Chapter 20

PREPARATION AND MANUAL LAUNCH OF PYROTECHNICS

20-1. General. This chapter covers the preparation and manual launch of pyrotechnics. TO 11A10-24-7, TO 11A10-26-7, TO 11A8-5-7, TO 11A8-2-1, and TO 11A10-25-7 contain the technical data on pyrotechnics, and AFR 127-100 and MACSUP 1 contain mandatory explosive safety standards. On all flights have heat protective or fire fighters gloves readily available and helmet visor down (or be wearing NVG's) when deploying pyrotechnics.

CAUTION: Prior to arming pyrotechnics inflight, a door will be open to permit emergency jettisoning.

20-2. Parachute Flares. Use parachute flares to illuminate areas for emergency crash landing, ditching, landing, hovering, dropping of supplies, and/or recovery equipment. Prior to arming pyrotechnics inflight, open a door to permit emergency jettisoning. If flares are to be used over land or over flammable areas, ensure they are launched at a sufficient height to allow for burnout prior to impact. Two crewmembers are required in cabin when deploying parachute flares.

a. M8A-1, Aircraft Parachute Flare:

(1) Operation. Pull the tear strip and remove the shipping cover. Attach the lanyard to the swivel loop of the hangwire. Launch flare parachute end up (attachment end) to assure opening. Be sure lanyard does not foul.

(2) Special Precautions. Drop from a minimum altitude of 2,500 feet above the surface to assure complete burnout before impact. Be sure lanyard does not foul. A pull of only 12 pounds on the lanyard after the flare is armed will initiate the fuses.

b. The LUU-4/B is a 1.6 million candlepower flare which is activated by a 30-pound pull on a lanyard during launch from an aircraft. The flare descends approximately 1,500 feet while burning. Approximate burn time is three minutes. Because the pyrotechnic candle consumes the flare case, the parachute may tend to hover during the last minute of burning time. Approximately 10 to 20 seconds prior to candle burnout, the heat of the burning illuminant activates the cable fitting explosive bolt, releasing a parachute shroud line and collapsing the parachute, allowing the flare to fall quickly to the ground, clearing the air of debris.

CAUTION: Care should be taken not to pull parachute shroud lines. Any pull in excess of 52 pounds will cause flare ignition. During flare handling, should the pull plug be accidently pulled and the cover assembly released, that portion of the parachute that comes out of the case may be stuffed back into the case and the cover assembly safely hand held and taped onto the flare housing. The flare is then marked for disposal.

c. LUU2A/B, Aircraft Parachute Flare:

(1) Operation. Set desired feet of fall in flare timer end cap.

NOTE: A setting of 500 feet sets a time delay of 6.3 seconds. A launch altitude of 3,000 AGL provides light at 2,500 AGL. The flare descends approximately 2,500 feet during burning. The snap hook in the lanyard package of the LUU 2A/B shipping container may be used for the flare attaching end. Attach a 10-foot lanyard, secured to a tie-down ring near the exit to the time set knob. Ensure that static line is clear of all extremities and/or equipment before dispensing flare. Flare launcher should coil excess static line and hold against the flare body. Toss flare overboard from the exit with ignition end out first. (Ignition end opposite from timer end cap.) A force of 30 to 35 pounds is required to extract the timer dial knob and drogue cover strip. The knob and cover strip remain with the static line. Retrieve the static line and dispose of all residue.

(2) Special Precautions:

(a) If the timer set knob is accidentally pulled and the timer cycle starts, the timer and release mechanism may be forced back onto the flare housing to prevent ejection of the timer and release mechanism. When the timer completes its cycle, tape the mechanism on the flare housing and mark for disposal. If the timer is ejected from the flare, that portion of the parachute that comes out of the housing may be stuffed back into the housing, taped, and marked for disposal.

(b) Pre-ignition of Flare or Full Blossom of Parachute:

JETTISON FLARE OR CONTAINER IMMEDIATELY.

WARNING: In the event of flare ignition, an attempt will be made to jettison the flare. In the event of candle ignition, intense light, heat and lethal gas will be experienced. Adequate respiratory, eye, and hand protection will be sought as soon as emergency permits. Flare suppression will be attempted as a last resort.

(c) FLARE BREAKAWAY FAILS TO RELEASE:

1. Static Line - CUT.
2. Pilot - NOTIFIED.

d. Marker Location (Ground-Marine), LUU-10/B:

(1) Physical Description. The LUU-10/B marker consists of two major subassemblies. The upper case assembly contains the deployment and flotation systems. This section contains: deployment lanyard cables, end cap, pullout cord, parachute, candle riser cable, igniter, compressed gas cartridge, flotation collar, actuating devices for the igniter and gas cartridge, and a manually extractable safety pin to prevent actuation prior to use. The safety pin is accessible from the outside, and the olive drab tape which circumscribes the upper case. The lower case assembly (approximately the lower two-thirds of the marker) consists of the outer container, inner insulation, and pressed candle. The candle assembly contains the pyrotechnic for producing the smoke. The assemhly contains approximately 10 pounds of smoke composition and 15 grams of igniter composition.

(2) Functional Description. The LUU-10/B marker may be hand launched from the UH-1N, HH-3, HH-53, and HH-60A helicopters and automatically dispensed from the HC-130. Design launch velocities are 0 to 200 knots at altitudes of 200 to 3000 feet. The deployment lanyard

becomes taut when the marker separates three feet from the launch point. The end cap is pulled out by the deployment lanyard, the marker separates an additional 15 feet, feeding out the pullout cord. The parachute container is pulled out of the marker when the pullout cord becomes taut, after the parachute is completely extended and candle riser tension actuates the inflation and igniter mechanisms, inflating the flotation collar and igniting the candle. Upon complete extension of the parachute, risers, and lanyards during deployment, the tension force on the deployment lanyard and the marker separates from the aircraft. Upon separating from the aircraft, the marker descends until impact on land or water. After impact, the marker continues to burn, emitting a red smoke signal for a period of 20 minutes with a minimum risk of igniting adjacent vegetation during operation.

20-3. Manual Parachute Flare Launching Procedures:

a. Obtain wind direction and velocity from the most reliable source (i.e., forecast, surface indications, doppler, etc.), and verify the information. The flare helicopter must establish precise patterns prior to committing the recovery helicopter into the target area. Constantly monitor the winds throughout the operation to preclude a wind shift from drifting the flares into the recovery helicopter.

b. Secure mission flares to the cabin floor with cargo tie-down straps.

c. Station the helicopter Flight Engineer (FE) at the door to deploy the flares. Other personnel may uncrate and supply the flares to the FE as required, and assist in keeping the cabin clear of flare crating material. The forward edge of the cargo door (the bottom and aft edges of the crew entrance door sill) may be taped if necessary to preclude chafing of the flare lanyard during repeated drops.

d. All crewmembers participating in the flare launching will wear a restraining harness adjusted to prevent exit from the aircraft. The crewmember deploying the flares will wear flying gloves and have a pair of heat protective or fire fighters gloves readily available in case of fire. All other personnel in the cabin not performing duties will be seated with seat belts fastened.

e. Drop two flares on each pass, one immediately after the other, to assure continued illumination in the event of a dud. On training flights, one flare may be dropped with another readily available for immediate deployment. Attach the flare lanyards to the cabin floor tie-down ring just aft of the personnel door. Limit lanyards to less than 10 feet to prevent fouling on the skide or in the main landing gear well after flare deployment. Lanyards will be locally manufactured, preferably of nylon tape. Use snap hooks of proper size to fit the flare and tie-down ring.

NOTE: Retrieve static lanyard immediately to prevent possible damage to aircraft.

20-4. Parachute Flare Drop Pattern.

a. Upon locating the target, the recovery helicopter will establish the pattern direction (left or right) into the wind. The flare helicopter will establish a pattern which will keep the pattern of the recovery helicopter clear of descending flares. Normally, the flare helicopter will fly a right-hand pattern and the recovery helicopter will fly a left-hand pattern (see figure 20-1).

b. Fly the flare pattern at a minimum of 3000 feet AGL (2,500 feet for M8A-1/LUU-4/B), 70 KIAS or 90 KIAS, with an absolute maximum of four minutes between drops (three minutes for M8A-1/LUU-4/B).

CAUTION

Airspeed during final approach and deployment of flares should never exceed 90 KIAS. Flare lanyard may cause damage to aircraft.

c. Estimate drop heading and timing from target to drop by use of figure 20-1 and adjusted as necessary.

d. The pilot establishes the flare pattern and advises the FE of the drop timing. The FE accomplishes the flare drop checklist and advises the pilot when complete.

e. The FE advises the pilot when over the target. The pilot not flying will start the timing and then make a countdown over the interphone from five seconds to "DROP NOW." The FE notifies the pilot when the flares are deployed and their conditions (i.e., dud, streamer, or good light one and/or two). The FE advises the pilot when it is clear to turn.

f. Notify the recovery ship any time a malfunctioned flare is dropped (i.e., good chute, no flare). The recovery ship will remain clear of the flare line until the flare's position can be determined.

g. The recovery helicopter will advise the flare ship, as necessary, on corrected drop heading and timing to ensure sufficient illumination during the hoist recovery; i.e., "Correct five degrees left and time to drop of 18 seconds."

h. Alternate Flare Drops Pattern. Due to the shorter burn time of some parachute flares, an alternate flare drop pattern may be required. A parallel pattern 500 feet abeam the recovery helicopter's pattern should be flown. Timing is the most difficult aspect of this pattern. Timing can be adjusted by turning abeam the hover point; however, if high winds prevent this, a separate pattern based on timed turns may be required. When using this type of pattern, consideration should be given to dropping a marker smoke in the general area of your release point to assist in determining a more exact release time. This pattern is not as precise as the established flare drop pattern, but it does allow for a safe means of deploying parachute flares without endangering the recovery helicopter.

20-5. AN-MK 6, MOD 3; Aircraft Smoke and Illumination Signal:

a. Use. This signal provides long burning surface smoke and illumination for day or night use. It is used to mark sightings at sea, make sea evaluations, marking a sea lane for night water landings or wind drift determination prior to deploying personnel. It may be used to provide smoke on land surfaces if a fire hazard does not exist. Burn time is approximately 40 minutes.

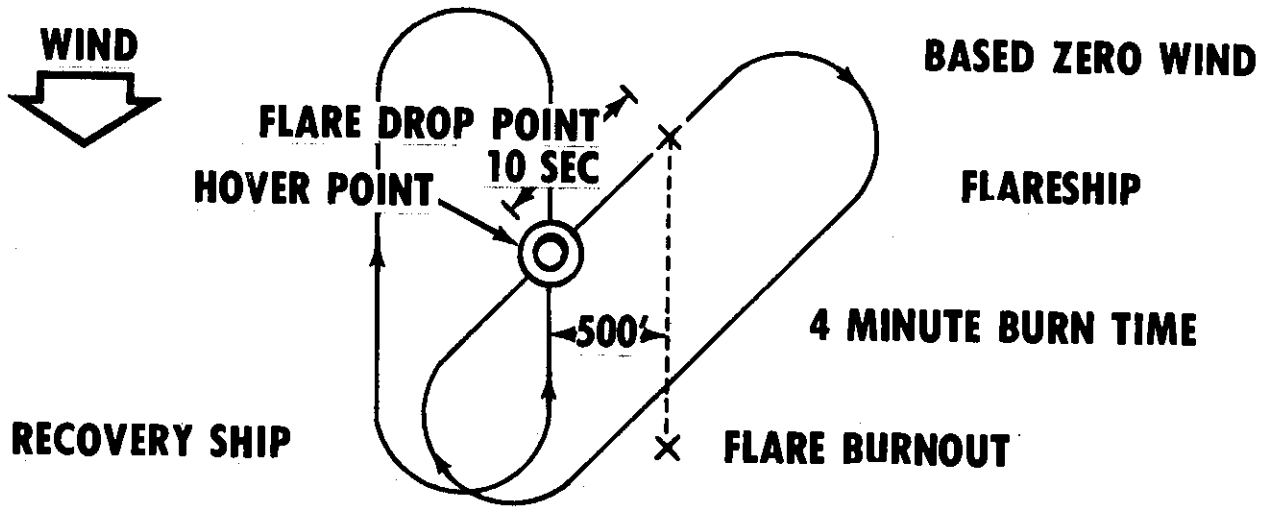
b. Operation. Prior to launching the signal, remove the adhesive tape covering the pull ring.

NOTE: Do not remove the four square patches of adhesive tape covering the metal caps in the holes from which flame and smoke issue after ignition of the candle. At the time the signal is launched, actuate the pull-type igniter either by hand or by a lanyard attached to the aircraft which sharply pulls the ring attached to the friction wire. This signal may be deployed from altitudes up to 5,000 feet AGL.

WARNING: The illumination and smoke signal must be launched immediately after the igniter has been actuated.

c. Special Precautions. Do not use a static line or lanyard to actuate the smoke signal when used for wind

FLARE DROP PATTERN



DROP HEADING AND TIME		70 KIAS	90 KIAS
AVERAGE W/VEL	HEADING CORRECTION	TIME/SEC	TIME/SEC
0	045°	10	10
5	020°	20	15
10	015°	40	30
15	010°	60	45
20	008°	90	70
25	006°	120	90
30	004°	180	120

NOTE: 90 KIAS RECOMMENDED FOR WINDS OVER 15 KNOTS

Figure 20-1. Flare Drop Pattern.

determination prior to personnel deployment. All safety-armed unexpended pyrotechnics: return them to original containers, and turn them over to the responsible personnel upon completion of the flight.

20-6. AN-MK 5, MOD 4; Aircraft Smoke and Illumination Signal:

a. Use. This marker was designed to be dropped from aircraft over water (salt and fresh) during day or night operations. It provides a flame 12-15 inches in height, accompanied by white smoke for a period of approximately 12 minutes.

b. Operation. Launch the signal nose down from the exit. No lanyard is required. Minimum recommended altitude and airspeed for launch is 300 ft AWL and 65 KIAS. The signal has a delay time of 22 seconds after impact.

20-7. MK 25, MOD 3; Marine Location Marker:

a. Use. This marker was designed for day or night use for any and all sea surface reference point marking purposes which call for smoke and flame in the 10-20 minute range.

b. Operation. To activate the marker, rotate the base plate from the safe to the armed position to allow the battery cavity ports to be opened. Open the ports by pressing

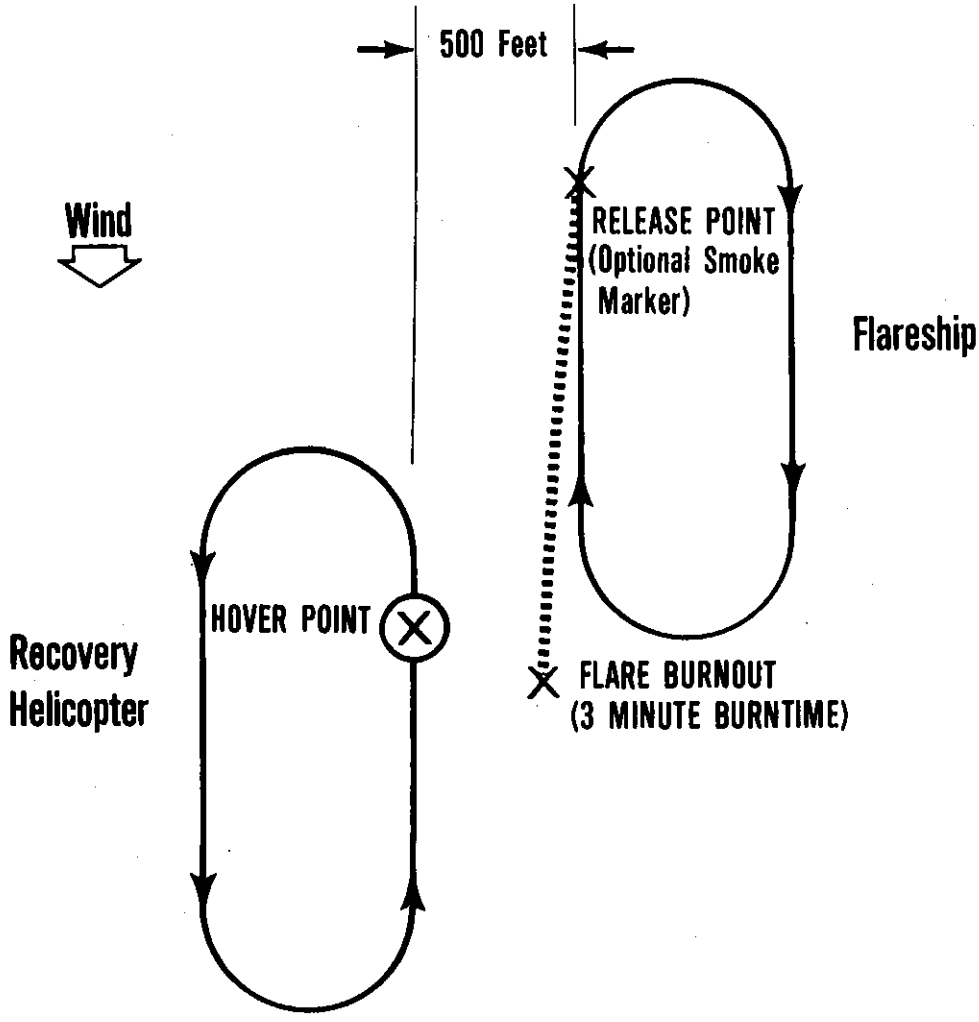


Figure 20-2. Alternate Flare Drop Pattern.

the two brass colored port plugs into the battery cavity using the thumb and forefinger. A one-pound force is required for plug removal. This device is considered to be a sealed unit until its base plugs (one or both) have been pushed in. For use in fresh water, open only one port and pour in approximately one tablespoon of dry tabis salt (crushed salt tablets may be used).

