/spotlights will be on for all night takeoffs and on final for night approaches, unless safety, weather, excessive glare or operational procedures dictate otherwise.

e. Takeoff to a Hover:

(1) Vertical ascent to 10 feet wheel height

(2) Constant heading

f. Hovering and Hovering Turns:

(1) Constant altitude over a spot

(2) Constant rate of turn

g. Hover Taxiing and Sideward/Backward Flight:

(1) Constant heading and altitude

(2) Constant groundspeed-five-knot maximum for training.

h. Crosswind Takeoff and Landing:

(1) Heading 90 degrees from wind direction

(2) Use extreme caution in strong or gusty crosswinds—avoid side drift.

i. Normal Takeoff from Hover:

(1) Constant heading

(2) Lower nose slightly (5-7 degrees) and gradually move forward. Maintain hover altitude or allow a gradual climb by increasing collective and accelerate through translational lift (approximately 15 knots).

(3) Passing through translational lift, adjust attitude and power as required for normal climb (approximately 20 percent Q more than hover power as a guide), increasing altitude and airspeed simultaneously.

(4) Above 100 feet and after passing 80 KIAS, perform After Takeoff Checklist, and adjust power to maintain the desired rate of climb.

(5) After initial takeoff, or when required, perform a power available check.

j. Takeoff Without a Hover:

(1) Constant heading

(2) Increase collective while climbing vertically until approximately 2 to 3 feet, and then proceed as in a normal takeoff from a hover.

k. Normal Running Takeoff:

(1) Active runway heading or into the wind

(2) Smooth firm surface

(3) Increase collective to 30 percent torque and initiate ground roll.

(4) At approximately 30 KIAS, move cyclic aft and smoothly increase collective to desired power (approximately 20 percent more than hover power as a guide), and allow aircraft to fly off the ground.

(5) Parallel the ground at approximately five to 10 feet AGL and accelerate to 50 KIAS.

(6) At 50 KIAS, adjust power as desired, initiate climb, and accelerate to 80 KIAS.

(7) At 80 KIAS, proceed as in a normal takeoff.

l. Running Takeoff (Simulated Heavyweight):

(1) Maximum Nr

(2) Proceed as with normal running takeoff

(3) At approximately 30 KIAS, increase power to simulated maximum (power to hover at 10 feet minus 10 percent Q), and allow the aircraft to fly off the ground.

(4) Parallel the ground at approximately five to 10 feet AGL, and accelerate to 50 KIAS.

(5) At 50 KIAS, the simulated maneuver will be terminated. Increase power to normal takeoff power, initiate climb, and accelerate to 80 KIAS.

(6) At 80 KIAS, proceed as in a normal takeoff.

(7) For an actual maximum gross weight running takeoff, maximum power available would be used.

m. VFR Traffic Pattern:

(1) The downwind and base legs of a rectangular pattern will be flown at 500 feet AGL or as specified in local directives.

(2) Airspeeds: 100 KIAS downwind, 80 KIAS base

(3) Other pattern types may be flown as the situation warrants; however, exercise caution to avoid excessive bank angles/descent rates or low airspeeds.

The point of rollout on final should allow a controlled, straight approach without a need for aggravated flares or abrupt control movements.

n. Normal/Shallow Approach to a Hover:

(1) Entry - 500 feet AGL and 80 KIAS

(2) Normal approach - 30 degrees apparent angle

(3) Shallow approach - 10 degrees apparent angle

(4) Constant apparent angle, groundspeed and rate of descent

(5) Vary power and pitch to arrive simultaneously at zero groundspeed and rate of descent over intended spot at 10 feet above ground in a landing attitude.

o. Approach to a Touchdown:

(1) Fly as a normal approach

(2) Continue approach to the ground, touching down in a landing attitude with a groundspeed of five knots or less.

p. Approach to a Running Landing:

(1) One hundred percent Nr (maximum Nr if power is limited).

(2) Entry - 500 feet and 80 KIAS

(3) Approach angle - 10 degrees apparent

(4) Constant apparent angle, groundspeed and rate of descent

(5) Land on smooth, firm surface only

(6) Touchdown above translational lift not to exceed 40 knots groundspeed.

q. Maximum Performance Takeoff:

(1) Maximum Nr

(2) Smoothly increase collective to maximum power allowed.

(3) Establish a near level attitude and plan to arrive simultaneously at 300 feet AGL and 50 KIAS.

(4) At 50 KIAS, lower nose to approximately 10 degrees nose low, increasing airspeed.

(5) At 80 KIAS, proceed as a normal takeoff.

(6) At reduced gross weight conditions, maximum power may be limited to make the maneuver more realistic for training.

r. Minimum Roll Running Takeoff/Simulated Heavyweight:

(1) Maximum Nr

(2) Takeoff on smooth, firm surface only.

(3) Apply forward cyclic and slowly increase collective to arrive at simulated maximum power (power required for 10-foot hover) as the aircraft passes through translational lift.

(4) Proceed as in running takeoff (simulated heavyweight).

s. Marginal Power Takeoff

(1) Maximum Nr

(2) Takeoff from a 10-foot hover using only that power required for the 10-foot hover.

(3) After passing through translational lift, continue to accelerate to approximately 50 KIAS. At 50 feet (simulated obstacle) lower the nose slightly and accelerate to normal climb airspeed.

t. Steep Approach:

(1) Maximum Nr

(2) Entry - 500 ft AGL and 50 knots groundspeed

(3) Approach angle - 45 degrees apparent

(4) Constant apparent groundspeed and rate of descent

(5) Maximum rate of descent - 500 to 700 FPM (maximum of 360 FPM during last 100 feet).

(6) On final, decrease airspeed from 80 KIAS to 50 KIAS.

(7) Vary power and pitch to arrive simultaneously at zero groundspeed and rate of descent over intended spot at 10 feet above ground, or continue to a touchdown.

u. Emergency Procedures. Actual and practice emergency procedures are accomplished IAW TO 1H-53(H)B-1.

8. H-60A Procedures:

a. One hundred percent Nr will be used for all maneuvers.

b. Entry altitude for approaches will be 300 feet AGL unless specified otherwise in this regulation.

c. A 10-foot wheel clearance or sufficient altitude to clear obstructions will be used for all hovering maneuvers.

d. Takeoff to a Hover:

(1) Vertical ascent to 10-foot wheel clearance.

(2) Constant heading.

(3) Check power required to hover with precomputed data on TOLD card.

e. Sideward/Backward Flight:

(1) Constant heading or ground track.

(2) Five knots maximum groundspeed.

f. Three Hundred Sixty Degree (360°) Hovering Turns:

(1) Constant rate of turn over a spot.

(2) Fifteen knots maximum wind velocity for training.

g. Landing From a Hover:

(1) Vertical descent.

(2) Constant heading.

(3) Use caution to avoid landing while drifting sideways.

h. Hover Taxi - Five Knots Maximum Groundspeed.

i. Ground Taxi:

(1) Unlock tail wheel.

(2) Minimum pitch necessary.

(3) Maximum taxi five knots groundspeed.

(4) To start the aircraft rolling, increase collective and use a small amount of cyclic if required. Once the aircraft starts to roll, collective may be lowered to the minimum necessary to maintain taxi speed.

j. Normal Takeoff From a Hover:

(1) Constant heading and ground track.

(2) Increase power to approximately 10 percent torque above hover power and lower nose slightly, not to exceed 10 degrees nose low, to establish an 80 KIAS climb.

WARNING: On all takeoffs, the pilot not flying will verbally call out the stabilizer indicator programming as the airspeed passes 40 KIAS.

k. Marginal Power Takeoff:

(1) Five-foot wheel clearance.

(2) Hover power.

(3) 50 KIAS.

(4) Fifty-foot simulated obstacle.

(5) Initiate the takeoff by smoothly applying forward cyclic. As the aircraft accelerates, it may tend to settle (depending on wind velocity); however, add only enough power to avoid ground contact. After passing through translational lift, accelerate to establish a 50 KIAS climb. At 50 feet AGL (simulated

obstacle) lower nose slightly and accelerate to normal climb airspeed.

l. Maximum Performance Takeoff:

(1) Simulated maximum power available; hover power plus 15 percent.

(2) Increase power to the required setting. After the aircraft has left the ground and is passing through normal hover altitude, establish a slightly nose-low attitude. Maintain attitude until passing 100 feet. At this point accelerate to safe single-engine airspeed (70-80 KIAS) before establishing a normal climb profile.

m. Traffic Pattern. If a rectangular pattern is flown the downwind leg will be flown at 500 ft AGL and 100 KIAS. During the turn-to-base, descend to 300 ft AGL and slow the aircraft to 80 KIAS. A level turn will be made to the final approach heading. (The before landing check will be accomplished on the down wind leg.)

NOTE: These altitudes will be used whenever possible if local conditions will permit, otherwise comply with appropriate local traffic patterns.

n. Normal/Shallow Approach:

(1) Normal approach - 30° apparent angle

(2) Shallow approach - 10° apparent angle

(3) Initiate the approach from 300 feet AGL with 80 KIAS. When the desired angle is intercepted, start a gradual reduction of airspeed. Maintain the apparent angle at which the approach is started and a constant closure rate.

o. Steep Approach:

(1) Fifty knots groundspeed.

(2) Forty-five-degree apparent angle.

(3) Maintain the apparent angle at which the approach is started throughout the approach. After the approach is entered, reduce the rate of descent to 800 feet a minute, maximum.

p. Approach to a Touchdown:

(1) Zero, or near zero, groundspeed at a specific landing spot.

(2) Landing attitude.

(3) Initiate and fly the desired approach angle. As hover altitude is approached, continue the descent and maintain angle while slowing the groundspeed and vertical velocity to have a landing attitude, at or near zero groundspeed upon touchdown. Cushion the touchdown with collective and continue to fly the aircraft fully onto the ground.

q. Running Landing:

(1) Eighty knots entry airspeed.

(2) Ten-degree apparent approach angle.

(3) Tail wheel locked.

(4) Adjust collective pitch to maintain the desired approach angle and dissipate airspeed gradually throughout the approach so the landing can be accomplished while below 60 knots groundspeed, but above translational lift. Use sufficient collective to cushion touchdown of the tail wheel and main gear. Do not exceed 25 degrees nose high attitude at touchdown. After aircraft is firmly on the ground, use cyclic and collective as necessary to stop forward motion.

r. Practice Single-Engine Landing:

(1) Practice single-engine landings will only be practices on smooth, hard surfaces approved for such training maneuvers.

(2) Engine failure will be simulated by retarding either throttle to produce a torque split.

(3) Accomplish single-engine failure checklist. Simulate those items which would shut down an engine, or create any unsafe condition.

(4) A normal traffic pattern may be flown or a straight-in-approach initiated; however, avoid unnecessary delay in establishing an approach for a safe landing.

(5) Use parameters for a running landing or shallow approach to a hover if single-engine hover power exists.

s. Stabilator Malfunction:

(1) Enter malfunction by taking control of the stabilator manual slew switch. (Maximum of 10 percent nose low.)

(2) Maintain collective position settings at the time of the failure, adjust airspeed as necessary.

(3) Complete appropriate checklists.

t. AFCS OFF, conduct under the following limitations:

(1) Maneuvers will be initiated in straight and level flight at normal traffic pattern altitudes.

(2) Approaches to a hover/landing will be made to a hard surface landing area or slide area.

(3) If any control difficulties are encountered while the system is off, the instructor/flight examiner will take control of the aircraft and restore the system as appropriate.

u. H-60 Electrical Control Unit (ECU) Lockout Operations:

(1) Enter inflight at normal traffic pattern altitude and airspeed.

(2) Simulate an electrical control unit malfunction. With engine power control levers in FLY, pull selected engine power control lever down and push forward to ECU LOCKOUT position. Quickly retard engine power control level to avoid exceeding TGT limits. (**CAUTION:** Overtemperature protection is disabled while in ECU LOCKOUT.) Smoothly adjust engine power control lever to maintain torque on controlled engine 10 percent below other engine. Avoid large and/or rapid collective movements.

(3) Execute a normal traffic pattern and an approach to a touchdown or hover. After landing, maintain desired torque until the collective is at minimum.

(4) To reengage the ECU after landing, or inflight, retard the engine power control lever to the IDLE position; then advance the engine power control lever slowly to the FLY position.

v. Night Operations. Night transition will be flown the same as day transition, except that emergencies will not be practiced.

SAREX/LATN PROCEDURES

1. General. Exercises are developed to thoroughly familiarize aircrews with tactics and procedures. Exercises refers to combat and peacetime operations training, MAC/IG directed search and rescue exercises, and MAC/IG exercises in support of SAC EWO commitments. During training exercises, realism is desired to permit greater return in training benefits. During MAC/IG directed exercises, the unit's operational capabilities are tested. This guidance is applicable to in-unit exercises as well as higher headquarters directed exercises. Since these exercises are conducted in peacetime environments, flight crews must refrain from overextending themselves and their equipment.

2. Participants. All participants must be thoroughly briefed and the functions and responsibilities of each participant must be established prior to engaging in exercises.

3. Crew Duty Time. (Applies to ARFs when operating under 23 AF mission symbols listed in AFR 60-1/MAC Sup.) Crew duty time for exercise will be 12 hours.

b. Alert duty for exercises will not exceed 16 hours if alert facilities are provided. When adequate facilities are not provided, crew duty will not exceed 12 hours from the time the crew reports for alert duty.

c. These crew duty limitations apply to formal exercises.

d. Crew duty/alert duty limitations for MAC/IG ORIs, will be IAW AFR 60-1 operational limitations. A basic crew will not be augmented to provide additional crew duty time after a crew duty period has started.

e. Aircraft commanders during exercises have the prerogative of delaying a mission, for the purpose of crew rest, whenever it is deemed advisable in the interest of flying safety.

4. Approval of Exercise Training Areas and Low Level Navigation Areas. Geographical areas, such as range complexes, may be designated as exercise/low level navigation areas. Ideally, low level navigation routes, if utilized, should feed into exercise areas. Surveying an area rather than a specific route for low level navigation will increase the effectiveness of the training by allowing greater flexibility in planning navigation legs.

a. Surveys. Low-level navigation areas/routes and/or exercise areas will be surveyed as follows:

(1) An extensive map study will be made of the selected routes and areas. All man-made obstacles over 50 feet AGL within the boundaries will be annotated on the flight map. The Chart Updating Manual (CHUM) will be used to insure current obstacles are depicted on maps.

(2) For nav legs below 500 ft AGL, a highly experienced pilot selected by the unit commander/mission commander will fly the survey. The pilot will conduct a parallel search of the proposed route/area at the lowest applicable altitude down to a minimum altitude of 50 feet AGL. Obstacle location will be checked against map location and any additional obstacles charted.

(3) Flight surveys are not required provided the exercise area is within a designated range complex and the host provides specific information (description, location, height MSL and AGL) for all man-made obstacles over 50 feet AGL.

(4) Resurvey of routes/areas is required when they have been inactive for over six months.

b. Master Maps. Master maps depicting low level navigation areas/routes and/or exercise areas will be made available to crews during flight planning. A copy of all master maps must remain in the unit. Annotate all man-made obstacles over 50 feet AGL, except when below the tree line. Additionally, annotate any published low level routes, no-fly areas, and animal farms or other hazards within the boundaries. Location of simulated combat threats will also be placed on the map. Master maps may be placed on the existing "Known Hazards to Low Level Flight Map," if practical. Master maps will be updated monthly using the CHUM supplement. The date of the CHUM update will be annotated on the master map. Crewmembers should continuously be scanning for uncharted obstacles. When uncharted obstacles are found, training will terminate while appropriate information (location, approximate height AGL and MSL) is recorded. Aircraft commanders will insure this information is immediately passed to appropriate supervisors upon landing.

5. Power Requirements. Power requirements will vary depending on the recovery area: See para 9-9a, Remote Area Power Restrictions.

6. Landing Areas. Crews are authorized to land anywhere in an approved exercise area as long as power/obstacle clearance requirements are met.

7. Surface Wind Considerations. Normal wind limitations for training will be observed for all SAREX/LATN operations. When accurate wing information is not available, wind determination will be based on forecast winds, Doppler/computer, if available, and on site evaluation. When practical, have the survivor/ground party pop a smoke for wind verification. The need to be aware of wind conditions cannot be overemphasized. Even though computed power available may appear to be adequate, downwind approaches and maneuvering can use a considerable amount of power and flight control authority.

8. Live Hoist Recovery. Personnel on the ground acting as survivors, instructors, and aggressors are necessary to provide realism and supervision during exercise. The above personnel may ride the hoist during exercises IAW the following:

a. Survivors. Survivors should be aircrew members. There will be a qualified safety observer available on the ground to insure the survivor properly uses the rescue device. This requirement may be met by lowering a qualified 23 AF aircrew member to assist the survivor. The survivor and accompanying ground safety observer will be briefed to consider the following when selecting recovery areas.

(1) Try to pick a clear area because a recovery can be completed faster and safer if the helicopter can land or use the hoist from a low hover altitude.

(2) If a recovery is to be accomplished from a forested area, the foliage must be sparse enough to

insure the survivor will not be dragged through the branches. When practical select areas with trees less than 40 feet tall to decrease hoisting time and provide additional safety for the survivor in the event of a hoist malfunction.

b. Other exercise Personnel. Every practical effort will be made to recover other exercise personnel by landing. They may be recovered by hoist if the remaining range time prevents movement of these personnel to a suitable landing area or when an extended period of time is required to reach a suitable landing area. These personnel will be briefed to select an area within a reasonable distance which will allow the helicopter to hover as low as practical.

c. The aircrew will comply with the following:

(1) The hover height for live hoist pickups will be the lowest altitude required by the recovery situation and still provide adequate clearance from all obstacles.

(2) Whenever practical, recoveries should be made in cleared areas. Recoveries near trees may be accomplished provided the survivor is kept clear of branches and obstructions. Hover heights higher than 40 feet should be avoided when practical.

9. Altitude Restrictions:

a. During combat exercises, helicopters will be limited to a base altitude of 50 feet above obstacles. (All crewmembers will conduct a thorough ground briefing and map study prior to each mission. Crewmembers will review airspeeds, bank angles, and altitudes commensurate with terrain, obstacles, visibility, and threats to be encountered.)

b. During peacetime SAREX/LATN training, comply with paragraph 5-17, this regulation.

10. H-3/53/60A Helicopter Weight Adjustment (Fuel Dumping). Refer to paragraph 6-66.

11. Pyrotechnics. Any pyrotechnics used during the exercise must be used in a manner so as not to create a fire hazard. Personnel will not depart the exercise area until all expended pyrotechnics have been extinguished.

12. Formation Flight. Formation may be flown with other type aircraft participating in an exercise provided all participating crewmembers attend a pre-exercise briefing and are thoroughly familiarized with tactics and aircraft characteristics of those aircraft participating in the formation.

13. Passengers. Exercise participants may be carried as passengers during air refueling, low level, evasive maneuvers, NWH, NVG operations and other tactical maneuvers in support of approved exercise missions.

14. Helicopter/Fighter Evasive Training:

a. Purpose. This program provides aircrew guidance for conducting realistic combat aerial evasive maneuvers employing current tactics.

b General. Helicopter/fighter evasive training is authorized during both higher headquarters and in-unit exercises.

c. Responsibilities. The mission commander will be responsible for planning, coordinating and conducting the mission. Additionally, the mission commander will brief all individuals involved in the mission on the rules of engagement (ROE). Every practical effort will be made to conduct a face-to-face ROE briefing with the aggressor force crewmembers.

d. Procedures. Evasive tactics must be flown under the following criteria:

(1) Helicopters are limited to 60-degree bank angles unless Dash One is more restrictive.

(2) Procedures outlined in appropriate 3-1(S) will be used.

(3) Maximum use of gun and scope camera is recommended on all engagement. Film should be analyzed and used for instructional purposes.

e. Rules of Engagement. All aircrews will comply with the ROE in this section.

(1) Helicopter(s) and aggressor will establish and maintain communication on a common prebriefed frequency during the entire engagement.

(2) If two aircraft approach head-on, each will clear to the right and the fighter will go above the helicopter.

(3) If visual contact is lost during an engagement, the aggressor aircraft will proceed to an assigned altitude block.

(4) All aircraft will maintain a 1,000 feet clearance from clouds.

(5) Prevailing visibility in the area must be five nautical miles or greater.

(6) Any flight member can terminate the engagement by transmitting "Knock It Off" at which time all participants will cease maneuvering and acknowledge with call sign, such as "Jolly One, Knock It Off."

(7) Minimum separation is 1,000 feet.

(8) Minimum altitudes prior to engaging: Fighters may descend t 1,500 AGL to gain performance/tactical advantage.

(9) Live missiles will not be carried.

(10) All guns will be safetied.

(11) An engagement will be terminated when one of the following occurs:

(a) The engagement drifts to the border of the authorized area.

(b) An unbriefed unscheduled flight enters the aerial combat tactics (ACT) area and is a factor detrimental to the safe conduct of the mission.

(c) Visual contact is lost by the aggressor aircraft within 3,000 feet.

(d) Helicopter rocks rotor tip path plane (not associated with normal maneuvering).

(e) If a dangerous situation is developing.

(f) Minimum altitude or clouds are approached.