CAUTION: Use only dry salt.

WARNING: Do not return armed markers to storage. To preclude needless waste of flares, do not push in the brass plugs until committed for deployment.

WARNING: When required, retrieve the expended flare from the water with asbestos gloves and place the burned end down in a metal container filled with water. Transport flares to a point whare EOD can receive them. The bucket, water and flares must be transported as a unlt. Do not pour out the water as it may be contaminated with phosphorous capable of spontaneous reignition.

20-8. MK 1, MODS 2 and 3; Marine Location Marker:

a. Use. This marker is designed to produce a daylight reference point on ocean's surface in the form of a chrome yellow dye slick. It is used to mark sightings, as a signal in search and rescue operations, or as a hover reference point. Dye persists for approximately 30 minutes.

b. Operation. Remove marker from its shipping container. Grasp the signal firmly in one hand, holding the safety lever firmly against the marker body while the cotter pin is removed and until the marker is launched. For launching in a hover, throw the marker forward and down from the right cabin door when directly over the survivor.

c. Special Precautions. Do not remove the safety cotter pin from the firing mechanism unless the marker is held properly. The grenade-type firing mechanism must be held so as to assure that the safety lever is secure against the body of the marker. Only a small movement of the release lever is required to free the striker.

WARNING: Do not attempt to replace the safety cotter pin after it has been removed. Once removed, the marker must be expended.

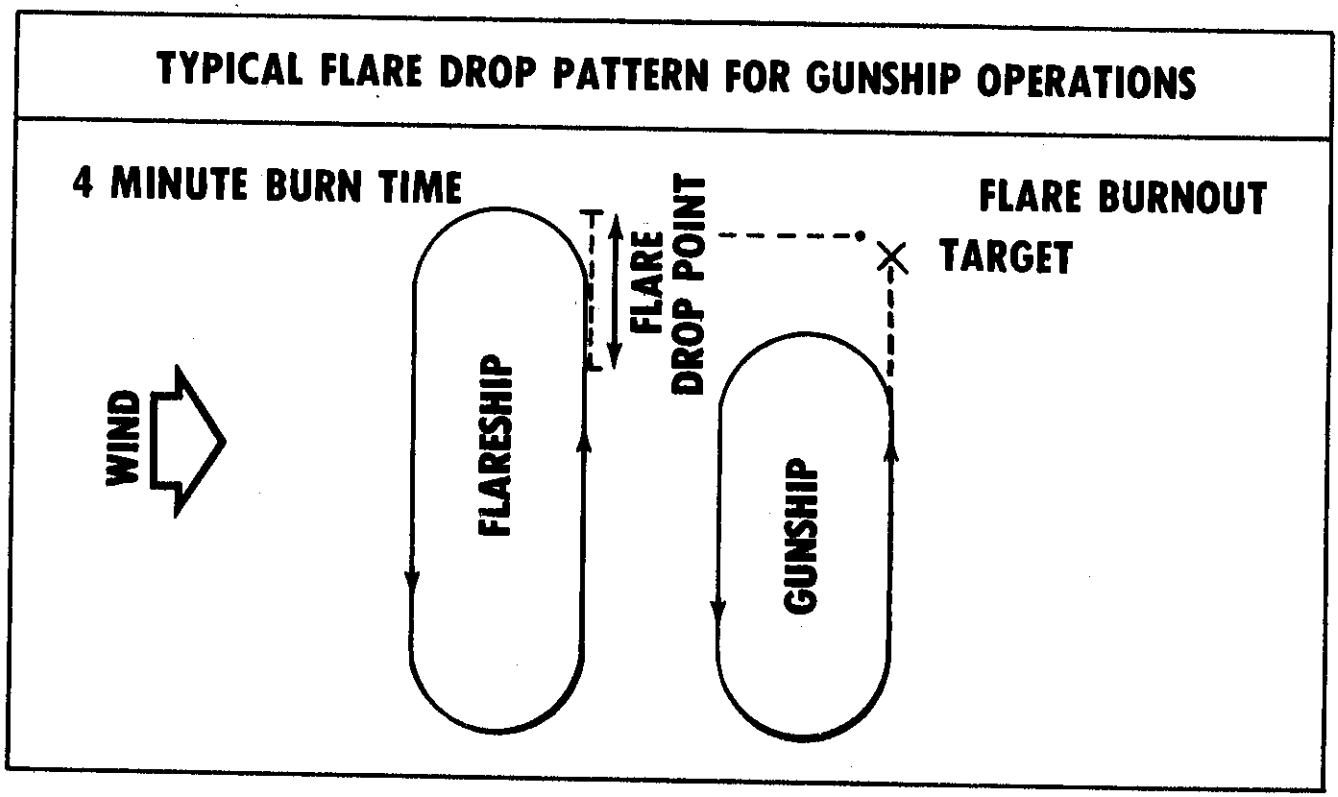


Figure 20-3. Gunship Flare Drop Pattern.

20-9. AN-MK 59; Marine Location Marker:

a. Use. This marker is designed to produce a daylight reference point on the ocean's surface in the form of a fluorescent green dye slick. It is used to mark sightings or as a signal in search and rescue operations. Dye persists for approximately two hours.

b. Operation. Open the cardboard container and remove the barrier line and completely open the end of the barrier bag overpack. When ready for deployment, invert the bag and allow the dye bag to free-fall from the protective bag. Upon striking the surface, the plastic bag ruptures, releasing the dye.

NOTE: Due to the fragile nature of the plastic bag containing the dye, it should be left in the barrier bag until deployment.

20-10. AN-MK 13, MOD 0; Marine Smoke and Illumination Signal:

a. Use. This signal is a combination distress signal for use under day or night conditions. It may be used to signal search aircraft and to indicate wind direction for paradrops or aircraft landings. Smoke or flame time is approximately 20 seconds for each end.

b. Operation. Determine which end of the signal to use. (Orange smoke for day and flare for night.) The flare end of the tube can be identified by a series of embossed projections extending around the case approximately ¼-inch below the closure. Remove the paper cap and give a quick pull on pull ring which will come away from the can, thereby igniting the composition.

NOTE: If unable to remove the soldered cap in this manner, bring the pull ring down over the rim of the can and press down using the ring as a lever to break the seal. Hold the signal at arm's length at an angle of about 30 degrees upward to prevent hot drippings. Signal may be restored to its original packing after cooling and retained for use of the opposite end.

c. Special Precaution. Never attempt to ignite both ends of the signal at the same time.

20-11. AN-MK 8; Smoke Grenade (White, HC Hexachloroethane):

a. Use. This smoke grenade is used for daytime ground and ground-to-air signaling of search aircraft to indicate wind direction or for prearranged visual communications. Smoke time approximately three minutes.

b. Operation. To launch, grasp the signal firmly in one hand holding the safety lever firmly against the grenade body while the cotter pin is removed and until the grenade is launched.

c. Special Precautions. Do not remove the safety cotter pin from the firing mechanism unless the smoke is held properly and is ready for launching. The grenade-type firing mechanism must be held so as to assure that the safety lever is secure against the body of the smoke until it is launched. Only a small movement of the release lever is required to free the striker igniting a 1.2 to 2-second delay element of the fuse.

WARNING: Do not remove the safety pin until just prior to deployment. Once prepared for use, the smoke must be expended.

20-12. MK 18; Smoke Grenade (Red, Green, Yellow, or Violet). This grenade is used for the same purpose as the AN-M8. Its operation and precautions for handling are identical. Smoke time approximately one minute.

20-13. Very Pistol:

a. Use. These signals provide day or night identification or signaling from aircraft or surface. Additionally, when used with the Mark 50, Mod 0 (IRCM Flare), it provides an infrared threat decoy designed to divert heat-seeking weapons (missiles) away from the helicopter.

b. Operation. Insert and lock the cartridge in the breech of the pistol. Once inserted and locked in the breech, the flare is launched by pulling the trigger. When used in-flight for diverting infrared weapons, the following procedures apply:

(1) Load flares into bandolier.

NOTE: Mark 50, Mod 0 flares are shipped in hermetically sealed containers and should not be opened unless actual use is anticipated. Once opened, the one year shelf life begins.

(2) Install mounting bracket on the aircraft.

(3) Attach Very pistol to the mount.

(4) Load the Very pistol (inflight prior to entering the threat area).

NOTE: Flares will not be loaded until Very Pistol is attached to the mount and must be unloaded prior to detaching from the mount.

WARNING: The Very Pistol is cocked and ready to fire at all times when the breech is closed.

(5) Don the bandolier or store it immediately available at the firing position.

(6) Upon detection of a missile launch, fire the appropriate flare in a manner that will draw the missile away from the aircraft. Do not fire at the missile.

NOTE: As soon as the pistol is fired, immediately reload to maintain a continuous defensive capability. IRCM kit contents are outlined in AFR 51-2/MACSUP 1, 23 AFR's 55-13 and 57-1. When these kits are aboard the aircraft, the provisions of TO 11-1-33, and TO 1-1-4 apply. During hands-on training with the IRCM kit, live rounds will not be loaded. Expended cartridges may be used to practice loading and reloading of the pistol.

c. Special Precautions:

(1) Do not fire flares if fuel siphoning is observed or fuel is being jettisoned.

(2) The smoke and fumes of the Mark 50, Mod 0 flares are highly toxic. If a flare is expended in a confined space, don protective masks immediately.

(3) If an aircraft signal fails to fire:

(a) Keep the pistol pointed in the intended direction of fire.

(b) DO NOT OPEN THE BREECH.

(c) After five seconds, make two attempts to fire the flare.

(d) If the signal still fails to fire, wait 30 seconds before removing the signal from the pistol.

Chapter 21

PERSONNEL/EQUIPMENT DELIVERY

SECTION A—PERSONNEL DELIVERY OPERATIONS.

21-1. General. There is seldom a tactical requirement for airdropping personnel from helicopters. The procedures in this chapter are provided for those instances where airdrops are required. Personnel delivery operations refer to operations where the unloading of personnel is accomplished from an aircraft in forward flight. Personnel will exit the aircraft on command of a qualified jumpmaster or jumpmaster under the supervision of an instructor after clearance is received from the aircraft commander.

21-2. Mission Briefing. A thorough briefing will be given by the aircraft commander. All aircrew members and the jumpmaster will attend. Ensure a passenger briefing is given. In addition, the following items will be covered:

a. Use of restraining devices.
b. Use of doors and/or ramps.
c. Movement in cargo compartment.

21-3. Personnel Parachute Drop Zone Markings:

a. Placement and type markings for both night and day drops will be as outlined in AFM 3-5, FM 31-20, USREDCOMM 10-3, ARRSR 55-11, and this regulation. Command emphasis must be focused to ensure that the DZ controllers and aircrews are fully coordinated on type markings used, configuration on the DZ, method of identification/authentication and release point.

b. For training or exercise SOF missions, a "Regular L" is normally erected. The helicopter flies up the base of the "L" and the jumpers exit when abeam the flanker panels. When using this marking system, the helicopter does not normally fly the 50 meter offset.

21-4. DZ Identification/Authentication:

a. Surface-to-Air:

(1) The primary method of confirming DZ identification is by radio contact. The display of a specified target panel/light/shade pattern during the scheduled time block (Example: two minutes prior to two minutes after a scheduled (TOT) and oriented to the approach azimuth/track at the specified geographical location may serve as DZ identification and authentication.

(2) An additional code light or smoke signal may be used for identification/authentication.

(3) All authentication requirements indicated on the mission request must be met or the drop will be aborted.

b. Air-to-Surface. The aircraft is identified/authenticated by arriving in the objective area within the specified time frame on the designated approach azimuth/track.

21-5. Personnel Parachute Delivery Deployment Abort Procedures. When conditions are not safe for the drop or if the drop is aborted for any reason, the following procedures will apply: Any crewmember will notify the aft compartment crewmembers by interphone using the words "No drop." The crewmember will acknowledge. The jumpmaster must be notified immediately upon determination of the delivery abort.

21-6. Wind Limitations for Personnel Parachute Delivery. Wind limits are determined by type of parachute used, water/land deployment and type of terrain. Wind limits will be prebriefed to the aircraft commander by the jumpmaster.

21-7. Altitude/Airspeed Limitations for Personnel Parachute Delivery (Training):

a. Minimum pattern altitude: 1500 ft AGL/AWL (1000 ft for SOF when required for contingency training)

b. Delivery airspeed: 60-90 KIAS (specific airspeed must be briefed prior to take-off)

NOTE: Static lines will not be hooked up until the aircraft is 1000 feet AGL.

21-8. Personnel Parachute Delivery Positions On-Board the Aircraft:

a. H-53—Standing on ramp.
b. H-3—Standing at main cabin door.
c. H-1/H-60A—Sitting on floor at edge of cargo doors. From either/both sides (if only one side is used it should be the side opposite the tail rotor.)

21-9. Aircraft Restrictions:

a. H-53—Tail skid must be retracted.
b. H-3—Main landing gear must be up.
c. H-1/H-60A—Cabin door on tail rotor side should remain closed unless delivering parachutists from both sides.

NOTE: H-3/53—To avoid the static line from becoming entangled with the jumper, the static line will be accordian folded and held until the weight of the jumper pulls the line free.

H-1/H-60A—To avoid the static line from becoming entangled all excess static line will be restowed in the jumpers parachute static line retaining bands.

21-10. Aircraft Preparations:

a. The anchor line will be connected through the floor mounted tie-down rings as depicted in figures 21-1 through 21-4.

b. During preflight the crew will ensure the following actions are accomplished:

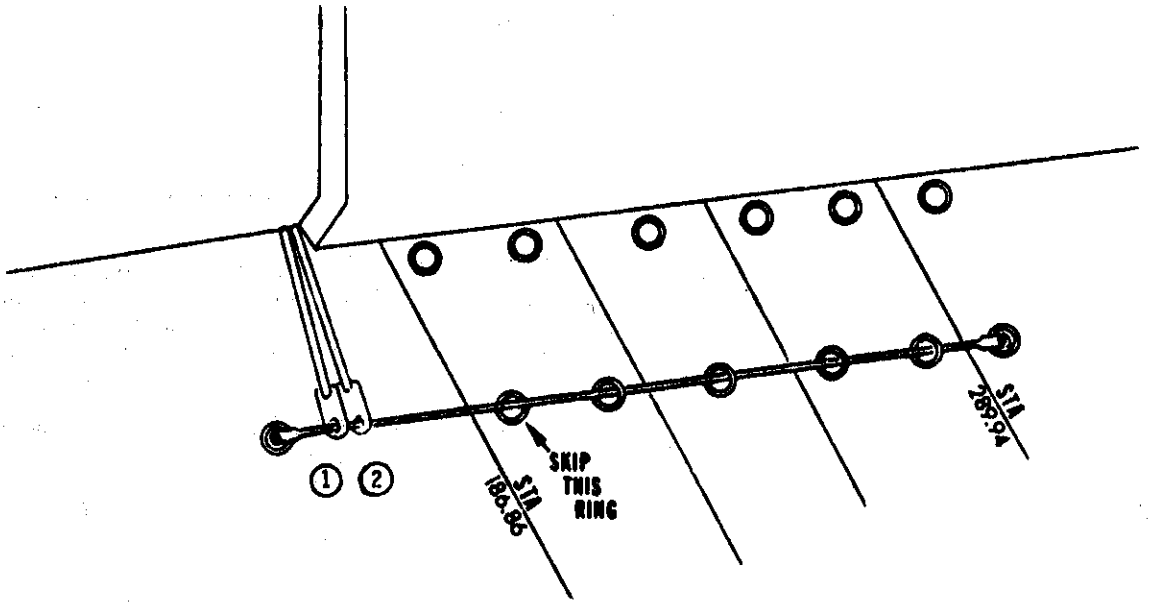
(1) All protruding objects and sharp edges in the vicinity of the exit doors are removed or taped.

(2) The anchor line cable is secure.

(3) A seat belt is provided for each parachutist.