(g) Situational awareness is lost.

f. Special Instructions:

(1) Participating aircrews must be given an overall situation briefing before participating in aerial combat tactics. This briefing will cover specific opposition aircraft capabilities, if applicable, special operating instructions and specific rules of engagement contained in this attachment.

(2) Helicopters flying at or below 300 ft AGL need not maintain radio contact with attacking fixed wing aircraft so long as vertical/lateral separation criteria are prebriefed and clearly understood by all participants. Attacking aggressor aircraft will be briefed to maintain at least 1000 ft separation from aircraft under simulated attack. Two-way radio contact is required for any air-to-air scenario involving

helicopters operating above 300 ft AGL, for any scenario involving aggressor helicopters and for any scenario involving HC-130s.

(3) Formation. When helicopters flying in formation are subject to simulated fighter attack during exercise participation, the formation leader will brief formation response to attack by simulated hostile aircraft. Appropriate 3-1's, will be used as a guide. The following items must be briefed as a required supplement to the basic tactical consideration.

(a) Aircraft attacked in formation will maneuver independently in response to the attack.

(b) Aircraft under simulated aerial attack will maneuver so as to establish and maintain positive lateral separation; aircraft in close formation will make their initial breaks away from each other.

(c) Every means of making sure/positive separation between formation members will be used. Continuous visual and radio contact is preferred; evasive maneuvers will be terminated if interformation radio contact is lost and at any time doubt exists as to the position of other aircraft in the formation.

15. Helicopter/Helicopter Evasive Training. Helicopter/helicopter evasive training is only authorized at higher headquarters' directed exercises. (Not applicable to ARF.) Current helicopter/fighter procedures and ROE apply with the following additions:

a. Descend no lower than 100 ft above obstacles.

b. A 500 ft lateral displacement and a 100 ft minimum altitude separation will be maintained between participating helicopters.

c. Engagement will terminate with loss of visual contact or a termination call.

d. Crossing ridge lines and blind covers will be coordinated with opposition helicopters to assure altitude separation of a minimum of 100 ft.

e. Helicopters will not attempt to engage aggressor helicopters offensively. Evasive tactics will be used. However, helicopters playing the role of aggressor helicopters may use tactics based on projected capabilities of the Hind/Hip helicopters.

f. All participating helicopters will maintain communications on a common prebriefed frequency at all times.

g. The copilot will monitor airspeed, altitude, rotor RPM and bank angle. It is highly recommended that a minimum of two scanners be used in the cabin area of participating aircraft when possible.

16. Low Level Unescorted Operations:

a. The primary consideration of low-level unescorted operations is flexibility. Crews must maximize the use of terrain masking techniques using terrain features either side of the intended track to enhance their concealment. Crews must be responsive to unplanned new threats and circumnavigate them as necessary.

b. There will be times when exact positioning and timing are a necessity. For this reason, crews will plan a minimum of two controlled checkpoints that must be passed within one-half mile. (*EXCEPTION:* HH-53/H when operating on unique systems.) Normally, low level navigation training routes will be 30 minutes long with a minimum of three turning points. Routes will include the area within 3 NMs either side of center line as a minimum.

c. Scenarios can be developed arrival and departure information that would actually cause crews to miss the checkpoints and timing; e.g., new threats en route. The crews should recognize this and possibly make an air abort decision based on their situation. A good example of this would be new threat, circumnavigation would cause late arrival over the pick up point.

Chapter 10

LOCAL OPERATING PROCEDURES

10-1. General:

a. Units will publish local and unique unit operating procedures, commencing with paragraph 10-2. The title of this paragraph will indicate the unit concerned (e.g., "Det 10, 38 ARRS LOCAL OPERATING PROCEDURES").

b. Send two copies of this chapter to 23 AF/DOV.

c. As a minimum the following subjects will be included, as applicable:

(1) Filing Flight Plans
(2) Taxi/Parking Procedures
(3) Scramble Procedures
(4) Traffic Pattern and Landing Areas
(5) Training/Operational Landing Sites
(6) Air Operations Security

Chapter 11

LOW-LEVEL OPERATION

11-1. General. Missions which require flight below 500 feet AGL are considered low-level flying (paragraph 5-17). Operations above 50 feet obstacle clearance are permissible. There are two types of low-level flying: low-level navigation and contour navigation. Low-level flying often requires a combination of both low-level and contour navigation to gain effective terrain masking.

a. Low-Level Navigation. Low-level navigation is used when flight operations permit the use of specific headings and a constant indicated altitude and groundspeed. This method of navigation lessens the possibility of enemy detection or observation in a relatively permissive environment, and can be used over flat, open terrain where significant terrain features are not available for navigation reference. Use low-level navigation when flying over friendly territory, or to comply with low-level corridor procedures to or from forward operating locations. Low-level navigation is less demanding than contour navigation because it permits the use of standard dead reckoning (DR) techniques.

b. Contour Navigation. During contour navigation, the pilot preplans a route based on charted terrain features leading toward the objective. Groundspeed, obstacle clearance altitude, and heading may vary considerably based on the terrain, weather, visibility, and the anticipated threat. Indicated altitude will vary considerably since the pilot maintains a relatively constant obstacle clearance altitude in order to take advantage of the available contours.

c. Navigation while Terrain Masking. Terrain masking can be applied to either low-level or contour navigation. When applying this tactic, the aircraft is flown to use terrain and vegetation objects to degrade the enemy's ability to visually, optically, or electronically detect or locate the aircraft. Depending on the available terrain and based on anticipated threats, airspeed and obstacle clearance altitude may vary. The aircraft commander preplans his route to take maximum advantage of significant terrain features in order to mask the aircraft's flight. Terrain masking is most effective when an obstacle is placed between the aircraft and the threat. As the flight proceeds, the pilot may make additional changes to his preplanned route, varying his flight path to take advantage of available tree cover, minor depressions, and/or small ridge lines not detectable in map study. Terrain masking requires a broader corridor of operation and makes conventional DR techniques almost useless. For terrain masking, establish "barrier lines" along the corridor of operations. These barrier lines are associated with either terrain or man-made features, to keep the flight path within a corridor of operations along the route. Terrain masking tactics require significantly more preplanning and map familiarization for successful navigation.

11-2. Flight Planning. Thorough flight planning is the key to successful low-level operations. Pilots should attempt to arrive at their planned objective point within approximately plus or minus two minutes of the flight plan arrival time.

a. Map Selection. Select maps that provide the detail desired to satisfy navigation requirements. Maps with a scale of 1:250,000 or greater detail are desired for low-level operations. Use recent aerial reconnaissance photographs of the objective area, if available. Use a large scale map for navigation to the objective area and transfer to a detailed map, e.g., 1:50,000, to locate the objective. Exercise caution when transferring from one scale map to another. Make transition between maps at a prominent terrain feature, readily identifiable on both maps.

NOTE: Refer to the CHUM to insure that maps and charts are current.

b. Route Selection. Select routes that avoid enemy threats and, if possible, provide safe areas for a precautionary landing. As a minimum, base route determination on the following:

(1) Avoid troop concentrations, radar facilities, populated areas, air defense units and other known threats.

(2) Use available terrain features for masking and navigation purposes.

(3) Avoid a direct routing to the objective. Plan sufficient course changes to avoid disclosing the objective. If possible, do not use the same routing for ingress and egress.

(4) Normally, do not exceed 15-20 NMs between checkpoints; dead reckoning is not precise over longer distances. The type of terrain will dictate the selection and distances between checkpoints.

(5) Establish an Initial Point. Establish an initial point (IP) over a prominent feature that is easily identifiable from low altitudes. The distance from the IP to the objective will vary with the situation, but should be approximately 3 to 12 NMs from the objective.

TARGET EXTIMATED SIZE (METERS)	RECOMMEND IP DISTANCE (NM)
30	1
60	2
90	3
120	4
150	5
300	10

NOTE: This table would allow the aircraft to pass to the side of the target at a distance of one-half the width of the target if a one degree heading error were maintained for the entire distance.

c. Map Preparation. Carefully review maps to identify obstacles and hazardous terrain. Annotate enemy threats, turning/checkpoints and barrier lines on the map. (This information may classify your map.) Establish specific course lines between turning points for low-level navigation. When terrain masking, these lines do not necessarily represent the ground track to be flown. Time-tick marks based on an established groundspeed are optional. These marks may be established for each leg or be accumulative for the entire route. Other flight planning data and information may be annotated; however, use caution to avoid obscuring pertinent information. Deployed mission commanders are allowed to determine the symbols used based on the actual mission profile, threats, terrain, political considerations, etc.

d. AF Form 70. Prepare an AF Form 70, 23 AF approved form, or a more detailed navigation form for each mission and include the following as a minimum: turning points, headings, distances, ETEs, and fuel computations. AF Form 70 is not required if the above information is included on the map.

NOTE: Additional Flight Planning Information. Refer to 1550 ATTW aircrew training student handout, Low-Level Operation and Navigation.

11-3. Crew Coordination. Crew coordination is a critical factor during low-level operations. Limit crew conversation to accomplishment of essential tasks. Each crewmember will call out hazardous obstacles and assist navigation by identifing prominent features along the route.

11-4. Pilot Responsibilities:

a. The pilot flying the aircraft must consider the following:

(1) Plan enough room for cruise airspeed maneuvering. Don't get trapped into low airspeed, tight turns close to the ground, especially at high gross weights and high density altitudes.

(2) Be aware of wind direction and velocity. A rapid turn into a tailwind condition may result in loss of lift.

(3) Avoid steep angles of bank. At approximately 45 degrees, the tip path plane will be below the skids/landing gear.

(4) Do not attempt to clear obstacles by cyclic inputs alone. Climbs and descents are best accomplished by coordinated cyclic and collective inputs. Be aware that abrupt aft cyclic inputs while low level may result in tail rotor contact with surface obstructions.

(5) Anticipate power requirements when approaching a ridge line. If feasible, increase power early and accelerate so that when the climb is initiated, there will be sufficient airspeed to assist in clearing the terrain. Approach ridge lines at approximately 45 degrees; this provides an escape route if power is insufficient to climb over the ridge or if an unexpected threat is encountered on the other side.

(6) Special consideration should be given to preplanning immediate actions in the event of engine failure at low level. Leave yourself an escape route whenever possible.

b. The pilot navigating will assist the pilot flying as follows:

(1) Keep the crew informed of ETAs, descriptions of turning points and intermediate checkpoints.

(2) Closely monitor the aircraft's course.

(3) Announce the direction of turn for the next leg prior to the turning point. When reaching a turning point, do not allow the pilot to turn by reference to the compass. Give him a turn and tell him when to stop.

(4) Record and compare actual time and fuel against that planned at each checkpoint on the AF Form 70 or map, or other 23 AF approved forms.

(5) Compute airspeed corrections to maintain a constant groundspeed.

(6) Monitor cockpit instruments.

(7) Make radio changes.

(8) Monitor and update navigation aids.

11-5. Enemy Threat Encounter. If appropriate, initiate immediate evasive action if exposed to ground/air threat. The evasive maneuver used will depend upon the nature of the threat, aircraft limitations, and terrain. Use jinking (rapid turns, climbs and descents) or terrain masking away from the preplanned route. Specific procedures are contained in appropriate 3-1's(S). The aircrew must continue to navigate during these maneuvers so that the mission may be resumed once the threat is evaded.

11-6. Evasive Maneuver Training:

a. Establish specific route segments or evasive maneuver training areas.

b. Initiate evasive maneuvers above 100 foot obstacle clearance.

c. Maintain a minimum of 100 feet obstacle clearance during evasive maneuvering.

d. Pilots will make crew advisory calls prior to turns, and will clear their flight path throughout the maneuvering.

11-7. Unknown Position. If you become disoriented, do not spend excessive time searching for a checkpoint. Multiple overflights of an area may alert enemy ground forces for a subsequent pass. If a checkpoint cannot be identified, continue on course (as a guide, use leg time plus 10 percent), and then turn to the next course. Continue the route without establishing the exact position only if predominant terrain features can be readily identified and the area of planned overflight is relatively secure. Climbing may assist in determining position by increasing the field of vision; however, you will be more susceptible to enemy detection. If a climb is initiated, concentrate on reorientation so that a descent can be made as soon as possible. Use a climb only as a last resort due to the possible compromise of the aircraft's location. If position cannot be established, abort the mission. During training, if unable to establish aircraft position, climb to a safer altitude and reorient yourself before resuming low level navigation.

11-8. Flying Below 100 Feet Obstacle Clearance:

a. Power Reserve. A major factor affecting low-altitude flight is power reserve, especially in mountainous terrain. During training in multi-engine helicopters, when safe single-engine performance is not available, consider flying at higher altitude and maintain single-engine airspeed or above.

b. Low-Level Deceleration. Exercise care when decelerating in a low-level environment. During a low-level deceleration, rotate the helicopter around the tail rotor. Perform a low-level deceleration by increasing collective to maintain tail rotor altitude, and then apply aft cyclic to decrease airspeed. Figures 11-1, 11-2, 11-3, and 11-7 depict tail rotor clearance when the helicopter is rotated. Power required increases as the helicopter decelerates (reference Flight Manual section VI).

c. When maneuvering at low altitude, main rotor blade contact with the ground is a realistic concern. Figures 11-4, 11-5, 11-6, and 11-8 depict main rotor blade clearances. In most cases, a slight climb will be required prior to banking the aircraft.

d. Maintain all parts of the helicopter at least 50 feet above all obstacles.

e. Under Certain conditions G loads may exceed power available to maintain level flight. Additionally max G loading may be exceeded.

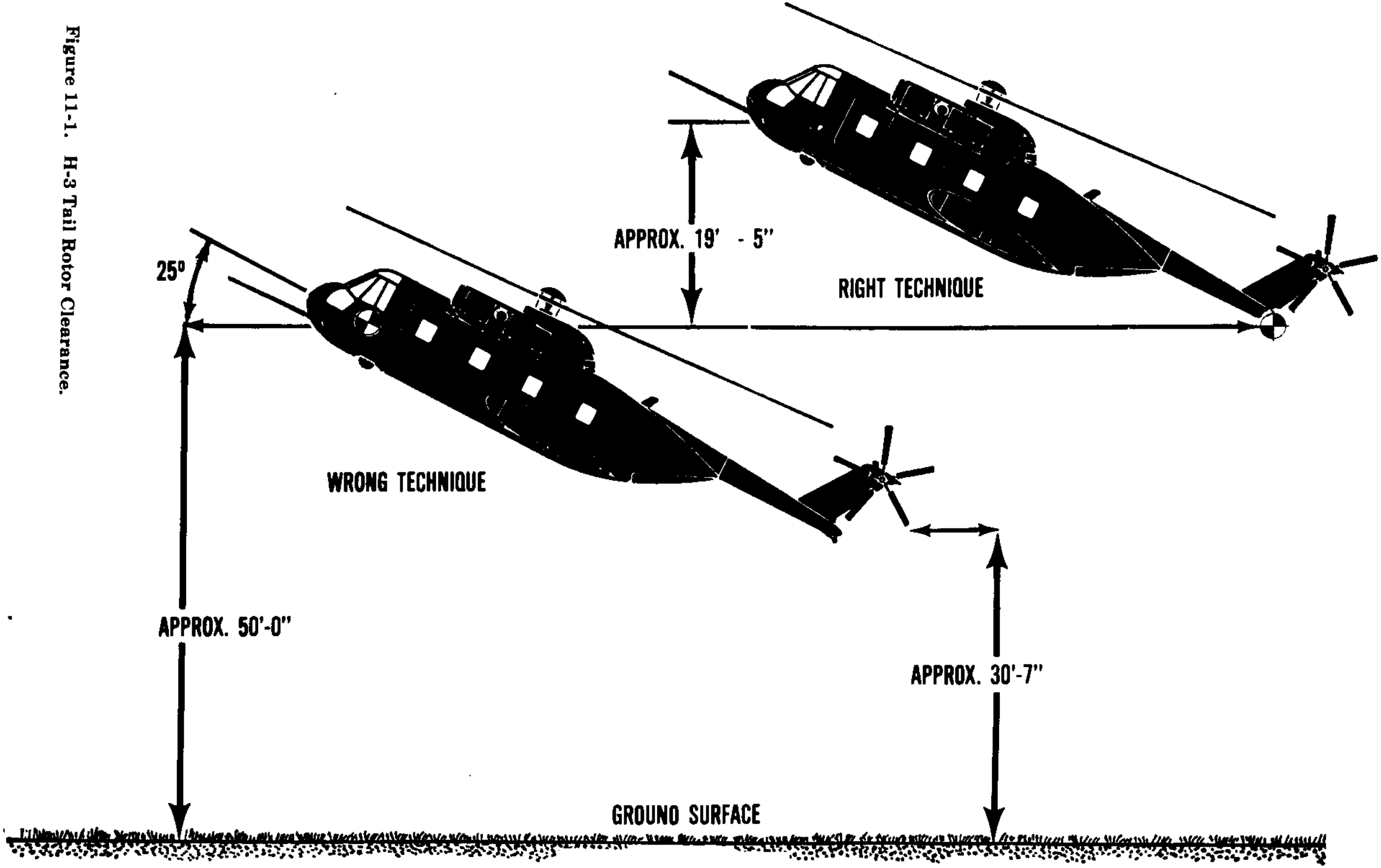


Figure 11-1. H-3 Tail Rotor Clearance.

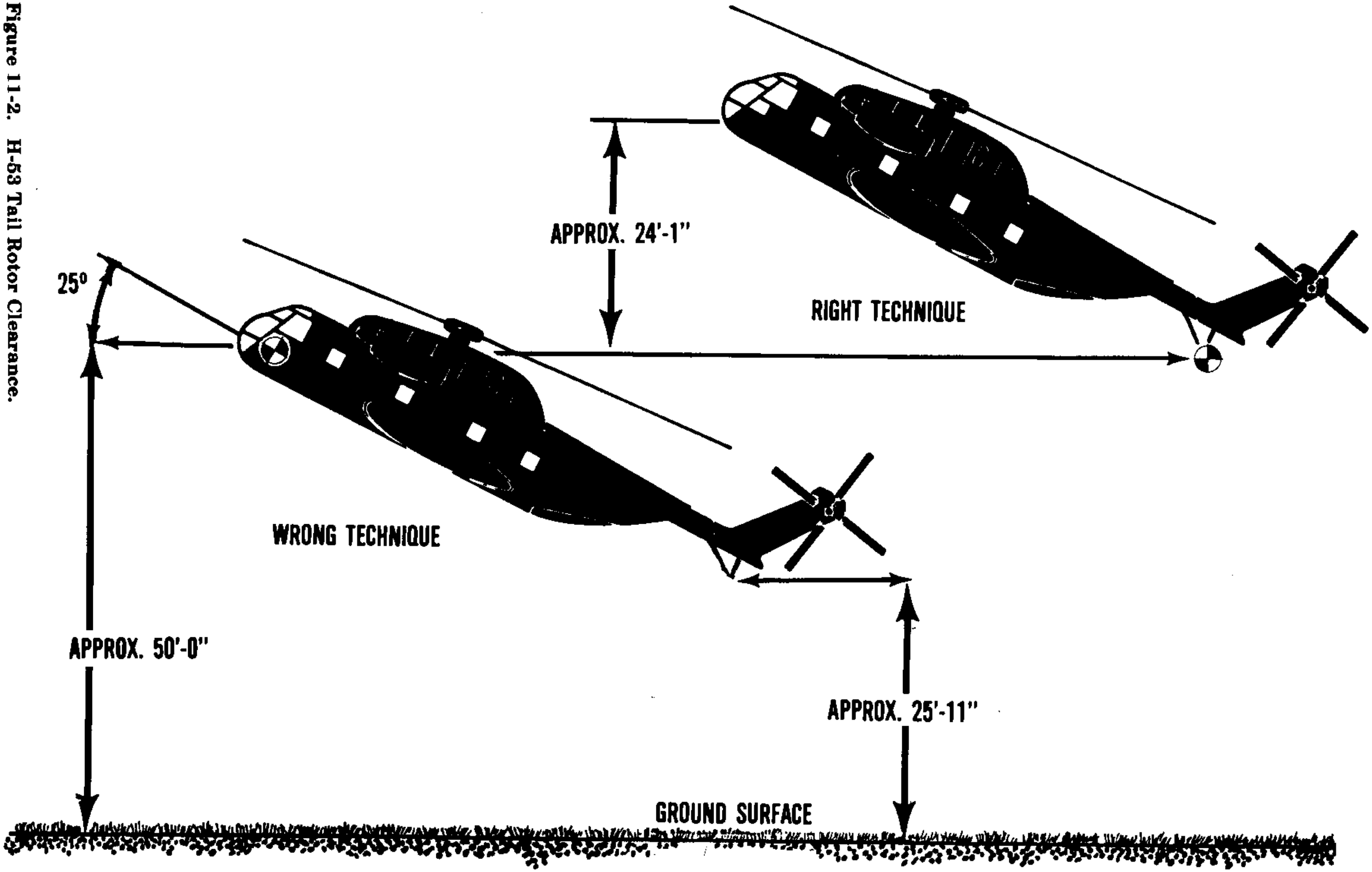


Figure 11-2. H-53 Tail Rotor Clearance.

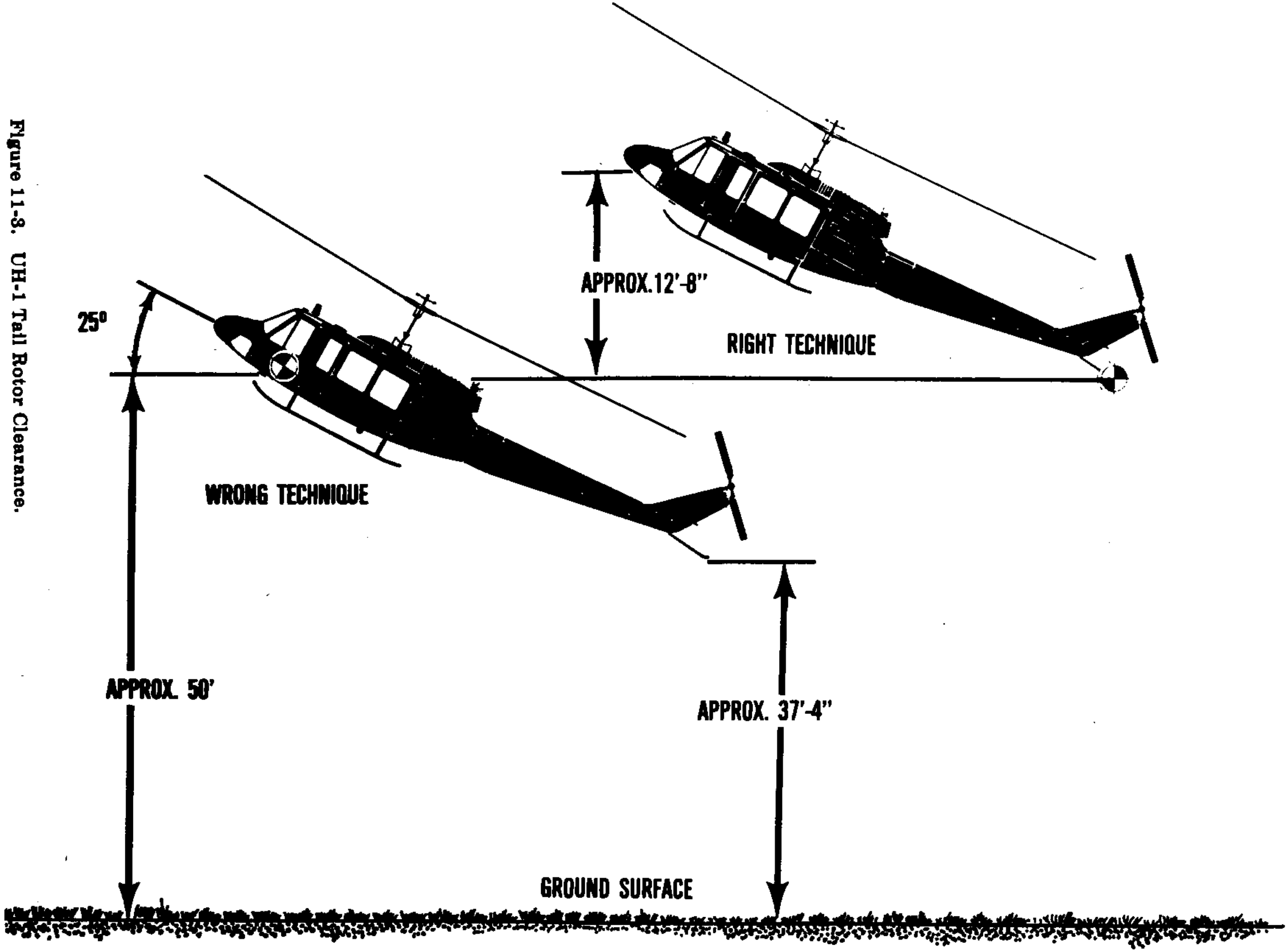


Figure 11-8. UH-1 Tail Rotor Clearance.

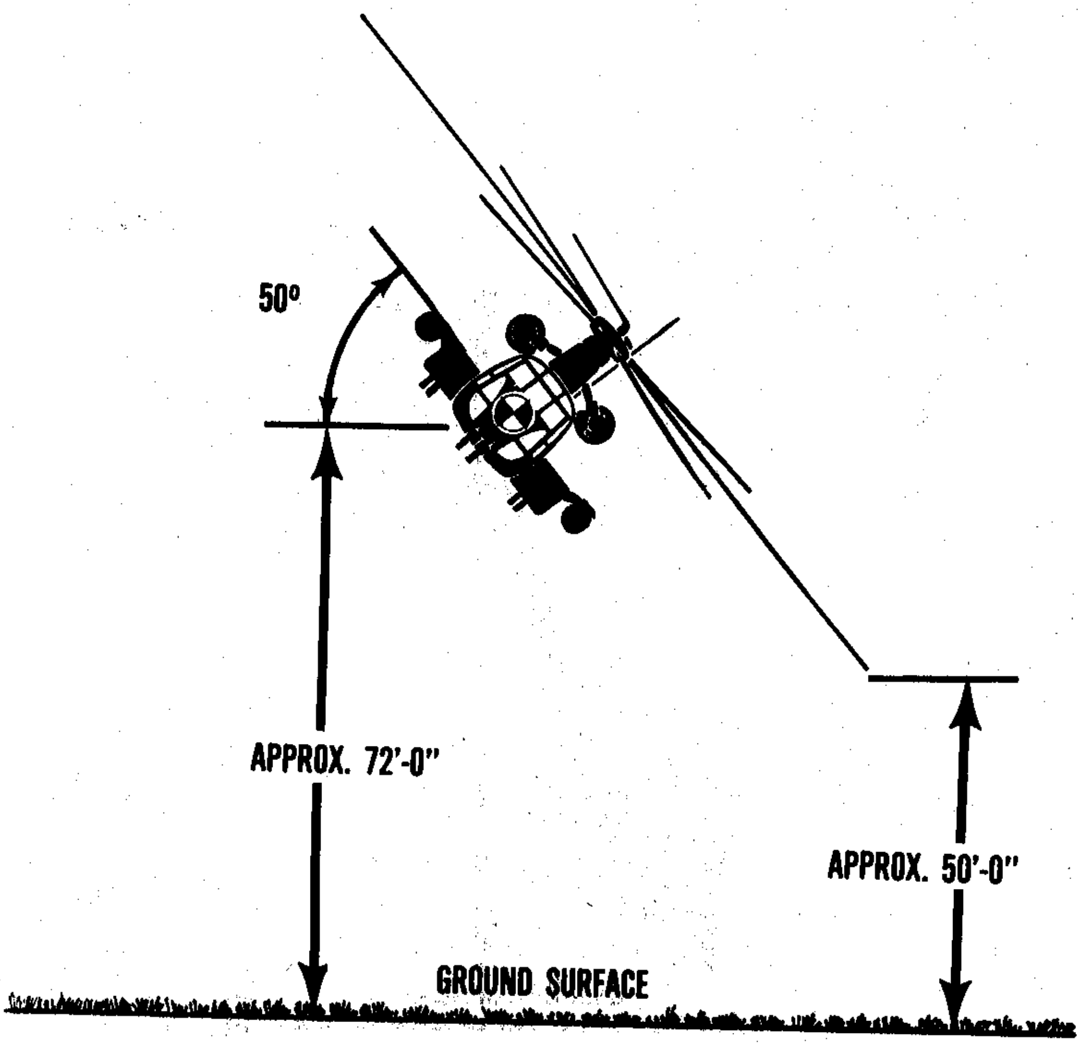


Figure 11-4. H-53 Main Rotor Clearance.

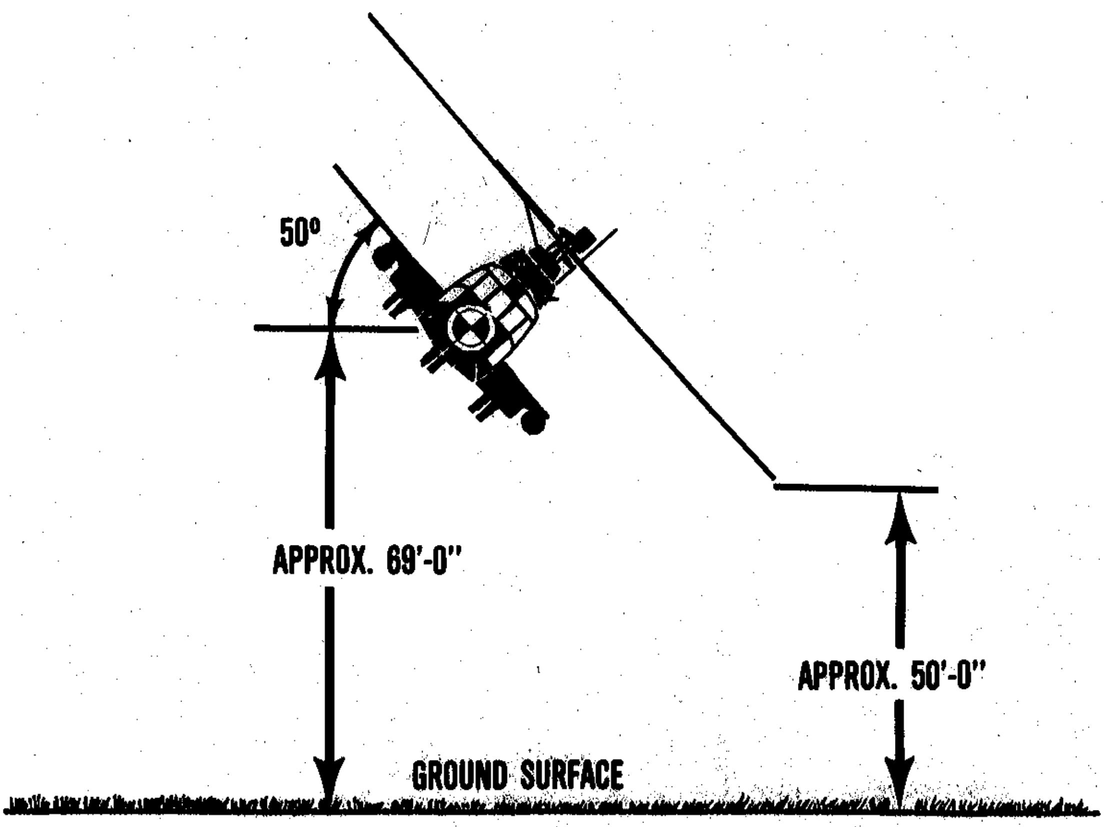


Figure 11-5. H-3 Main Rotor Clearance.

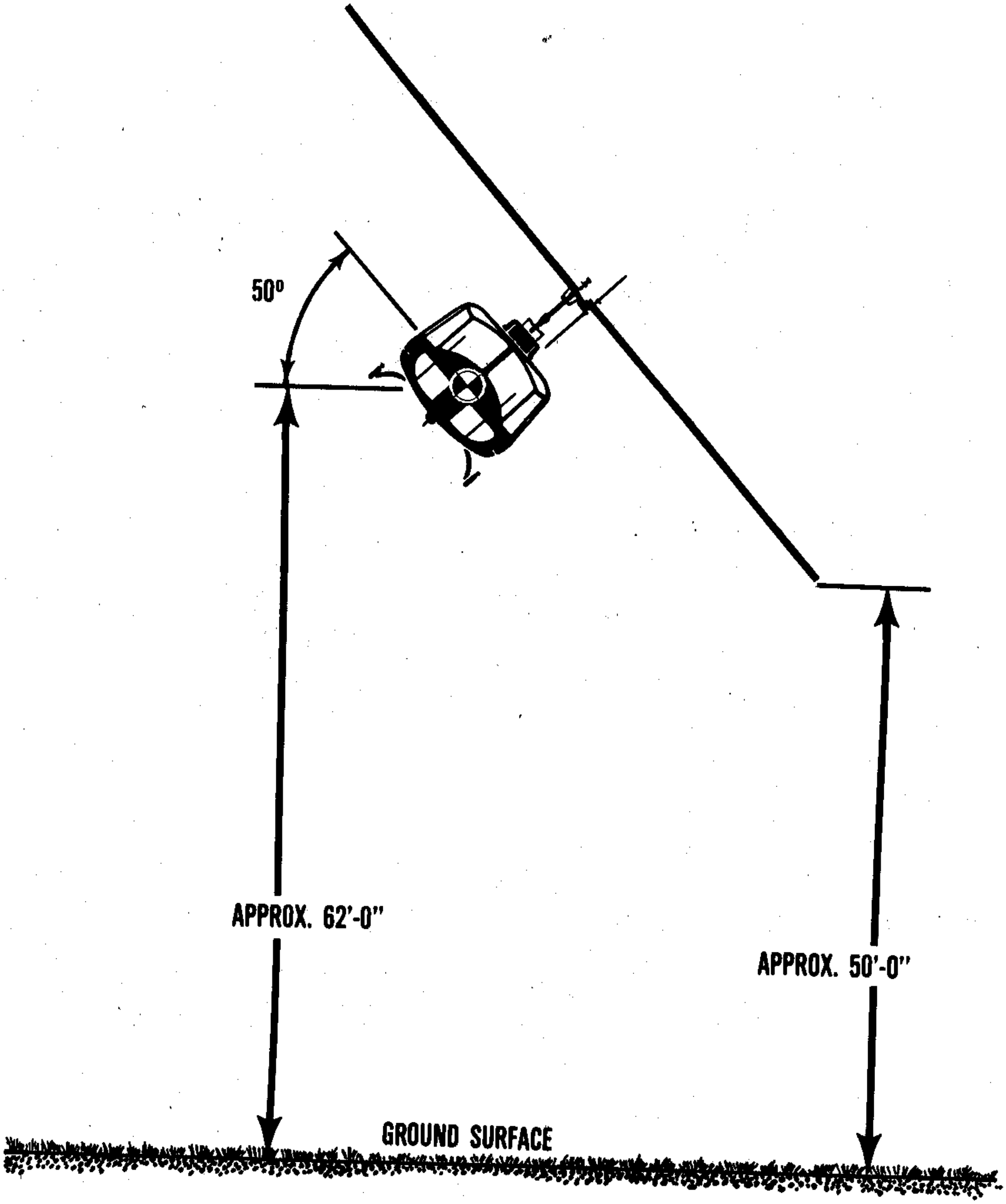


Figure 11-6. Main Rotor Clearance.

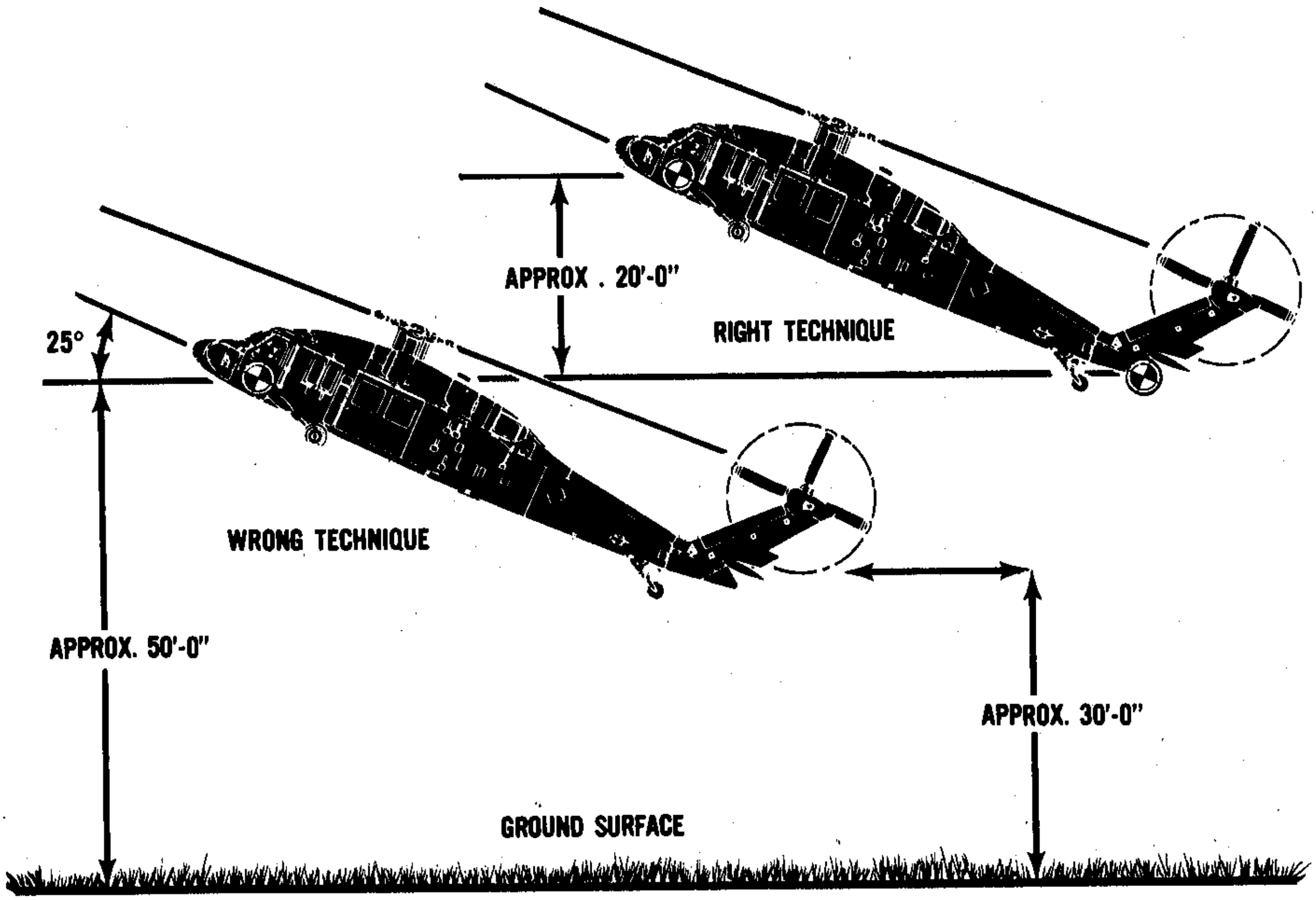


Figure 11-7. H-60A Tail Rotor Clearance.

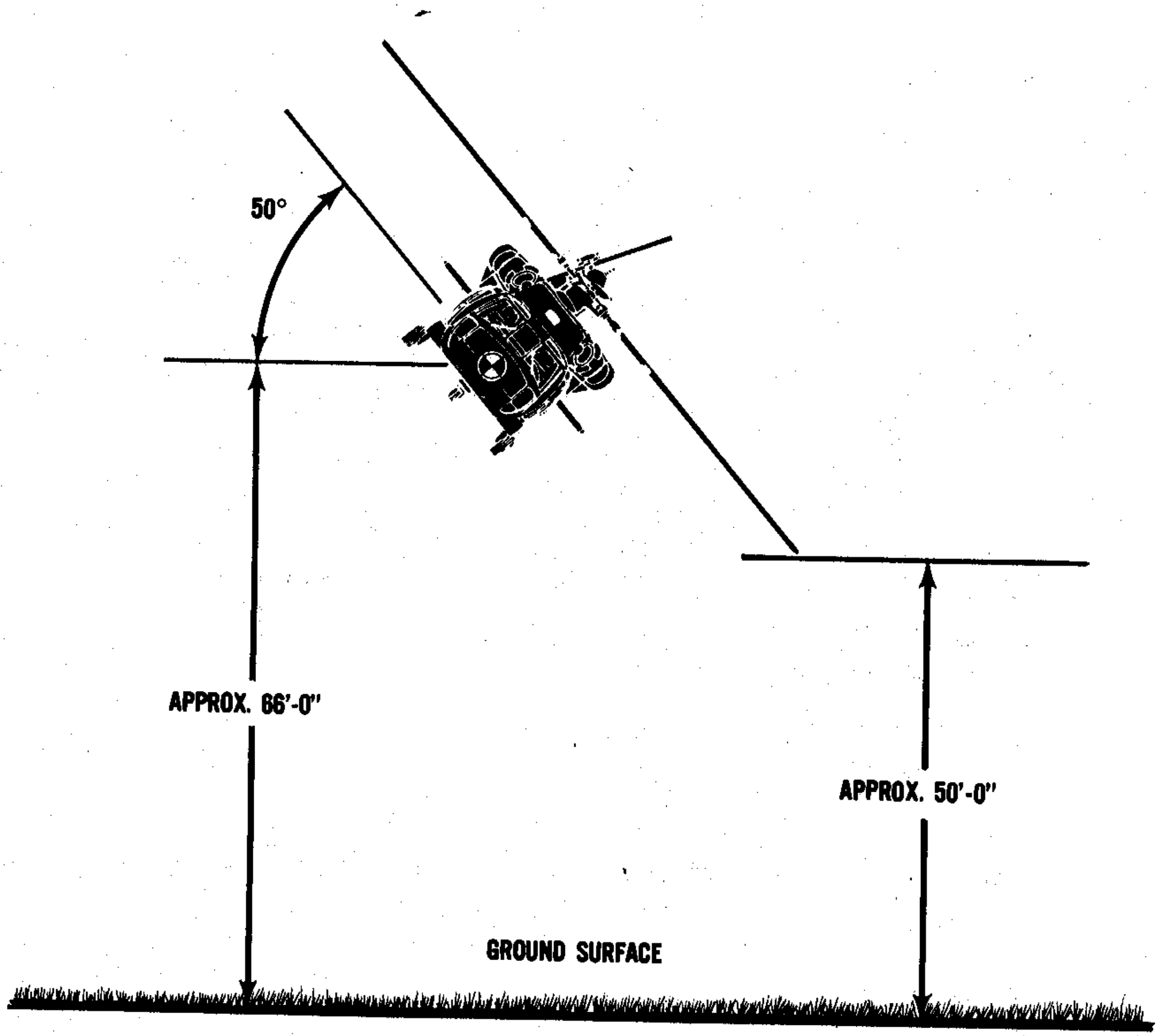
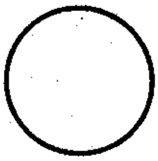


Figure 11-8. H-60A Main Rotor Clearance.