(4) Safety harness is provided for the aircrew safetyman and jumpmaster (if jumpmaster is not going to jump).

(5) Troop seats will be configured to avoid damage or entanglement.



1. First Jumper's Hookup Point
2. Second Jumper's Hookup Point

Figure 21-1. H-3 Anchor Line Cable.

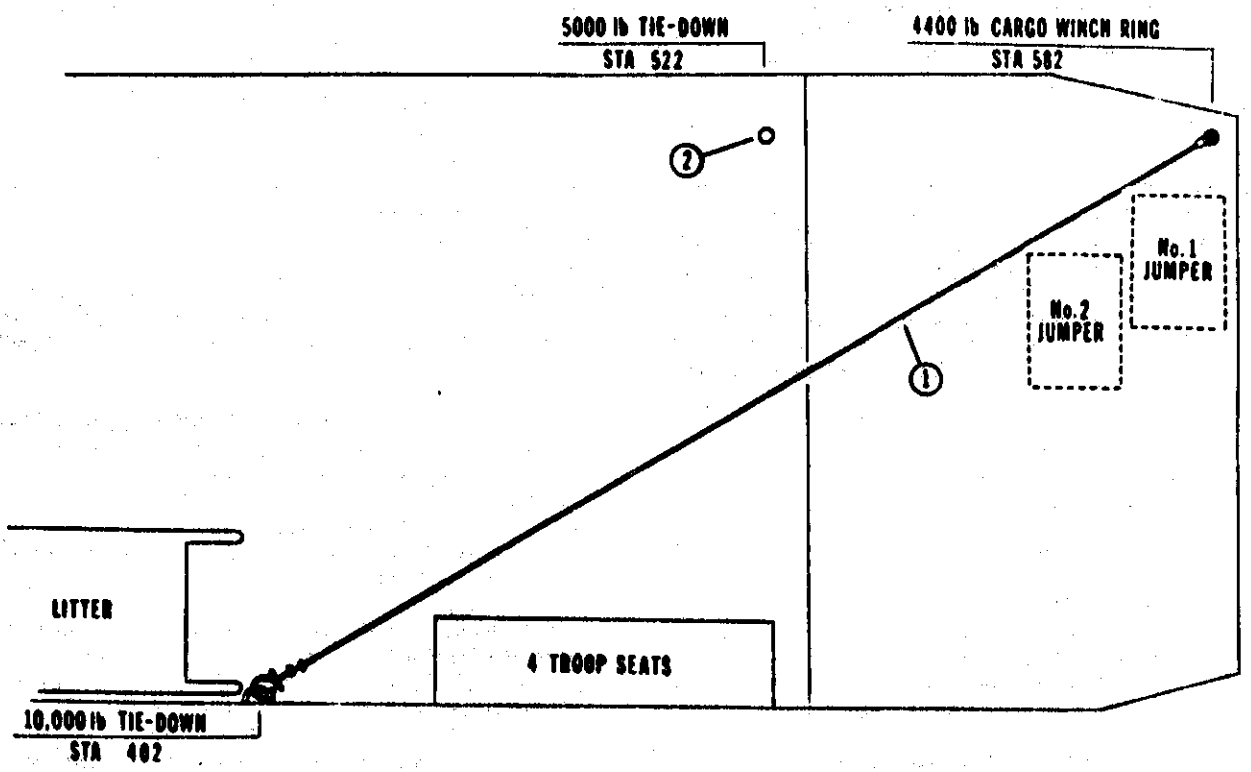
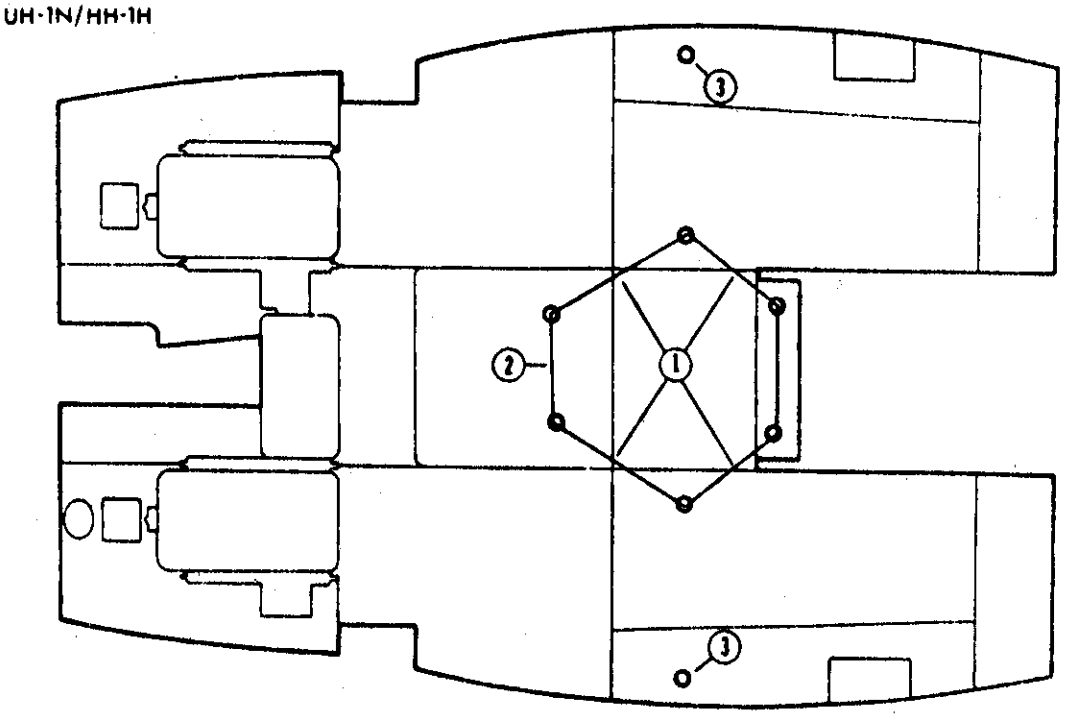


Figure 21-2. H-53 Anchor Line Cable.



1. Jumper's Hookup Points
2. Cable Union Point
3. Spotter Chute Anchor Point (Tie-down Ring)

Figure 21-3. UH-1N/H-1H Anchor Line Cable.

21-11. Personnel Parachute Delivery Procedures. These procedures apply to all aircrews participating in the delivery of personnel by parachute. Coordination between the AC and jumpmaster is the key to success. Details for delivery patterns are provided in ARRSR 55-11, Army Training Circular 57-1, Field Manual 57-1, MACR 3-3, and TM 57-220. The non-tactical personnel parachute delivery pattern/procedures are depicted in figure 21-5. All training will be conducted at drop zones that have been surveyed and approved.

21-12. Communications:

a. Air to Surface. Radio contact with the DZ is normally required. This requirement is waived if:

(1) Lost radio procedures are prebriefed.

(2) Red smoke grenades or flares are available to the DZ control party.

(3) Marker panels and DZ markers are visible to the pilot or jumpmaster when inbound to the DZ.

b. Aircrew communication procedures:

(1) Voice terminology—The accuracy of a personnel delivery mission depends on the coordination between crewmembers. The pilot will normally give 10 minute, 5 minute and 1 minute warnings prior to reaching the drop zone. The pilot will call 30 seconds prior to drop and will acknowledge "clear to drop" after he receives the response "safetyman check completed." The decision whether or not to jump rests with the aircraft commander. The jumpmaster will acknowledge all calls from the pilot (while on intercom). The jumpmaster provides heading corrections on final approach using the following standard terminology:

(a) "Steady." Present course is satisfactory.

(b) "Right." Change direction to the right five degrees.

(c) "Left." Change direction to the left five degrees.

(d) "Right/left degrees." Change direction as indicated. This direction is utilized to direct changes in excess of five degrees.

(e) "No Drop." No drop will be made due to unsafe or unknown conditions or unsatisfactory positioning over target.

(f) "Jumper away, clear to turn." The pilot is clear to turn and begin the next pass or observe the results of the drop just accomplished. The safetyman retrieves all deployment bags prior to issuing a clearance to turn.

(g) Special considerations. To inform the pilot of the location of the spotter chute, streamer, or jumper, use clock positions relative to the last final flown; i.e., the spotter chute landed at the 12 o'clock position, 100 yards away, etc.

(2) Hand signals: When off intercom, the jumpmaster will use the following hand signals to relay course corrections through the safetyman (they will be briefed prior to flight).

(a) Thumb-left/right indicates five degree corrections.

(b) Straight ahead is indicated by a vertical "slicing" motion parallel to the longitudinal axis of the

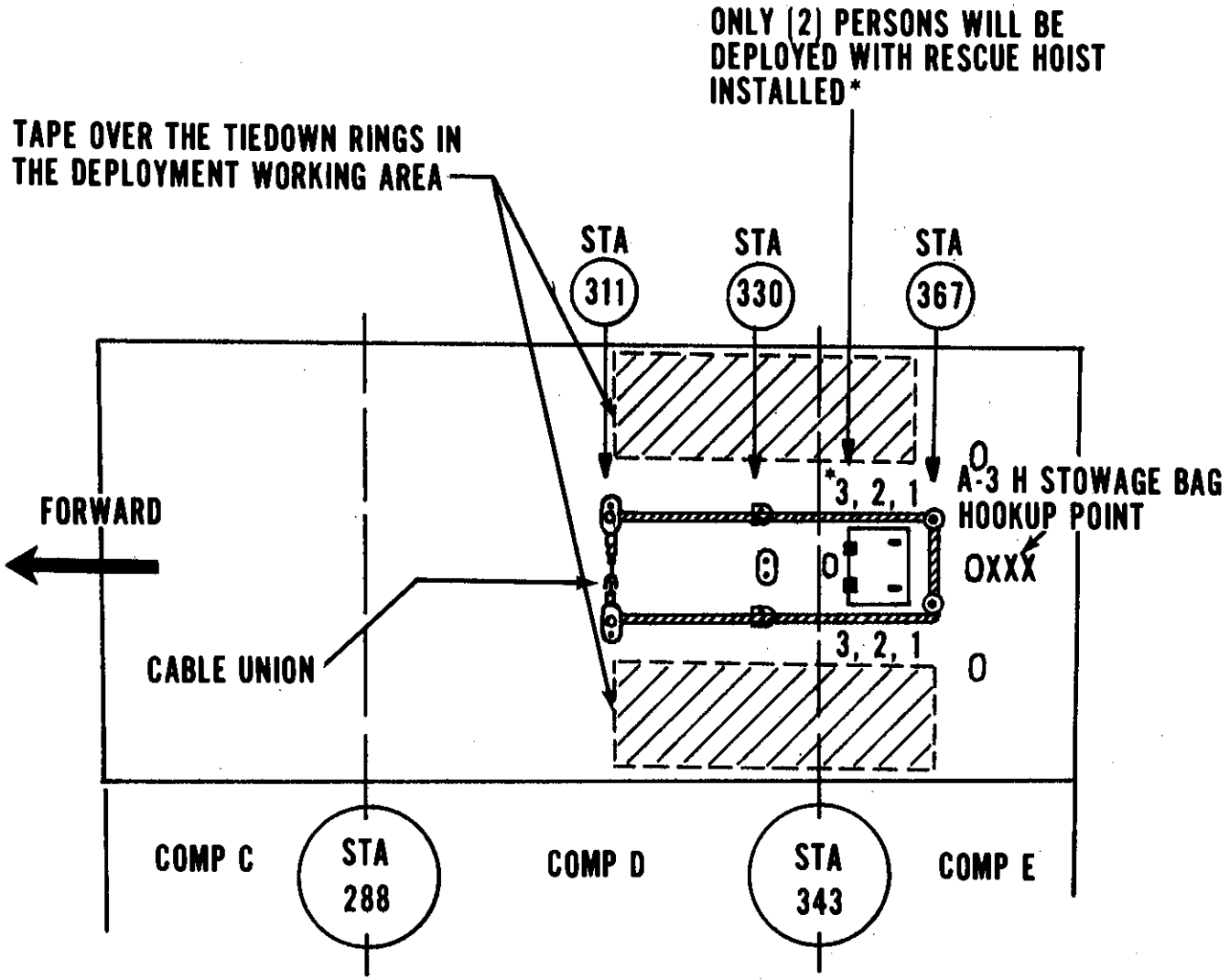


Figure 21-4. UH-60A Anchor Line Cable.

aircraft, hand held perpendicular to the floor.

(c) Abort jump or lost target is indicated by clinching the fist and placing it in front of the first jumper for an aborted jump, or passing the hand in front of the face to indicate that the DZ is lost.

21-13. **Personnel Parachute Delivery Emergency Procedures.** Parachutist towed behind aircraft:

a. Altitude Requirements. If a parachutist becomes fouled in clearing the aircraft and is being towed behind, the pilot will maintain an altitude of at least 1500 feet AGL. Avoid flying over built up areas or water; except scuba equipped parachutists will be flown over water.

b. Parachutist Procedures. The parachutist will indicate that he is conscious and that the reserve chute is ready for use by placing one or both hands on the top of his helmet.

c. Aircrew Procedures:

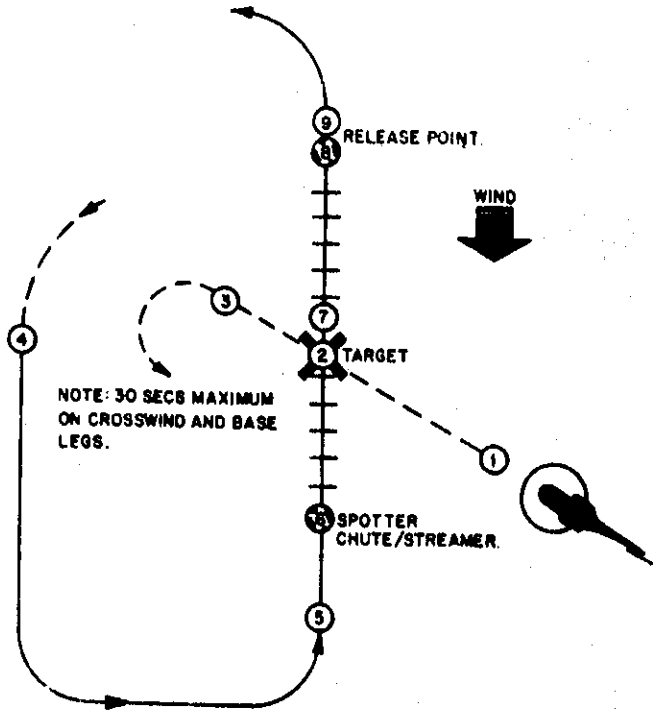
(1) If the parachutist is conscious and his reserve chute is ready for operation, the static line will be cut. The decision to cut the parachutist free will be made by the aircraft commander.

(2) If the parachutist is unconscious or the reserve chute is not ready for operation, the aircraft will come to a high hover and the parachutist will be lowered vertically to the ground. The recovery method will be as directed by the aircraft commander if the aircraft cannot make an immediate landing.

21-14. **Free-Fall Swimmer Delivery Operations.** This maneuver provides an effective method of delivering a swimmer(s) near a target or objective area in the water. Free-fall swimmer delivery may be utilized by all 23 AF forces.

a. Determine the wind direction prior to personnel delivery. Some objectives can drift up to 10 percent of the wind velocity. Usually, personnel deliveries should be made downdrift of the objective. When mission circumstances warrant deliver swimmers upwind or offwind.

b. Make an approach into the wind at a maximum of 10 ft AWL and 10 knots daylight, or 15 ft AWL and 15 knots at night.



1. Head directly toward the target, regardless of the wind direction.
2. Release the spotter chute/streamer directly over the target. (If required)
3. Immediately upon release, make left/right turn to observe descent and position of spotter chute/streamer.
4. Establish rectangular drop pattern oriented so that the final approach will be aligned with the spotter chute/streamer and the target, respectively.
5. Turn on approach. Make minor changes in heading to pass over the spotter chute and the target on a direct line. Aircraft drift correction should be established prior to passing over the spotter chute.
6. Initiate uniform count over the spotter chute/streamer.
7. Reverse count over the target.
8. Deploy the second spotter chute/streamer (if required) or parachutist when the last digit in reverse count is reached.
9. After the jumper clears the aircraft and the flight engineer states, "jumper away, clear to turn," turn to observe the accuracy of the drop.

Figure 21-5. Non Tactical Spotting and Personnel Parachute Delivery—Fixed Target.

c. Deployment Procedures:

(1) Safetyman positioning/exit points:

(a) H-3/H-53 forward door edge/personnel door or aft ramp, as applicable.

(b) H-1/H-60 forward and slightly aft of the last deploying team member/sitting position from either or both cabin doors.

(2) Safety considerations during final approach:

(a) The team members should be in a position to view the objective area at approximately 50 ft AWL.