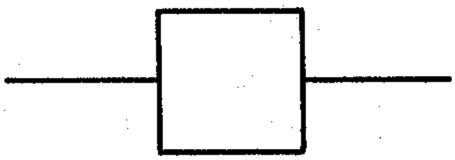
STANDARD SYMBOLS FOR MAP PREPARATION

The following standard annotations and symbols should be used in preparing maps for both combat and non-combat operations. Recommend the use of black ink, pencil, or symbol tapes to portray data on inflight materials. Navigation computer, tactical airlift mission plotter or suitable substitute should be used for annotating standard symbols.

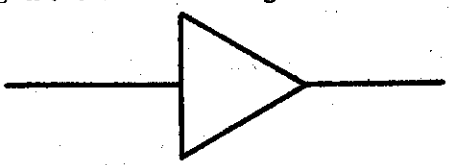
a. Waypoint. Use a circle to depict en route points where the aircraft course is altered or key actions occur. Number waypoints consecutively to facilitate identification. Place corresponding navigation information blocks (NIB) immediately adjacent to or slightly downtrack from the waypoint along the right edge of the strip chart.



b. Initial Point (IP). The IP is identified by a square centered on the point, with the sides parallel to the course line. If the IP is simply a coordinate, a dot will be positioned on the coordinate location centered within the square.



c. Objective Point (OP). The OP is identified by a triangle centered on the planned point with the apex pointing in the direction of flight.



d. Navigation Information Block (NIB). The NIBs are designed to give the crew the required navigational data from the present waypoint to the next waypoint.

(1) To Waypoint. The number designator of the next waypoint and ARIP, PIP, IP, LZ, etc., if applicable.

(2) Mag Hdg. The magnetic heading to the next waypoint. (True heading if required for unique Nav system.)

(3) Coordinates. Depending on the type of helicopter navigation equipment, insert the latitude/longitude, UTM, or doppler grid coordination.

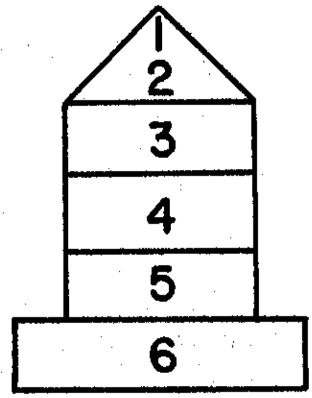
(4) Distance. The distance to the next waypoint in NM.

(5) MSA. Minimum safe altitude for each leg. When Night Vision Goggles are employed, minimum safe altitudes are:

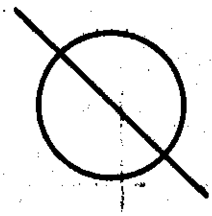
(a) VMC. The altitude which provides a minimum of 500 feet above obstacles within 3 NM of course center line when maintaining VMC.

(b) IMC. The altitude which provides a minimum of 1000 feet above obstacle within 5 NM of course center line (2000 feet required in designated mountainous areas) when IMC is encountered.

(6) Fuel (recommended entry).

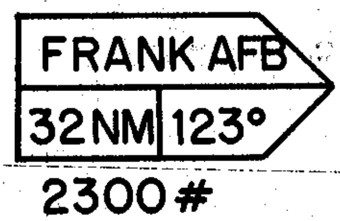


e. Emergency Landing Bases. AFNORTHAllied Forces Northern Region (Optional). Use a single circle with a diagonal line to identify those airfields compatible with unit aircraft and which may be used in an en route emergency. The number of emergency bases selected and the frequency of occurrence are at the discretion of the mission planner.



f. Alternate Recovery Bases (Optional). Use two concentric circles to identify those airfields compatible with unit aircraft and which are preferred for recovery in case the primary base is unusable because of weather, damage, or other reasons. Connect this symbol to the planned course by a dashed line depicting the alternate course from either a planned divert point or from the primary recovery base, as determined by the mission planner.

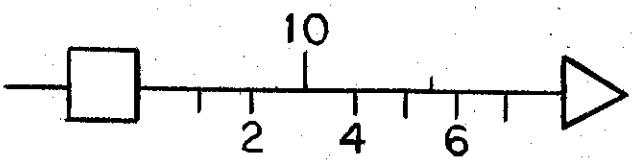
g. Recovery Arrow Box (Optional). Use a horizontally divided arrow box pointing in the general direction of the alternate recovery base to provide navigational information to the alternate base. This box depicts base name, distance in NM from divert point to alternate base, and Command and Control communications. The mag course from divert point to alternate base. Estimated fuel required for the recovery may be placed immediately beneath the recovery arrow box.



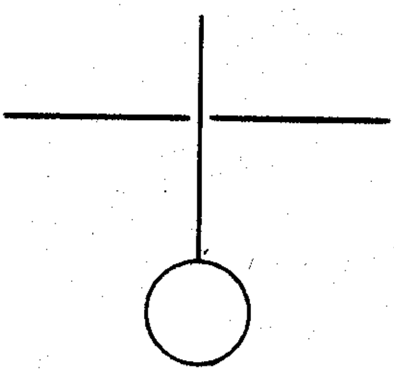
h. Course Line and Time/Distance Marks. Draw course lines for the entire route inbound to the objective and continue on to portray the return route to the primary and alternate recovery bases.

(1) Time Marks (Optional). Place them on the right side of the course line. Use longer marks to indicate even minutes and shorter, unnumbered marks for odd minutes. Time marks are of particular value along the pre-initial point route segment.

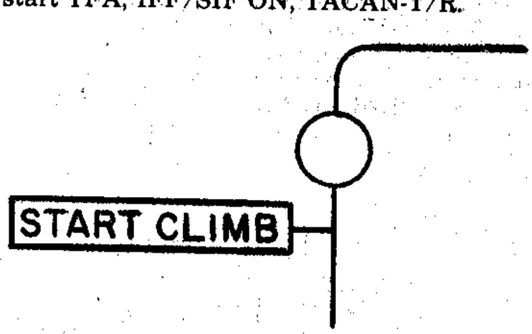
(2) Distance Marks (Optional). When used, place them on the left side of the course line. Use longer marks to indicate 10 NM increments and shorter unnumbered marks to indicate 5 NM increments. Over the IP to objective leg, use distance marks at 1 or 2 NM increments to enable greater accuracy.



i. Combat Entry Point. A heavy line identifies and locates the point at which the flight route crosses the FEBA/FLOT. The line extends at least one inch on either side of the course line. The entire FEBA should be annotated, if known.

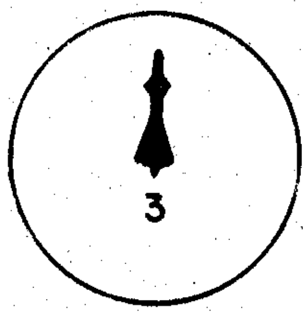


j. Operational Advisory Annotations. Advisory annotations concerning operational aspects of the mission are positioned to the side of the course line. The annotations consist of a line at the point en route where the function should be performed and the action is noted on the side end of the line. The action description may be either enclosed in a box or left open at the descretion of the mission planner. Examples of these operational advisories are as follows: start climb, start decent, IFF/SIF STBY, lights off, lights on, TACAN Receive only, start TFA, IFF/SIF ON, TACAN-T/R.



k. Order of Battle (OB). Depict threat information directly on the navigation chart using the following symbols and annotations. Chartpak symbols can be obtained from the unit intelligence office.

(1) Surface-to-Air Missiles (SAM). The number associated with the symbol indicates the specific type weapon system (SA-2, SA-3, SA-6, etc.). The actual SAM location is at the base of the symbol, which is to be oriented parallel to track. Use circles to indicate effective radii of the system at the planned mission altitude. (Symbols are mandatory, radii are optional.)



(2) Antiaircraft Artillery (AAA). Depict known AAA sites and indicate type (i.e., ZSU-23-4, 57 mm, etc.).

(3) Aircraft. Indicate locations of enemy airfields supporting aircraft capable of intercepting the mission. The delta-wing symbol indicate all-weather capable aircraft and the swept wing symbol indicates clear-air mass (CAM) interceptors.

Chapter 12

FLIGHT ENGINEER PROCEDURES

12-1. General. This chapter contains normal procedures for flight engineers not contained in the flight manual and/or applicable TOs.

12-2. Authority To Clear a Red X. Flight engineers normally are not authorized to clear a Red X. If a situation is encountered where the aircraft is on a Red X and qualified maintenance personnel are not available, the home station chief of maintenance may authorize the flight engineer to clear the aircraft for flight.

12-3. Refueling/Defueling. Flight engineers normally are not required to refuel or defuel aircraft; however, the flight engineer may refuel/defuel when maintenance personnel are not available. Use the refueling/defueling checklist during all refueling and defueling operations. If ground support personnel are not available, the aircraft commander will designate other crewmembers to assist the flight engineer.

12-4. Aircraft Systems Management. The flight engineer will monitor aircraft systems during flight and ground operations. Notify the pilot of all abnormal indications and take action as directed. When noting a malfunction during takeoff that may be cause for an abort, state the problem (e.g., rotor RPM low).

12-5. Flight Monitoring. The flight engineer will assist with flight monitoring.

a. Notify the pilot when seeing deviations more than 200 feet/20 KIAS from assigned altitude/airspeed, and 10 degrees from assigned heading. Also, advise pilot when approaching any aircraft flight manual limitation and comply with other duties as briefed by the pilot.

b. Notify the pilot if aircraft configuration (e.g., rotor RPM, gear, cargo door, ramp) is not correct for the manuever being performed.

c. Maintain outside vigilance during flight.

d. Monitor the primary radio, interplane radio, interphone, and HOT MIC.

e. Assist in navigation as necessary.

12-6. TOLD Cards:

a. Complete TOLD cards for takeoff prior to the before starting engines checklist. Use the TOLD card as a worksheet and keep it available for pilot or copilot review. Compute data applicable to the type takeoff/landing to be made (in and out of ground effect, power available/required, single engine capability, etc.).

b. During multiple takeoffs/landings, only affected parameters need be recomputed if favorable conditions afford an additional margin of safety in all other areas (e.g., gross weight decreases due to fuel burn-off, while pressure altitude and temperature remain constant).

12-7. Fuel Management:

a. Preflight. The flight engineer will insure the preplanned fuel load is on board the aircraft.

b. In-flight. The flight engineer will monitor fuel management. He or she will compute fuel consumption, bingo fuel and keep the pilot advised of fuel status at all times (except H-1's).

12-8. Weight and Balance. A new or corrected DD Form 365-4, Weight and Balance Form F, need not be recomputed provided the initial takeoff gross weight (item 16) is not added to by more than 150 lbs or weights of more than 500 lbs are removed. (Example: (1) Gross Weight Initial Computation = 14,500 lbs, 400 lbs is removed, no written adjustment is required. (2) Gross Weight Initial Computation = 14,500 lbs, 200 lbs is to be added in, a written adjustment is required.) Although no written adjustment may be required the flight engineer will compute these changes to insure center of gravity limits are not exceeded. The aircraft commander will be informed of the changes.

12-9. Use of DD Form 365-4:

a. Wings/unit DOV will determine whether "zero fuel" weights/computations are required on the DD Form 365-4. If "zero fuel" is not utilized, the following applies to the DD Form 365-4:

(1) Line through item 21.

(2) Enter "less fuel" under item 22. (Item 10 minus item 23.)

(3) Enter the aircraft's minimum fuel in item 23 and line through the adjoining index/mom squares.

(4) All other zero fuel references on the 365-4 may be left blank.

b. Passengers. Item 12 will reflect the number of passengers in a compartment/seat/position, their weight, and the compartment/arm/station.

EXAMPLE:	H-1 Series	2/400/117.0
	H-3	1/200/D-10
		1/200/D-11
		3/600/D
	H-60	2/400/320.7
	H-53	3/600/D

c. Cargo. Use the last cargo and compartment/arm/station column on the right side of the form.

Chapter 13

HELICOPTER STANDARD CONFIGURATION

Standard configuration is detailed in appropriate 57-series regulations. This chapter contains the policy governing configuration.

13-1. Responsibilities. All helicopters are configured IAW the appropriate 57-series regulation. Additional special mission equipment may be added at the option of the unit commander. Rescue aircraft need not be fully rescue configured when a specific mission requires placement of additional seats/cargo in the space provided for mission equipment, when maximum gross weight is a consideration, or when otherwise authorized (e.g., VIP, MAST, host base support, survival school support). Locate items at the stations indicated when they are on board. All equipment authorized for and installed on the aircraft will be categorized and managed IAW AFR 66-12/MACSUP 1. Aircraft will not be modified to secure/install equipment unless authorized by aircraft technical orders or AFR 57-1.

NOTE: Cargo/Equipment. Securing life support/medical equipment/medical kits with seat belts is authorized. Items requiring constant access, such as nav kits or mission kits, that weight less than 20 pounds may be secured with seat belts. Secure cargo/equipment items not requiring rapid removal during an aircraft or medical emergency with devices identified in TO 1C-1-71. Do not modify tiedown devices in any fashion.

13-2. Rescue-Equipped TDY Aircraft. Normally, any time an Rescue aircraft departs home station, it will be equipped to accomplish the rescue mission. Unit commanders will determine the equipment required to be on board TDY aircraft which are unable to maintain full rescue configuration. (The 37 ARRS, 1550 ATTW, and Det 2, 67 ARRS, are exempt from the requirements of this paragraph.)

13-3. Deviations. Commanders may authorize deviations from standard configuration. Configure assigned aircraft with equipment required to accomplish tasked missions. Helicopters assigned to the 1550 ATTW are not required to carry the pyrotechnics/mission equipment storage box or contents while performing their assigned training mission. Deviations from combat configuration requirements are authorized at employment locations (including exercises) when the mission dictates.

13-4. Combat Requirements. Any unit tasked for combat operations will deploy or operate, as applicable, from home station with the additional combat equipment and pyrotechnics identified in this regulation unless otherwise directed in the tasking/execution order. Deployed units will supplement this regulation pertaining to equipment carried and will comply with the provisions of MACR 55-22. When tasked for combat operations, configure aircraft with basic combat equipment. The requirements of this chapter do not apply to 1550 ATTW aircraft; however, armor will be available and identified by tail number.

13-5. FCF Configuration. Aircraft may fly functional check flights without the equipment installed; however, emergency survival equipment required by MACR 55-22 as supplemented will be on board.

13-6. Exercise Configuration. Mission commanders are authorized to establish and publish equipment requirements for use during all headquarters approved exercise (i.e. RED FLAG, MAPLE FLAG, etc.). Establish equipment requirements based upon the scenario. The configuration(s) should not be altered just for the purpose of carrying additional observers, ferrying simulated survivors, etc. Aircraft will be employed and perform SAR alert in the configuration(s) developed for the exercise. Survival equipment required by MACR 55-22 as supplemented will be included in these configurations.

13-7. Discrepancies. Document all standard configuration discrepancies using AFTO Form 781A.

Chapter 14

FORMATION FLYING

14-1. General. The primary purposes of helicopter formation flight are mutual support and control. In addition, formation flight enhances discipline, maneuverability, and flexibility. If more than three aircraft are required for a tactical situation, consideration should be given to breaking into smaller elements to aid threat avoidance. The minimum separation between aircraft in any formation is one rotor diameter and a vertical step-up (optional) for each succeeding helicopter. Tactical formation will not normally be flown in instrument meteorological conditions. Formation flights with dissimilar aircraft are authorized when all participating crewmembers attend a prebriefing and are thoroughly familiar with the other aircraft's performance and tactics. Rotor disk separation will be based on the largest rotor disk diameter.

NOTE: See FLIP planning for proper formation flight plan filing procedures.

14-2. Responsibilities. Every crewmember has well defined responsibilities which, if not strictly adhered to, will jeopardize the safety and mission of the entire formation.

a. Flight Leader. The flight leader must know and consider the capabilities of all members of the flight. Flight lead is responsible for:

(1) Briefing the flight.

(2) Performing maneuvers within the capabilities of all members of the flight.

(3) Maintaining flight integrity and air discipline.

(4) Directing radio channel changes, making radio calls, navigating, ensuring formation clearance from other aircraft and hazards, and directing all formation changes.

b. Wingman. The wingman is responsible for:

(1) Maintaining position in the formation until authorized or directed to change.

NOTE: Advise flight lead when it is necessary to deviate from any directed position.

(2) Acknowledge radio-directed changes in the formation position prior to initiation.

(3) Navigation and terrain/obstacle clearance independent of lead.

(4) Backing up the flight lead where necessary and being able to assume the lead if required.

(5) Notify if visual contact with formation aircraft is lost, flying safety is jeopardized, or radio failure.

c. Crewmembers. In view of the extremely limited visibility below and aft in most helicopters, each crewmember has the responsibility to provide mutual coverage for other aircraft in the formation. This is especially necessary in a combat environment where the flight is susceptible to an attack from enemy ground and airborne weapon systems.

14-3. Briefing Requirements. The flight leader will ensure the briefing for the formation phase of the mission is completed, covering as a minimum those items contained in the formation briefing guide (MACR 55-54, chapter 31).

14-4. Communication. Formation flight will not be accomplished without positive inter-aircraft radio communications. Prior to takeoff, a communications check of all aircraft in the formation will be conducted. (Unless mission requires radio silence.)

a. Radio Procedures. After initial radio contact has been established between aircraft, the lead is responsible for making all calls pertaining to the flight.

(1) Frequency changes will be initiated only by lead.

(2) Wingmen will acknowledge (by numerical position in the flight) a frequency change prior to switching to the new frequency; however, lead may prebrief way points for communication changes, these do not require acknowledgement. Throughout the formation mission, an acknowledgement of a frequency change indicates all checklists are complete and your are ready for the next event. If you are not ready, reply with "standby." The frequency will not be changed until all have made the normal acknowledgement.

(3) Lead will check in on the new frequency followed by all wingmen (in order).

(4) If a wingman fails to check in after a reasonable length of time, lead will attempt contact on another radio. If this fails, lead will direct a member(s) of the flight back to the previous (or a prebriefed) frequency to reestablish contact.

(5) Both the pilot and copilot in each aircraft in the flight will monitor the interplane frequency.

(6) Only essential transmissions will be made. Strict radio procedures and discipline must be enforced in order to avoid jeopardizing safety and mission effectiveness.

b. Signals. All crewmembers who engage in formation flight will be knowledgeable of the visual formation signals contained in AFR 60-15. Aircraft commanders will insure their aircraft have the appropriate equipment to pass light signals prior to engaging in night formation flights.

NOTE: Formation light signals are included in Chapter 31.

14-5. Types of Formation. Formations of more than two aircraft may be divided into elements. The following formations are authorized for helicopters:

a. Echelon Formation. (Right or Left) (See Figure 14-1) Each aircraft holds a position approximately 35° to 45° astern of the preceding aircraft on either the right or left side. Except for minor corrections, turns are normally made away from the formation.