(b) All deploying exits will be open at 50 ft AWL and below. Deploying personnel will be in a restraining harness or safety belt prior to and on the descent into the 10 knots and 10 ft AWL flight regime.

(c) The "Thumbs-up" from the safetyman to the deploying team on final indicates 10 ft AWL and 10 KTS is confirmed and the team is cleared to deploy at the team leader's discretion.

WARNING: The safetyman will ensure the departing team members have removed their restraining device(s) prior to deploying.

(d) All required water hoist extraction devices should be on board, inspected, and rigged prior to low and slow deployments.

(e) It is recommended that all rescue hoist checklists be completed in the event an injury occurs to the departing team. An immediate extraction may be required. The rescue hoist hook (H-3/H-53) will be stowed, so the cable is not in the doorway.

(f) The team leader will brief equipment delivery procedures (i.e., the safetyman or another team member may be required to deploy the Stokes Litter).

(g) The safetyman will ensure adequate gear/airframe clearance exists during deployments.

(h) Deploying team members should show a "Thumbs-up" signal after water entry. This indicates they are "OK" and have not sustained injuries.

d. If a pattern is planned, aircrews will use the typical water hoist patterns depicted in chapter 16. Regardless of the type pattern flown, turns will not be

accomplished below 50 feet AWL. If OGE power is not available, a minimum of 50 KIAS will be maintained during the water recovery pattern.

e. Restrictions:

(1) Day:

(a) When conducting free-fall swimmer deliveries a safety boat or second hoist equipped helicopter should be present at the water training site.

(2) Night: (May only be accomplished by HH-53H when using unique systems).

(a) When conducting free-fall swimmer delivery at night for USAF personnel, a safety boat or second hoist equlpped helicopter will be present. When delivering other than USAF personnel a safety boat or second hoist equipped helicopter should be present.

(b) Only aircraft with an operable radar altimeter will be used.

(c) The hover coupler should be used to reduce the possibility of overcontrolling.

21-15. **Swimmer Recovery Procedures.** Hoist recovery procedures in chapter 16 apply for all water hoist recoveries. An alternative method of recovery is by rope ladder. Procedures listed in chapter 24 concerning rope ladder operations always apply to water operations. Ensure the rope ladder is grounded in the water prior to reaching the first swimmer.

21-16. **Helo Cast/Boat Delivery Operations.** The following H-53 procedures will be used for delivering boats/rafts.

a. Boat/Raft Configuration:

(1) Remove keel guard if desired. The boat may be laced to plywood or suitable material which will roll easily on the aircraft roller system.

(2) The boat may be loaded bow or stern first, two boate may be loaded if loaded bow first. The boats should be secured with at least two cargo tie-down straps per boat and will have a short bow/stern line attached to the aircraft when the straps are removed just prior to drop.

b. The following procedures will be briefed and used.

(1) At "5 minute" call, team members who will deploy from the front, if this method will be used, will move to the front of the cabin area. The team members who will deliver the boat will prepare for exit in the aft.

(2) At "1 minute" call the team members and crewmembers will prepare the boat for drop by removing tie-down straps except bow/stern line.

c. The pilot will approach a 10 ft wheel height above the waves while slowing to 10 to 15 knots groundspeed. The hover coupler should be used. The pilot not flying/flight engineer will call out radar altimeter readings to the pilot.

d. The pilot will acknowledge "clear to drop." When cleared, the designated crewmember/team member will release the bow/stern line from the aircraft and push the boat out.

NOTE: The team may exit the aircraft from either the door or ramp or both. If both are used the ramp delivery will be executed first.

e. The delivery team leader will remain on intercom until the 1 minute call. A prebriefed crewmember on intercom will be deaignated to relay the clear to drop signal to the team. Concise briefings and good crew coordination are a must in conducting safe helo cast operations.

SECTION B—EQUIPMENT DELIVERY OPERATIONS

21-17. **General.** The procedures in this chapter are provided for those instances where equipment airdrops are required due to terrain or enemy activity. Airdrop operations refer to air movement of supplies or equipment in which unloading of equipment is accomplished in forward flight. Only free-fall bundle drops are recommended.

21-18. **Wind Limitations for Equipment Airdrops:**

a. Surface wind: 17 knots

b. Drop altitude winds: 40 knots

21-19. **Procedures.** Briefings, drop zone markings, authentication, and abort procedures are identical to those procedures listed in Section A—Personnel Delivery. The approach should be planned so that delivery of equipment can be accomplished at the lowest airspeed and altitude that will allow safe flight. Caution must be exercised to preclude injury to personnel on the ground during the delivery. Drops will always be made to targets set up by ground personnel. Aerial delivery of equlpment will be accomplished in the following manner:

a. Ground forces personnel are responsible for selecting the DZ and marking the desired point of impact witb panels, smoke, or lights. The pilot is responsible for selecting the release point and initiating the airdrop so that the cargo impacts as closely as possible to the designated impact point (target).

b. Free drops should be made at as low an altitude as safety permite but never above 200 feet AGL.

c. Refer to figures 21-5 and 21-6 for additional guidance concerning free-fall ballistics and DZ markings.

21-20. **Seven/20-Member Life Raft Delivery:**

a. Preparing the raft for drop:

(1) Remove the raft inflation D-ring from ite pocket, and leave the pocket unsnapped.

(2) Securely tie a 14-inch piece of MIL-T-5661-C web tape through the D-ring to form an approximate 5-inch loop.

(3) Attach a 10-foot lanyard (the one used for flare drops) to the tie-down ring located by the forwardmost part of the side cargo door. Attach the other end to the 5-inch loop of web tape.

(4) Snap the carrying handles together beneath the raft.

(5) Chemlites will be attached to the raft at night prior to deployment.

b. Delivery Procedures:

(1) Use a smoke device on all life raft drops to assist in determining the exact wind direction and a drop reference.

(2) Use normal traffic pattern airspeeds/altitudes.

(3) Make a shallow approach in order to establlsh level flight at 40 knots and 75 feet altitude on final. Two crewmembers work together, one to monitor the survivor and to signal the other crewmember to deploy the raft when directly over the survivor. Delay the drop one second for every 5 knots of wind over 10 knots. After dropping the raft, call "raft away" and immediately recover the lanyard.

c. Safety Procedures:

(1) When scanning or conducting life raft deployments, all personnel will wear the safety harnesses to preclude accidental exit from the helicopter.

(2) Use the radar altimeter if installed and operable.

(3) It may be necessary for two men to work together to deploy the 20-member raft.

(4) A V-blade knife should be available to cut the raft if it should become entangled.

(5) Do not hold the 10-foot lanyard after the raft is dropped.

FREE DROP BALLISTICS DATA CHART

Ground Speed (knots)	120	110	100	90	80	70
Vertical Distance (feet)	Horizontal Distance (Yards)					
200	228	210	191	173	155	137
180	217	199	182	164	146	128
160	205	189	172	155	138	121
140	193	177	161	147	131	115
120	179	164	150	135	120	105
100	163	150	137	123	109	95
80	147	135	123	111	99	87
60	128	117	107	96	87	77
40	105	96	88	79	70	61
20	74	68	62	56	50	44

Figure 21-6. Free Drop Ballistics Data Chart.

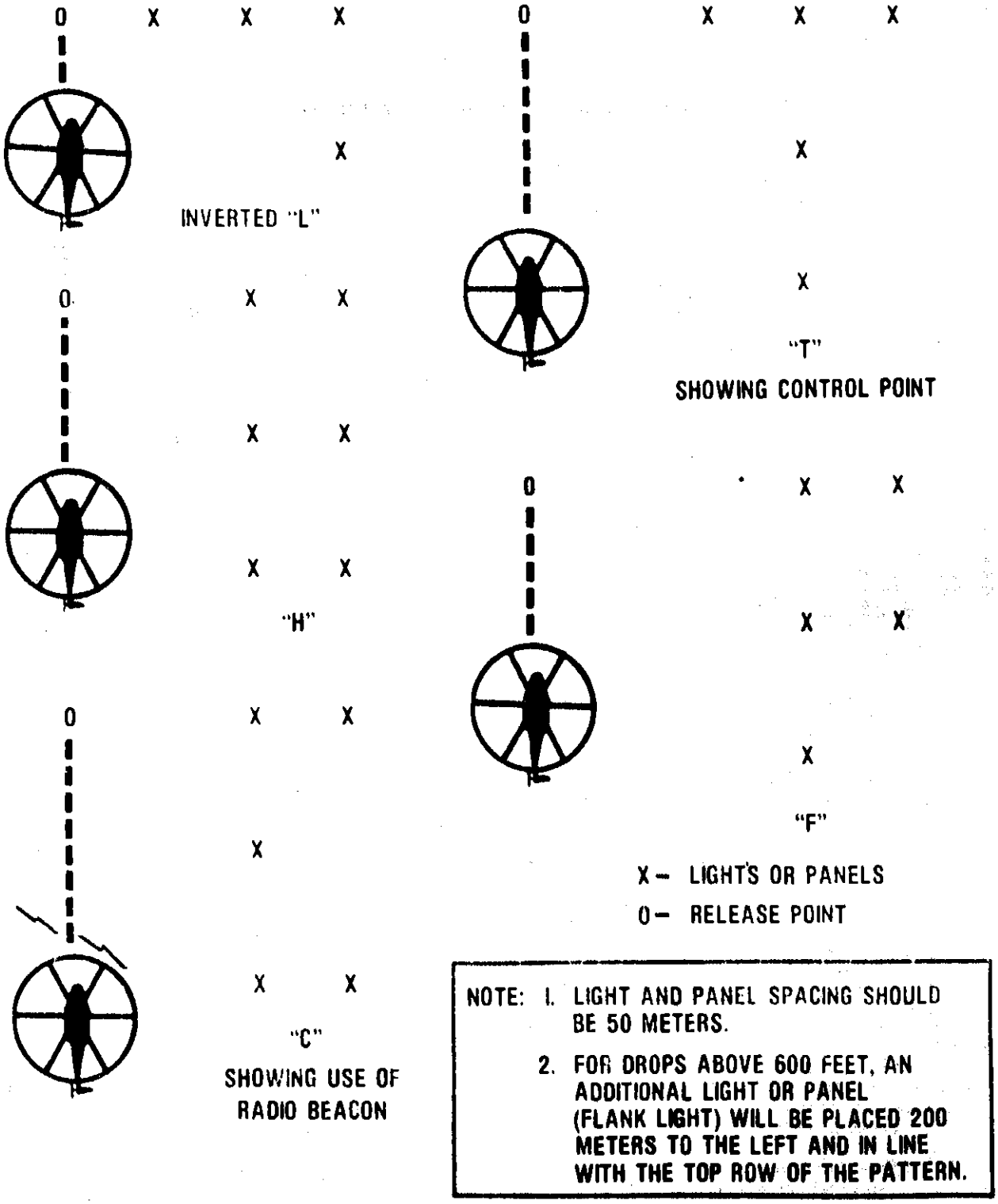


Figure 21-7. DZ Markings.

Chapter 22

SHIPBOARD OPERATIONS

22-1. General. Each shipboard situation is unique and the final decision on the course of action must rest with the aircraft commander. The chapter establishes standard procedures and guidelines to be used during shipboard operations.

22-2. Shipboard Hoist Procedures. If the ship does not have a suitable landing area or if rough seas will prevent a safe landing, a hoist recovery will be necessary.

a. After arriving on scene, make observation passes as necessary to:

(1) Identify the ship.

(2) Check the ship's superstructure for poles, antennas, cables, smoke stacks, and any other hazards to a hover.

(3) Confirm the location for survivor recovery or select a better one.

b. Complications and problems associated with rescue hoist pickups usually are the result of poor planning and the use of untrained personnel aboard the vessel. These problems may be minimized by prebriefing the crew of the vessel by radio, loud hailer, message streamers, or if required, by lowering a crewmember with a radio onto the vessel. The use of the rescue hoist to lower a message is not recommended. Inadvertent entanglement of the hoist cable with the vessel can result in an extremely hazardous situation. Therefore, this method of communication will not be used except when all other means are exhausted, and only then when a life or death situations exists or is suspected. Brief these items:

(1) Course of vessel. Normally the ship should steer to put the wind 30 degrees off the port (left) bow. However, this may have to be varied depending on available hover references.

(2) Speed of vessel. The vessel should maintain minimum forward speed (idle or steerageway speed) in calm areas. Slightly higher speeds are required in higher seas.

(3) Pickup location (bow/amidship/stern).

(4) Type rescue device.

(5) Signals to indicate the survivor is securely attached to the rescue device, etc.

c. Complete power available checks and compute power required for an out-of-ground effect hover.

d. Make an approach to a hover astern of the ship and establish a hover at the same speed as the ship. Avoid hovering directly downwind of the funnel where hot, choking stack gas and smoke may be encountered or downwind from any large superstructure where turbulence and downwash may be present. Watching the ship's wake may induce vertigo.

(1) Check power to hover.

(2) Observe sea state versus ship pitch and roll pattern. When the ship is light and seas heavy, the pitch and roll cycle will vary from stable to violent. By observing this pattern, a stable period may be chosen for crewmember placement and recovery from the ship. The pitch-and-roll pattern also varies with the type of ship and loading. A tanker may be stable where a partially loaded freighter, under the same sea conditions, will pitch and roll violently. If the ship is underway, the roll factor may be cancelled out; but if it is dead in the water, you will encounter violent pitch, roll and yaw with very little or no measured pattern. In any case, select the most stable part of the ship for a recovery; in most cases, superstructure permitting, it will be amidship. Close observation and coordination between the pilot and hoist operator are required during this type of operation.

e. Hover taxi to the pickup location over the ship. Use a tag line to facilitate the recovery.

(1) It may be necessary to deploy a PJ with a radio to make a medical evaluation and assist shipboard personnel with the recovery. The PJ determines what type of recovery equipment is required and supervises loading of the patient. After the PJ is on the vessel and clear of the hoist, recover the rescue device and move to the observation position to await further instructions. If the Stokes litter is used, disconnect it from the hoist for patient loading. Recover the hoist and deploy it again when ready for hookup. Do not allow the hoist cable to be secured to the ship or taken below decks. After the patient is recovered, if conditions allow recover the crewmember.

(2) Whenever observing or signaling the vessel, or while waiting for the survivor to be prepared for hoist operations, move to an observation position. Hover to the left and rear of the vessel where you can adequately observe activity on the vessel and where rotor wash will not affect recovery operations.

(3) The helicopter crewmember will signal the helicopter back in for the pickup and will specify the type of rescue device. The crewmember should keep the shipboard personnel away from the rescue device as it approaches the deck. Ground the rescue device prior to handling.

f. The RCC/OCC accomplishes all coordination for medical assistance. Case history, vital signs, and medication administered should be passed to the hospital.

g. Night Operations. Night pickups may be complicated by inadequate lighting of mast, booms, or rigging. Parachute flares may be used for illumination whenever possible, except when NVG's are being used.

(1) An escort aircraft, especially on long range missions, is very desirable. If weather and numerous ships are in the recovery area, excessive time can be consumed locating and identifying the vessel.

(2) To aid in location and identification, request the ship to shine a search light beam vertically or display flares when the aircraft arrive in the area.

(3) Reduced depth perception at night make approach to a ship difficult. Fly a rectangular pattern using the ship as a reference. During descent, the copilot calls out altitude in 100-foot increments when above 300 feet AWL and 50-foot increments below 300 feet AWL. As the ship is approached, enter a hover astern above the deck.

22-3. Shipboard Landing Procedures. If the ship has a suitable landing platform (size and weight bearing capacity) and the sea state (ship's pitch-and-roll) is not violent, a landing is the most expeditious method of recovery. Use

the following procedures to accomplish shipboard landings on missions:

a. Communications. Established radio contact with the ship's primary flight controller and confirm the following:

(1) Direction of landing
(2) Wind direction and velocity
(3) Ship Heading. Base Recovery Course (BRC).
(4) Current altimeter
(5) Other aircraft in the area

b. Traffic Patterns. Normally, for shipboard landings to port, a left-hand pattern is flown. For landing to starboard, a right-hand pattern is flown.

(1) The traffic pattern is flown at 300 feet.

(2) Complete power available checks and compute power required for an out of ground effect hover.

(3) Set brakes (H-3/H-53/H-60A)

(4) Avoid crossing the bow of the ship. However, if crossing is unavoidable, continue upwind a sufficient distance (500 yards) to remain well clear of the ship. Notify the ship of your intentions.

c. Approach. Final approach should be shallow to avoid exaggerated power changes or excessive flares near the deck. Avoid hovering directly downwind of the funnel where hot, choking stack gas and smoke may be encountered or downwind from any large superstructure where turbulence and downwash may be present. Pilots should not attempt to watch the ship's wake as it may induce vertigo.

(1) Establish visual contact with the landing signal person (LSE). The LSE wears a yellow shirt in contrast to other flight deck personnel. The LSE provides visual landing signals. If the LSE is not in sight prior to crossing the deck, a wave-off (go-around) is mandatory. (EXCEPTION: During operations where LSE is not being utilized, with concurrence of the Air Boss/Captain.)

(2) Wave-off and hold signals must be obeyed. Other signals should be followed as closely as possible unless safety of flight is jeopardized.

(3) Final movement onto the deck normally is accomplished by moving forward at air-taxi speed from the edge of the deck and about 10 to 15 feet above the deck. A significant change in hover attitude (nose low) occurs when hovering over a moving deck.

d. Deck Operations. Precise hovering and extreme caution is required at all times when operating on or over tbe landing platform.

(1) A typical shipboard landing platform consiste of:

(a) The longitudinal axis of the helicopter will be aligned with the landing line-up line. The line is usually aligned approximately 45° to the bow. An approximate 15° crosswind will be encountered with the wind 30° off the ship's bow.

(b) The larger circle is 24 feet in diameter.

(c) The center circle is four feet in diameter and is the designated landing position for the front wheels or forward skid supports.

(d) The VERTREP (vertical replenishment) line-up line is used during sling operations. The center of the main rotor must remain over or aft of this line.

(2) Post scanners, if available, to both sides of the helicopter.

(3) The FE/AG/PJ talks the pilot down to the deck after being given the land signal by the LSE. The FE/AG/PJ ensures both main gear are over the deck. Touchdowns must be smooth and positive to reduce the possibility of ground reasonance. Under adverse conditions it may be necessary to turn off the AFCS amplifiers (H-53) or disengage the AFCS (H-3/60A) immediately after landing on a ship to avoid tip path movement induced by the AFCS attempting to compensate for ship pitch and roll. Disengage heading hold feature to prevent yaw inputs.

(4) If rotors are to be shutdown, ground crews come under the rotor blades to chock and chain the aircraft immediately after landing. Shutdown is accomplished upon signals from the LSE. Consider rotor disengagement wind limitations prior to shut-down. If a droop stop fails to come in, reengage rotors. If the rotors must be shutdown with a droop stop out, ensure the landing platform is cleared. The ship is constantly under way, hence any wind gusts will be increased by the ships speed. An overstress of helicopter components may result. Adequate rotor blade tie-down equipment is mandatory.

(5) Exercise caution while on the landing platform. Slippery footing, ship's motion and lack of good hand holds are potential hazards. Continue to wear LPUs while working on the deck.

(6) Coordinate APP/APU start, engine start and rotor engagement via radio with primary flight control. Do not initiate starting/engagement sequences without approval from the LSE. Locked rotor starts will be performed by H-53s. The FE/AG/PJ will remove the pins as required by the checklist. Excessive intercom interference may occur if an intercom cord is allowed to rest on the deck. During rotor engagement, it is mandatory that the tie-down chains be loose (two to three inches of slack). Confirm visual signals with the LSE as follows:

ITEM CREW RESPONSE	LSE SIGNAL	
APP Start	three fingers	same
No. 1 Engine Start	one finger	same
No. 2 Engine Start	two fingers	same
Rotor Engagement	circular motion with finger	same
Four Tiedown Chains displayed to crew	points to chains	thumbs up
Four chocks displayed to crew	points to chocks	thumbs up

(7) Takeoff. Remove chocks and chains prior to takeoff. Accomplish takeoff after clearance from primary flight control and a visual signal from the LSE.

(a) If the ship is rolling and pitching engage the AFCS amplifiers (H-53) or engage the AFCS (H-3/H-60A) just prior to takeoff.

(b) Takeoff to a hover and check power before continuing the takeoff to clear the ship's deck. Slight rearward and sideward flight may be required to clear deck obstacles.

(c) The preferred takeoff is made on a 45 heading from the ship's heading.

(d) Raise landing gear (H-3/H-53) immediately after clearing the ship.

NOTE: Gear may be left down if multiple closed patterns are flown to the ship.

(e) At high gross weights, be aware that there is a considerable increase in power required when the helicopter moves off the ship's surface. This phenomenon occurs even when the over deck wind velocity places the helicopter in translational lift.

e. Recurring Shipboard Operations. These missions will require extensive coordination with the ship's crew, and a thorough knowledge of detailed procedures for shipboard operations. NWP 42(B) SHIPBOARD HELICOPTER OPERATING PROCEDURES and a diagram of the ship's landing platform and obstacles will be made available to crew when performing recurring shipboard operations.

NOTE: Hot refueling is normally the only means of obtaining fuel aboard Naval vessels. Use the appropriate flight manual hot refueling procedures with the exception of deploying aircrew members to conduct the refueling operation.

f. Carrier Operations. CV NATOPS MANUAL covers these procedures and should be used for extensive operations from carriers.

22-4. H-3 Surface-To-Air Refueling. A technique has been developed and employed by the US Navy whereby a refueling hose is hoisted from the deck of a ship by the helicopter rescue hoist. The refueling hose nozzle is then connected to the single point refueling adapter by a crewmember stationed in the door of the helicopter, and the aircraft is refueled while hovering alongside the ship. Certain naval vessels equipped with this system can refuel H-3 helicopters in an emergency.

a. If surface-to-air refueling is required, prior coordination with the vessel is necessary to assure it is equipped to refuel helicopters, has a Parker nozzle available, and the deck crew is trained and briefed on the proper procedures.

b. The ship is equipped with 150 feet of one and one-half inch refueling hose. A grounding wire is married to the hose. Capacities of the fuel service tank vary from 350 to 750 gallons depending upon the class of ship. Fuel normally is pumped from the service tank to the helicopter at a rate of 400 pounds a minute at a hovering altitude as high as 80 feet.

c. Helicopter Procedures:

(1) Prior to initiating an approach, the ship turns so that the wind is 30 degrees off the port (left) bow. This allows the helicopter to approach into the wind and still keep the deck of the ship in view. Complete the hi-drink checklist.

(2) The ship crew has the fueling rig prepared and the saddle pickup point positioned in the center of the landing circle.

(3) Hover at approximately 25 feet and lower the hoist cable to the deck of the ship. The hook on the end of the cable is engaged with the loop attached to the refueling hose saddle. Because of the danger of static electricity, shipboard crewmembers should not touch the hoist cable until it has contacted the ship.

(4) Hoist the refueling hose into position so the helicopter crewmember stationed in the main cabin door can connect the grounding cable and hose nozzle to the refueling adapter. This is best accomplished by having the flight engineer in a prone position at the cabin entrance door to handle the hose and nozzle. The pararescueman should operate the hoist. The hose remains attached to the hoist cable during the refueling operation. The crewmember making the connection lowers the helmet visor to protect from fuel spray in the event the nozzle does not completely seat in the adapter. After the connections are made, move the helicopter outboard and forward to a position abeam the port side of the flight deck of the vessel, signal to commence refueling. The refueling hose is fed out and recovered as necessary by the deck hands on the ship.

(5) When fuel transfer is completed, the flight engineer signals the ship to stop refueling; moves back over the deck of the ship, and disconnects the nozzle and ground wire from the refueling port; and lowers the hose and nozzle to the ship eo it can disconnected from the hoist cable.

(6) Use visual aircraft-to-ship hand signals in addition to radio communications. A circular motion with the index finger extended vertically means transfer fuel. A "throat cutting" motion made by drawing the hand across the throat means stop fuel transfer. These signals are given from the main cabin door.

d. Ship Procedures:

(1) During fuel pumping operations with the helicopter hovering clear of the ship, the fuel hose is tended by two deck handlers to prevent excess slack developing in the hose. It is essential that no excess strain be placed on the hose. Should this occur, the possibility exists of the hose breaking and whipping into the helicopter rotor. When the helicopter hovers directly over the ship, no fuel hose handlers are required as no hose strain exists.

(2) A quick disconnect is provided between the refueling nozzle and the hose out-board of the saddle and shackle assembly. The quick disconnect is used in emergency situations when it is necessary to separate the refueling hose from the helicopter quickly. The quick disconnect is activated by pulling a lanyard that is attached to the refueling hose and within easy reach of the flight engineer. When the disconnect is made using this system, the refueling nozzle remains attached to the helicopter, and the saddle and shackle assembly remain attached to the hoist cable. The refueling hose outboard of the saddle and shackle assembly falls to the surface.

Chapter 23

37 ARRS PROCEDURES

23-1. General. This chapter contains procedures unique to the missile site unit security program and is applicable only to the 37 ARRS and subordinate units.

23-2. Terms Explained:

a. Transportation Control Center (TCC). Agency which manages missile site security support transportation requirements.

b. Launch Complex. The area in which TITAN launch operations are conducted.

c. Launch Control Center (LCC). A manned facility from which monitoring, controlling, and launching are conducted (TITAN/Minuteman units).

d. Launch Control Facility (LCF). A manned facility composed of a launch control building, a hardened launch control equipment building, a launch control center, and support buildings (Minuteman units).

e. Launch Facility (LF). A remote, unmanned missile site which consists of a launcher, launch support building, security system, and service area (Minuteman units).

f. EWO Commitments. For the purpose of this regulation, any missile site activity related directly to operations, maintenance, to include munitions, communications, civil engineering maintenance, supply and security functions or related significant logistics support (i.e., cable and flood surveys).

g. Airborne Fire Team (AFT). A security team carried on convoy surveillance helicopter.

h. Choke Point. A section of road bounded by some obstacles that will prevent any turning or detouring of the weapons van or weapons transporting vehicle and thus halt the progress of the convoy.

23-3. Utilization. Helicopters are provided primarily for support of SAC missile activities. The key to effective helicopter employment lies in close coordination among all agencies concerned with management of helicopter resources and supervision of unit employment programs. Use the air transportation priority system (IAW ARRS Regulation 55-6) to determine mission accomplishment sequence for multiple mission requirements.

23-4. Radio Frequencies. SAC has authorized the uee of 266.2, 271.9, 308.8, and 314.3 MHZ for missile air support operations. All frequencies used in 23 AF and SAC support operations must be approved by the base frequency manager.

23-5. Operational Requirements:

a. Establish procedures for LCC/LCF/LF and other site support missions to provide pilots a visual signal indicating that passengers and cargo are clear of the aircraft prior to departure.

b. Establish common routes between the strategic missile support base (SMSB) and all missile sites. The unit commander must approve these routes prior to use. Use direct routes where topographical considerations permit. If direct routes are not feasible, establish specific routes and turning points. Consider tactical low-level routes/ altitudes. Adhere to established routes when practical for air traffic control (ATC) and safety. Report deviations as soon as possible to the flight following agency.

c. Detachments will maintain diagrams of each helipad showing prominent landmarks, site elevation, obstructions to flight, location of wind indicator, prohibited landing area, approach/departure zones, and restricted areas. Place checklist size diagrams in each mission navigation kit. Units must review sites annually for currency. Document this review.

d. Maintain the following information for ready reference in the unit operations section:

(1) Aircraft availability.

(2) Helipad status. Include all prohibited sites, construction in progress, and obstacles not on the site diagrams due to recent changes.

(3) Mileage and time charts from parent base to missile LCC/LCF and from any one LCC/LCF to any other LCC/LCF.

e. Establish procedures to ensure the radio equipped unit operations section is manned during periods of missile site security mission activity. The operations section will monitor mission activity, relay diversion requests and provide emergency assistance to unit aircraft.

23-6. Operational Procedures:

a. Conduct missile support flights within the missile/base complex under day visual meteorological conditions. The squadron commander or his or her designated representative has waiver authority. (EXCEPTION: See paragraph 3-2a(2)(b).)

(1) Weather minimums are 700 feet ceiling and one mile visibility for other than priority one missions.

(2) Support flights may be flown to areas outside the missile/base complex under instrument or visual flight rules.

(3) Detachment 8 is authorized to conduct support flights within the missile/base complex using IFR for launch and termination at the support base provided the operational portion of the mission can be conducted under VMC.

b. Do not fly below 500 feet AGL except for approaches/departures, takeoffs/landings, cable route inspections, missile site security checks (100 feet AGL minimum), and missile security or launch safety support.

c. Landing Clearance:

(1) Inside LCF/LF fences. Obtain clearance from the missile combat crew (MCC) prior to landing by direct radio contact with the MCC or by landline through the operations section. If unable to establish radio contact, land at the LCF/LF as scheduled. All personnel must remain aboard until identified by a security guard at the LCF or manned LF (AFR 207-16).

(2) LCF helipads located outside the security fences and launch facilitiee. Attempt to obtain landing clearance. If communications fail, land as scheduled. For LCC helipads, attempt to obtain landing clearance if you cannot determine winds and/or topside site status (via the surface warning control beacon). Determine site status (Titan II only) prior to landing.

(3) Landing on access roads is authorized only when mission dictates or landing on the site is not feasible (e.g., when landing area is blocked by vehicles or other obstacles) complete all remote area procedures prior to landing.

(4) Do not land at LFs with transport erectors or RV/G&C and PT vans within the fenced area without missile wing/LG approval. (Exception: Landing areas outside the fenced area.)

d. Immediately report any unusual digging, building, or activity noted around missile sites or along cable right-of-ways to the base SAC command post.

e. Monitor the unit operation section/LCF/LCC frequency while en route on support missions except when frequency change is required for ATC. Ensure that the unit is notified of all arrival, departure, and estimated en route times. Arrival times need not be reported if a departure report is made within 10 minutes after arrival ETA. Make position reports to the unit operations section at least every 45 minutes. Arrival and departure reports are considered as position reports. Avoid frequent position reports to prevent communications saturation; however, more frequent position reporting may be required during unusual conditions or marginal weather. Report ETA changes of more than 10 minutes to the unit operations section as soon as practicable.

f. Missile Site Evaluation. Prior to commencing final approach at a missile site, the aircraft commander will review the site diagram and evaluate site elevation, power required, power available, obstructions to flight, wind, and approach and departure routes. A power available check may be completed at the pilot's discretion and will be completed any time maximum engine power is anticipated. If required, the pilot may descend to a minimum of 300 feet AGL into the wind/500 feet AGL downwind for the evaluation.

23-7. Mission Kits. Provide a mission navigation kit containing the following minimum information for each mission:

a. Charts of the entire missile complex layout, (Charts of the local area depicting all normal support/operational sites for Det 8.)

b. Common routes, magnetic courses, and distances from the parent base to missile LCF/LCC and from any one LCC/LCF to any other LCC/LCF.

c. No wind times for common routes.

d. Terrain and equipment permitting, VOR/TACAN radials to LCFs/LCCs.

e. Diagrams of each helipad/support site.

f. Aircraft flight manual (dash 1).

g. MACR 55-54

h. AFR 60-16

i. AF Form 15, United States Air Force Invoice, 315, United States Air Force Airfuels Invoice, 664, Aircraft & Fuels Documentation Log.

j. FLIP IFR supplement (one each).

k. FLIP VFR supplement (ons each).

l. FLIP en route low altitude charts. (One set for area of operation.)

m. FLIP low altitude instrument approach procedures. (One set for area of operation.)

n. Local area navigation maps and charts, sectional aeronautical charts. (One set for area of operation.)

o. Current flight crew bulletin.

NOTE: Each unit is required to maintain a minimum of one mission kit containing those items listed in chapter 6 for flights outside the local area.

23-8. Mission Briefings. The pilot will be briefed on the following items:

a. Current weather and forecast changes.

b. Itinerary.

c. Load (passengers and cargo).

d. LCC/LF/LCF support site landing status.

23-9. Convoy Procedures. Conduct convoy escort as specified in SACR 207-18 and this chapter.

a. General:

(1) Helicopters are assigned to support the SAC Nuclear Security Mission due to the vulnerability of off base weapons convoys. Accompany off base weapons movements with a surveillance helicopter when weather and safety restrictions do not prohibit flight.

(2) The deterrent value of having helicopters overhead is important but its presence should not be so obvious that it is an easy target or a distraction to the citizenry. It may be assumed that anyone attempting to hijack a convoy will be well informed on convoy/helicopter operations and will more than likely be armed with weaponry capable of combating armed escort personnel as well as the surveillance helicopter. Denial of a good target is the key to success.

(3) Denial of a target can be accomplished by a combination of distance and airspeed. Static or stereotyped procedures are the easiest to ambush. It is therefore necessary that variety and ingenuity be used when maintaining surveillance. Surveillance remains paramount. Survival of the helicopter is essential to the successful deterrence of an attempted hijacking.

(4) The SAC wing commander is the command authority for the convoy and exercises operational control over the helicopter resources. The wing commander's directions normally will be received through wing security or the wing command post, depending on location. The convoy commander is the on-scene commander for the ground forces associated with the convoy; however, authority or responsibility as aircraft commander will not be relinquished.

b. Procedures:

(1) Prior to departure, ensure the aircrew is briefed on applicable items from the "Convoy Commander Departure Briefing" contained in SACR 207-18. Brief the AFT on surveillance and deployment procedures. In addition, removal of finger rings will be recommended to the AFT.