NOTE: Left echelon is normally used when two or more helicopters rendezvous with a tanker for refueling.

b. Staggered Formation. (See Figure 14-2) A formation composed of two or more elements of two

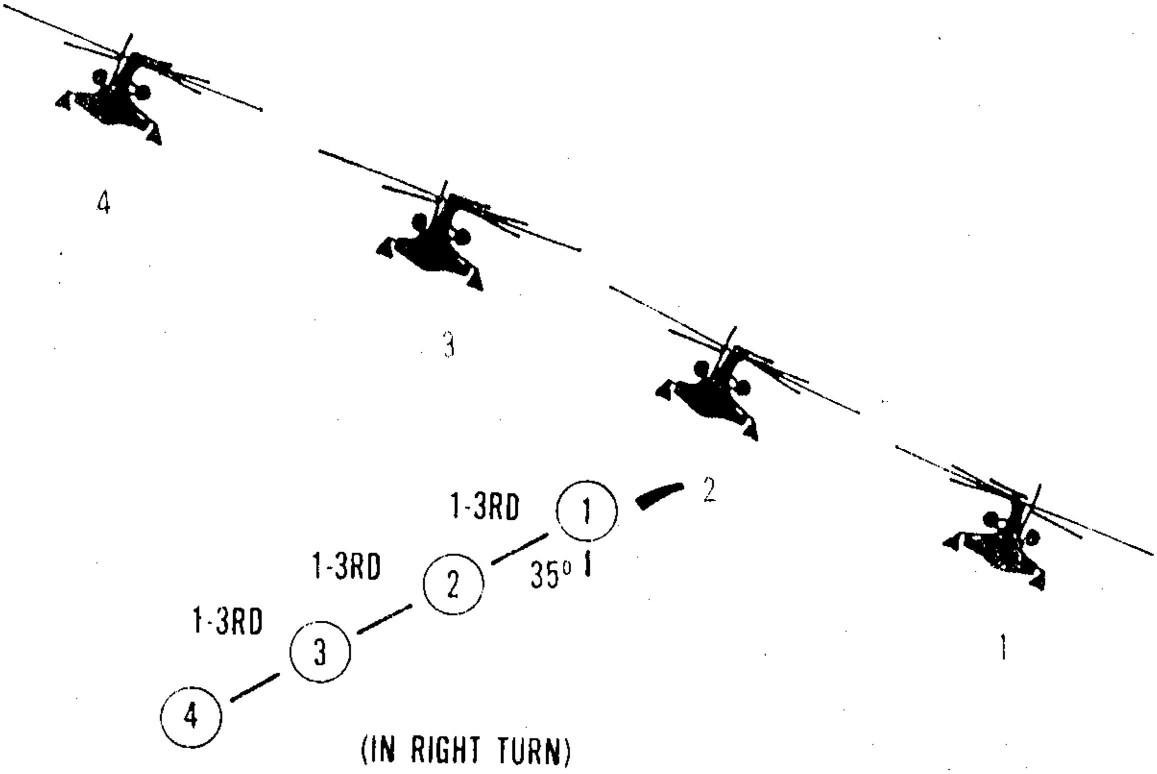


Figure 14-1. Echelon Formation.

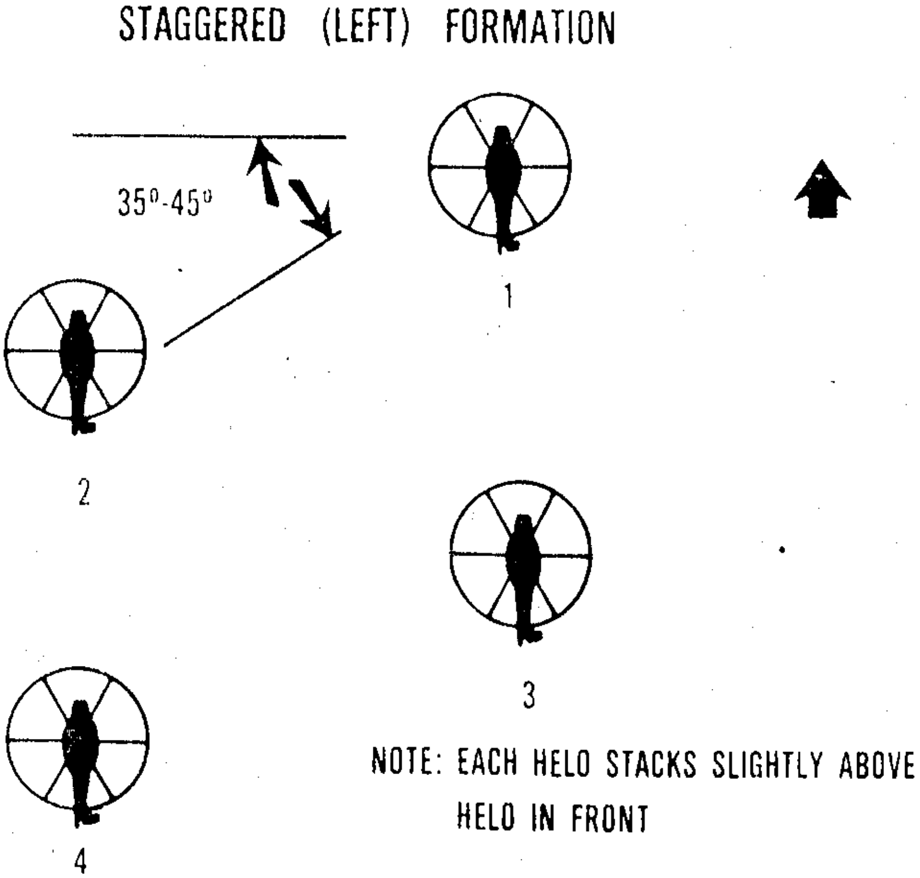


Figure 14-2. Staggered (Left) Formation.

aircraft in trail. Left or right stagger is determined by echelon positions of the wingmen. Spacing is normally one to three rotor disk on an approximate 35° to 45° angle.

c. Tactical Formation. A loose formation with the wingmen positioned a minimum of 500 feet from the preceding aircraft anywhere from line abreast to trail depending on tactical requirement. Whenever possible, the wingman will stay out of lead's 4 o'clock to 8 o'clock position. This will provide better mutual coverage of 6 o'clock positions. Wingmen should be far enough from the lead so that lead can maneuver in any direction. Vertical separation should not be greater than plus or minus 100 feet. This formation is normally used in a combat environment. Tactical formation allows lead to maintain flight integrity and still maneuver the formation with few restrictions. Tactical formation allows for improved mutual support and is recommended for long flights as it conserves fuel and is less demanding on the aircrew.

d. Trail Formation. (See Figure 14-3) A formation where each aircraft holds a position one to three rotor disks directly behind the preceding aircraft, staggered slightly higher.

14-6. Engine Start and Taxi. Start engines by visual signal, radio call, or at prebriefed time. Prior to requesting taxi clearance, flight lead will check-in the flight. The flight will normally taxi in order with a minimum of 100 feet clearance between tail rotor and bladetip.

14-7. Lineup for Takeoff. The following procedures will be utilized:

a. Lead will normally taxi to downwind side of the runway to permit lineup and hover checks. Lead must allow adequate room on the runway for all formation members to maneuver.

b. Spacing should be commensurate with the type helicopters and conditions with a minimum of 100 feet rotor-tip to rotor-tip.

c. Each aircraft will indicate ready for takeoff by stating "ready for takeoff." During comm-out aircraft will extinguish their anti-collision lights. When all aircraft have extinguished their anti-collision lights, and ATC clearance is received, lead will extinguish it's anti-collision lights, wait five seconds and takeoff. During training, the last member of the flight will fly with position lights and an anticollision light on.

14-8. Takeoff. There are two types of formation takeoffs—"wing" and "tactical." Either type may be initiated from the ground or a hover. Prebrief the type to be used.

a. Wing Takeoff. Aircraft takeoff simultaneously maintaining formation separation. Lead may be required to hold a slightly lower than normal power setting to enable the wingmen to maintain position without requiring excessive power.

b. Tactical. Lead initiates a takeoff and wingmen takeoff at five second intervals. Lead will climb at briefed airspeed and rate of climb.

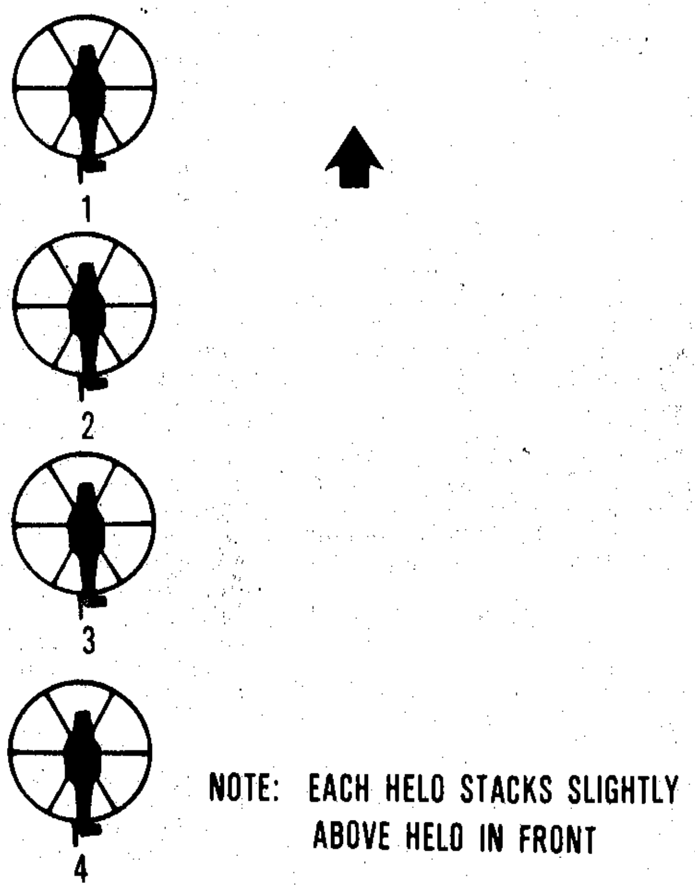


Figure 14-3. Trail Formation.

14-9. Aborts:

a. Prior to takeoff, an aborting aircraft will notify lead, pull out of the takeoff stream, if practical, and return as directed.

b. If an abort occurs during takeoff, the aborting aircraft will call abort, state call sign, and state intentions. The aborting aircrew will, if possible, maintain the side of the runway from which the take off was started.

c. Succeeding aircraft may continue takeoffs or delay as the situation dictates.

d. If an abort occurs, all other aircraft will assume new position, call sign, and complete the mission as briefed. At the discretion of the flight leader, a spare aircraft or the original may rejoin the formation in last position.

14-10. Join-Up. Two types of join-ups may be used: Straight Ahead or Turning. Wingmen maintain clearance on preceding aircraft, close to slightly wide position and synchronize airspeed. Wingmen then move into their respective pre-briefed formation positions.

a. Straight Ahead. Lead establishes a heading while wingmen accelerate until established in position. To expedite the maneuver, lead may reduce airspeed until wingmen call in position. This type of join-up is used when you want to depart on course or when a turn after takeoff would not be practical.

b. Turning. Lead establishes an angle of bank no greater than 20 degrees. Wingmen then turn inside of lead/preceding aircraft until established in position.

NOTE: If an overshoot becomes unavoidable, the joining aircraft should remain below the preceding aircraft so as not to lose visual contact. Never pass directly under or over any other aircraft in the formation.

c. Night Join-Ups. Exercise extreme caution during night join-ups due to the difficulty in estimating distance and closure ratio. It is essential that all formation aircraft maintain prebriefed parameters (i.e., airspeed, rate of climb). After takeoff, maintain visual contact with lead. Lead maintains all lights on bright (except NVG operations) until join-up is complete and then reset lights. Turn lights to the dim position as requested by the wingman.

14-11. Night Formation. Night formations procedures are the same as for day, but increased vigilance is an absolute necessity due to decreased visual references. All corrections should be slower and more cautious. The following light settings are recommended:

a. VFR Formation (Not applicable for NVG operations):

(1) Fuselage Lights - ON
(2) Formation Light - ON (If applicable)
(3) Anti-Collision Lights - OFF (ON for the last aircraft in formation - ON for lead during night join-ups or crossover)
(4) Blade Tip Lights - ON (If applicable)
(5) Position Lights - ON
(6) Other Interior Lights (As required)

b. NVG Formation:

(1) Fuselage Lights - ON 50%
(2) Blade Tip Lights - ON 50% (If applicable)
(3) Cargo Compartment Lights (As required)
(4) Position Lights - ON
(5) Anticollision Lights - OFF (on for last aircraft in formation when above 300 ft AGL)

14-12. En Route:

a. Spacing for most formations will be 1 to 3 rotor disks (except tactical) with each helicopter stacked slightly above the preceding helicopter.

b. Formations are normally flown with a maximum of five (5) aircraft to insure safe lost visual procedures. If VMC is assured and circumstances require larger formations, they may be used.

c. Minimum altitude for en route formation is 500 feet AGL except when mission requirements dictate a lower altitude.

14-13. Pitch-Out and Rejoin. Lead will place the flight in echelon and give the prebriefed pitch-out signal. Lead will begin a turn away from the formation and maintain the turn for approximately 180 degrees. The pitch-out need not be a level turn. The wingman (men) will delay 3 seconds and begin a turn to duplicate the flightpath of lead or wingman ahead of him. The lead aircraft will then signal for rejoin if desired. This is a maneuver used primarily in training.

14-14. Changing Formation. Unless briefed otherwise, lead will set the formation, changing aircraft as required to reduce pilot fatigue, provide terrain clearance, etc. If lead desires a formation change, radio, light or visual signals may be used to change the formation.

a. Crossover. During the crossover, wingmen will maintain a clearance of 50 feet vertically and 100 feet aft. Use a heading change of approximately five degrees to cross from one side to another. Once number two changes, all corresponding aircraft will move to establish the new formation, i.e., if the formation is staggered left and two moves to right, all even numbered positions will move to the right with the odd position maintaining their position behind the lead aircraft.

b. Lead Change (Figs 14-4, 5, 6). Formation lead changes can be directed ONLY by the lead aircraft. Lead changes will be acknowledged by all flight aircraft prior to execution. Lead changes and formation changes will not be accomplished simultaneously. However, a staggered formation will switch sides when #2 becomes lead without any repositioning of aircraft. The new lead may change formations after the lead change is completed. When lead has received acknowledgement of lead change from all aircraft, it will give the execute signal, immediately turn away from its number two wingman, and when clear, decelerate so that the flight will pass. Lead will then fall back into formation as trail. If a lead change is initiated from a trail formation, the lead will always clear to the right. Lead will use scanners to stay clear of the flight.

(1) The aircraft assuming lead will state "abeam" when approaching abeam the leader, and ready to assume formation lead. The lead, when ready to relinquish formation lead, will state "tally-ho." The new lead states "assuming lead" and takes up the appropriate squawk.

(2) Maintain the original formation call sign regardless of the number of lead changes.

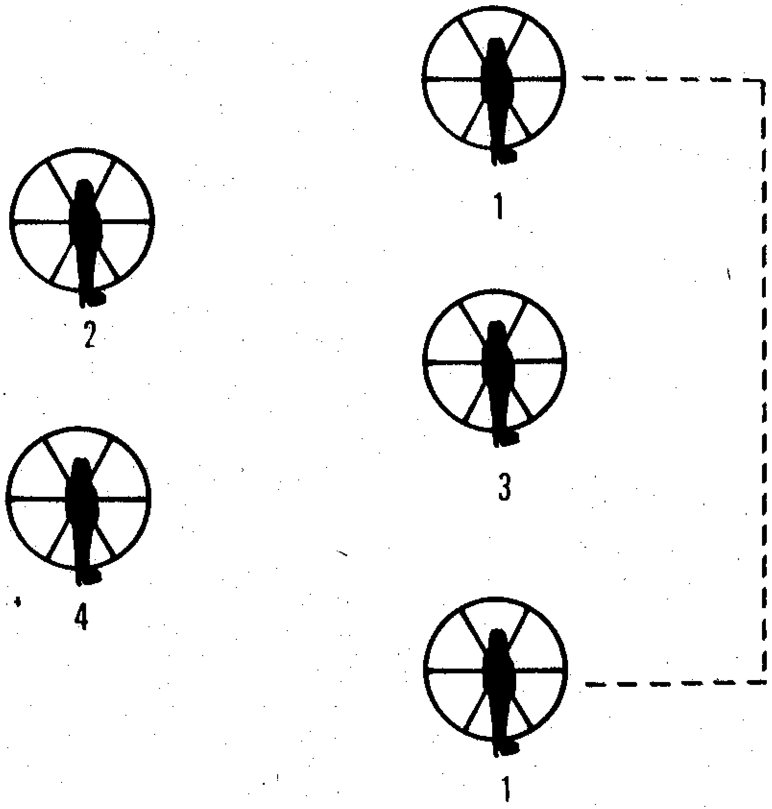


Figure 14-4. Lead Changes—Staggered Left Formation.

14-15. Lost Visual Contact (See Figure 14-7, 8, 9). Whenever a wingman loses sight of the preceding aircraft, it is imperative that all members of the formation react quickly and precisely to prevent a mid-air collision. In such a case, the aircraft losing contact will call, "Call Sign, Lost Visual Contact." Lead will announce the base heading, altitude, and airspeed and all wingmen will take action based on that heading and altitude. Wingmen will acknowledge lead's calls.

NOTE: Aircraft commanders may be required to declare an emergency with the appropriate controlling agency when initiating the altitude changes required by the lost contact procedures.

NOTE: If another aircraft calls lost visual contact and you still have sight of the preceding aircraft, maintain position on that aircraft. If you then lose sight of the preceding aircraft, execute the appropriate procedures listed below:

a. Echelon Left/Right. Number two turns 20 degrees away from the base heading for 20 seconds and climbs 400 ft. above the base altitude. Number three turns 30 degrees for 30 seconds and climbs 600 ft. Number four turns 40 degrees for 40 seconds and climbs 800 ft. If applicable, each aircraft will contact the controlling agency for an IFR clearance. (See figure 14-7.)

NOTE: The rule of thumb is multiply your position (or chalk number) by 10 for your heading and time and by 200 feet for your altitude. Timing starts when you complete your turn. At the end of your timing, return to the base heading.

b. Staggered Left/Right. Number two turns 20 degrees left/right for 20 seconds and climbs 400 feet above base altitude. Number three turns 30 degrees right/left for 30 seconds and climbs 600 feet above bare altitude. Number four turns 40 degrees left/right for 40 seconds and climbs 800 feet. (See figure 14-8.)

c. Trail. (Not applicable to low level operations.) Number two turns 20 degrees right for 20 seconds and climbs 400 feet. Number three turns 30 degrees left for 30 seconds and climbs 600 feet. Number four turns 40 degrees right for 40 seconds and climbs 800 feet.

d. Low Level Lost Visual Due to Inadvertent IMC. This paragraph provides suggested inadvertent IMC techniques. It is offered as an example of what might be done to cope with this critical situation. The tactical environment, existing weather conditions, and terrain may require deviations from these techniques. In all cases, the formation briefing will contain a detailed discussion of this area if the possibility of inadvertent IMC exists.

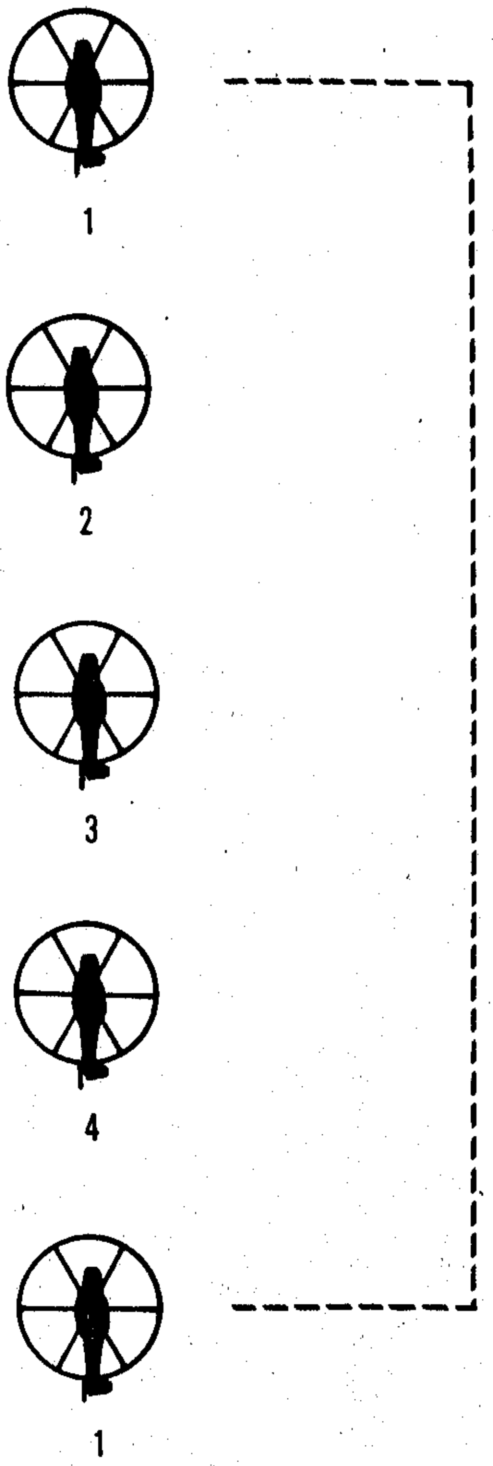
(1) If confronted with a large formation requirement where inadvertent IMC is possible, strong consideration should be given to keeping the maximum number of aircraft to five.

(2) A minimum safe altitude (MSA) should be preplanned for all route segments of the flight. These MSAs must be known by all members of the flight and should be recorded on their flight logs.

(a) For training, the MSA for non-mountainous terrain should be at least 1,000 feet above the highest terrain 5 NM either side of course.

(b) For training, the MSA for mountainous terrain should be at least 2,000 feet above the highest terrain 5 NM either side of course.

(c) For operational missions, the MSA should be at least 500 feet above the highest terrain 3 NM either side of course.



NOTE: LEAD WILL ALWAYS CLEAR TO THE RIGHT

Figure 14-5. Lead Changes—Trail Formation.

(3) If a five-ship formation is in trail and in close proximity to mountainous terrain for masking purposes, normal inadvertent IMC procedures cannot be used. Any aircraft entering IMC and losing visual with other members of the flight will immediately alert lead by stating on interplane frequency, "Position (call sign) is lost visual contact." Lead will immediately initiate the IMC breakup by saying, "Execute," and will follow this with his heading, altitude, and the MSA for that route segment. At the call to execute, aircraft perform breakup and turn their position lights on.