(2) Inflight Requirement:

(a) Prior to convoy departure, establish and maintain radio contact with the convoy.

(b) Maintain communications with the support base through the command post, security control, TCC or the helicopter operations section.

(c) During normal convoy surveillance, fly the helicopter at unspecified altitudes and airspeeds. Factors such as terrain, weather, and fuel will dictate the parameters maintained.

(d) Unless diverting for weather, remain within five minutes of the convoy at all times.

(e) Under normal conditions, maintain at least 500 feet AGL and remain at least 1,600 meters (one statute mile) from the weapons vehicle.

(3) Procedures during increased threat or actual hostilities:

(a) Immediately maneuver to a safe distance and altitude to avoid hostile fire. Maintain knowledge of the exact position of the convoy at all times. Relay this information to the command post or helicopter operations section.

(b) Be prepared to tactically deploy the AFT, at the direction of the on scene command authority, in order to reinforce the friendly ground forces or to halt/slow the movement of a hijacked weapon. Deployments will not be made if the aircraft commander determines the deployment sequence will unnecessarily jeopardize the helicopter and/or diminish it's effectiveness as a surveillance platform.

(c) Provide the AFT team chief with the approximate direction and distance to the convoy hostilities prior to the team's offloading during a deployment operation.

(d) Once the aircraft is landed at a choke point, shut down the engine, remove the key and abandon the aircraft.

(e) The tactical approach as described in para 19-7e(3), may be used during deployment and choke point operations.

23-10. Cable Route Survey Procedures.

a. The following procedures apply to minuteman cable route survey missions:

(1) Minimum altitude is 100 feet AGL or IAW the flight manual height/velocity chart, whichever is higher. Hover taxiing to accomplish this survey is not authorized.

(2) A copilot will be used while accomplishing this mission. The pilot not flying the aircraft will help in tracking the calbe route and keep the pilot flying advised of potential hazards and obstacles. Additionally, an observer will be in the cargo compartment to observe the condition and security of the buried cable.

(3) Landing on the cable right-of-way is authorized. Complete all remote area procedures prior to landing. The pilot should select the safest landing area on the cable right-of-way within walking distance of the area requiring inspection. Damage to personal property (e.g., crops, fences, livestock) should be considered and will be avoided.

b. Mission Planning. As with all types of low-level operation, thorough flight planning is critical to mission safety. Pilots should carefully review the appropriate maps for anticipated hazards to low-level flight for their area of operation. Crew briefings should emphasize crew coordination procedures and climatical concerns (e.g., winds, turbulence, visibility, DA). Consider the activity of other low flying aircraft, such as military aircraft on published low-level routes and civilian agriculture aircraft.

c. During cable route missions 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 altitude.

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

(3) Avoid using excessively steep angles of bank to maintain position over cable route. Anticipate significant heading changes of the cable route and use normal bank angles when possible. At approximately 45 degrees the tip path the plane will be below the skids and will require a significant power increase to maintain terrain clearance.

(4) Do not attempt to clear obstacles by cyclic inputs alone. Climbs and descents are best accomplished by coordinated cyclic and collective inputs.

(5) Anticipate power requirements when approaching a ridge line. If feasible, increase power early and accelerate so that when climb is initiated, there will be sufficient airspace to assist in clearing the terrain. Anticipate leeside downdrafts and turbulence.

(6) Avoid checking cable routes from a direction that will place the aircraft facing directly into the sun low on the horizon which would make the detection of power lines and suspended cables extremely difficult.

(7) The threat of engine failure should be given constant consideration. Careful crew preplanning and the use of the highest possible airspeed/altitude combination are critical to minimizing this threat.

(8) Cable route survey can be physically and mentally demanding mission. Frequent exchange of cockpit duties and shorter duration sorties are helpful in minimizing the fatigue factor.

Chapter 24

ALTERNATE LOADING AND ALTERNATE INSERTION/EXTRACTION ROPE PROCEDURES

SECTION A - ALTERNATE HELICOPTER LOADING PROCEDURES

24-1. General. All personnel flying in MAC aircraft must be restrained by the safest means possible for the type mission being flown. Standard troop seats are sometimes too narrow to accommodate combat-equipped personnel (backpacks, parachutes, etc.). The use of standard seating normally requires this equipment be removed and secured. This method is satisfactory for administrative transportation but is impractical in a tactical environment where rapid on/off loading is required. Additionally, helicopter standard troop seating does not always provide sufficient seating for the number of personnel required by tactical scenarios.

24-2. Concept of Operation. Alternate loading methods are provided below wherein all seats and equipment not required for the mission may be removed. The cabin floor itself will be defined as the seat and either a seatbelt or tiedown strap will restrain the occupants. All restraints may be removed upon landing in the LZ or while taxiing to the offload point. For hover operations (including water ops) restraining devices will be removed as required. These procedures may only be used during infil/exfil operations when PJ, CCT, or dedicated unconventional forces and their host country counterparts are used. Procedures may also be used for parachute deployments from the H-1 and H-60.

WARNING: Personnel must be aware of the possibility of reduced main rotor and/or tail rotor blade ground clearance and avoid the upslope side and tail rotor side of the helicopter when loading or offloading.

24-3. Alternate Loading of Combat Equipped Personnel, H-1H/N. Mission requirement and helicopter gross weight will dictate the total number of combat equipped troops to be loaded on the H-1H/N. Recovery equipment may be installed as required, in accordance with appropriate directives. The following procedures will be used.

a. Aircraft Configuration.

(1) The cabin area will be stripped of all equipment not required for the mission.

(2) Seat belts attached to tiedown rings on the cabin floor or two 5000 pound tiedown straps will be used for securing troops for flight. Tiedown strap number one will be loosely attached to the tiedowns IAW figure 24-1. Tiedown strap number two will be loosely attached to the tiedown rings IAW figure 24-1.

(3) Seat belts will be installed at positions 31, 27, and 28, and 32 for the two crewmembers.

b. Personnel Loading. Personnel will have weapons pointed down, safetied, and radio antenna collapsed prior to entering the rotor plane. They should enter the rotor plane area only when cleared by the crew (beckoning motion hand signal) and should always enter from the sides and/or forward of the helicopter. Personnel will seat themselves on the cabin floor with their backs against the transmission area. Once seated, crewmembers will ensure that the tiedown straps are positioned across each troop's lap and tightened as necessary to ensure troop safety.

c. Personnel Offloading. Once the aircraft has completed the approach to hover or landing (as briefed), the cargo tiedown straps will be released and personnel allowed to deplane. They will depart the rotor disc area toward the sides and/or forward of the helicopter.

24-4. Alternate Loading for Combat Equipped Personnel, H-3. Mission requirements and helicopter gross weight will dictate the total number of combat troops that can be loaded.

a. Aircraft Configuration:

(1) The cabin will be stripped of all equipment not required for the mission.

(2) Two 5,000-lb cargo straps will be attached longitudinally along the cabin floor between the two 2,500-lb cargo fittings at station 290 and station 445.

(3) Two 5,000-lb cargo straps will be attached longitudinally along the cabin walls between the forwardmost seat ring and the aftmost seat ring to serve as handholds.

b. Personnel Loading. Personnel will have weapons pointed down, safetied, and radio antennas collapsed prior to entering the rotor plane. They should enter the rotor plane area only when cleared by the crew (beckoning motion hand signal) and will enter the aircraft through the ramp entrance and move as far forward in the cabin as the aircrew directs. Personnel in the aft cabin area, when loaded, will not extend past the forward ramp hinge. Once personnel are on board they will seat themselves on the cabin floor with their backs against the cabin wall. The 5,000-pound tiedown strap will be placed across the laps of all personnel in each row and tightened as necessary to provide restraint.

c. Personnel Offloading. Once the aircraft is on the ground and stopped, the tiedown straps will be removed to allow personnel to exit the aircraft as rapidly as possible out the ramp.

24-5. Alternate Loading of Combat Equipped Personnel, H-53. Mission requirement and space available will dictats total number of combat equipped personnel to be loaded on the H-53. The following procedures will be used:

a. Aircraft Configuration:

(1) The cabin area will be stripped of all equipment not required for the mission.

(2) Two 5,000-pound tiedown straps will be attached longitudinally along the cabin walls between 20,000-pound tiedown fitting at station 322 and 10,000-pound tiedown fitting at station 502 (left side) and the 10,000-pound tiedown fittings at stations 262-502 (right side). In addition, two more 5000-pound tiedown straps will be positioned longitudinally along the cabin floor between the 5,000-pound tiedown fittings at stations 322-502 (left side) and stations 262-502 (right side), to be used as handholds.

(3) For crewmember restraint, seat belts will be attached to the 5,000-pound cargo tiedowns at stations 182 and 202 (left side), stations 222 and 242 (right side) and 502 and 521 (left side) forward of the ramp hinge.

b. Personnel loading. Personnel will have weapons pointed down, safetied, and radio antennas collapsed prior

to entering the rotor plane. They should enter the rotor plane area only when cleared by the crew (beckoning motion hand signal) and will enter the aircraft through the ramp entrance and move as far forward in the cabin as the aircrew directs. Personnel in the aft cabin area, when loaded, will not extend past the ramp hinge.

(1) Once personnel are on board they will seat themselves on the cabin floor with their backs facing the cabin wall. The 5,000-pound tiedown strap will be placed across the laps of all personnel in each row and tightened as necessary to provide restraint.

(2) Troops equipped with snap link devices may be secured in the following manner. Once troops are on board they will seat themselves on the cabin floor facing aft. When troops are in position on the floor they will lock into a cargo tiedown strap with the snap link device. Also, they will hold on to the tiedown straps during takeoffs and landings.

c. Personnel Offloading. Once the aircraft is on the ground and stopped, the tiedown straps will be removed to allow personnel to exit the aircraft as rapidly as possible out the ramp.

24-6. Alternate Loading Method of Combat Equipped Personnel, H-60. Mission requirements and helicopter gross weight will dictate the total number of combat equipped personnel to be loaded on the H-60. Recovery equipment may be installed as required IAW appropriate directives. The following procedures will be used:

a. Aircraft Configuration:

(1) The aircraft will be stripped of all equipment not required for the mission.

(2) One or more (depending upon configuration) 5,000-pound tiedowns will be attached to stations 312.22 and 330.75 or 367.0 and 379.0 or at all four stations. Install door straps for use when cargo doors are open. (See figure 24-2.)

(3) For troops that are equipped with snap link devices, route a tiedown strap through the floor cargo tiedown rings in the shape of the letter "I" (see figure 24-3).

b. Personnel Loading:

(1) Personnel will have weapons pointed down, safetied, and radio antennas collapsed prior to entering the rotor plane. They should enter the rotor plane area only when cleared by the crew (beckoning motion hand signal) and should always enter from the sides and/or forward of the helicopter. The forward two rows of personnel will be seated on the floor facing each other with the most forward row facing the aft cabin wall. The aft two rows of personnel will face one another with the most aft row seated with their backs against the aft cabin wall facing forward. A 5,000-pound tiedown strap will be placed across the laps of all personnel in a row to provide restraint.

(2) Troops equipped with snap link devices may be secured in the following manner. Once seated, troops will lock into the tiedown strap with a snap link device. They will also hold on to the "I" strap during takeoff and landing.

c. Personnel Offloading. Once the aircraft has completed the approach to hover or landing (as briefed), the cargo tiedown straps and cargo door straps will be released and personnel allowed to deplane. They will depart the rotor disc area toward the sides and/or forward of the helicopter.

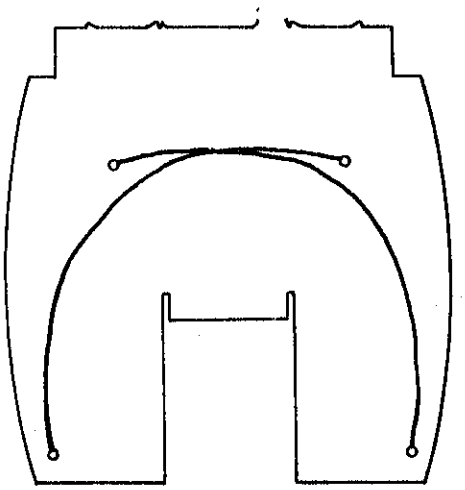


Figure 24-1. H-1 Alternate Loading Configuration.

SECTION B—ALTERNATE INSERTION/EXTRACTION ROPE PROCEDURES

24-7. General. The following rope insertion/extraction methods provide an effective alternate means of delivery/extracting personnel during a tactical operation when landing is not feasible. Procedures apply to both day and night operations.

24-8. Mission Briefing. Prior to deployment, the aircraft commander will ensure the Alternate Insertion/Extraction briefing in Annex A is completed for the applicable device to be used.

24-9. Rappelling. Helicopter rappelling is a rapid deployment procedure to be used then the aircraft cannot land. Rappelling of qualified personnel is faster than hoist operations and reduces aircraft exposure in a tactical environment.

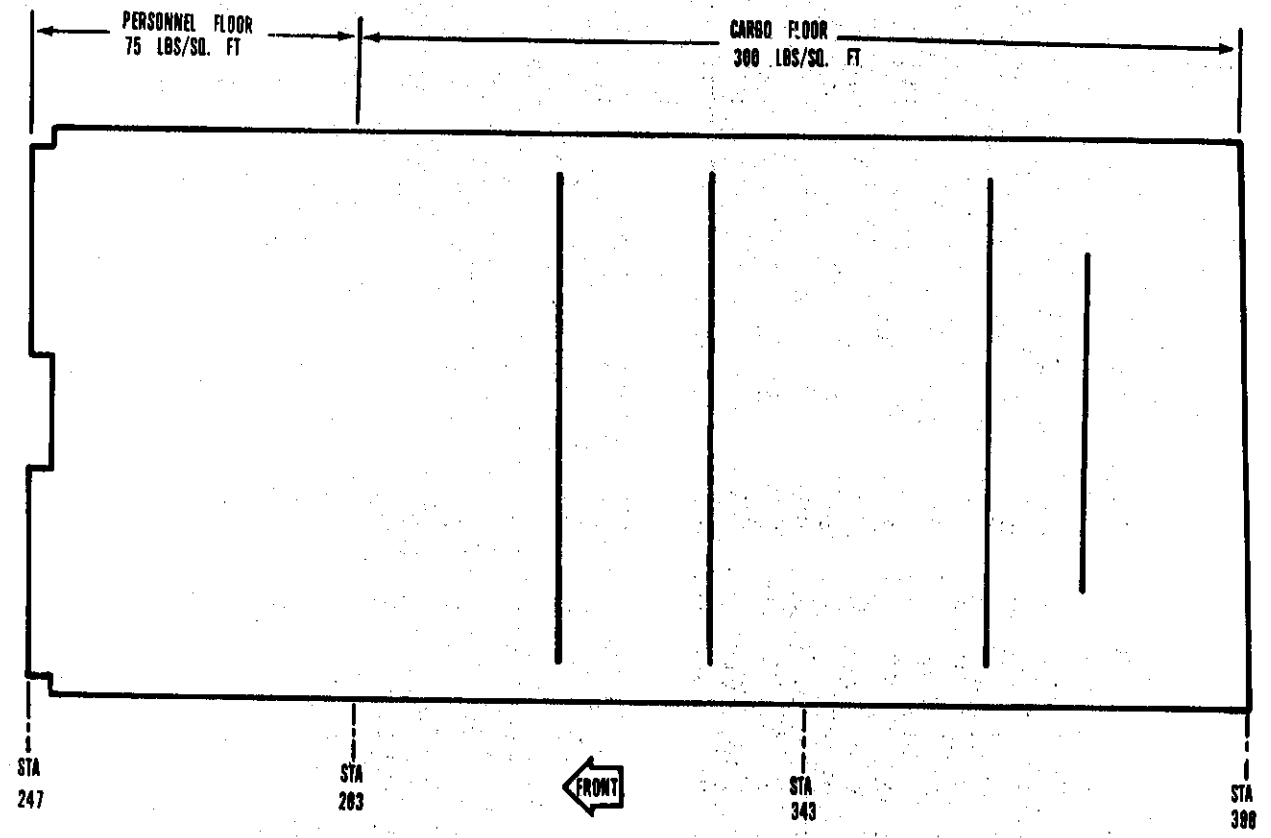


Figure 24-2. H-60 Alternate Loading Configuration.