(a) Assuming 100 KIAS as the cruise airspeed for this example, lead should accelerate to 110 KIAS and climb to MSA.

(b) Aircraft #2 will maintain 100 KIAS and climb to MSA plus 400 feet.

(c) Aircraft #3 will decelerate to 90 KIAS and climb to MSA plus 600 feet.

(d) Aircraft #4 will decelerate to 80 KIAS and climb to MSA plus 800 feet.

(4) Aircraft #5 will decelerate to 70 KIAS and climb to MSA plus 1,000 feet.

(5) As each aircraft reaches its desired altitude, maintain airspeed and heading for 3 minutes, then accelerate to a prebriefed cruise indicated airspeed and resume own navigation along route. Time, distance, heading, and dead reckoning will be used during IMC flight to retain as much navigational accuracy as possible. Based on an assessment of the weather situation, threat environment and other factors, lead will decide whether to abort the mission with a controlled turn-around of all aircraft, or to perform a controlled rejoin if VFR conditions are attained down track. Rejoin may be accomplished at a way point along the planned flight path. Lead should designate this join-up location, which may also become a letdown point for those following aircraft who may still be IMC because of their higher altitudes. If letdown is required, it should be accomplished at a controlled rate of descent (no more than 500 feet per minute), and should be flown to a lead designated minimum altitude (MSL). As a guide, lead should not clear the flight down until lead has a 500-foot ceiling.

14-16. Evasive Maneuver Battle Drill:

a. General. No rigid set of procedures can be given to cover all tactical situations since the maneuvers used by a helicopter force vary according to the threat and tactical situation. However, in all situations, a decision must be made promptly whether to take or not take evasive action. Once the decision to take evasive action has been made, action must be initiated immediately.

b. Attack Warning. A successful evasion depends on the timely receipt of a warning of the attack, which depends on effective lookout techniques and rapid communications.

c. Lookout Doctrine. Each aircrew member shall be assigned a sector of lookout responsibility. Within the limitations of aircraft configuration, the aggregate of such sectors shall provide 360 degrees of lookout around the aircraft. Lookout sectors shall be designated by clock coding with twelve o'clock coding oriented on the nose of the aircraft. Vertical sectors shall be designated with reference to the horizon; so that <u>level</u> shall refer to a position on the horizon, <u>high</u> to a position above the horizon, and <u>low</u> to a position below the horizon. Sectors shall overlap when possible. Individual lookout sectors and responsibilities shall not

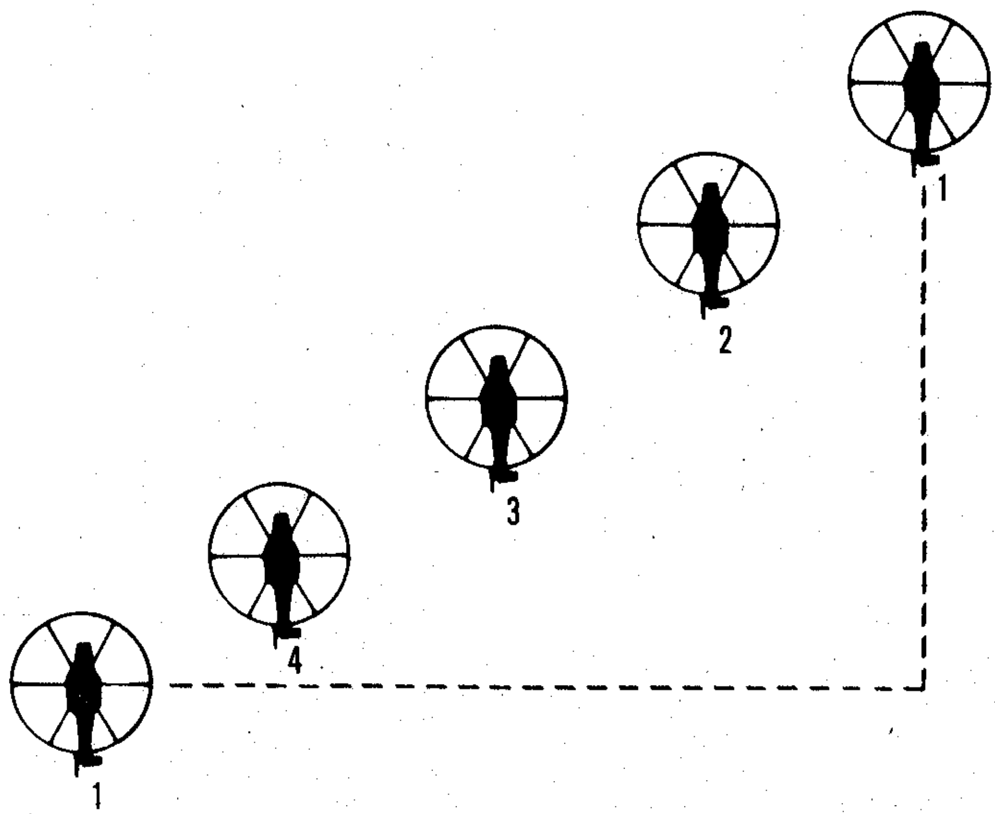


Figure 14-6. Lead Changes—Echelon Left Formation.

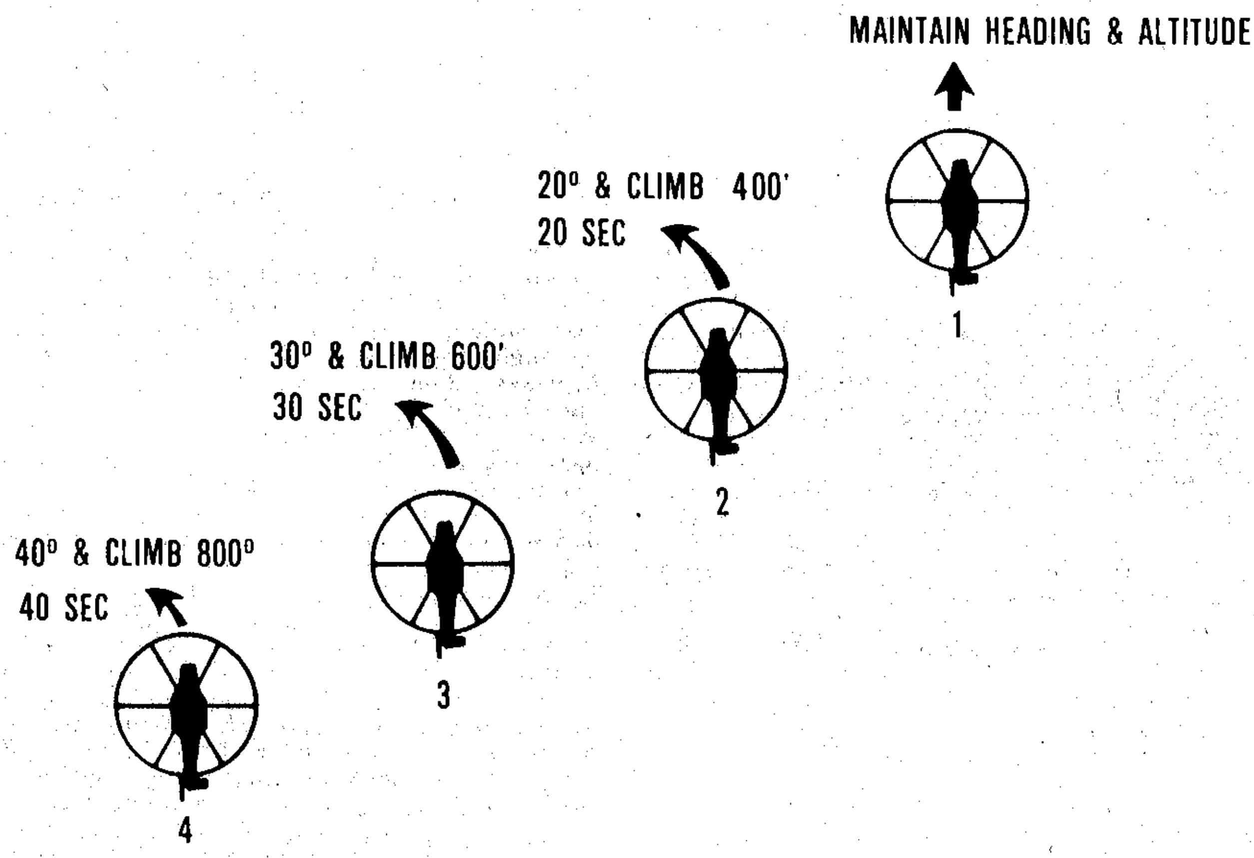


Figure 14-7. Lost Visual Contact—Breakaway for Left Echelon.

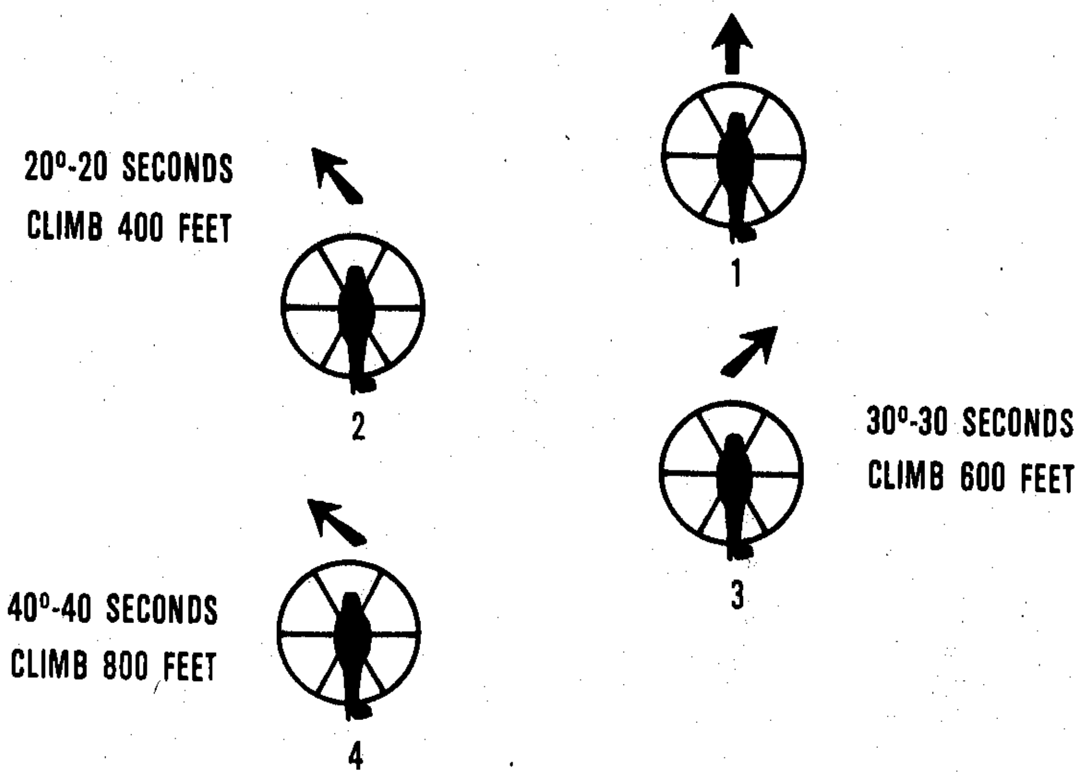


Figure 14-8. Lost Visual Contact—Right Staggered Formation.

be modified or relaxed when a helicopter is operating in a flight.

d. Exact terminology should be used when calling threats. Some examples are:

(1) Bogie - Any aircraft not positively identified as friendly.

(2) Bandit - Any aircraft positively identified as hostile.

(3) SAM - Visual sighting of missile launch.

(4) Triple A - Visual sighting of anti-aircraft weapons.

(5) Ground Fire - Visual sighting of small arms fire or other ground threat which cannot be readily identified.

(6) Engaged - The threat is attacking or maneuvering for an attack.

(7) Not Engaged - The threat is not making a hostile move or has not begun an attack.

(8) Low - Below the altitude of your aircraft/flight.

(9) Level - At the same altitude as your aircraft/flight.

(10) High - Above your aircraft's altitude.

e. The sequence and content of threat calls must be accurate and succinct. When calling a break, use the following sequence:

(1) Desired evasive maneuver
(2) Clock position
(3) Altitude
(4) Description

f. Examples of "Not Engaged" and "Engaged" threat calls are:

(1) Not Engaged: "Bogie/Bandit, 10 o'clock high, 5 miles."

(2) Engaged: "BREAK RIGHT (LEFT), BANDIT 4 O'CLOCK HIGH TWO MILES, MiG-21."

NOTE: The "Break" implies two critical elements: (1) you are engaged and, (2) the aircraft is CLEAR in the direction of the break called.

g. Two-Ship Techniques:

(1) Two-ship formation should employ tactics which use mutual support to defeat the enemy. Lead, of course, must be free to maneuver, as necessary. The wingman then maneuvers so as to maintain visual contact with lead. Several advantages can be realized:

(a) Two targets of opportunity may help to throw off the aggressor as he takes that split second on each pass to decide which helicopter to attack.

(b) If the formation is attacked by more than one aggressor and those aggressors go after one aircraft, the free helicopter may be able to warn his engaged wingman of an undetected attack from a blind quadrant.

(c) The free helicopter may also have more time to call for armed assistance while monitoring the attack.

(2) For a two-ship to successfully execute evasive maneuvering, preplanning, in the form of certain radio calls and an agreed upon response to those calls, is essential. Examples:

(a) Break right or break left - Both aircraft initially break in the same direction with an approximate 90° turn in response to an attack.

(b) Reverse right or reverse left - Both aircraft initially turn in the same direction and execute a 180° turn in response to an attack.

(c) Split - Aircraft on right side of formation breaks right, and aircraft on left breaks left.

h. Large formation techniques. For large formations, especially at night, the response to an attack can quickly become very complicated. The

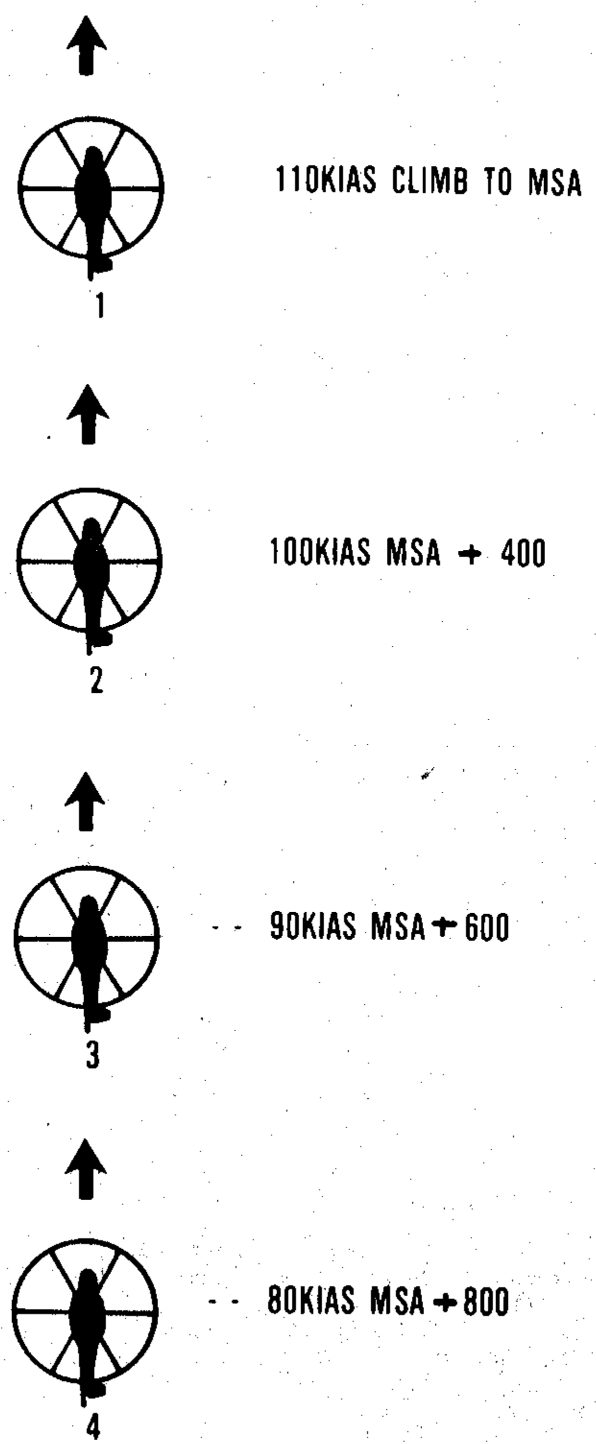


Figure 14-9. Lost Visual Contact—Trail Formation.

response may vary greatly based on many factors such as the nature of the airborne threat, the number and types of aircraft in the formation, the terrain etc. Some basic principles should be observed; however, if the intention is to break up the formation, consider the following:

(1) All members of the formation should be aware of their location within the flight and should be prepared to break away from the formation in such a way they will not break into another member of the formation, causing a mid-air. The breakup should be preplanned and prebriefed to avoid conflicts.

(2) If the preplanned break forces a member of the formation to place his 6 o'clock towards the attacker, he should be prepared to immediately reverse course once he is clear of the formation.

(3) If possible, an attempt should be made to maintain element integrity, thus allowing use of the two-ship tactics mentioned above.

(4) After breakup, the first consideration must be given to evasive maneuvering and terrain masking to break enemy contact.

(5) When the enemy threat has passed, the aircraft will proceed separately to a prebriefed rendezvous point for that leg. The rendezvous point is usually the first or second way point after the leg where the attack occurred.

(6) Loiter at the rendezvous point should be terminated after a given amount of time, usually predicated on lead's arrival. Alternate lead procedures should also be predetermined in case lead doesn't make it.

14-17. Leaving Formation. Aircraft normally will leave the formation by decelerating/turning away from the formation until clear of the formation. Do not rejoin until permission is received from lead.

14-18. Recovery:

a. Individual Recovery. Lead breaks up the formation prior to entering the traffic pattern. Aircraft enter normal traffic individually for landing.

b. Overhead Approach. If more than two aircraft, transition to echelon formation prior to entry onto initial, echelon flight away from the direction of the break. Fly traffic patterns at 500 feet AGL. Break interval should be prebriefed and never be less than two seconds. Lead may increase break interval if landing conditions warrant a greater time interval the briefed. Execute the break at the approach end of the runway or landing spot. Make a level 180 degree turn to downwind and accomplish the before landing check. Wingmen should fly the same pattern as the preceding aircraft to achieve the proper spacing. Each flight member will plan to land on the runway not closer than 200 feet behind the preceding helicopter. Each aircraft will plan the approach to allow room to safely pass the aircraft ahead of it. Announce any emergency as soon as possible.

c. Tactical Recovery. During tactical formation recoveries, maintain 500 feet separation throughout the approach and landing unless the aircraft are assigned separate helicopter pads in which case aircraft may close to the clearance interval.

d. Wing Landing. During staggered/trail formation recoveries, maintain one to three rotor disc separation throughout the approach and landing.

14-19. Helicopter Station Keeping Procedures. Whenever possible, attempt to maintain formation integrity and adhere to normal formation procedures given in chapter 14. In the event that IMC conditions exist such that those procedures cannot be used, primary consideration should be given to using single-ship IFR procedures, deviating around the weather or delaying further flight until VFR conditions exist. If, however, operational considerations mandate IMC formation, the following procedures will be used. The weather penetration must be pre-planned and an altitude reservation (ALTRV) requested IAW FLIP. Prior to using these procedures, formation leaders must insure all pilots in the formation have a thorough understanding of these procedures, and that formation aircraft have appropriate operational navigation and communication equipment.

a. Prior to entering IMC, calibrate each aircraft's compass, navigation equipment, airspeed, and altimeter against those of the flight lead. To make this check, fly in standard echelon formation. Lead announces base heading, airspeed, altitude, and gives DME check. The other elements note the errors in their instruments while in coordinated flight.

b. Once proper corrections are determined, assume IFR formation positions. Normally, only two helicopters fly in formation, but it may be required to fly with more than two under certain operations. In that event, lead flies at base altitude. Number two flies at base altitude plus 500 feet, and one mile in trail. Number three flies at base altitude plus 1,000 feet and two miles in trail. Number four flies at base altitude plus 1,500 feet and three miles in trail. The 500 foot stagger and one mile longitudinal separation are minimums and should be increased to 1,000 feet and two miles if feasible. Altitudes and airspeeds may be decreased when using onboard radar for station keeping (HH-53H).

NOTE: Be aware of atmospheric pressure variations and update altimeter settings frequently.

c. Station keeping is maintained primarily by use of air-to-air TACAN and course guidance from surface navaids (except HH-53H using unique systems). When dead reckoning, fly corrected headings and check alignment with UHF-DF at least every 10 minutes. An HC-130 may be able to assist in station keeping by flying extending trail and tracking flight members on radar. The HC-130 must be used in a monitoring role and is needed to accomplish lost COMM procedures.

NOTE: The station keeping capabilities of the HC-130 are very limited and dependent upon the aircraft's minimum operational speed, the operational status of the radar, the radar operator's abilities, and the weather. All of these factors must be considered prior to committing the HC-130 to a station keeping assistance role.