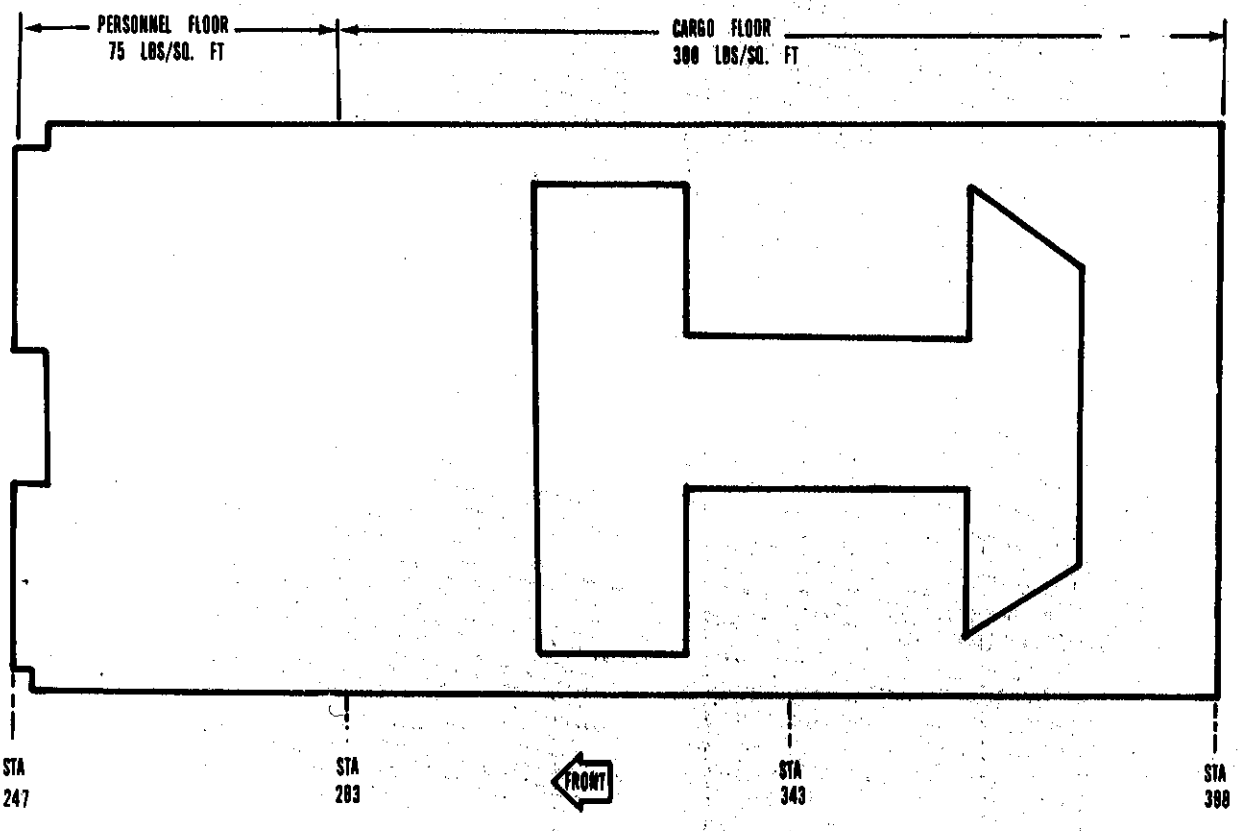


Figure 24-3. H-60 Alternate Loading "I" Configuration.

The aircraft commander will provide deploying personnel with 20-, 10-, 5- and 1-minute time warnings. A safetyman will be in position to monitor the activities at each exit used (H-1 and H-60 only require one safetyman). The safetyman will relay communications, monitor the deployed ropes to ensure ground contact is maintained and recover or release the ropes when rappelling is complete. Deploying personnel may be secured using alternate loading procedures.

a. Installation:

(1) H-1:

(a) Aircraft seats will be removed as necessary from the cargo compartments.

(b) A cable will be installed IAW figure 24-4. The cable is 9 feet 2 inches long, 1/4-inch diameter, 6,400 pounds test, with swaged cable eye and forked terminals, fastened with steel bolt and lock nut with safety pin. Cables will be fabricated and maintained IAW TO 1-1A-8. Manufactured cables will have the date of initial manufacture and weight testing capacity (2,500 pounds) permanently marked on the forked terminal. Cables will be visually inspected each time the cable is installed. Cables showing excessive wear, corrosion or more than three broken strands per inch will be removed from service. Cables will be weight tested to 2,500 pound capacity within each 12 calendar month period. (Example: Cables weight tested on 1 Jan will be due weight testing by 31 Jan the following year.) Documentation of annual weight testing will be accomplished on a DD Form 1574, Serviceable Tag-Materiel, attached to the cable.

(c) Pad or tape any sharp edges that could damage ropes.

(2) H-60:

(a) Aircraft seats will be removed from the center cargo compartment.

(b) Both cargo compartment doors will be placed in the locked-open position prior to final approach.

(c) Pad or tape any sharp edges that could damage ropes.

(d) The anchor points for the H-60 are the four (4) cabin ceiling rappelling fittings and the upper cargo net attaching rings IAW figure 24-5. If the cargo net attaching rings are used as anchor points, the overhead "I" cable will be installed.

(e) All ropes will be attached to the anchor points using locking carabiners.

(3) H-3:

(a) A cable will be installed IAW figure 24-6.

(b) The cable is 10 feet long, ¼ inch diameter, 6,400 pounds test, with swaged cable forked terminals, fastened with a steel bolt and lock nut with safety pin; cable will be fabricated and maintained IAW TO 1-1A-8.

(c) Pad or tape any sharp edges that could damage the ropes. A length of fire hose may also be used over the portion of the rope that contacts the door edge.

(4) H-53:

(a) When rappelling from the crew entrance door, the ropes are connected with locking carabiners to the two 10,000-pound tiedown rings under the left scanner's window IAW figure 24-7.

(b) When rappelling from the ramp, the ropes are connected with locking carabiners to the two 10,000-pound tiedown rings on the left and right side of the aircraft at station 522 IAW figure 24-7 or to the fast rope attaching points, if available.

(c) Pad or tape any sharp edges that could damage the ropes. A length of fire hose may also be used over the portion of the rope that contacts the door or ramp edge.

b. Operating Procedures:

(1) The safetyman will monitor intercom and be secured with a gunner's belt.

(2) Deploying personnel are responsible for aircraft rigging and proper hookup of rappellers.

NOTE: The cargo hook door may be opened and the hook placed in the down position to provide a view of the rapplers during descent (except H-1 and H-3).

(3) Once hooked to the rappelling equipment, personnel may release other restraints in preparation for the exit. On short final, personnel may position themselves to facilitate immediate deployment.

(4) Do not deploy ropes until the aircraft is in a stable hover over the intended deployment area.

(5) As the aircraft comes to a hover, the pilot will give the command "ROPES." At this time, the safetyman will relay the signal by yelling "ROPES" and pointing out the door.

NOTE. When the command "ROPES" is given, it is understood that as soon as the ropes are deployed and on the ground, the team is cleared to deploy.

WARNING. The safetyman will ensure that the ropes reach the ground prior to final positioning of rappellers for deployment. The safetyman will coordinate with the pilot to ensure the aircraft maintains a hover altitude that will keep the ropes in contact with the ground.

(6) After the last rappeller is off the rope, the safetyman will release/retrieve the ropes.

WARNING. Ropes will be released or retrieved prior to commencing forward flight to prevent possible entanglement.

c. Safety Procedures:

(1) If the helicopter experiences an engine(s) failure or an aircraft emergency during rappelling, the rappellers on the rope will descend as rapidly as possible and move from beneath the helicopter.

(2) If the helicopter gains altitude above the length of the rope, the rappeller will immediately brake and lock-in, awaiting helicopter descent to a safe rappelling altitude.

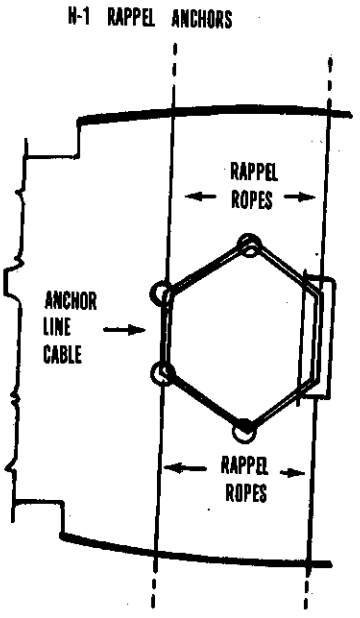
(3) The V-blade knife or other similar tool should be readily available to use if the ropes need to be cut during aircraft emergencies or rope entanglement.

24-10. Rope Ladder Procedures. A rope ladder is used to extract personnel (three or more) from water or land recovery zones. Ladder operations offer an alternate to hoist recovery that reduces pilot and crew coordination workloads and speeds the recovery of deployed personnel.

a. Inspection and Installation of Ladders. Crew duties and coordination, time warnings, and deployment clearance are the same as rappelling procedures. The flight crew is responsible for providing, inspecting, and rigging rope ladders.

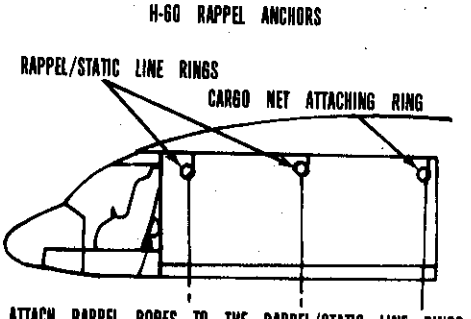
(1) When use of the ladder is anticipated, the following inspection will be performed during the aircraft preflight.

(a) Check for oil or grease on the cabin floor.



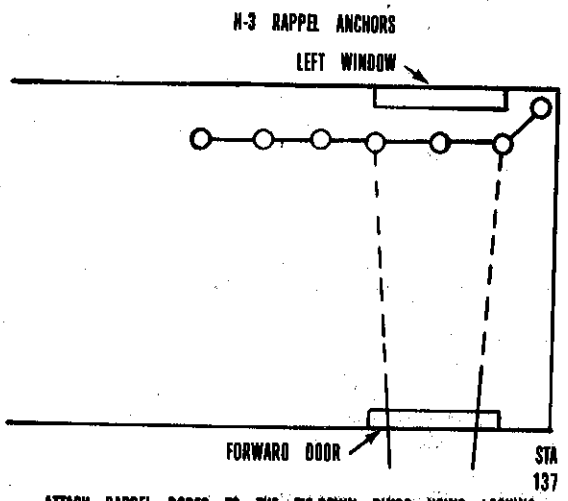
ATTACH RAPPEL ROPES TO THE TO-DOWN RINGS USING LOCKING STEEL CARABINERS. THE CARABINER MUST GO AROUND THE CABLE AND THROUGH THE TIE-DOWN RING.

Figure 24-4. H-1 Rappel Anchors.



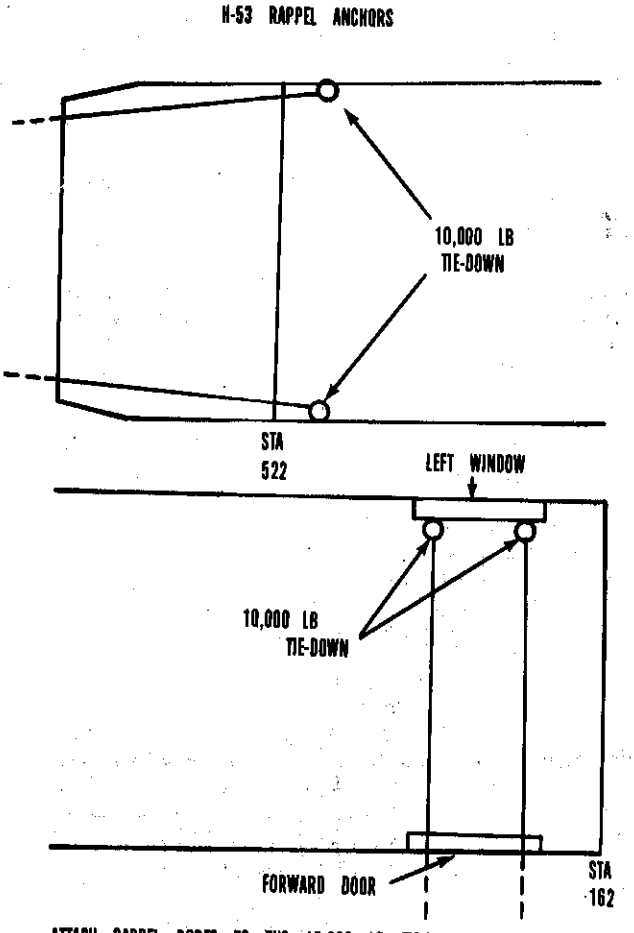
ATTACH RAPPEL ROPES TO THE RAPPEL/STATIC LINE RINGS AND TO THE CARGO NET ATTACHING RING USING A STEEL LOCKING CARABINER AND A FIGURE EIGHT KNOT.

Figure 24-5. H-60 Rappel Anchors.



ATTACH RAPPEL ROPES TO THE TIE-DOWN RINGS USING LOCKING STEEL CARABINERS. THE CARABINER MUST GO AROUND THE CABLE AND THROUGH THE TIE-DOWN RING.

Figure 24-6. H-3 Rappel Anchors.



ATTACH RAPPEL ROPES TO THE 10,000 LB TIE-DOWN RINGS USING A STEEL CARABINER AND A FIGURE EIGHT KNOT.

Figure 24-7. H-53 Rappel Anchors.

(b) Check applicable anchor fittings for security.

(c) Check ladder for frayed cable/fabric.

(d) Ensure all aluminum tubes are secure to the cable/fabric and check for cracks.

(e) Check for any sharp pieces of metal or extending wires which may cause cuts or scratches.

(f) For night operations, a chemlight (standard or IR) will be attached to the first and third ladder tube from the trailing end.

(2) Installation. The ladders will be secured to the aircraft at the desired length (see figures 24-8 thru 24-11). The ladder may be attached using steel locking carabiners or a cargo tiedown strap with a minimum of four (4) wraps around the step providing the desired length. Ladder(s) will be rolled up and secured before flight. H-3 will not deploy ladders from ramp.

WARNING. When using cargo tiedown straps to attach ladders to the aircraft, do not use a strap that has any sign of grease or oil contamination or corroded hardware. Straps identified for use with ladders will not be used for any other purpose.

b. Operating Procedures:

(1) Land. Normal procedures will be used for approach/departure to/from the LZ. The pilot will hover over the LZ or team and notify safetyman when cleared to deploy the ladder. The safetyman will monitor the team and keep the pilot advised of their progress, to include number of personnel on the ladder, last man in, and ladder retrieved and secured/cleared for forward flight. In the event of enemy fire, it is possible to fly out with personnel on the ladder. However, the ladder may be unstable due to twisting and turning, which could dislodge the personnel. The ladder may also be jettisoned when required, by cutting the tiedown strap, if used. The decision to jettison the ladder will be made by the aircraft commander and at his command or as briefed.

CAUTION. Limit the number of personnel on the ladder at any one time. The excess weight could cause aircraft control or CG problems. The recommended limits for the H-1/H-60 are three per side, H-3 are three, and the H-53 is five forward and five aft.

(2) Water. When exfiltration of personnel from water is required, use established water hoist pattern. Ladder deployment and retrieval is the same as over land; however, it may be necessary for the team to position themselves along the wind line at approximately 25-foot intervals between team members to allow the pilot to hover taxi the aircraft for pickup. Hover taxiing at approximately 2-5 knots will reduce water spray and aid in a more rapid exfiltration of personnel. At night, the team will use chemlites attached to their arm to position themselves and also allow the pilot and crew to maintain visual contact with team members. Altitude of the aircraft will depend upon ladder length. Safetyman should monitor the ladder to ensure at least two steps are in the water prior to reaching the first member and advise the pilot of required altitude changes to maintain this condition. As the ladder is trolled through the water, personnel will grab the ladder and ascend immediately.

NOTE. The restrictions for free-fall swimmer operations apply to rope ladder water operations.

c. Emergency Procedures:

(1) In the event the ladder becomes entangled on the ground and aircraft control is questionable, it may be desirable to cut the tiedown strap/cable and release the ladder. Aircraft/personnel safety will determine the course of action to be taken. The decision to jettison the ladder will be made by the aircraft commander and at his command or as briefed.

(2) If the aircraft begins settling with personnel on the ladder, they should remain on the ladder until the ground/water is reached. They will then get off the ladder and move from beneath the helicopter toward the three o'clock position. The pilot should attempt to move the helicopter forward and left while descending to avoid personnel.

(3) In an emergency or if the aircraft comes under fire, personnel will secure themselves to the ladder and the aircraft may depart the immediate area. Slow forward flight to a safe area should be accomplished if flight characteristics and power requirements allow. Care should be taken during forward flight due to the twisting and turning of the ladder. Airspeed should not exceed 60 KIAS.

24-11. Fast Rope Procedures (H-53/H-3). Fast rope procedures allow the rapid insertion of large numbers of personnel, limiting aircraft and personnel exposure. Crew duties and coordination, time warnings, and deployment clearance are the same as rappelling procedures. The aircrew will install ropes and inspect attaching points. The deploying team is responsible for providing and inspecting ropes.

a. Deployment Concept. On modified H-53s, it is possible to deploy personnel from three positions utilizing fast rope procedures. One rope is for deployments out the crew entrance and two ropes are for deployments off the ramp. (See MAC Project 15-81-84, Plural Hemp (U), Final Report (S))

(1) The forward rope can be used on any H-53/H-3 aircraft with an external hoist and usable cable. The rope is simply hooked into the hoist's hook.