(1) Maintain trail position with air-to-air TACAN. If all others are on the same channel (i.e., lead on 29Y and all others on 92Y) then each airplane will display DME based on lead. Make channel assignments based on channels needed for navigation; this permits switching to X-band and T/R to obtain navigation data.

(2) Make formation altitude changes by calling, for example, "JOLLY 96, new base altitude, 4,500 feet climb (descend), NOW." On the command the flight initiates a 500 FPM climb (or descent). Maintain constant prebriefed/en route airspeed during the climb/descent. Lead calls out passing each 500 feet during the maneuver, so other elements can adjust their rates of climb or descent. At level-off, lead reconfirms new base altitude and airspeed.

(3) To accomplish a turn over a point on the ground, where there is no ground NAVAID, calculate the time required to travel the distance your helicopter is in trail from lead, and delay turning for that number of seconds from the turn command. Lead calls; for example, "JOLLY 96, new base heading 350 degrees, turn NOW."

(4) To adjust position in the formation, increase or decrease airspeed by 10 knots. Hold this change for 36 seconds for each tenth of a mile change of position needed. For example, ¼ NM position change would take 1½ minutes to complete. When in the correct position, resume corrected base airspeed.

(5) If air-to-air TACAN is lost, maintain position by:

(a) Station keeping assistance from an HC-130 escort. Provided it has already been used in that capacity and is in position to immediately render assistance.

(b) Frequent UHF-DF check. This is an emergency procedure and to be used only until Air Traffic Control is advised and the flight member is directed to accomplish single ship procedures.

d. Accomplish single ship recoveries under IMC using separate ATC clearances.

e. In the event of lost comm during IMC, maintain the last assigned heading and altitude and squawk 7600 for three minutes, then return to assigned squawk. Survival radios may be used to reestablish radio contact. If after squawking, radio contact is not regained, the comm out flight member will separate from the formation, rejoin at the rear of the formation and accomplish the prebriefed IFR clearance to include all particular instrument approaches at the destination. The HC-130 will notify lead (alternate lead) which flight member has lost comm and how he is separating from the flight. Lead will then contact ATC and tell them what routing, altitude, and instrument approach that flight member is going to accomplish.

Chapter 15

MEDICAL EVACUATION/MAST

15-1. Aeromedical Evacuation Missions. (Not applicable to MAST missions.) Aircraft will not be used for routine patient transfer. Medical evacuation flights may be operated to transport seriously ill or injured persons and/or to transport medical personnel, equipment or supplies under emergency conditions when other means are not suitable or readily available. Prior to dispatching an aeromedical evacuation mission, obtain the best medical evaluation available to determine the need for rescue assistance. This evaluation is not the final determinant that the mission will be performed.

15-2. Medical Assistance. SAR missions involving life threatening injuries/illnesses require immediate launch because any delays in reaching the patient/survivor further decrease the probability of survival. Avoid delays whenever and wherever possible. If one or more qualified pararescuemen are immediately available, deployment of aircraft/helicopters will, as a rule, not be delayed pending arrival of a local flight surgeon/physician. When feasible, the flight surgeon/physician may be transported by another aircraft/helicopter. The flight surgeons/physicians will assist in emergencies and when used, are in charge of the medical aspects of the mission. They provide specialized medical skill and equipment beyond the capability of ARRS pararescuemen. Unit commanders should continuously coordinate their local mission response criteria and requirements with flight surgeons/physicians so potential delays can be avoided. To familiarize the flight surgeons/physicians with procedures and available medical equipment, encourage their participation in training and operational missions, whenever possible.

15-3. Mast Missions. Certain Rescue helicopter units are designated as MAST units. These units are tasked to provide assistance in serious civilian medical emergencies (i.e., situations when an individual's condition requires airevacuation to a medical care center as soon as possible to prevent death or aggravation of illness or injury). The decision to request a MAST helicopter is based solely on the judgment of the law enforcement officer, physician, or other responsible persons at the scene of the emergency. Assistance may be provided if it does not interfere with the military mission. The authority for the MAST program is contained in the Defense Appropriation Act, Public Law 93-155.

15-4. Hazardous Medical Equipment Aboard Rescue Aircraft:

a. Any nonstandard medical equipment used during air evacuations should be regarded as potentially hazardous. Nonstandard electronic and oxygen equipment is an item designated by manufacturer and model number that is not listed in the current "Status Report on Medical Material Items Tested and Evaluated for use in the Aeromedical Evacuation System," Brooks AFB, TX 78235. Authorization for medical material not listed in this report will be addressed to ARRS/SG on an individual basis. If approval is granted for the use of nonstandard medical equipment, two types of equipment are of major concern:

(1) Electronic medical equipment that produces electromagnetic interference (EMI) which can interfere with aircraft communication and navigational equipment.

(2) Therapeutic oxygen systems present an increased hazard of fire/explosion.

b. Take the following precautions for nonstandard electronic medical equipment:

(1) Pararescuemen (or attached medical technician) must inform the A/C when nonstandard electronic medical equipment is brought aboard the aircraft. Include the anticipated period of use of the equipment during the mission.

(2) Be alert for any interference with aircraft communication or navigation equipment caused by this equipment.

(3) When continuous use of the equipment is required throughout the duration of the mission, flight is restricted to VFR conditions. Use additional caution on night VFR missions to insure there are no adverse effects on navigational equipment.

c. Take the following precautions for nonstandard oxygen equipment:

(1) All compressed oxygen equipment with exposed unprotected cylinder neck, manfold or regulator must be completely secured from all movement in its longitudinal and lateral axes.

(2) Pararescue (or attached medical technicians) must continually monitor the operation of the equipment to detect possible malfunction during flight.

Chapter 16

HOIST OPERATIONS

16-1. General. The following procedures apply to both day and night operations. Parachute flares provide the best possible illumination for night hoist operations, but if not available, hoist operations at night can be safely accomplished using aircraft lighting/night vision goggles/pave low system. Use these procedures unless there is a conflict with the flight manual.

16-2. Rescue Devices. The aircrew determines which device to use. A survivor unfamiliar with the rescue device should be assisted by a crewmember, briefed over a loud hailer, or provided printed instructions attached to the device to insure proper entry and security for a safe pickup. The rescue hoist will not be used to relay messages except when all other possible means of communications (i.e., radio, message streamers, loud hailer) have been exhausted. In this event, the rescue hoist may be used only when necessary in a life or death situation, or to determine if one exists.

NOTE: Rescue devices used for hoist training will be identical to and configured the same as operational equipment. If live hoist training is to be conducted, only operational equipment will be used.

a. Forest Penetrator:

(1) The description and maintenance instructions for the forest penetrator are contained in TO 14S6-3-1 and TO 00-25-245, section IV.

(2) The forest penetrator can be used for single or multiple recoveries from land or water. It is recommended for recovering personnel whose parachutes have become entangled in trees. It allows assisting personnel use of both hands to aid the survivor. The forest penetrator can be used to recover inert or injured personnel safely with the exception of those with back injuries.

(3) Procedures:

(a) Establish a stable hover. Fold the seat paddles and stow safety straps with the zippers closed before lowering the forest penetrator through trees or dense foliage.

(b) If the hoist operator loses sight of the rescue device, the cable tension must be relied upon to detect when the penetrator has reached the ground. If it appears that the penetrator has reached the ground, it should be raised several feet and relowered to insure that it is not hung up.

(c) When there is no visual or oral communication with the survivor, the hoist operator will hold the hoist cable, for survivor's signal. Jerks on the cable is the signal to start retrieving the cable. Hoist retrievals from trees must be slow enough to allow survivors to fend off branches, and prevent cable entanglement.

(d) It may be possible for a crewmember on the penetrator to recover the survivor without unstrapping from the penetrator.

(e) It is possible to recover three people at one time with the penetrator. However, this should only be done when time is critical since it may load the hoist to the limit.

(f) If the crewmember leaves the penetrator to assist the survivor during a tree recovery, fold the seat paddles and stow the safety straps with zippers closed so that they will not snag on obstructions if the helicopter moves or the hoist cable has to be retracted.

(g) For water recoveries, install the flotation collar prior to lowering the penetrator. Place at least one seat paddle in the down position and remove one safety strap from the stowed position. Do not unhook the safety strap fastener from the penetrator.

b. Stokes Litter:

(1) Description. The device is constructed of wire mesh and light weight steel tubing that holds a survivor immobile in a supine position. The sides of the litter protect the survivor from bumping against obstructions or the side of the helicopter during retrieval. The stokes litter will be configured with the sling, flotation devices, and three restraining belts when stowed on the aircraft. Construction, modification, inspection, and maintenance instructions for the stokes litter are contained in TO 00-75-5.

(2) Applicability. The stokes litter should be used to immobilize the survivor. Once the survivor is strapped securely in this device, he/she need not be moved until arrival at the medical facility. The stokes litter will be secured to helicopter prior to takeoff.

(3) Procedures

(a) To lower the litter, place it outside the aircraft foot end first; then move it parallel to the side of the helicopter. The hoist operator may be required to lean out of the door to maneuver the litter.

NOTE: For water recoveries, the stokes litter may be deployed utilizing the low and slow deployment procedures (see chapter 21). This is the quickest means of deployment and subjects a critically injured survivor in the water to less exposure to rotor wash.

(b) Lower the stokes litter to the survivor after the helicopter is established in a hover. The hoist operator provides enough slack so that the crewmember can disconnect the hoist cable. It is not necessary to stay over the survivor once the litter is removed. After the survivor is secured in the litter and ready for hoisting, the crewmember reconnects the hoist cable and insures that rescue hook safety pin and carabiner locking sleeves are properly positioned. When using the stokes litter, insure that the survivor is securely strapped in the litter prior to hoisting. For small patients, the belt can be routed directly across the patient. For large patients, the belt can be routed outside and over the top bar before securing patient to the litter.

(c) Use extreme care when hoisting the stokes litter because of litter pendulum action and rotation. These actions may increase to unmanageable proportions if they are not quickly stopped by the hoist operator. The pendulum action is dampened by moving the cable in the opposite direction of the litter movement. Litter rotation can be stopped by rotating the hoist cable in a one- to two-foot diameter circle in the opposite direction of the rotation of the litter. In extreme emergencies if litter rotation cannot be stopped by the hoist operator, the pilot can transition to forward flight at an airspeed of up to 40 knots (30 KIAS H-1's) to stop oscillation and rotation.

(d) Stop the litter just below the helicopter. Then maneuver the litter to align it parallel to the aircraft. At the same time, push the litter outward so that the basket does not contact the side of the helicopter. Litter maneuvers may require both hands. This maneuvering may be accomplished by using the litter cables.

(e) When the stokes litter is parallel, raise the litter to the full-up position so that the litter is above the cabin floor level. Turn the litter perpendicular to the aircraft and pull it into the cabin head first. The pilot or another crewmember may have to provide cable slack at this point.

c. Rescue Net:

(1) Description: The Rescue Net, (FSN 1670-433-3426LX) is constructed of stainless steel tube frame and 5/16 inch polypropolene netting. The net weighs approximately 20 pounds. A sea anchor drogue is provided to position and stabilize the net and allow for flight path corrections. The sea anchor drogue may be replaced by a 10-foot line with a three-five pound bag of shot for stability.

(2) Applicability. The rescue net is particularly useful for recovery of personnel not familiar with the forest penetrator and/or stokes litter. Because entry is easier and more rapid for a survivor than a forest penetrator. It is perhaps the best device for recovery of survivors from frigid waters.

(3) Procedures:

(a) The rescue net may be lowered on final approach at airspeeds below 30 knots. While in forward flight for a water recovery, the 10-foot line may be allowed to contact the water prior to reaching the survivor. Lower the net to the water short of the survivor at an approximate ground speed of three-five knots.

(b) Raise the net as soon as the survivor enters it. Do not wait for a signal from the survivor. As soon as the net clears the surface, the survivor is forced to its back and prevented from falling out.

(c) An immobile survivor may be recovered in the same manner except that a crewmember may have to ride down in the net to assist. A stable hover is required for this type pickup.

(d) Due to the size of the net, remove the survivor from the net prior to bringing the net into the helicopter.

CAUTION: The rescue net must be held firmly against the helicopter while the survivor or crewmember depart the net.

16-3. Hoist Operator. The primary hoist operator will be the flight engineer; however, any crewmember may be designated the rescue hoist operator as the mission dictates. Therefore, all crewmembers should understand these duties. The hoist operator's duties are to relay directional instructions on interphone and to operate the hoist from the cabin position leaving the pilot free to concentrate on hovering. When radio contact is not available, hand signals will be used between ground personnel and the recovery helicopter.

a. Ground the hoist to discharge static electricity to prevent personnel on the ground or water from sustaining a shock. To preclude ignition of fuel, do not ground the hoist near spilled fuel from damaged aircraft or vehicles.

b. Use caution during hoist operations; insure that slack cable is held to the minimum necessary to perform the recovery. Excessive slack can be especially dangerous during water recovery where the survivor cannot see the cable.

c. Notify the aircraft commander any time the hoist cable cannot be adequately monitored. In such cases, alternate methods of making the pickup should be considered or an additional crewmember should be used to help monitor the hoist cable.

d. Greater than normal oscillations may occur when the hoist cable is raised and lowered without some weight attached.

e. If pendulum action and rotation of the rescue device are not quickly stopped, the rotations may increase to unmanageable proportions. The pendulum action may be dampened by moving the cable in the opposite direction of the movement of the rescue device. Rotation of the rescue device can be stopped, if detected early, by rotating the hoist cable in a one-or two-foot diameter circle in the opposite direction of rotation of the rescue device.

f. Do not conduct hoist training with the hoist operator's interphone inoperative.

16-4. Power Available Check. See paragraph 19-2, this manual.

16-5. Land Hoist Procedures:

a. Smoke Drop Pattern. Determination of wind direction and velocity is important to successful hoist operations. If a smoke device is used, plan an approach to drop the smoke device as low and slow as terrain permits. Complete the smoke drop checklist and deploys the smoke device near the survivor. Deploy smoke close enough to the survivor to give accurate wind information and, if possible, in an area that can be seen from anywhere in the hoist pattern. Select a nonflammable target area for the smoke device.

b. Hoist Pattern:

(1) Complete the pilot's hoist recovery checklist and the hoist operator's checklist prior to starting final approach for hoist recovery.

(2) If possible, establish a right-hand, rectangular pattern with a final approach oriented into the wind. This aids in keeping the survivor in sight while preparing for the pickup.

(3) Keep the hoist operator informed of position in the pattern at all times. Likewise, the hoist operator informs the pilot when ready to deploy smoke markers or accomplish the pickup.

(4) On final approach at night, turn on all available lighting (except NVG/PAVE LOW Operations) to provide maximum illumination. Lighting configuration may be varied in conditions of restricted visibility.

(5) During descent at night or adverse conditions, the copilot will call out altitudes in 100-foot increments when above 300-feet AGL and 50-foot increments when below 300-feet AGL.

(6) If the survivor appears to be injured and attached to the parachute, hover at an adequate distance to prevent the rotor wash from billowing the parachute and dragging the survivor.

c. When the pilot has determined that the recovery can safely be accomplished, direct the hoist operator to "Go Hot Mike" prior to losing sight of the survivor.

Devote full attention to maintaining a steady hover, use all available references and the hoist operator's instructions. The copilot will monitor the engine instruments, help maintain adequate blade tip clearance and remain oriented with the horizon throughout the hoisting operation to assist the pilot should the need arise. The hoist operator will assist the pilot in maintaining adequate rotor tip clearance to the rear and right side of the helicopter. The rear ramp of the H-3/H-53 may be opened to aid in clearing the rear of the helicopter.

d. When the survivor is in the rescue device and ready for hoisting, the hoist operator will give instructions to position the helicopter over the survivor and take up any slack in the cable. Normally, the hoist operator will raise the survivor, however he may request the pilot to "raise helicopter." The hoist operator will keep the pilot advised of the survivor's position. When the the survivor is in the cabin, notify the pilot and complete the after pickup checklist. When over trees, advise the pilot when the survivor is clear of the trees.

e. For H-53 hover coupler operations, the flight engineer (FE) may be directed to take control of the aircraft and operate the hover trim control. The hover trim control stick is immediately engaged upon notification from the pilot. The FE will hover taxi the helicopter, using the Hover Trim Control, to a position over the area. Once positioned over the area, the FE may transfer control to the pilot for the appropriate operation.

16-6. Land Hoist Precautionary Measures:

a. Hoist operators will monitor interphone.

b. Hoist training over trees may be conducted at authorized sites that are adjacent to a suitable emergency landing area. During exercise training, comply with exercise procedures.

16-7. Deployment Water/Hoist Procedures. Water hoist recoveries may be accomplished day or night. Lack of depth perception and possible disorientation at night and in marginal weather require more precise smoke drop patterns and procedures. Use day procedures during both peacetime and combat exercise operations. H-53 water hoist operation will normally be accomplished with the landing gear down. H-3/53 may be flown over water with the gear pinned down.

NOTE: Pulling the landing gear warning system circuit breaker on the H-53 is not authorized.

The hover position for water hoist is directly over the survivor. However, once the rescue device is lowered to the water, the pilot may elect to back to a holding hover. Once the survivor is ready for hoisting, the pilot should establish the hover over the rescue device prior to hoisting the survivor out of the water. **CAUTION:** Smooth water adversely effects depth perception.

a. Day Pattern:

(1) Complete pilot's hoist recovery checklist and hoist operator's checklist prior to final approach.

(2) After initial sighting of the survivor, maneuver to a position approximately 100 feet downwind of the survivor from which an observation pass can be accomplished (figures 16-1 and 16-2). If the survivor's condition is unknown or swimmer deployment is anticipated, the observation pass will be made at a maximum of 10-feet AWL and 10 knots between zero and 90 to the wind line to allow for swimmer deployment. If swimmer deployment is not required, make the observation pass above translational lift airspeed at approximately 25-feet AWL.

(3) After the observation pass, initiate a climbing right turn at 50 feet AWL to a 100 feet AWL minimum downwind altitude. Deploy sea dye or smoke markers as directed by the pilot. If OGE power is not available, a minimum of 50 KIAS and 50 feet AWL is required prior to initiating the climbing turn to downwind. With OGE power, start the turn at a minimum of translation lift airspeed and 50 feet AWL. Use sea dye instead of smoke markers to avoid detection during combat or when an oil or fuel spill is near the survivor. In high sea states or high winds, use of more than one sea dye is recommended. During combat water training at locations that prohibit use of sea dye marker, aircrews may use a smoke marker as a hover reference. If use of sea dye or smoke markers is prohibited or not required proceed without them.

(4) Roll out on downwind and then continue turn to final. Do not descend below 50 feet AWL until established on final. If the survivor is not ready for immediate pickup, tactical situation permitting, establish a holding hover approximately 75 feet downwind of the survivor.

(5) On final, descend to hover altitude and slow to approximately five knots forward hover speed 75 feet downwind from the survivor. If the helicopter instrument panel interferes with forward visibility, the final approach may be displaced to the left.

b. Night or Marginal Weather Water Hoist Pattern: (NA to Pavelow or NVG operations)

(1) Upon initial sighting of the survivor, deploy a smoke marker in the immediate vicinity of the survivor.

(2) Commence pilot's hoist recovery checklist and hoist operator's checklist prior to initiating the hoist pattern.

(3) After the wind direction is determined, establish a smoke drop pattern at 300 feet and 70 KIAS (H-1, H-3), 80 KIAS (H-60A), and 90 KIAS (H-53) so that the final approach pass over the survivor is aligned approximately 30 degrees to the right of the wind direction.

(4) When immediately over the survivor, the hoist operator will deploy all three markers with one second intervals—the first two markers should be dropped straight downward while the third should be thrust outward and downward at an approximate 45-degree angle from the heading of the aircraft. The pilot may delay the deployment of the smoke markers for up to three seconds after passing over the survivor when conditions warrant extended hover, i.e., exceptionally high hover heights, or strong wind/current conditions. Sea dye may be used in addition to or in lieu of smoke markers (i.e., the sea dye marker is a safer method of establishing a hover reference when an oil/fuel spill is near the survivor). If sea dye is used in addition to smoke markers, deploy it prior to the smoke markers.

(5) Normally, a right hand rectangular hoist pattern is flown with a final approach to the wind, see figure 16-3. When parachute flares are deployed, a left hand pattern is flown to avoid descending flares. Remain conscious of the location of descending flares, duds and burned out flares. Unnecessarily extending

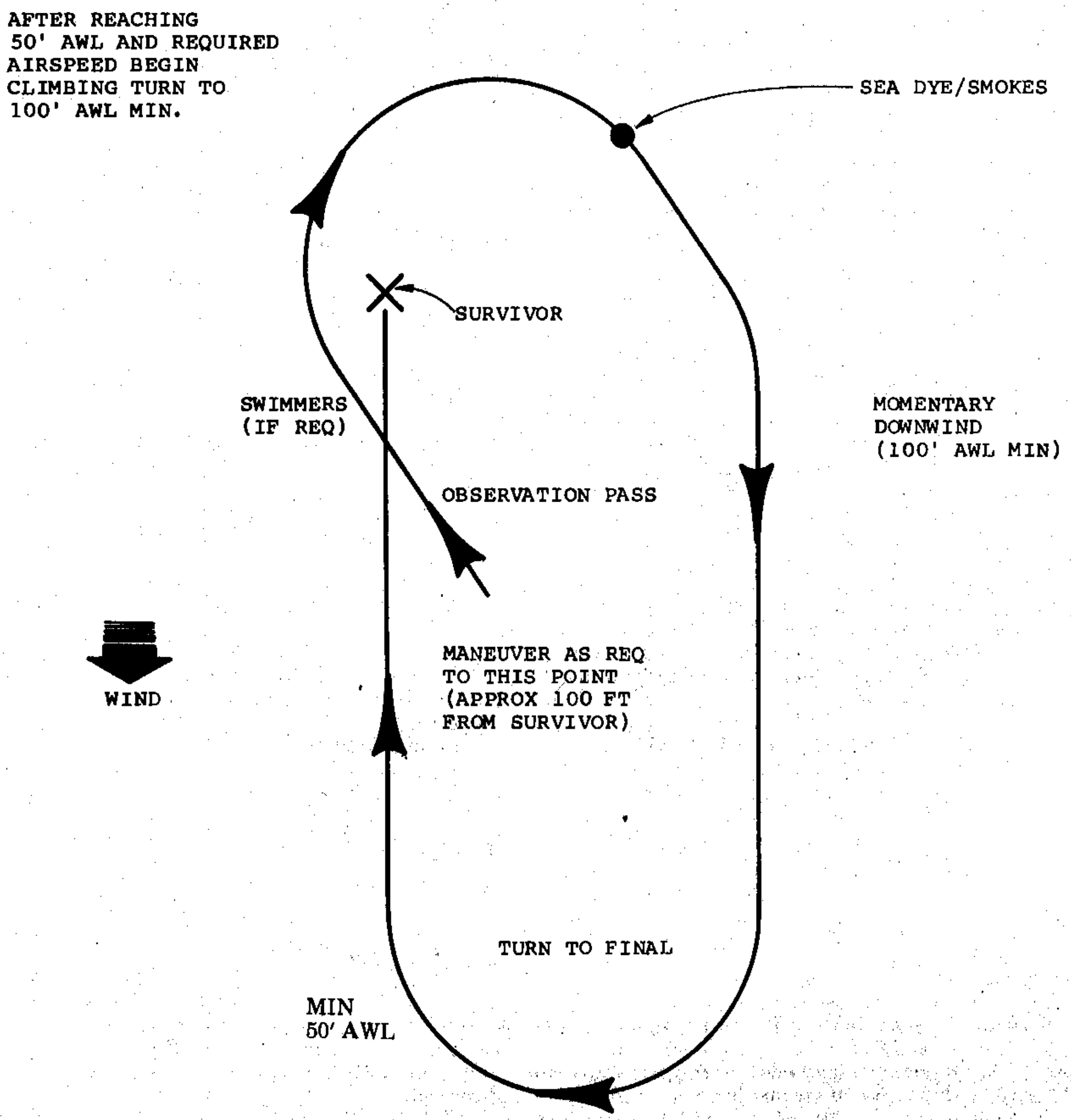


Figure 16-1. Typical Water Hoist Pattern—H-3/H-53/H-60A.

1. Deploy swimmers 10-30 yds downwind from survivor.
2. Deploy sea dye 10-30 yds from survivor.
3. Do not deploy sea dye directly upwind from survivor.
4. Maintain 50 KIAS minimum during climbing turn and downwind if OGE power is not available.

the hoist pattern may result in losing the survivor's position.

(6) The pilot will keep the hoist operator informed of the position of the aircraft in the pattern at all times. The hoist operator will acknowledge each position report and keep the pilot abreast of all changes.

(7) Establish final approach using the survivor and smoke markers as references. Once the approach is started, cross-reference the flight instruments so as to reach approximately 200 feet AWL with an approximate forward speed of 30 knots (unless using HH-53H unique systems and TF altitude is lower). Decrease airspeed and altitude to reach a minimum hover as determined by sea state, salt spray, and power reserve. 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 from the survivor while allowing the helicopter to continue moving slowly forward to the hover point. If the helicopter instrument panel interferes with forward visibility, the initial hover may be offset to the left.

(a) Normally, use all available lighting. Lighting configuration may be varied in conditions of

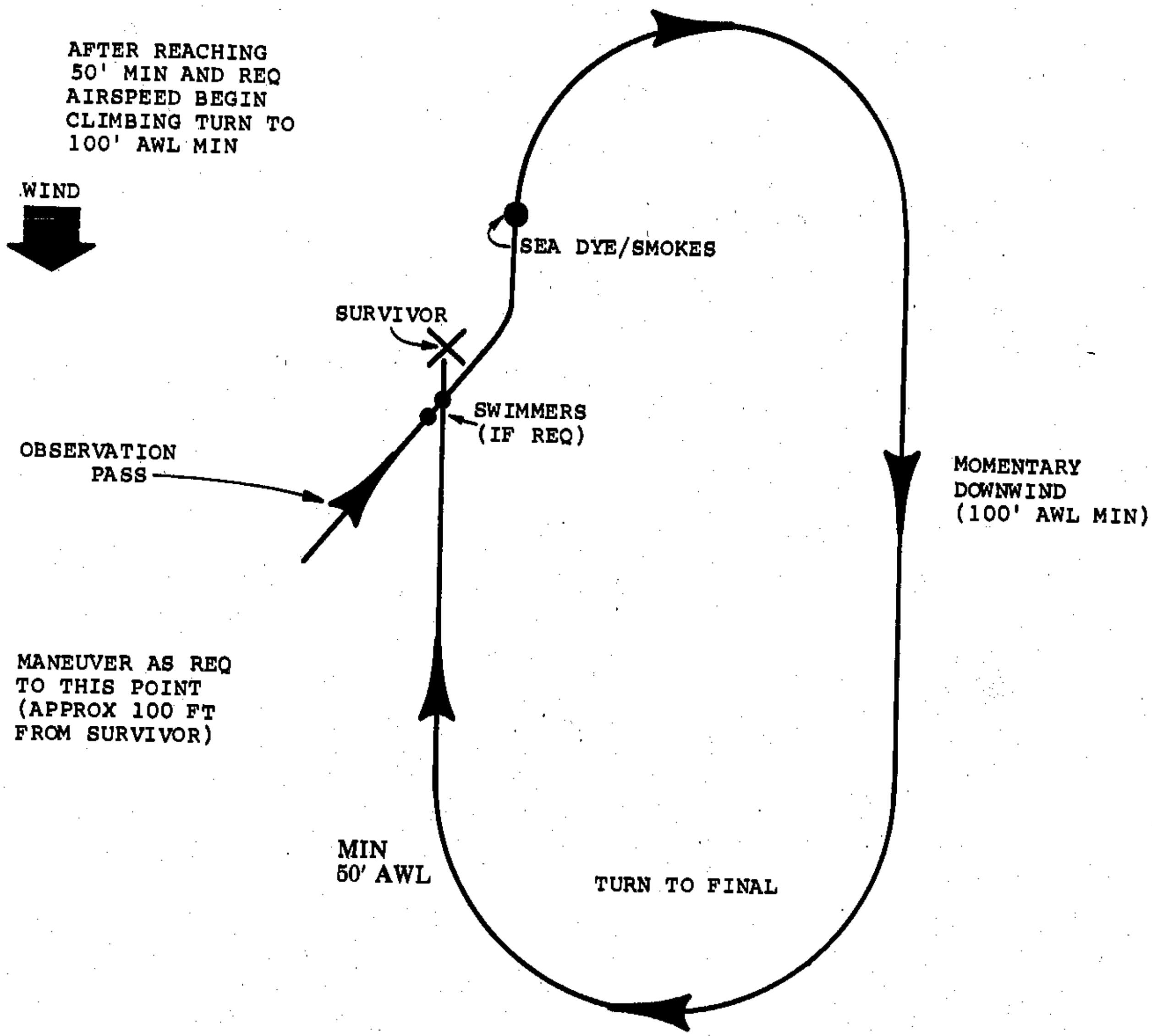


Figure 16-2. Typical Water Hoist Pattern—H-1/60A.

1. Deploy swimmers 10-30 yds downwind from survivor.
2. Deploy sea dye 10-30 yds from survivor.
3. Do not deploy sea dye directly upwind from survivor.
4. Maintain 50 KIAS minimum during climbing turn and downwind if OGE is not available.

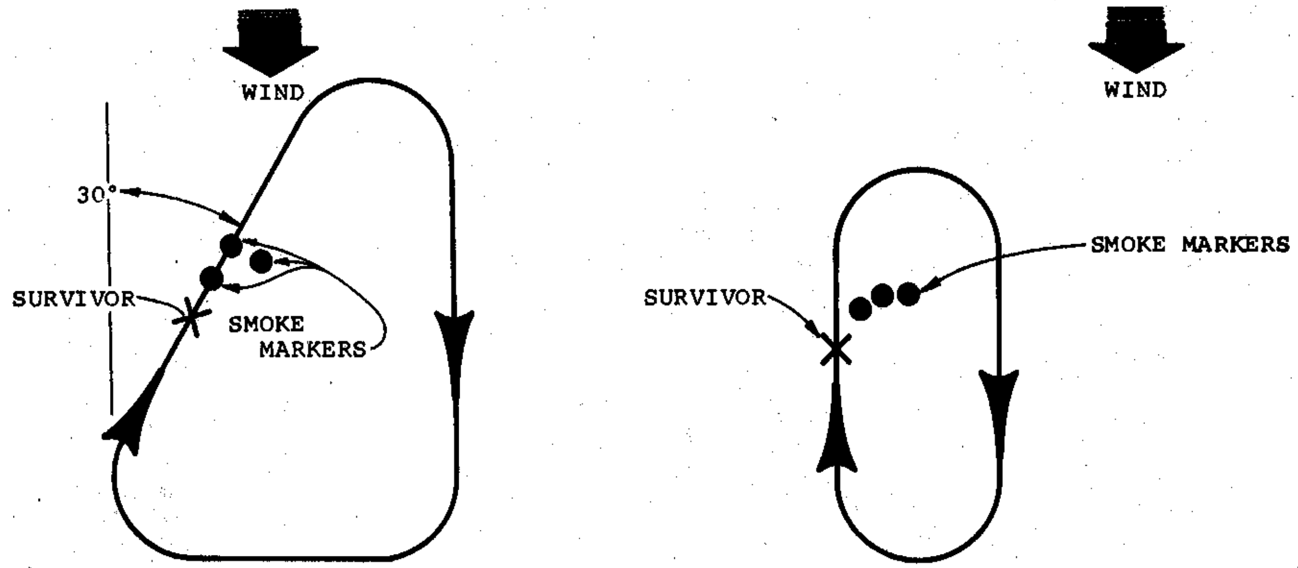
restricted visibility. Large and excessive movements when adjusting the search or landing light may induce vertigo.

(b) Cross reference the radar altimeter with the barometric altimeter throughout the pattern and hover. The pilot not flying/flight engineer calls out passing altitudes in 100 foot increments above 300-feet AWL and in 50 foot increments below 300 feet AWL. Monitor rate of descent and callout excessive decent rates. A steep and/or fast final approach at night is extremely hazardous. If airspeed and/or rate of descent are excessive on final, go around.

(c) Attempt to determine where the smoke generated by the markers is drifting. Under light or variable wind conditions, the smoke may pose a visibility and orientation hazard. Be prepared to execute a go-around, if necessary.

c. Recovery Phase: Pilots must devote full attention to altitude control and power settings during the transition from the approach to the hover phase. Prior to losing sight of the survivor, direct the hoist operator to "Go Hot Mike." The hoist operator should shift visual references from the water to the horizon at frequent intervals to prevent spatial disorientation. When the survivor is in the rescue device and ready, the hoist operator gives instructions to position the helicopter over the survivor, takes up any slack in the cable. Normally, the hoist operator will raise the survivor, however, he may request the pilot to "raise helicopter." The hoist operator will keep the pilot informed of the survivor's position. When the survivor is in the cabin, complete the after pickup checklist.

(1) A raft approached very slowly will be blown along slowly in advance of the rotor wash. As a raft is approached, do not excessively slow the closing speed, but move smoothly toward and directly over the



WATER SMOKE MARKER PATTERN

WATER HOIST PATTERN

(**Note:** Entire pattern may be flown race-track 30° off-set from wind)

Figure 16-3. Night/Marginal Weather Water Hoist Pattern.

raft. Hovering over small boats may present the same drift difficulties as a raft. Personnel supported by life jackets present no drift problem.

(2) If the survivor appears to be injured and is attached to the parachute, hover at an adequate distance to prevent the rotor wash from billowing the parachute and dragging the injured survivor.

(3) The pilot must not attempt to watch the pickup as spatial disorientation may result. Pilot vertigo can become a problem during night hoist recovery. Use the attitude indicator as an additional reference in conjunction with the dye and smoke markers.

(4) Beware of the tendency to drift backwards while hovering at night over water. This may result in a loss of relative wind and loss of lift causing the helicopter to descend. If allowed to continue, sufficient power may not be available or overtorque of the main gear box may be required to recover.

16-8. Water Hoist Precautionary Measures. Conduct water training at approved water operating areas:

a. Surveillance by a motorpowered surface vessel or hoist equipped helicopter is required for single-engine helicopters during water training. The surveillance helicopter will be prepared to deploy a 7- or 20-member life raft.

b. Do not conduct water hoist training/evaluation in single-engine helicopters over water when water temperature is below 55°F.

c. Conduct all water hoist training a minimum of 100 yards offshore.

d. Night water hoist training requires:

(1) Ceiling and Visibility. When parachute flares are used, 3500 feet and three miles.

(2) A rescue configured HC-130 capable of deploying PJs or MA-1 kits in absence of a surface vessel or another hoist equipped helicopter. *EXCEPTION:* A non-hoist capable H-3 may be used provided the sea state is three or less. The H-3 must carry a fully qualified rescue crew.

(3) Operable radar altimeters when installed.

(4) Each helicopter will either drop smoke or fly a simulated smoke drop pattern at prescribed altitude if using another helicopter's smoke. (N/A HH-53H when operating on unique systems.)

(5) Parachute flares are not required for training in sheltered areas (inland lakes, bays, etc.) where sea state conditions are not a safety factor. Open sea NWH training requires parachute flares except HH-53H, when operating on unique systems. IPs may direct a pattern and recovery without flares to familiarize the crew with limited visibility operations and precautions. Use pattern in Fig 16-3 when parachute flares are not required.

16-9. Inert Survivor Recovery. Hoisting procedures for the recovery of an unconscious or inert survivor from water or land areas are as follows:

a. The hoist operator determines if the victim is unconscious or unable to enter the rescue device. The pilot directs one of the crewmembers to be lowered by the hoist and another to act as hoist operator. The pararescue specialist, when available, is the primary crewmember for deployment to aid an injured or inert survivor.

b. The hoist operator insures that the crewmember being lowered is properly equipped and the the equipment is properly adjusted. Advise the pilot when the crewmember is ready to be lowered.

c. Enter the rescue device after the approach. Secure the survivor for hoisting and give a "thumb up" signal to indicate that the survivor is ready for pickup.

16-10. Voice Procedures:

a. The hoist operator directs the pilot over the survivor or hover point using standard terminology. Instructions should be clear and concise with commentary on the progress of the approach and hover operation. The hoist operator can aid the pilot with airspeed control during the approach by describing the reduction of distance, in a numerical sequence, from a given point from the survivor, to a hover point over the survivor. The frequency of numerical calls that are made should indicate the speed of the helicopter toward the survivor or closure rate. A closure rate is not necessarily given in a preset distance of feet, yards, or meters, but is normally associated with one of them. An example would be "survivor at twelve for one hundred, seventy five, fifty, forty, etc." The faster the call, the more rapid the closure. "Five, four, three, two, one, stop." If too fast, and you can't safely slow the helicopter down in time, don't hesitate to call a "go around." Standardized words for directions and motion may be added to better describe actions necessary for safe operation, i.e. "Slow forward, turn right, stop back."

See examples below:

DIRECTION	MOTION
Forward	Fast
Back	Slow
Right	Stop
Left	Hold
Up	Turn
Down	

Raise helicopter (for initial lifting of survivor by pilot)

16-11. Safety Procedures:

a. Throughout the entire recovery phase, the pilot not flying/flight engineer monitors the flight instruments and advises the pilot when reaching the altitudes, airspeeds, and rates of descent prescribed. When in a hover, the copilot/FE cross-references the attitude indicator and the reference smoke. If the pilot becomes disoriented, initiate an instrument takeoff or direct the other pilot to assume control of the aircraft.

b. Monitor the hoist mechanism to insure proper cable feedout and retrieval. Crew briefings prior to hoisting will include positive actions to be taken in the event of equipment malfunctions or impending failures such as overheating, oil seepage, unusual cable vibrations, etc. During training missions, terminate live hoisting immediately at the first indication of equipment malfunction. If possible, return the individual to the surface by lowering the aircraft. For actual SAR missions, existing circumstances must dictate actions to be taken. The hoist operator will advise the pilot, check hoist power sources and hoist controls, and request another crewmember to operate the hoist, if necessary.

c. Exercise the utmost caution during hovering operations to preclude anchoring the helicopter hoist hook or cable around an immovable object. The hook and cable should be kept in view at all times to prevent the cable from becoming entangled with ground objects. If the hook or cable should become fouled, attempt to free it by playing out slack and manipulating the hoist. Use caution when applying tension to the cable. If the cable should break, cable whiplash action can cause rotor damage.

d. The hoist operator will wear a heavy, work-type glove on the hand used to guide the hoist cable and have the helmet visor down (visor down is not required when wearing NVG's).

e. When pulling the survivor into the helicopter, the easiest method is to turn the survivor's back to the helicopter and pull in. This procedure reduces the possibility of semiconscious or injured survivor fighting the hoist operator. The rescue device should never be removed from the hoist cable or the survivor until the survivor is safely inside the helicopter and clear of the door.

f. To prevent dropping the rescue device, use the hoist hook safety/retaining pin. *EXCEPTION:* When raising or lowering an empty stokes litter for water recoveries, the use of the safety/retaining pin is not required. This makes it easier to remove the litter from the hoist cable. Install the safety/retaining pin prior to hoisting the litter with a survivor.

g. If a loss of power is experienced while hoisting, attempt to lower the person being hoisted to the surface. It may be necessary to cut the cable. Should an inadvertent landing occur, primary consideration must be given to moving away from personnel on the ground.

h. Interphone Failure. If interphone failure occurs between the pilot and hoist operator and cannot be remedied by changing interphone cords, have the copilot or another crewmember relay the hoist operator signals to the pilot. The hoist operator gives directions by moving an open hand with the palm turned in the desired direction of movement. To hold position, clench the fist. The hoist operator can direct use of the hoist control or indicate hoist operation by extending the thumb of a clenched fist either up, down, in or out, as applicable. To indicate "survivor in and secure and ready for takeoff," point in the direction of intended takeoff.

16-12. Purpose of the Tag Line. The combination of boat size, mast or antenna obstructions, rigging obstructions, and little or no relative wind may result in a hoist during which the pilot will be unable to see the vessel. Conditions might also prevent the pilot from maintaining a high hover for any length of time. In these situations, the tag line can be used to simplify the hoist operation. It reduces the time the pilot is required to maintain a stable hover without a reference, and also prevents wide swinging during a high hoist or when a rescue device must be lowered to a restricted location.

16-13. Procedures for a Tag Line Hoist:

a. A weight should be attached to the end of the tag line without the weak link. The other end of the tag line may be fastened to either the hoist hook small eye or the rescue device. Snap the tag line to the hoist hook or the hoisting device by the weak link, just before the device goes out the door.

b. Deliver the tag line from a hover while using extreme care to avoid fouling the line in the rotor system.

(1) To deliver the tag line to a small vessel, establish a hover short of the vessel and lower the tag line to the water and then raise it approximately five feet above the water. The hoist operator will then direct the pilot to the vessel.

(2) To deliver the tag line to a large vessel with a restricted pickup area, the tag line should be lowered

after the helicopter is in a hover over the vessel.

c. The pilot normally loses sight of the vessel during deployment of a tag line and has to rely entirely on the hoist operator for position information.

d. Once the tag line is on the vessel and the boat crew is tending it, the hoist operator directs the pilot clear of the vessel while paying out slack in the tag line. When the pilot can again see the vessel, the hoist operator begins to lower the hoist.

e. Shipboard personnel use the tag line to guide the rescue device into the desired location.

f. When the rescue device is on the vessel's deck and the survivor is ready for hoisting, the hoist operator gives directions to position the helicopter back over the deck. Retrieving the rescue device vertically may not always be possible. Be aware of this and be prepared to recover the rescue device at an angle. However, when conditions permit, always recover the rescue device vertically. As soon as the survivor is clear of the deck and all obstructions, the hoist operator clears the helicopter away from the vessel, usually left but sometimes back. Maintain this position until the survivor is in the cabin and the tag line is either retrieved or discarded and the crewmember has reported ready for forward flight.

g. The tag line will be used in lieu of the hoist cable to lower small items to a boat. The item to be lowered will be attached to the snap link with the weight. Use the same procedures as above for delivery of the tag line to small and large vessels. The weak link end of the tag line will be attached to a cabin tie-down ring.