(2) The two aft ropes can be used on any H-53 aircraft that has been modified and fitted with a cross-bar.

WARNING. All H-53s must be configured with 650-gallon external fuel tanks when conducting fast rope operations off the ramp. See MAC Project 15-81-84, Plural Hemp (U), Final Report (S), Annex C, Weight and Balance.

(a) The ramp door must be removed to install the cross bar.

(b) The bar is placed in the two brackets with the two quick release paddles facing forward.

(c) At this time, ensure the quick release system works properly.

CAUTION. Ensure the quick release system is operable, has two pit pins, and that they are operable and installed with both heads facing the aircraft's center line.

b. Rope Installations. The ropes are interwoven hemp with a diameter of approximately 2 inches and a hookup point on one end. Lengths will vary, depending on the needs of the mission (terrain, tactical environment, user requirements, etc.).

WARNING. It is the aircraft commander's responsibility to ensure that all crewmembers are aware of the length of the rope(s). Failure to do so may result in serious injury

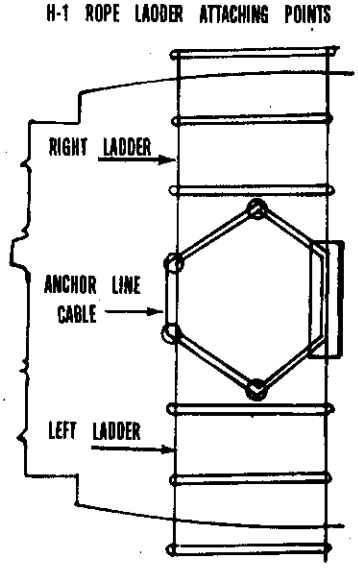


Figure 24-8. H-1 Rope Ladder Attaching Points.

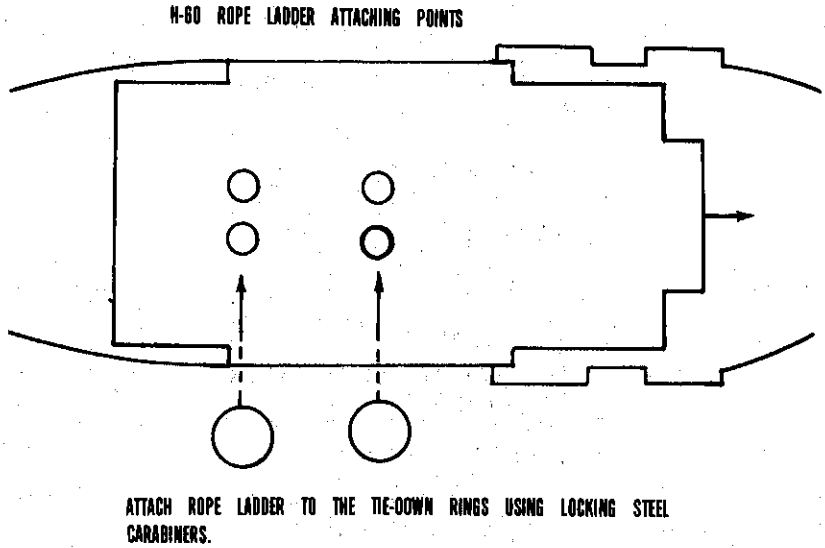


Figure 24-9. H-60 Rope Ladder Attaching Points.

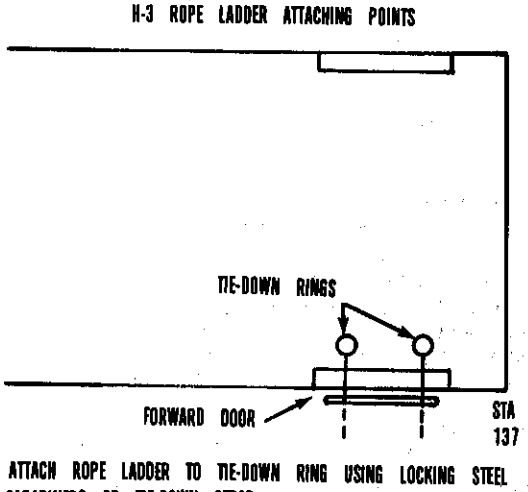


Figure 24-10. H-3 Rope Ladder Attaching Points.

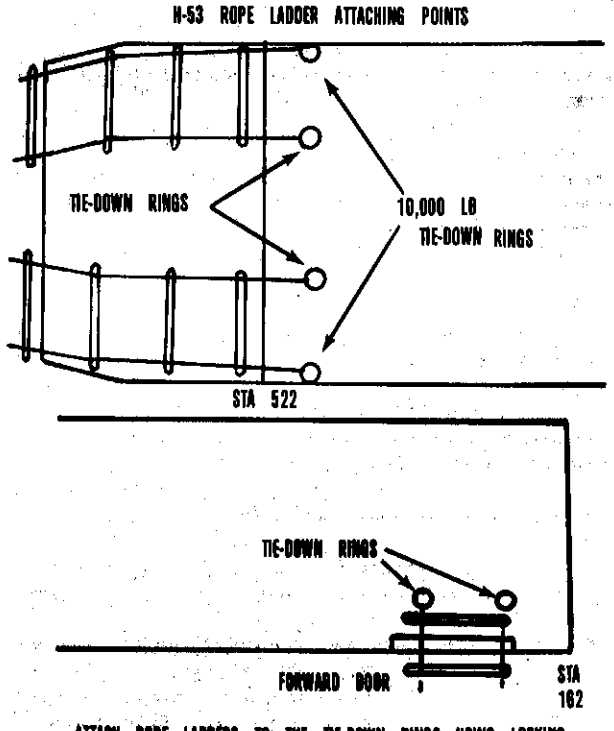


Figure 24-11. H-53 Rope Ladder Attaching Points.

to deploying personnel and/or damage to the aircraft. There are two different types of hookups.

(1) One rope is looped and braided back into itself. The second type has a sleeve slipped over the end with a bolt passing through the middle of the sleeve and rope. At the end of the sleeve is a metal ring on a swivel.

(2) Coil and secure ropes.

c. Cabin Configuration. Ensure the cabin is configured for the number of personnel and type of mission. Deploying personnel may be secured to the cargo compartment floor using aircraft seat belts or alternate loading procedures.

(1) Hand Rails. Each hand rail consists of two pieces of plastic tubing connected in the center with a rail running down each side of the aircraft. Standard aircraft tiedown straps may be used in lieu of plastic tubing.

(a) The railing is run from the top of the fast rope bar to half way down the cabin, hooking into the center compartment wall brackets (litter hook-up brackets along cabin wall).

(b) Tape the tubing 6 inches to the outside of the quick release paddles or attach to U bolts, if installed. Also, tape or tie, with 550 cord, the tubing to the bottom of the last window, leaving two inches of slack. This is to help stabilize the rail between the two litter brackets.

(2) Overhead Support Straps. The straps are simply tie-down straps hooked to the overhead litter strap rings to help balance the deploying individuals.

(a) The overhead straps (one on each side) are run from the overhead litter straps rings just forward of the ramp to a ring forward of the transmission. Midway down the strap, tie it with tape or 550 cord to an overhead ring to help reduce the amonnt of slack.

(b) A third tie-down strap is run from an overhead litter strap ring by the crew entrance door to the same tie-down ring just forward of the transmission that the left overhead support strap ends at.

(3) Floor Straps. If the seats are removed for alternate loading, use tie-down straps run from the ramp to the front of the aircraft. Use the same floor rings that the seats hook up to, ensuring the strap is run through at least every other tie-down ring.

d. With Weapon Systems Installed:

(1) .50 Caliber. The right and left aft ropes may be used under this configuration. Prior to deployment, ensure the weapon is pointed to the 6 o'clock position. Bungy cords may be used to help stabilize the weapon in that position.

(2) GAU-2B (Minigun). Under this configuration, the right aft rope may still be used. The use of the left aft rope is not recommended, but may still be used if necessary.

(a) If the left aft rope is required, the ammo chute must be disconnected and stowed back in the ammo can.

(b) Secure the ramp minigun in the firing position facing the 6 o'clock position with bungy cords.

CAUTION. When deploying personnel from the ramp with weapons installed, there is a risk of hang-up on the ammo can or weapon itself. If a hang-up on a weapon occurs, especially the .50 caliber, the weapon may turn facing the other rope and block that rope. The aft safetyman must be prepared to render assistance which may include pulling the hung person into the aircraft to untangle him from the weapon or the ammo can.

e. Deployments Procedures. The following procedures are recommended for day or night deployments, but may be altered to suit the mission. Any changes to these procedures will be thoroughly briefed prior to deployment.

NOTE. The team leader may require more than the minimum time calls. The team leader should be on intercom to at least the 5-minute call.

(1) The rope may be attached to the hoist before takeoff or anytime during the flight, as the mission dictates.

(2) The ropes should be secured to the floor with a cargo tie-down strap during the flight prior to insert.

(3) At the "5-minute" call, team members will move to the front of the aircraft if deploying from the crew entrance door, and to the forward edge of the ramp if deploying from the rear of the aircraft.

(a) At this time, the safetyman (one at the crew entrance door and one on the ramp) will disconnect the fast rope from its storage point and prepare it for deployment. This may be handing it to the first man out of each stick or setting it up on the edge of the ramp, ensuring it is back-coiled.

WARNING. Rope must be coiled toe to head.

(b) Night Deployments. All chemlites will be activated.

(4) At the "1-minute" call, all team members will move into position for deployment at the door or ramp.

(5) As the aircraft comes to its hover, the pilot will give the command "ROPES". The safetyman will relay the signal by yelling "ROPES" and point out the door. When the command "ROPES" is given, it is understood that as soon as the ropes are deployed, the team is cleared out with no further commands.

(6) The stick leaders are cleared to throw or kick out the ropes and immediately deploy.

CAUTION. Due to the nose-up attitude of the aircraft, any hover altitude changes should be made by the forward safetyman, if possible. If the aft safetyman corrects for his ropes, he may raise the forward rope off the ground. If the aircraft is below 25 feet AGL, the aft ropes will blow up due to the ground effect.

(7) As the last man touches the ground, the safetymen is cleared to release the ropes or pull the ropes back in.

(a) (H-53) To release the aft ropes, pull the pit pins and hit the paddles. When retrieving the aft ropes and time is a factor, the left scanner will assist the ramp safetyman.

(b) The forward safetyman has three options after deployment of personnel: retrieve the rope back into the aircraft; opening the hoist hook, lifting the rope out, and dropping it; or under actual emergencies, sheer the hoist cable.

WARNING. When released, the aft ropes will drop back and right 10 to 20 feet. When using the rope with the sleeve and metal ring, ensure all personnel are cleared from below the aircraft.

WARNING. If doing multiple deployments or landing on the deployment site, all scanners should ensure that the

deployed individuals are cleared from below the aircraft prior to landing. This is especially critical during night deployments when injured personnel may be hard to see on the ground.

f. Night Deployments. Procedures remain the same. Chemlites are used to identify ropes and exits.

(1) Three chemlites will be used on each fast rope. Two are taped at the bottom and one taped five feet from the bottom. The chemlite, five feet from the bottom is to ensure that at least five feet of rope are on the ground.

(2) On the ramp, a chemlite will be taped horizontally to the avionics rack. It will be facing forward and in line with each fast rope. Place a piece of tape on the bottom side to ensure no one on the ground or aft of the ramp will see it.

(3) On the quick release paddles, a chemlite will be taped in a vertical position. In addition, tape a "V" at the bottom of the chemlite to give an appearance of an arrow pointing down. This chemlite is to aid in the location of the rope, in addition to the quick release paddles.

(4) On the forward rope, tape a chemlite vertically to the rubber boot of the hoist cable. Tape a "V" at the bottom to give an appearance of an arrow pointing down.

(5) A chemlite may also be taped horizontally just above the crew entrance door in line with the rope. Place a piece of tape on the bottom side to prevent observation by hostile personnel on the ground.

g. Other Considerations:

(1) (H-53) With a large number of personnel, remove the 20-man life raft from the rear of the cabin and secure it up front. Remove all parachutes from the rear of the aircraft and move forward with any other nonessential equipment.

(2) Ensure comm cords are clear of pathways. Route them up the walls, along ceilings and have them come down from above to the safetymen. The team leader's cord should be just long enough for necessary movements.

(3) Ensure gunner belts are clear of personnel and pathe of travel. On the ramp (H-53) hook up on the overhead rings. A "Y" strap should be used for the ramp safetyman. The "Y" strap is not available through supply channels and must be locally manufactured by the unit. The strap will be weight tested and inspected using the criteria as listed in TO 13A1-1-1 for the personnel restraint harness. It is hooked between the two overhead straps litter strap rings with a gunner belt hooked in the center. An intercom cord may then be routed from above and taped to the belt.

h. Aircrew Procedures:

(1) Normal checklist sequencing should be used prior to deployment.

(2) Pilots should alert the rear scanners 20 minutes, 10 minutes, 5 minutes, and 1 minute prior to the objective.

(3) Safetymen should ensure the ropes have been back coiled on the floor in position for deployment. (On the aft ramp, place the ropes on the outside corner of the ramp away from the weapon mounted on the ramp.) Both the ropes and employing personnel should be positioned and ready for deployment prior to the 1 minute call. Safetymen will relay time calls to the personnel to be deployed.

WARNING. Weapons located at the deployment stations will not be fired during personnel deployment from those stations.

NOTE. If mini=guns/M-60s are installed in the right door or tall position, they will be stowed (ammunition chute disconnected) prior to deploying personnel from either the right door or aft ropes. For single line deployments where only the right aft rope is to be used, the mini-guns may remain operational.

(4) On final, the pilot will maneuver the aircraft over the target, terminating in a hover. The type of maneuver flown will be dependent on the tactical environment. The approach can vary from a slow gradual deceleration and descent to a quick-stop type maneuver. It is important that, regardless of the type of approach flown, the aircraft should be flared once and at the completion of the flare the aircraft should be in a stabilized hover. Just prior to rolling the nose over to stabilize in a hover, the pilot flying the approach will ensure the aircraft is in position for deployment. The pilot will only call "ROPES" when he has ensured that the aircraft is at the correct altitude. The appropriate scanners will give the hand signal for rope deployment (a sweeping motion of the hand with the index finger extended toward the exit). The first man of each team will kick out the rope, determine that the rope is on the ground, then exit the aircraft. Off the aft ramp, the rope should be deployed at a 45 degres angle away from the rear of the aircraft.

(5) Since the aircraft altitude will change as the CG of the aircraft shifts, altitude trend information is essential and, normal crew coordination procedures should be used to maintain a stable hover clear of obstacles.

NOTE 1. During final approach, when deploying large numbers of personnel from aft stations only, the aircraft will pitch up faster than normal due to the aft CG. This does not cause a control problem but the aircraft will decelerate faster than expected. This pitch up must be anticipated or the aircraft will stop short of the target.

NOTE 2. If a go around is necessary, it should be initiated as soon as possible. Normal go around procedures should be used; however, when an aft CG the aircraft tends to pitch up when left turns are initiated below 60 KIAS. This causes no control problems but should be anticipated if the turn is required.

NOTE 3. The deceleration and roll-over on NVGs, including the quick-stop type maneuver, does not cause any visibility or aircraft handling problems. All crewmembers should practice and become familiar with aircraft handling characteristics through the entire range of approaches.

WARNING. Altitude deviations while personnel are on the ropes will have an adverse effect on their breaking ability and can cause serious injury. During the hover the scanners must relay sufficient information to the pilots to ensure the ropes do not leave the ground during altitude deviations. The importance of a stabilized hover cannot be over emphasized.

NOTE 4. Since the pilot flying the aircraft is the only one who knows precisely when he will be rolling over the nose, he must be the one who calls "ROPES." The safetyman must ensure that the ropes are not deployed until the pilot calls for them.

(6) Recovery from the hover should be accomplished in the following manner. If the ropes are to be recovered,

the pilot should maintain his hover while the left scanner moves to the ramp to assist the tail scanner in retrieving the ropes from that station. The right scanner should retrieve his own rope. Scanners will advise the pilot when ropes are in and secured. If the ropes are to be released, the tail scanner will pull the safety pins and depress the release handles. The right scanner will pull the safety pin from the rescue hoist, open the hook and manually remove the rope from the hook and drop it. Scanners will advise the pilot when all ropes have been released. Once the pilot has been advised that the ropes have been secured or released, he should depart using normal procedures.

WARNING. It is essential that the ropes are completely recovered or released prior to departing the hover.